Digital Payment Channels and Poverty Index: The Nigerian Experience

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Abstract

Premised on the postulation that financial development is a sine qua non for economic growth and development, this study aims at examining the relationship between digital payment channels and poverty index in Nigeria. The value of transactions through the ATM, POS, and mobile payment were used to capture digital payment channels in Nigeria, while poverty rate was used to measure the poverty index. Using the Autoregressive Distributed Lag technique on time series data sourced from Central Bank of Nigeria Statistical Bulletin and the National Bureau of Statistics, the results reveal that VTATM and VTPOS related negatively with poverty rate in Nigeria. But VTMP shows positive relationship with poverty rate in Nigeria. Interestingly, value of transactions through the ATM, POS and mobile payments, all show significant relationship with poverty rate in Nigeria. This implies that the adoption and usability of digital payment channels in Nigeria seriously relate with the level of poverty in Nigeria. The study concluded that digital payment channels exert significant relationships with poverty index in Nigeria. The study therefore recommended that the deposit money banks and payment service providers should create enabling environment for effective digital usage in the country. Also, the CBN digital experts should beef up their cyber security policies and strategies in order to curb internet fraud.

Key Words: Poverty Rate, Automated Teller Machine, Point of Sale, Mobile Payment, Nigeria.

Introduction

Poverty eradication stands tall in the United Nations 2030 Agenda for Sustainable Development which is a common desire of all nations (Li et al., 2022). Any country with high incidence of poverty is an indication of economic backwardness which its attendant effects permeate every outlook of the economy. Possible causes of poverty can be attributed to high rate of unemployment, poor implementation of government policy, high dependency on foreign manufactured products, backwardness in technological advancement and applications, among others. Among the listed factors, unemployment rate has an immediate and direct influence of the people's well-being. The National Bureau of Statistics [NBS] (2022) has recorded the unemployment rate as 33.3 percent. Also, the analysis by Bloomberg in 2022, shows that one-third of the 69.7 million vibrant labour force in Nigeria either did nothing or worked for less than 20 hours a week, defining them unemployed in the context of Nigerian definition of unemployed (Okoye, et al., 2022:50).

Consequently, the introduction of digital payment channels otherwise known as electronic payments system in the banking sector become a new breath of life to some of the poor and those that are vulnerable to poverty in Nigeria tapping from the attendant job opportunities associated with the technological development in the financial sector. Today's banking environment is very dynamic and has undergone rapid changes as a result of innovations in information and communication technology (ICT), increased awareness and demand from customers (Aduaka & Awolusi, 2020; Ugwueze & Nwezeaku, 2016; Xu & Zhang, 2025). Banking industry of the 21st century operates in a complex and competitive environment characterized by these changing conditions and highly unpredictable economic climate. ICT is at the center of this global change curve. ICT has changed the dimensions of competition in the retail banking sector. Okoro (2014) concludes that the automated teller machine (ATM), Point of Sale (POS) terminals and Internet services are the major instruments used by the customers of the deposit money banks in Nigeria. In fact, digital

payment transactions in Nigeria rose to N1.07 quadrillion in 2024, and for only POS services, it was reported that 18 trillion transactions were done, as at 2024 (Akintaro, 2025). In the height of this fintech advancement, Akintaro (2025) further mentioned that Moniepoint (with over 800,000 POS), and Opay (with over 500,000 POS agents) are in operation in Nigeria.

Thus, increased adoption and penetration of digital payment channels, have added a new distribution channel to retail banking - Internet/Online-banking. For example, the POS services which appear in two forms – the POS merchants and the POS agents – have the advantages of quick service delivery and reduction of cost, alongside the provision of source of livelihood to the people as compared to the traditional banking. It is necessary to highlight here that the POS merchants are businesses or individuals who accept card payments from customers using point-of-sale terminal or system. However, the POS agents are businesses of individuals that act as intermediaries between merchants and financial institutions or payment service providers. The charges POS agents impose on their services generate them income, thereby, enhancing their standard of living as well as promoting economic growth.

Statement of Problem

This development in the banking sector especially in the use of electronic channels to effect payments for transactions and transfers of money, has created open doors for business activities and enable avenue for generating jobs for people both in the urban and rural areas. This has plunge some people to be banks' agents rendering retail banking services for their survival. Some have ventured into the repair and maintenance of ATM, some involved into the distributions of POS machines, among others. But to our dismay, youth and non-youth unemployment rate in Nigeria has been increasing as the number of students graduating from institutions has increased (Okoye et al., 2022) turning many of the citizens into poverty. As at 2022, Nigeria was reported with the record of 63% of the population, representing 133 million people that are multidimensionally poor (Nigeria Multidimensional Poverty Index [MPI], 2022). Nigeria been one of the most populous nation in Africa is inflicted with high rate of poverty.

This buttresses the essentiality and necessity of avenues that offer empowerment as well as employable opportunities in order to ameliorate the level of poverty and also the attendant vices associated with it.

