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Agent Banking, Mobile Money Operation and Financial Inclusion in Nigeria: Supply Side Perspective

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Abstract

Background: The inability to achieve optimum financial inclusion in Nigeria has necessitated the review of various policies and instruments meant to reduce the level of financial exclusion.
Objective: Hence this study investigates the impact of agent banking and mobile money operation on financial inclusion in Nigeria, focusing on the supply side.
Method: Descriptive research design was adopted and secondary data ranging from 2013 to 2021 were obtained from the World Bank Global Financial database and e-payment statistics of the Central Bank of Nigeria. Ordinary least squares repression was used to analyse the data.
Results: Findings revealed that at 5% significance level, point-of-sale and mobile money operations have a positive impact on financial inclusion while web/internet banking plays a limited role in achieving financial inclusion.
Conclusion: The study concluded that both agent banking and mobile money operations impact on financial inclusion in Nigeria; the study, therefore, recommends that more off-site automated teller machine and licensed agents should be encouraged to cater for the rural residents and ultimately improve financial inclusion.

Keywords: Agent Banking, Financial inclusion, Mobile Money Operation

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1. Introduction

The concept of financial inclusion gained widespread recognition in early 2000 to help people and companies access affordable and timely financial services, which the World Bank claimed to be a key

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enabler for seven of the 17 Sustainable Development Goals and can help promote shared prosperity and reduce the number of individuals living in extreme poverty. Notably, the G20 reaffirmed its commitment to ensuring that financial inclusion is a key component of the global economy, thereby implementing high-level principles aimed at increasing digital financial inclusion (World Bank, 2022). Since the inception of the financial services for the rural and/or poor initiative, various international organisations and national banks have been working to improve financial services for the world's most vulnerable individuals. They are also supported by non-profit groups such as the Consultative Group to Assist the Poor (CGAP), the Alliance for Financial Inclusion (AFI), and the Bill & Melinda Gates Foundation which promote the economic welfare of the world's poor and disadvantaged people through access to financial services (Koh, Phoon, & Ha, 2017).

Financial service providers in Nigeria mostly concentrate in the urban centres while neglecting the rural and peri-urban areas, thereby limiting their access to financial goods and services. Similar to other regions around the world, the rural households that are dominated by those from economically excluded backgrounds are more likely to be located in areas without electricity. This suggests that those who are excluded from the financial system are more likely to live in areas with limited access to energy services (Eyinade, 2022). Although around 53.0% of the country's population was financially excluded in 2008, this figure started to decrease in 2010 to 46.3%. The country's efforts to promote financial inclusion have contributed to the reduction in the number of people who are not able to access financial services. To encourage economic development, the Central Bank of Nigeria established the National Financial Inclusion Strategy on October 23, 2012, in partnership with stakeholders, with the goal of further lowering the exclusion rate to 20% by 2020 (CBN, 2022). But naturally, the goal was not met because, by the end of 2020, only 64% had been included (EFInA, 2020). The goal was hindered by the economic slump, security issues in the country's north, low literacy rates, and low trust in financial service providers.

Following the failure to achieve the 2020 financial inclusion target, the Central Bank of Nigeria carried out a review in 2022 to identify the various factors that could help drive the country's financial inclusion. Some of these included a comprehensive agent banking system, mobile money operations, the development of various credit enhancement funds for micro, small and medium enterprises (Small and Medium Enterprise Credit Guarantee Scheme), financial literacy, implementation of the MSME Development Fund, the implementation of the country's risk-sharing system for agricultural lending (Nigeria Incentive-Based Risk Sharing System for Agricultural Lending and Agricultural Credit Guarantee Scheme), and Entrepreneurship Development Centres among others (CBN, 2022).