This situation has evoked the interests of researchers like Elechi and Anthony (2016); Joseph and Richard (2015); Osazevbaru and Yomere (2015) that all wrote advocacy papers majorly on the benefits and challenges associated with e-payment or cash-less policy. Li et al (2022) focus their work on the impact of mobile payment on household poverty vulnerability. Okoye et al (2022) examined the impact of POS business in reducing unemployment in Anambra. From critical observation, none of the extant Nigerian literature employ time series data on digital payment channels in determining its impact on poverty index. This created a gap in literature that needed to be filled. This necessitated study, to empirically examine the relationship between digital payment channels and poverty index: the Nigerian experience for the period 2009 to 2023. Therefore, in order to achieve the above aim, specifically, the study seeks to achieve the following objectives; to:

i. Examine the nature of relationship between digital payment through automated teller machine and poverty rate in Nigerian;
ii. Investigate the nature of relationship between digital payment through point-of-sale and poverty rate in Nigerian;
iii. Determine the nature of relationship between digital payment through mobile phone and poverty rate in Nigerian;

The rest part of this work is structured into sections two to five. Section two focuses on literature review which uncovers the major digital payment concepts, theories and related empirical studies. In section three, is the methodology of the study that emphasizes on the nature and source of data, model specification, apriori expectations and method of analysis. While section four which is on results and findings showcases the empirical analysis as well as the findings on digital payment channels system and poverty index in Nigeria. And then, section five which is a conclusion and recommendation highlights major finding in the study as well as suggestions for policy implementation in regards to the findings.

Literature Review

The Concept of Digital Payment Channels

Digital payment which is also known as electronic payment which is also known as e-payment emerges as a result of the development that took place in the banking sector. Digital payment is the use of computer networks, digital and internet systems to effect transfer as well as payments for business transactions (Igudia, 2017). In Nigeria, digital payment system was borne out of the Central Bank of Nigeria policy in 2009 under the administration of Alhaji, Sanusi Lamido Sanusi, with the primary aim of reducing the volume of cash in circulation as well as reducing the cost of cash production and transportation (Alaomama, et al., 2016). This implies encouraging a society in which purchases of goods or services, as well as payments are made by credit cards or electronic funds transfer rather than cash based transaction. Igudia (2017) posits that the goal behind the e-payment system was to align the Nigerian payments systems in line with global best practices, at the same time, gain national utilization and international recognition in Nigeria. To enforce and effect this policy, ban and certain charges were placed the withdrawal of smaller amounts of money in the bank.

Consequently, various e-payment channels such as: Automated Teller Machine (ATM), Mobile banking, web banking, and point of sales (POS) evolved as major electronic banking or e-payment instruments in Nigeria (Ughulu & Agbonkhese, 2020). Igudia (2018, p. 151) identified these e-payment channels to include: the automated teller machines (ATM), automated clearing house (ACH), payment cards (debit or credit), point of sales (POS) terminals, online web portals, mobile phones, direct debit/deposit and real time gross settlement (RTGS) systems. The evidence is captured in the Central Bank Statistical bulletin published annually.

a) Automated Teller Machine: This is the conduct of banking transactions through the use of electronic cards (Value Card, ATM Card, Debit Card, Credit Card etc.) and automated machines. The smart card system makes it easy for bank customers to have access to cash, carry out transfers and make enquiries about their accounts

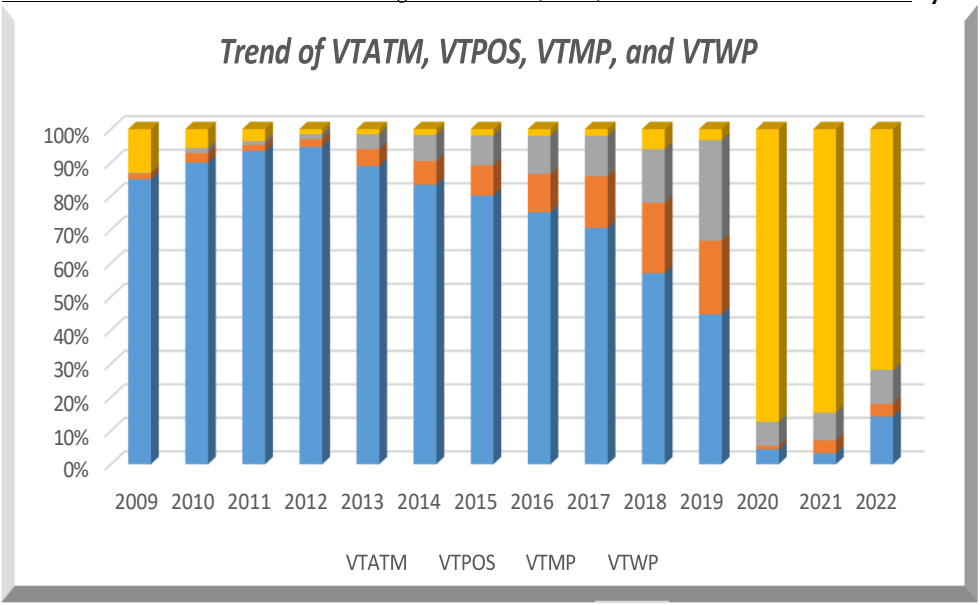
without visiting the banking hall. ATM facility is usually mounted at strategic places in the cities such as supermarkets, Hotels, Transport terminals, shopping malls etc. Today's ATMs are sophisticated computers that are capable of performing what a bank cashier can, thereby ushering a paradigm shift from old to new era in banking services (Boateng et al., 2014).

b) Point of Sale: Point of sale (POS) is a device that can be used in a particular time and place in which a small transaction is accomplished. Various businesses are gradually adopting POS methods at accelerated rate, and the explanation is that a POS system jettisons price tags. It is worthy to emphasise here that two types of POS services exist – the POS merchants and POS agents. The POS merchants accept card-use payment for shopped items or benefited service, however, the POS agents act as middlemen between the merchants and financial instititions by effecting payments for certain imposed charge which serves as income to them.

c) Mobile Payment: This payment system uses an automated phone answering system with instructions passing via voice or short messages (SMS) to the remote computer. The computer decrypts the message and executes the instructions through a highly coded device, and then the response is given back to the customer (Taiwo & Agwu, 2017). As such, it facilitates sales of items with the acceptance of this channel for payment.

d) Web Payment: Web banking, mostly called online or electronic banking permits a user to conduct financial transactions via the internet (Frankenfield, 2019). Electronic banking allows customers of a financial institution to conduct financial transactions on a secure website operated by the institution, which can be a retail or virtual bank, credit union or building society. Web banking enables banks customers to transact conveniently – at home, at work, or on the go without necessarily visiting branch of the bank to perfect vital banking transactions.

The application of these instruments over the years may have impacted negatively or positively on the poverty level in Nigeria. The



application of a channel depends on factors such: payer's or receiver's choice, organization/institution's policy, literacy of the user, time, place, and condition of transaction, network availability, etc.

Digital Payment Channels Practice in Nigeria

Digital payment system in Nigeria has witnessed a gradual process right from its inception in 2009. Below is the trend of the use of various e-payment channels in transfers as well as payments for transactions.

Figure 2.1: Trend of Digital Payment through ATM, POS, MP, WP Channels in Nigeria from 2009 to 2022
Source: EView Output on CBN Statistical Bulletin Data

As shown in figure 2.1 above, electronic payment through the ATM has been the dominant e-payment channel from 2009 to 2019. Its

patronization stood at 90% and above from 2009 to 2013, with others together patronized by less than 10% of e-payment users. The patronization trend began to decline in 2013 rapidly from 80% to 40% in 2019. This suggests that there was increase in the sensitization as well as the usage of other e-payment channels as the years come by. As at 2019, percentage of patronisers for: ATM was 40%, POS (23%), MP (30%), while WP (50%). However, from 2020 to 2022, the narrative changed drastically, as the percentage of ATM users was less than 10%, POS (less than 10%), MP (10% on the average) while web payment was 78% on the average. This suggests that the privacy, comfortability and convenience associated with web payments have motivated the e-payment patronisers on the use of web payment channel more than others.

Although, the introduction of e-payment system has brought good to the economy, it cannot be ruled out its encountered challenges especially at its early period in Nigeria. Elechi and Anthony (2016); Joseph and Richard (2015) identified initial associated challenges with electronic payment system to include: lack of uniform platform of banks, inadequate provision of e-payment infrastructure; platform security problem, lack of seriousness by banks; resistance to change in technology among customers and staff (due to: fear of risk, lack of awareness on benefits of new technology, lack of trained personnel); high rate of illiteracy, high cost of internet, and frequent power interruption. However, most of these challenges have been overcome due increase in the sensitization and investment into e-payment facilities by financial institutions. Meanwhile, the major overwhelming e-payment challenge at present is the problem of insecurity. Internet fraudsters have taken advantage of the new technology to siphon money from people's account. These fraudsters range from dishonest bank staff, the e-payment agents like the POS attendants, yahoo boys, and other miscreants in the society.

Poverty Index

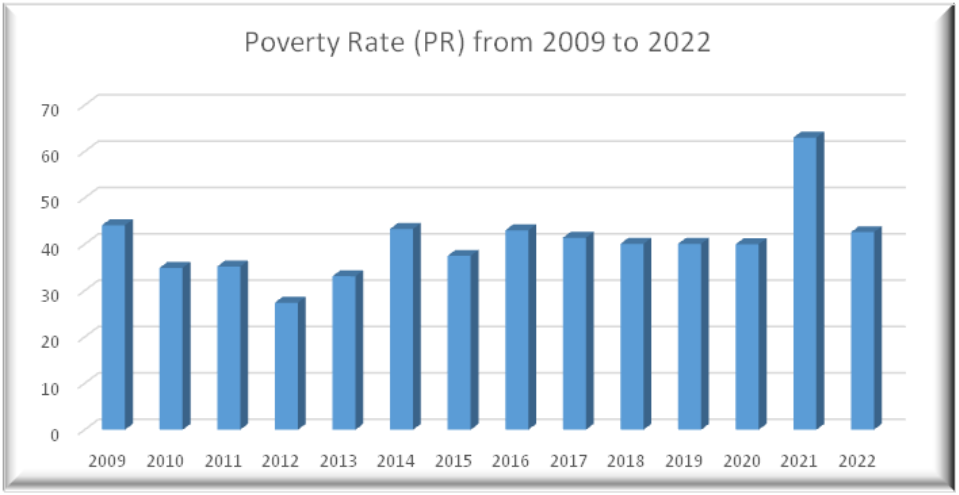
Poverty as a concept connotes lack or inability of a person or people to access basic necessities of life. The Organization for Economic Co-operation and Development (OECD) published its Guidelines for Poverty Reduction (OECD, 2001) views poverty from

two perspectives – absolute and relative poverty. OECD (2001) explains absolute poverty to mean when people lack basic necessities for survival. It quantifies the number of people below the poverty line and is independent of place and time. On the other side, relative poverty occurs when people's way of life and income is much worse than the general standard of living. It classifies people as poor not by comparing them with a fixed poverty line, but by comparing them with others in the population under consideration (Deonandan, 2019).

The issue revolving around poverty rating is the questions of: who is poor and what measures determine the poverty? This has been a controversial issue across many countries. However, Li et al (2022) identified two main ways in addressing this problem. One, is the calculation of the incidence of poverty using poverty line set to classify the poor population. Each country has its own poverty line. In the same vein, in 2010 the "World Bank set an international consumption poverty line based on purchasing power parity [PPP] calculations of USD 1.9 per person per day, USD 3.1 per person per day in developing countries, and USD 5.5 per person per day in developed countries as the standard" (Li et at., 2022, p.3).