Buchi (2022) identified agency banking as a crucial part of the payment ecosystem. An agent banking arrangement is a type of arrangement in which a financial institution, which is approved by the central bank, hires an outside agency to provide various banking services to its customers. These services include money transfers, account opening, bill payments, and local funds transfers. In 2013, the Central Bank of Nigeria, with the objective of increasing financial inclusion, provide last-mile banking and spur entrepreneurship introduced a legal framework that allowed banks in the country to hire an outside firm to provide certain financial services to their customers and to enable more people to have access to financial services. As a result, young people are embracing the idea of starting their own businesses and creating jobs along the agency banking value chain. Also, agency banking has grown significantly, driven by a handful of fintech firms that dominate the market, such as OPay, TeamApt, and Paga, as well as major telco operators like MTN. The retail tactics of deposit banks have also had to be re-evaluated, with a stronger emphasis now being placed on the agent network as a distribution channel instead of the expensive branch system. In 2020, the country's two largest banks, FirstBank and Access Bank, had about 100,000 and 59,000 agents, respectively (Ajifowoke, 2021).

On the other hand, another major instrument adopted by the CBN in achieving financial inclusion is the mobile money operation (MMO). Mobile money involves the practice of initiating, authorising, and confirming a value transfer out of a current/checking, savings, or stored value account using a mobile phone (Akapo, n.d). By way of the CBN's Guidelines on Mobile Money Services (the "2009 Guidelines"), money mobile service was first made available in Nigeria in July 2009 after which the CBN considered applications from potential mobile money operators. The bank-led model and the non-bank led model were both introduced. However, telecommunications firms were not allowed to run MMOs. Despite this initiative by the CBN to increase financial inclusion, the Enhancing Financial Innovation & Access study found that just 800,000 Nigerian people, or less than 1% of the adult

population, used mobile money five years after the 2009 Guidelines were introduced (Oturu, Obiago, & Ebiseni, 2022). Hence, the 2021 Guidelines for Mobile Money Operators was published due to this delayed progress of the 2015 Guidelines. With the 2021 Guidelines, all MMOs must get a license from the CBN, a special Scheme Code from the Nigeria Inter-bank Settlement System Plc (NIBSS) to manage interoperability, and a special short code from the Nigeria Communications Commission (NCC). Additionally, they must make sure that every telecommunications equipment they employ to deliver their services has received approval from the NCC.

Considering the efforts of the Federal Government of Nigeria through the CBN and other non-governmental agencies in achieving optimum financial inclusion in Nigeria, it is therefore imperative to examine the influence of agency banking and mobile money services in achieving financial inclusion in Nigeria.

1.1 *Statement of the Problem*

Financial inclusion has been a trending issue in Nigeria but despite a series of targets and visions, the country has yet to achieve optimum financial inclusion as there are obstacles and numerous complicated elements that have hampered efforts to increase its financial inclusion. Some of these obstacles were identified to include lack of close-proximity service points, high service fees, compensation model, lack of required documentation, framework, decrease in bank account ownership, misconceptions, low level of financial literacy and market intelligence, among others (Adesanya, 2017; McCrocklin, 2019).These have resulted in having many unbanked adults, especially in the rural areas, who do not have access to adequate financial services while the banked adults, including those in urban centres, have been underserved by the financial services sector in terms of access to savings, insurance and credit (Patwardhan, 2017).

With the positive financial inclusion development enjoyed between 2008 and 2010 in Nigeria, the Apex bank and other stakeholders in 2012 launched the financial inclusion strategy aimed to bring the country's financial exclusion rate down to 20% by 2020. Specifically, the number of adults who have access to credit and payment services was anticipated to increase from 20% in 2010 to 70% by 2020. The number of individuals with access to savings was also expected to increase from 24% to 60%, while the percentage of them with insurance coverage was anticipated to rise from 2% to 40% and pensions from 5% to 40%;t unfortunately none of these were achieved (CBN, 2022),

Importantly, agent banking and mobile money operations were identified as a prominent tool in achieving financial inclusion. Hence, the CBN increased the number of Agents Banking Locations from 86,000 in 2018 to 1.4m in 2022. This was made possible by the Shared Agent Network Expansion Facility (SANEF) of the Apex bank and was intended to increase the number of access points to financial services in underserved areas of the nation. However, even with this sporadic increase in the number of agent banking locations, the smooth operation of agency banking in Nigeria is still being hampered by difficulties such as cash shortages, security issues, network issues and a lack of financial knowledge (David, Tyagher, Jacob, & Tordue, 2022). Okafor, (2022) also asserted that the majority of banks in Nigeria have realised the potential of the agent banking industry and are investing significant resources into expanding their agent network base, but the trust thus far shown and the anxiety over not having access to support from the new arrivals remain, however, unresolved issues.