On the contrary, some scholars had argued that rating poverty based on economic ability (expressed in purchasing power) is insufficient to qualify a household as poor (Alemu & Singh, 2021). They advocate a multidimensional approach, that poverty should be comprehensively measured from several perspectives such as education, health, and quality of life, therefore, making the identification of poverty broader. Furthermore on the determination of accurate measure of household that is vulnerable to poverty, Pritchett et al (2000) assert that a household could be described vulnerable if the probability of future poverty is more than a certain threshold value, which was established at 0.5 by Klasen and Waibel (2015) dependent on the local resources, macroeconomic environment, as well as human capital of the study population. By this standard, having a probability of future poverty of an household or population to be 50% is an accurate prediction that that household or population is vulnerable to poverty than the use of poverty incidence.

This World Bank standard for rating poverty had been the benchmark for most developing countries like Nigeria. However, in



2018, Nigeria adopted the Multidimensional Poverty Index (MPI) as a new and better dimension of assessing the poverty situation in the country. It is calibrated from 0 to 1 index. Towards zero (0) indicates presence of low poverty rate whereas towards one (1) depicts high rate of poverty. This MPI has four major dimensions, which include: health, education, living standards, as well as work and shocks (Nigeria MPI, 2022). The index depicts the proportion of population majorly deprived from healthcare services (i.e. access and time to quality healthcare); basic education (i.e. being schooled at the right age, using state-of-the-art instructional facilities, under competent teachers); quality living standards (i.e. access to quality food, shelter, and water); as well as work and shocks (i.e. nature and level of employment, security shocks level). Below is the trend of poverty rate in Nigeria from 2009 when e-payment channels were introduced.

Figure 2.1: Trend of Poverty Rate in Nigeria from 2009 to 2022

Source: EView Output on National Bureau of Statistics' Data

Figure 2.1 shows the trend in the report of Poverty Rate (PR) in Nigeria. In 2009, PR was 44%, then, the rate dropped from to 35% in 2010 and was sustained to 2011. And it fell to 27.4% in 2012. However, the PI escalated to 43.3% in 2014 and 2016, and in between was a sharp drop in 2015 to 37.5%. From 2017 to 2020, the tempo was maintained at 40.1% on the average. This suggests strong government effort in

sustaining the rate within the period. The PI later increased to 63% in 2021. Reason for this rapid increase could be attributed to the effect of the covid-19 pandemic of which Nigeria and countries over the globe were greatly affected. Then, in 2022, poverty rate decreased to 42.6%. In summary, on the average, the poverty rate in Nigeria from 2009 to 2022 is 40.4%. This implies that about 40% of the total population of Nigeria has suffered as victims of poverty experiences.

Electronic Payment and Poverty Index Nexus

The poverty situation of Nigeria is one that demands conscientious efforts to mitigate its devastating effects. Although, the development of e-payments system as financial development strategy was primarily targeted at the ease of payments for business transactions alongside benchmarking Nigeria's banking sector system with the global world, however, Okoye et al (2022) posit that this development precipitated various business activities and also generated many job opportunities.

> In climes where Agent banking and Mobile Payments are rooted, financial institutions have successfully expanded their outreach by engaging local agents to offer their services. These services include: cash in/cash out, electronic transfer, bill payments, pre-approved credit lines, accounts opening, international remittances, government and other micro credit payments and other banking transactions that may be permissible by the financial institution and CBN (Akanni, 2019).

An efficient payment system (that which depends less on cash) is a sine qua non for national development and a significant national infrastructure for growth (Osazevbaru & Yomere, 2015:4).

Theoretical Underpinnings

The Bank-Focused Theory, Financial Inclusion Theory, and Transaction Cost Theory are employed in the study, however, the study is anchored on Financial Inclusion Theory due to its capacity to reduce poverty.

The Bank-Focused theory propounded by Kapoor (2010) is based

on the use of non-traditional low-cost delivery channels by a traditional bank to provide banking services to its existing customers. Although the bank-focused model offers advantages such as more control and branding visibility to the financial institutions concerned, it is not without its challenges (Kapoor, 2010). The customer's primary concerns are the quality of experience, security of identity and transactions, reliability and accessibility of service and extent of personalization allowed. Banks address these issues by providing a branchless banking service with an easy to use interface (Kapoor, 2010).

Financial Inclusion theory advocated by Kodan and Chikara (2013), suggests that increased access to financial services, including electronic payments, can help reduce poverty by providing opportunities for savings, investments, and economic participation. In their postulation, they highlight the pivotal role of financial inclusion using electronic devices to drive economic growth. Tarigan and Mawardi (2022) also added that the use of digital payment systems facilitates public access to financial services, such as payments, money transfers, and savings, thereby, providing opportunity for those who were previously marginalized to participate in economic activities. Meanwhile, factors such as adequate technological infrastructure, higher financial literacy rate, supportive regulations, as well as cooperation among various related parties, have been identified great influencers of successful implementation of digital-based system innovations (Tarigan & Mawardi, 2022).

The Transaction Cost theory, attributed to Oliver Williamson, who modified the work of Ronald Coase, posits that electronic payments can reduce transaction costs, making financial transactions more efficient and accessible, potentially benefiting low-income individuals. Its emphasis is on how transaction costs influence economic outcomes, including the decision to use financial services.

Empirical Review

In the advocacy paper of Joseph and Richard (2015) titled electronic payment system in Nigeria: its economic benefits and challenges, they posit that the arrival of the internet has taken electronic payments and transactions to an exponential growth level. According, this development has spur consumers to make online purchase of goods and services and also send unencrypted credit card

numbers across the network, which did not provide much security and privacy. The study also found that associated challenges with e-payments system include lack of common platform for banks' operation, public acceptability, issues of security, lack of adequate infrastructure. The presence of these challenges affected the fast spread of e-payment at the start-up period. Osazevbaru and Yomere (2015) also examined benefits and challenges of Nigeria's cash-less policy. The study was an advocacy paper that dealt much on the introduction of cash-less financial policy in January, 2012 with emphasis on Point of Sales, card acceptance services. The content analysis was used on the secondary. Thus, the study found banks' income higher in cash-less setting than in cash based arrangement. Therefore, it was concluded that the cash-less policy offers immense benefits to the banking sector.

Empirically, it was found by Ogbeide-Osaretin and Nkiruka (2016) that e-banking had significant impact on economic growth. ATMs and MB were found to have a positive impact on economic growth in Nigeria while POS and WB showed a negative impact, using the Autoregressive Distributed Lag bond testing technique for the period 2009 to 2014 on quarterly data. In the work of Elechi and Anthony (2016) on cashless policy in Nigeria and its socio-economic impact on small scale businesses, it was found that the benefits of cashless policy include increased convenience, reduced risk of cash related crimes, more service options for customers; then, faster access to capital, reduced revenue leakage, reduced cash handling costs for corporations; and greater financial inclusion, increased tax collections, and increased economic development, for the government. On the other hand, the associated challenges include: Infrastructure shortage, Security problem, Socio-Cultural issues as well as Legal & Regulatory issues.

Gautam et al (2021) investigated the effects of financial technology (Kisan Credit Card and ATM) on India's Poverty and empirically analyze the influence of financial technology on poverty scores. They considered data from twenty-two Indian states for three fiscal years (2018 - 2020). Using panel data analysis, their results indicated a negative association between financial technology (Kisan credit card and ATM) and its influence on the poverty score in India.

More so, Li et al (2022) in their work titled impact of mobile

payment on household poverty vulnerability and the mechanism of action using the China Household Finance Survey 2017 microsurvey data. From the probit model and a series of robustness tests, they found: (1) mobile payment significantly negatively impacts household poverty vulnerability; (2) the mechanism analysis indicates that promoting entrepreneurship and improving risk management capabilities are the main channels through which mobile payment mitigates household poverty vulnerability; (3) household entrepreneurship and entrepreneurial survival significantly reduce the probability of poverty vulnerability; and (4) the probit regression analysis shows how mobile payment has a greater negative impact on poverty vulnerability among low-income, homeless, and relatively backward households in rural or western areas.

Using primary data, with the aid of structure questionnaire obtained the responses of 300 respondents, a sample of 3045 population by Okoye et al (2022) in Anambra state examining the impact of POS business in reducing unemployment rate in Anambra state From the analyses, the study found out that, point of sales outlets has significant impact in reducing unemployment in Nigeria. Accordingly, Availability and the use of POS has served as a source of income for the owners of POS business centers in Anambra state.

Tarigan and Mawardi (2022) examined the influence of digital based payment system innovation on financial inclusion and poverty alleviation, an overview of social programs in the Sumatra Region, using Simple Linear Regression on primary data obtained from 223 respondents, through purposive sampling. They found that digital-based payment system innovation positively influence … and poverty alleviation in the studied area. Cheng (2023) in his China-based study, also found that digital inclusive finance played a significant dividend effect, as it has promoted the process of multi-dimensional poverty alleviation by reducing the supply cost of financial institutions and the use of financial services.

Xu and Zhang (2025) employs data from the 2017–2019 China Household Finance Survey to theoretically and empirically examine the impact and mechanisms of digital payments on the financial vulnerability of rural households. They found that digital payments significantly reduce the financial vulnerability of rural households.

As revealed from the related literature reviewed, four of the literature are foreign studies (Cheng, 2023; Gautam et. al., 2021; Li et. al., 2022; Tarigan & Mawardi, 2022; Xu & Zhang, 2025), while the rest five are Nigeria based. Looking at the Nigerian-based studies specifically, Elechi and Anthony (2016); Joseph and Richard (2015); Osazevbaru and Yomere (2015) all wrote advocacy papers majorly on the benefits and challenges associated with e-payment or cash-less policy. Okoye et al (2022) examined the impact of POS business in reducing unemployment in Anambra. From critical observation, none of the extant literature employ time series data on e-payment channels in determining its impact on poverty index, with exception to a related study by Ogbeide-Osaretin and Nkiruka (2016), who studied e-banking impact on economic growth and its sample period ended in 2014. This creates a gap in literature that needed to be filled. This necessitated this study, to empirically examine the relationship between digital payment channels and poverty index: The Nigerian Experience for the period 2009 to 2023, using quarterly data.

3. METHODOLOGY

This study adopted the expost facto design because of the usage of secondary time series data on the variables (Value of transactions through the ATM, POS, and MP as explanatory variables; and poverty rate as the explained variable). Time series quarterly data employed in the study were sourced from the Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics, for the period 2009 to 2023. The choice of this period is justified, as 2009 was the advent year of digital payment channels in Nigeria.

The behaviour of data was studied using the graph which shows the trend characteristics of the variables within the period of study. In course of determining the empirical relationship between digital payment channels and poverty index, the Autoregressive Distributed Lag (ARDL) technique was used. This technique was found suitable, due to the fraction integration that was found in the stationarity test. All the variables with exception to poverty rate that is in percentage. were refined with the use of logarithm for a better estimation results.