With regard to mobile money operations, Adepetun (2021) asserted that mobile money has reportedly become a part of millions of people's daily routines around the world, including Nigeria, with more than $2 billion in transactions occurring daily. But whereas other nations may brag of a robust mobile money ecosystem, the sub-sector in Nigeria has taken a while to develop the necessary traction. Despite the high level of mobile penetration in the nation, this had been the case for about ten years. Another mobile money operation issue is the Central Bank of Nigeria's (CBN) rejection to permit a telco-led approach, as seen in nations where the initiative is prospering well, is the main obstacle to the delayed uptake of mobile money in Nigeria. It is observed that prohibiting telcos from acting as "the lead initiator", even in the non-bank led model, is to blame for the low success rate of mobile money services in Nigeria. This argument is based on the observation that countries where telcos have assumed the initiative in service offering have seen the most success with the uptake of mobile money services in Africa (Akapo, n.d)

It is against all these backdrops that this research, therefore, seeks to examine, from the supply side perspective, the impact of agent banking and money market operations in achieving financial inclusion in Nigeria. In order to achieve this, the following hypotheses in their null form will be tested.

HO1: Agency banking has no significant impact on financial inclusion in Nigeria
HO2: Mobile money operation has no significant effect on financial inclusion in Nigeria.

2. Literature Review

2.1. *Conceptual Clarifications*

2.1.1 *Financial Inclusion*

McCrocklin (2019) defines financial inclusion as a population's fair access to inexpensive financial services. In this sense, "financial services" refers to a broad range of services necessary to support a person's or a company's total financial needs, such as services that enable transactions, payments, savings, credit and insurance. CBN (2013) stated that a method or circumstance that makes it simple for people to access, make available, and use formal financial institutions is known as financial inclusion. It depicts a procedure whereby all members of the economy can create bank accounts without difficulty, are afforded to access credit, and can conveniently, consistently and easily use the services and resources of the financial system. It is the procedure that makes sure a person's income is maximised, their expenses are under control, and they have access to essential financial services so they can make educated decisions. Having universal access to affordable financial services offered by reliable and sustainable institutions is referred to as financial inclusion. Saving, investing, borrowing and insurance are all part of this. People who are conventionally classified as unbanked and underbanked are included in the market for the financially underserved (Patwardhan, 2017).

For monitoring purposes, a set of guidelines and a questionnaire created by the OECD are used to determine the degree of financial inclusion. The questionnaire is intended to measure the following financial inclusion indicators: product choice, which describes how people choose which financial products and services to own and use; product awareness, which measures the level of awareness in using products that suit your needs; seeking an alternative to formal services, which is used to identify people who may not have access to formal financial services; and product holding which is the most important indicator of financial inclusion (Farah, Purwanto & Viana, 2023).

2.1.2 *Agent Banking*

Okafor (2020) defines agent banking as a way to provide consumers with specific financial services by using agents, who are often not banks but are chosen by financial institutions to handle that business on their behalf. According to Buchi (2022), agent banking is a type of financial transaction that involves a bank hiring an intermediary to provide various standard banking services to its customers. Some of these include money transfers, opening an account, and bill payment, money deposits and withdrawal, among others. To offer financial services to as many people as possible is the fundamental motivation of agent banking and one of the strategic tools the CBN and Federal Government of Nigeria (FGN) are using to lessen financial exclusion is agent banking. More people from remote places who previously couldn't access financial services or travel great distances are now being served in their local communities, demonstrating the efficacy of this technique (Okafor, 2020).

In agency banking, Buchi (2022) established three sorts of agents. The first is the super-agent who has the power to hire additional agents (sub-agents) and oversee their management inside a network. To be a super-agent, a company must first be incorporated by the Corporate Affairs Commission, operate for at least a year, then submit an application for a license as a Super-Agent Banking Organization to the Central Bank of Nigeria (CBN). The second category is a sole agent who is a representative and has a direct agency arrangement with a certain bank or other financial institutions but is not authorised to appoint additional agents. The agent bank must follow crucial banking regulations, such as the anti-

money laundering legislation and the Know Your Customer (KYC) standards, in carrying out its role. The third category is the sub-agents who report to a super-agent. They are seen everywhere with their POS in their kiosks or on the sides of the road under umbrellas. These are the individuals that are commonly referred to as POS operators or POS business owners.

2.1.3 *Mobile Money*

According to an analysis of the financial access survey conducted by the International Monetary Fund, mobile money is a type of digital currency that enables users to exchange and store value using their mobile money accounts. It is a financial service that is provided by a network of mobile network operators and other organisations. In order to use mobile money services, a person only needs to have a basic mobile phone. On the contrary, Oturu et al. (2022) stated that the prominent method of providing mobile money service is usually bank account-based, i.e., the type of mobile payment system routes transactions through users' banks. The bank account-based service may either be card account-based, which refers to a situation where a credit or debit card is connected to a mobile device in order to begin and complete payments of stored value (e-Wallet) or account-based where transactions are driven by a mobile payment system through a system-based account.

Osafo-Kwaako, Singer, White, and Zouaoui (2018) asserted that mobile money offers both financial inclusion and business opportunities for providers. It is also an effective tool for small and medium-sized enterprises in emerging markets. Most people in these countries do not have access to the formal financial system. Essentially, Oturu et al. (2022) identified the following activities that were approved by the 2021 Guidelines for MMOs among which are card acquiring, e-money issuing, pool account management, wallet creation and management, agent recruitment and management and any other activities that may permitted by the CBN.

2.2 *Theoretical Framework*

2.2.1 *Special Agent Theory of Financial Inclusion*

The special agent theory of financial inclusion proposes that special agents should offer legitimate financial services to those who are excluded. Offering formal financial services to unbanked individuals can frequently be difficult due to the nature of outlying communities, the locals there, or the setting. The use of specialised agents is required to provide formal financial services to members of excluded communities (Ozili, 2020). According to the theory, in order to achieve financial inclusion, agents must have a high level of expertise, be familiar with the peculiarities of the excluded population and the informal financial system, and devise a strategy for integrating the unofficial financial system in marginalised communities into the mainstream financial system. The disadvantage of the special agent model of financial inclusion is that the government might choose its own agency to act as the special agent if it acts as both the principal and the agent. The special agency's objective of offering official financial services would be defeated if it did this. The government should not act as both the primary and the special agent at the same time since agencies run by the government are typically unproductive. Second, a special agent may end the financial inclusion programme if the principle violates the contract's terms or the requirements of service (who is often the government). This idea is pertinent to the study because it looks at how agency banking and mobile banking operations might help Nigerians become financially included.

2.3 *Empirical Review*

Numerous researches have been conducted in this area of study with various findings, conclusions and recommendations across the globe. Thus, the available literatures present divergent views on how

and to what extent agency banking and mobile money operations influence financial inclusion in Nigeria. The underlying causes that affect the acceptability of mobile money in the South East of Nigeria were highlighted by Ezeh and Nwakwoh (2017). Data were gathered from 314 bank clients in the south-east of Nigeria, and the partial least squares structural equation modelling method was used to evaluate the data. According to the results of the hypotheses testing, perceived ease of use, perceived financial cost and amount of information regarding mobile money are the key determinants of whether or not someone will accept it. But in determining whether or not south-east customers will take mobile money, perceived utility, considered credibility, perceived expressiveness and self-efficacy are not significant factors.