Model Specification

The study employed one finametric model to estimate the relationship between digital payment channels and poverty index in Nigeria. The model employed in this study is adapted from the work Ogbeide-Osaretin and Nkiruka (2016) with little modification on the dependent variable from gross domestic product to poverty rate.

The model is stated as follows:

PR = f (VTATM, VTPOS, VTMP,) - - 1

Expressing the equations in econometric form is as follow:

$PR=\alpha_0 + \alpha_1 VTATM_t + \alpha_2 VTPOS_t + \alpha_3 VTMP_t + \mu t$ (2)

Where

PR = Poverty Rate,

VTATM = Value of Transactions through the Automated Teller Machine

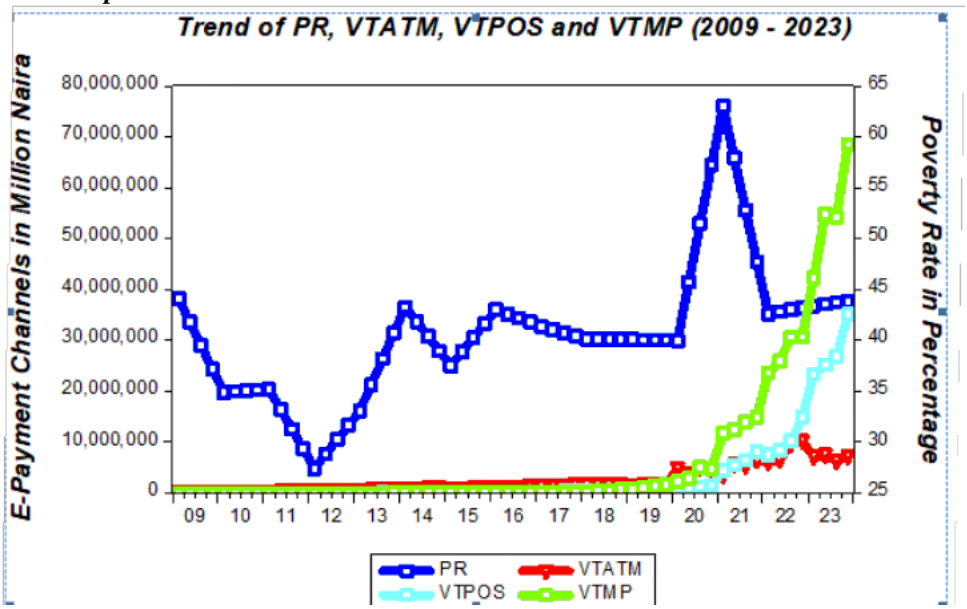
VTPOS = Value of Transactions through Point of Sale

VTMP = Value of Transactions through Mobile Payment

t is time, α0 is the intercept parameter; $\alpha_1 - \alpha_3$ are the slope parameters to be estimated; μt is the error correction term.

The data on all the variables except PR were refined using natural logarithm. Theoretically, apriori relationship between the

4.1: Graph



dependent and independent variables is stated as: α_1 α_2, α_3, < 0. ε and μ = error terms. That is to say that, in the model, Value of transactions through the ATM, POS, and MP as explanatory variables are theoretically expected to exhibit negative relationship with poverty rate**Figure 4.1**: Line Graph Showing the Trend of PR, VTATM, VTPOS, and VTMP in Nigeria for the Period 2009 to 2023 in Million Naira

Figure 4.1: Line Graph Showing the Trend of PR, VTATM, VTPOS, and VTMP in Nigeria for the Period 2009 to 2023 in Million Naira

Source: E-view Output

As observed in figure 4.1, the movement of PR in Nigeria from 2009 to 2023 has been a staggerly one, in the sense that it is irregular. In a downward trend, PR falls from 44.1% in 2009 to 27.4% in 2012. And irregularly rose to 43% in 2016. The PR was sustained within 40.1% from 2017 to 2020, then the rate skyrocketed to 63% in 2021 and later dropped to 42.6% in 2022 which was relatively sustained till 2023. Reason for the uncommon rapid change in 2021 is attributed to the effect of covid-19 pandemic when most businesses and sources of livelihood were affected due to the national lockdown of movements and business operations. However, when the situation came under control, the rate came back to 42.6% which was not far from the pre-covid-19 PR.

Looking at the trend of explanatory variables, payments through the electronic channels have been relatively very low from the advent year, 2009 to 2019 with an average values of N2,328,056.85

Table 1: ADF Stationary (Unit Root) Test Result

Variable	ADF stat	Critical Value at 5%	Order of Integration	P-value
PR	-3.734945	-3.502373	I(0)	0.0290
LNVTATM	-8.808713	-3.489228	I(1)	0.0000
LNVTPOS	-3.709763	-3.487845	I(0)	0.0294
LNVTMP	-4.238969	-3.487845	I(0)	0.0072

Source: E-view 10 Output

million, N3,155,774.13 million, and N6,817,039.1 million for ATM, POS, and MP respectively. However, a shoot up occurred in all the channels in 2020 to 2023, although values of transactions through ATM and POS were not up to N4,000,000 million; that of mobile payment rapidly increased from N1,428,111.57 million in 2019 to N68,463,610.63 million in 2023. This suggests that mobile payment was highly patronized than any other employed means of payment within that period. This may be as a result of its associated convenience as the channel permits payment for transactions at anytime and anywhere at one's comfort.