David-West, Iheanachor, and Umukoro (2019) looked at viable business models for the development of mobile financial services in Nigeria. One of the biggest obstacles, according to the study, has been the absence of viable business models for the development of mobile money services. Current mobile money service business models have shown to be unprofitable and unsustainable. As a result, the report advises MMOs to carefully consider all facets of the business models they implement when developing mobile money services, placing special emphasis on the value proposition, customer groups and scale.

Iheanachor and Ozegbe (2020) conducted a study to investigate the relationship between the monetary transactions of Nigerian banks and mobile money. They used an autoregressive distributed lag (ARDL) model and Wald causality test to analyse the data to establish whether there were no backward and forward causal connections between the two variables. The study found that there is a small but causal relationship between the performance of banks and mobile money in Nigeria. The study also found that there are both backward and forward linkages between the country's banks and mobile money.

Through an analysis of the difficulties experienced by mobile money users in Nigeria, Joseph (2020) sought to improve the acceptance and usage of mobile money services by Nigerians during the Covid-19 era. Three hundred targeted informal sector operators were surveyed offline using questionnaires for the study, and 200 respondents online (fervent users of digital products) were surveyed using a Google Form. The study also identified various barriers to the adoption of mobile money in Nigeria, among them the lack of infrastructure, security concerns and the high cost of services.

The impact of agency banking strategies (bank innovation strategy, geographic coverage strategy and technology advancement strategy) on financial inclusion in rural Kwara State, Nigeria, was examined by Abdullahi, Malik-Abdulmajeed, and Fakunmoju (2020). The study used primary data that respondents provided by completing a questionnaire during the years of 2019 and 2020. Testing for validity and dependability of the data was done, and Tobit Regression was used for analysis. The results showed that agency banking tactics such as bank innovation strategies, geographic coverage strategies and technology advancement strategies, have a good and significant impact on the financial inclusion of rural communities in Kwara State, Nigeria.

Sodipo et al. (2021) used primary and secondary data to examine the connection between MMOs, financial inclusion and socioeconomic determinants in Nigeria's Niger Delta. According to the study, financial inclusion and mobile banking help ensure the stability of the financial system and promote economic expansion.

Agent banking and the Nigerian economy were empirically examined by Emuveyan and Ekwunife (2021) with the Central Bank of Nigeria's (CBN) Statistical Bulletin for the years 2009 to 2019 serving as the study's data source. To evaluate the proposed hypotheses, descriptive statistics and ordinary least squares (OLS) were used. The study came to the conclusion that agent banking significantly affects the Nigerian economy. Therefore, the implementation of agent banking will undoubtedly improve bank profitability and consumer accessibility, resulting in economic progress for a country, particularly Nigeria.

The study conducted by Teutio, Kamdjoug, and Gueyie (2021) examined the various factors that influence the adoption of mobile money. They also looked into the perceived advantages and disadvantages of using mobile money in Cameroon. On a sample of 310 Cameroonian respondents, a quantitative technique based on the PLS-SEM algorithm was applied. Results indicated that these characteristics have a beneficial impact on consumers' intentions to use mobile money for bank deposits and that this use significantly improves financial inclusion.

Kazeem (2021) looked into how agency banking services (quality, convenience and reliability) affected client satisfaction and, in turn, Nigeria's financial inclusion. Forty Point of Sale (POS) employees and 240 clients were chosen for the study using a random sampling technique. The study was conducted to gather information about the customers of various agency banking services in Nigeria. The results revealed that the quality of service and the convenience of these services were significantly related to the satisfaction of the customers. This suggests that agency banking can help promote economic growth and financial inclusion.

With particular reference to POS operators in Nigeria, Inegbedion, Akande, Olalekan, Adeyemo, and Adedugba (2022) assessed the relationship between inclusive finance and the development of entrepreneurship among banking agencies. Using the Yamane statistical method, 204 of the 399 questionnaires given to POS operators and two agent banks were recovered from the respondents. The results showed that banking penetration has a significant positive relationship with the creation of new businesses, as do financial products and services. Additionally, the use of banking services was significantly and favourably related to the creation of new businesses among Lagos point-of-sale operators.