4.2. Unit Root Tests

The unit root test was conducted in the study to ascertain the stationarity of the variables using the Augmented Dickey-Fuller (ADF) test. The result of the unit root test is shown in

Table below:

Table 2: Heteroskedasticity Test

Heteroskedasticity Test: Harvey

F-statistic	0.826829	Prob. F(13,41)	0.6303
Obs*R-squared	11.42409	Prob. Chi-Square(13)	0.5753
Scaled explained SS	7.842036	Prob. Chi-Square(13)	0.8537

Source: E-view 10 Output

As observed in table 1, there is a fractional integration in the stationarity of the variables, as some of the variables are stationary at difference 1(1) while others are stationary at level 1(0). Thus, evidence of stationarity at level for Poverty Index, Transactions through POS and mobile payment. Value of transactions through ATM is stationary at difference in order one. These results have implication for ARDL methodology which, unlike its competitors (e.g. Johansen and Engle-Granger co-integration frameworks), allows co-integration among variables that have different orders of integration. Therefore, the use of ARDL method for data analysis in this study has been justified. Meanwhile, the normality in the model was checked by carrying out

heteroskedasticity test.

Table 3: Presentation of Bound Test Co -Integration Output

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic : n=1000	
F-statistic	10.58226	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: E-view 10 Output

The residual and normality in the model was checked using the result of Harvey heteroskedasticity test displayed in Table 2 for the model, the estimated sample shows F-statisti probability values of 0.6303 for the model which is greater than the 0.05 significance level. Also, the corresponding observed R^2 of 11.42409, of which its P-value (0.5753) is greater than 0.05%, this leads to the acceptance of the null hypothesis which shows that there is no existence of heteroskedasticity problem in the employed study model showing that variables are influenced from the error term more than internally and it also validates the classical linear regression model assumption (CLRMA).

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As revealed in Table 3, since the F-statistics of 12.75001 is greater than the upper and lower bound statistics at all levels (1%-10%), therefore, the null hypothesis will be rejected, implying that there is a long run association between the variables under investigation in the both models.

4.3 ARDL Error Correction Output

The lag order selection for our ARDL model was based on the Schwarz information criterion (SIC). From the optimum lag length selection exercise, the minimum values of the AIC which is 3.69, and the model that gives this minimum value is ARDL (4, 1, 4, 1). This implies that a model that includes four lag of the dependent variable (PR), one lag of VTATM, four lag of VTPOS, and one lag of VTMP, as additional regressors is the best description of our time series data.

Considering the global utility of the model, from the ARDL results shown in table 4 above, the coefficient of determination (R^2) for the model is 0.665230, indicating the strength of the explanatory variables in explaining changes that take place in the poverty rate. This implies that, the predictor variables in the model, as channels of e-payment account for 67% for corresponding predictors, of variation in the rate of poverty in Nigeria. In other words, about 33% of variation in poverty rate in the model is caused by other factors not included in the model. The robustness of this result is further buttressed by the Durbin-Watson statistic of 1.590148 which falls within the acceptable region 1.5 to 2.5, thereby, clearly indicates that there is no effect of serial correlation problem among the variables used in the study. The f-statistic probability value of 0.000000 that is less than 0.05 at 5% significance level is an indication of goodness of fit of the model. Therefore, this justifies dependable estimation of the model.

As earlier stated in the apriori expectations, all the predictor variables are expected to have negative relationships with PR. However, in the relative utility of the model as shown in the result above, only VTATM and VTPOS related negatively with poverty rate in Nigeria. This suggests that a unit increase in VTATM and VTPOS

Table 4: ARDL Error Correction Output

ARDL Error Correction Regression
Dependent Variable: D(PR, 2)
Selected Model: ARDL(4, 1, 4, 1)
Case 5: Unrestricted Constant and Unrestricted Trend
Date: 05/31/25 Time: 16:01
Sample: 2009Q1 2023Q4
Included observations: 55

ECM Regression
Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.052007	0.409801	0.126908	0.8996
@TREND	0.002698	0.011492	0.234722	0.8156
D(PR(-1), 2)	0.288464	0.102648	2.810222	0.0076
D(PR(-2), 2)	0.310176	0.111132	2.791070	0.0080
D(PR(-3), 2)	0.499512	0.124812	4.002122	0.0003
D(LNVTATM, 2)	-1.931030	0.526536	-3.667424	0.0007
D(LNVTPOS(-3), 2)	-1.161530	0.522209	-2.224263	0.0318
D(LNVTMP, 2)	2.655571	0.899120	2.953523	0.0052
CointEq(-1)*	-0.683546	0.092316	-7.404394	0.0000

R-squared	0.665616	Mean dependent var	0.044545
Adjusted R-squared	0.580076	S.D. dependent var	2.057944
S.E. of regression	1.333580	Akaike info criterion	3.603841
Sum squared resid	76.47268	Schwarz criterion	4.041805
Log likelihood	-87.10563	Hannan-Quinn criter.	3.773205
F-statistic	7.781329	Durbin-Watson stat	1.590148
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

Source: E-view 10 Output

will reduce PR by 193.1% and 116.1% respectively. But VTMP show positive relationship with poverty rate in Nigeria within the period, meaning that payment value of transactions through the mobile phones increases the poverty rate. Ironically, the positivity of VTMP in relation to PR amid the growing patronage mobile payment transactions, suggests the intruding of fraudsters infiltrating the system defrauding customers who use their phones for transactions. And

Nigeria being an emerging nation with over 133 million people suffering Multidimensional Poverty Index [MPI], which reveals the fraction of the population majorly deprived from monetary ability, basic education, and basic infrastructure and services in the country, has good number of uneducated especially in the rural areas that are vulnerable to this fraudulent activities. Many small scale businesses have been ruined because of the mobile payment fraud, and this may render the owners, workers as well as their dependents, jobless and miserable, thereby, increasing the level of poverty in the country.