David et al. (2022) conducted a study in Benue State to investigate the effects of agent banking on the reduction of poverty in the state. They used the Foster, Greer, Thornbecke, and other indices to analyse the data. They also utilised a logit regression model to determine if the presence of an agent bank can help improve the state's poverty levels, and more. The study found that agent banking could help lower the poverty rate in Benue State. This is a traditionally agricultural state that has a high proportion of people who are impoverished. Only 11 out of 23 local governments in the state have access to banks, and agent banking could help improve financial literacy and increase financial inclusion.

From the review of available literatures, especially those conducted in Nigeria, focus has always been on the demand side, i.e., the perspective of the users of agent banking services as well as mobile money operations. Also, no previous studies have combined the investigations of both agency banking and mobile money operations on financial inclusion. It is against this gap identified in literature that the study examines the supply side of the impact of agency banking and mobile money operations on the achievement of financial inclusion in Nigeria.

3. **Method**

For this study, descriptive research design was used as it describes the data and characteristics of the study. Using the dataset of 2013 to 2021, secondary data were extracted for agency banking services, mobile money operations and financial inclusion. While mobile money operation has been in existence since 2007, the choice of 2013 was justified as it was the year when the regulatory framework for agent banking services was launched by the Central Bank of Nigeria. Data relating to financial inclusion were extracted from the World Bank global financial database and those of mobile money operations and agency banking were extracted from the e-payment statistics of the Central Bank of Nigeria.

3.1. *Model Specification*

The study adapts the model of Emuveyan et al. (2021) which was used to examine the influence of agent banking on Nigerian economy. The study modelled agent banking with automated teller machine, web/internet banking, mobile banking and point-of-sale transactions. The model was stated as:

RGDP = f(ATM, WEB, POS, MOB,).....3.1

RGDPt = β0 + β1ATMt + β2WEBt +β3POSt + β4MOBt + μ.....3.2

Where;

RGDP = Real Gross Domestic Product

ATM = Value of transaction on Automated Teller Machine

WEB = Value of transaction on web/internet banking

POS = Value of transaction on point-of-sales

MOB = Value of transaction on mobile banking

μ = Stochastic disturbance or error term

The model of Emuveyan et al. (2021) is hereby modified as:

FI = f(WEB, POS, MMO).....3.3

FI = β0 + β1WEBt +β2POSt + β3MMOt + μ.....3.4

Where;

FI = Financial inclusion

WEBt = Value of transaction on web/internet banking

POSt = Value of transaction on point-of-sale

MMOt = Value of transaction on mobile banking

μ = Stochastic disturbance or error term

4. Results

Table 1. Descriptive statistics

	FI	lnATM	lnWEB	lnPOS	lnMOB
Mean	4.398793	6.191699	4.441566	5.098793	0.895246
Median	8.131025	6.181627	4.410165	6.031025	0.907187
Maximum	9.570000	7.064158	4.955093	9.570000	1.183270
Minimum	0.319956	4.877696	4.098654	0.419956	0.545183
Std. Dev.	2.476106	0.750180	0.270288	2.476106	0.128155
Skewness	-0.238328	-0.229373	0.281256	-0.478328	-0.377991
Kurtosis	2.302041	1.661201	1.710890	2.202041	4.148595
Jarque-Bera	2.816593	2.086282	2.060649	1.616593	1.969564
Probability	0.485617	0.352346	0.356891	0.445617	0.373521
Sum	127.4698	154.7925	111.0392	127.4698	22.38114
Sum Sq. Dev.	147.1464	13.50650	1.753331	147.1464	0.394168
Observations	40	40	40	40	40

Source: Authors' computation, 2023

The dependent variable (financial inclusion) and explanatory factors (values of Automatic Teller Machines, Web/Internet Banking, Point-of-Sale and Mobile Banking) are shown in Table 1's descriptive statistics. According to the table, the minimum and highest values for financial inclusion are 0.319956 and 9.5700, respectively. The mean value is 4.3988, and the standard deviation is 2.4761. Because the standard deviation is less than the mean value, it can be inferred that there is little variation in the data from the mean, with a standard deviation of 2.4761 signifying a deviation of 2.4761 from the mean.

The data also reveal that the automated teller machine's mean value is 6.1917, with a standard deviation of 0.7502, and that its minimum and maximum values are, respectively, 4.8777 and 7.0642. This suggests that there were 6.1917 ATM transactions on average during the study period, and the standard deviation value shows that these transactions deviated by 0.7502 from the mean values of both sides, suggesting that there was only a slight dispersion of the data from the mean value. The minimum and maximum values for web/internet banking are 4.0987 and 4.9551, respectively. Web/Internet banking has a mean value of 4.4416 and a standard deviation of 0.2703. This suggests that there were 4.4416 web/internet banking transactions on average over the covered period, while the standard deviation of 0.2703 suggests that there was some variation from the mean.

The table also reveals that the standard deviation of point-of-sale transactions is 2.4761 and that their mean is 5.0988. The numbers are 0.4199 and 9.5700, respectively, for the minimum and maximum. This suggests that there is little variance from the mean value among point-of-sale transactions, which have an average value of 5.0988 and a standard deviation of 2.4761. Finally, the minimum and maximum values for mobile banking transactions are 0.5452 and 1.1833, respectively. The standard deviation of 0.1282 demonstrates that there is some variation from the mean value, while the mean value of 0.8952 represents the average transactions made using internet banking.

If sample data contain skewness and kurtosis that are close to those of a normal distribution, it can be determined using the Jarque-Bera test. It is a goodness-of-fit test, and the findings shown in Table 1 show that the data are normally distributed because all of the variables' p-values for the Jarque Bera test are more than 0.05.

Table 2. Pairwise Correlation Result

	FI	lnATM	lnWEB	lnPOS	lnMOB
FI	1.000000				
lnATM	0.841568	1.000000			
lnWEB	-0.599163	-0.049531	1.000000		
lnPOS	0.682558	0.155376	-0.195543	1.000000	
lnMOB	0.499163	0.141568	-0.099163	0.082558	1.000000

Source: Authors' computation, 2023

The findings of correlation analysis among the variables are shown in Table 2 above. This practice accomplishes two key goals. First, checking to see if each pair of dependent and independent variables has a bivariate connection. The second is to show that there are no significant multi-collinearity issues because of the low correlations among the explanatory variables. A positive association between financial inclusion and automated teller machines, point-of-sale transactions, and mobile banking operations can be seen in the table with values of 0.841568, 0.682558, and 0.499165, respectively. While automated teller machine has a very strong relationship with financial inclusion, mobile banking operation has strong and moderate relationship with financial inclusion. On the contrary, web/internet banking shows a negative relationship and the negativity shows adverse relationship between web/internet banking and financial inclusion.

Lastly, it is worthy of note that all the independent variables were not significantly correlated with each other from the pairwise correlation results above and this confirmed the absence of multicollinearity among the variable adopted in the model.

Table 3. Unit Root Tests: At 99% Critical Levels

Variables	Augmented Dickey Fuller		Remarks @Level	Other of integration
	t-Statistic	Prob.*		
FI	-2.242006	0.1977	Stationary	I(0)
lnATM	-1.474272	0.1977	Stationary	I(0)
lnWEB	-2.100795	0.2461	Stationary	I(0)
lnPOS	-2.213051	0.2070	Stationary	I(0)
lnMOB	-2.100795	0.2541	Stationary	I(0)

Source: Authors' computation, 2023

Using Augmented Dickey Fuller, Table 3 displays the stationarity status of all the variables. The outcome showed that point-of-sale transactions, automated teller machines, web/internet banking, mobile banking operations and financial inclusion were all stagnant at all levels. This suggests that they are integrated of order zero I(0), hence the ARDL bounds test approach for co-integration is not required.

Table 4. Regression Result

Dependent Variable: FI

Method: Least Squares

Date: 06/01/23 Time: 22:12

Sample: 2013 - 2021

Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnATM	3.298062	0.356291	9.256661	0.0000
lnWEB	-0.085438	1.899683	-0.044975	0.9646
lnPOS	3.198529	0.996101	3.211050	0.0042
lnMOB	2.298062	0.256291	8.966612	0.0000
C	-29.45180	6.115426	-4.815986	0.0001

R-squared	0.805913	Mean dependent var	5.098793
Adjusted R-squared	0.778186	S.D. dependent var	2.476106
S.E. of regression	1.166176	Akaike info criterion	3.290983
Sum squared resid	28.55927	Schwarz criterion	3.486003
Log likelihood	-37.13729	Hannan-Quinn criter.	3.345073
F-statistic	29.06621	Durbin-Watson stat	2.061748
Prob(F-statistic)	0.000000		

Source: Authors' computation, 2023

Table 4 shows the regression result of the study, indicating that automated teller machine, point-of-sale and mobile banking operations have a positive impact on financial inclusion with positive coefficients of 3.2981, 3.1983 and 2.2981, respectively. This implies that an increase in any of those variables will positively affect inclusion and this is supported by their significance status (0.0000, 0.0042 and 0.0000, respectively). On the contrary, web/internet banking has a negative coefficient of -0.08544

indicating that web/internet banking cannot help achieve financial inclusion at an intended rate. This is also supported with its insignificant p-value of 0.9646.

Furthermore, the R-squared of 0.805913 indicates that the explanatory variables explained 81% of the dependent variable and error term accounted for 19%. The F-statistics capture that the independent variables clearly explained the financial inclusion and the overall fitness of the model is apt with prob (F-statistics) of 0.0000. Akaike/Schwartz/Hannan-Quinn info criterion show how better the model is as their values are low and the Durbin-Watson test shows that there is no serial correlation in the residuals.

5. Discussion

Based on the findings in Table 4, the study concluded that automated teller machines positively affect financial inclusion in Nigeria, and their significance is indicated by their p-value. This suggests that increased financial inclusion in Nigeria has been facilitated by the availability of numerous automatic teller machines both inside and outside of banking facilities. According to the analysis, an increase of ATMs will significantly affect financial inclusion, with a coefficient of 3.2980.

Furthermore, the study revealed that web/internet banking has a negative impact on financial inclusion in Nigeria and the result shows that it is statistically insignificant. The implication is that the requirement of internet connection to effect web/internet banking is a major limitation in ensuring that web/internet banking influences financial inclusion. Moreso, most local communities do not have an internet connection thereby incapacitating the rural dwellers to adopt web/internet banking to facilitate banking transactions. This finding is in line with the study of David et al. (2022)

In addition, this study found that point-of-sale also has impact on financial inclusion in Nigeria. This is evident with the sporadic rate with which point-of-sale booths are established across the country. With a POS machine and a desk, basic deposits and withdrawals can be conducted by rural dwellers and this simple gesture has improved the level of financial inclusivity in Nigeria. This finding is in tandem with Abdullahi et al. (2021) and Emuveyan et al. (2021).

Lastly, this study revealed that mobile banking operation has a positive relationship with financial inclusion and the p-value shows that it is significant. This is a resulting effect of 1.4 million agent banking locations added by the Central Bank of Nigeria to boost financial inclusion in Nigeria. Aside from basic deposit and withdrawal, people now have access to other banking services without visiting the bank premises. This finding is in tandem with Joseph (2020) and David et al. (2022).

6. Conclusions

Based on the findings of the study, it is evident that agent banking and mobile money operations play a significant role in financial inclusion in Nigeria. This is a result of previous efforts made by the government and non-governmental agencies in achieving financial inclusion through a series of policies and implementation procedures. In view of the findings of this research work, it is recommended that from the various tools adopted in implementing financial inclusion, more effort should be on off-site automated teller machines to enable people in distant locations to deposit money in their bank and have access to some financial services without visiting the bank premises. Also, more agent bank locations should be approved to cover a wider area in achieving a reduction in the level of financial exclusion and mobile banking operations should be more encouraged through a series of sensitisations from the deposit money banks. This will indeed reduce the level of traffic in the banking hall.

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