Even the educated are not left out as victims of this fraud. The presence and activities of "Yahoo Boys" who are online fraudsters on a daily basis are taking advantage of victims' stolen phones with SIM card number linked to their bank accounts, to siphon people's money into an unknown accounts – of which some are betting accounts that are operated differently from the conventional banking practice, making the tracking of these people and money difficult.

However, the significance associated with all the employed digital payment channels, interestingly, value of transactions through the ATM, POS, and mobile payment show significant relationship with poverty rate in Nigeria. This implies that the adoption and usability of digital payment channels in Nigeria seriously relate with the level of poverty in Nigeria. The convenience, easiness, fastness as well as cost reduction associated with digital payments, help in enhancing business activities. Through these mediums, jobs are created in form of POS attendants, software developers and installers, ATM installers and maintainers, etc. All these avenues become source of livelihood to the citizens especially in the Nigeria where white and brown collar jobs are not prevalent.

Conclusion and Recommendations

From the above findings, this study conclude that digital payment channels exert significant relationship with poverty index in Nigeria, with the evidence from value of transactions through the ATM, POS, and mobile payment that are statistically significant in relating with poverty rate in Nigeria. This supports the work of Okoye et al (2022) that found out that point of sales outlets has significant impact in reducing unemployment in Nigeria, and the availability and

the use of POS has served as a source of income for the owners of POS business centers. The study therefore recommend that:

i) The deposit money banks and payment service providers should create enabling environment for effective digital usage in the country.

ii) Also, the CBN digital experts should beef up their cyber security policies and strategies in order to curb internet fraud;

iii) The government should enforce relevant laws to bring to book culprits on internet fraud, to serve as deterrent to others.

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Appendix 1: Data on Employed Variables

Period	VTATM N'M	VTPOS N'M	VTMB N'M	PR %
2009q1	137720.00	3510.00	60.00	44.1
2009q2	145570.00	2750.00	110.00	41.8
2009q3	126120	2480	520	39.5
2009q4	139190	2290	580	37.2
2010q1	62590	2770	870	34.9
2010q2	80720.00	2670.00	1370.00	34.97
2010q3	114900.00	2800.00	1840.00	35.05
2010q4	141500.00	4480.00	2570.00	35.12
2011q1	333510.00	6280.00	3320.00	35.2
2011q2	364670.00	6450.00	3720.00	33.25
2011q3	387480.00	8640.00	5010.00	31.3
2011q4	476080.00	9650.00	6930.00	29.35
2012q1	454789.20	1865.37	1081.55	27.4
2012q2	483245.46	8738.11	4926.69	28.82
2012q3	499712.58	14749.28	7260.33	30.25
2012q4	546911.58	22655.56	18240.77	31.67
2013q1	611258.15	26284.96	22878.57	33.1
2013q2	675087.98	30941.48	28915.65	35.65
2013q3	729229.73	43145.87	33924.31	38.2
2013q4	813363.14	60644.03	57078.61	40.75
2014q1	784053.48	67467.80	66359.92	43.3
2014q2	852355.34	70251.99	74157.06	41.85
2014q3	1027923.5	78001.43	86476.95	40.4
2014q4	1015545.1	96350.52	119473.36	38.95
2015q1	937963.29	96314.88	91610.43	37.5
2015q2	962429.78	104568.63	100432.53	38.87
2015q3	1011481.5	112424.97	109304.03	40.25
2015q4	1058377.7	135204.06	141006.78	41.62
2016q1	1069989.9	144760.31	135242.19	43
2016q2	1134496.2	163712.00	168284.64	42.6
2016q3	1246798.7	189947.01	223057.44	42.2
2016q4	1536848.5	260577.19	230313.20	41.8
2017q1	1502056.9	285977.30	260589.37	41.4
2017q2	1544229.4	324131.54	295236.13	41.07
2017q3	1558755.2	364549.89	239356.05	40.75
2017q4	1832550.7	435154.36	306817.43	40.42
2018q1	1568949.1	474731.34	329115.76	40.1
2018q2	1603166.4	543625.55	410565.94	40.1
2018q3	1591013.5	650406.59	498081.72	40.1

2018q4	1716956.83	714345.42	736488.01	40.1
2019q1	1539265.92	633805.67	810105.68	40.1
2019q2	1699162.91	749818.30	1155638.88	40.07
2019q3	1622925.98	856863.34	1428111.57	40.05
2019q4	1651253.42	964265.90	1687108.51	40.02
2020q1	4858796.46	1008312.68	2260091.35	40
2020q2	3741308.09	994914.01	2896906.19	45.75
2020q3	5054101.53	1207981.41	5009506.36	51.5
2020q4	4545454.18	1515868.72	4821234.97	57.25
2021q1	3604977.43	4417559.14	11808553.76	63
2021q2	5646394.00	5540630.99	12516080.17	57.9
2021q3	5517186.13	6423603.29	13924286.75	52.8
2021q4	6462376.99	8073622.78	14959351.80	47.7
2022q1	6137168.97	7486280.82	23687715.25	42.6
2022q2	6501972.97	8377803.33	25966844.83	42.8
2022q3	9672325.69	10284981.56	30693856.67	43
2022q4	10336555.9	14886735.61	30773693.92	43.2
2023q1	7165563.96	23284143.32	42312659.08	43.4
2023q2	7467002.16	25160722.85	54743409.74	43.55
2023q3	6361692.53	26822054.48	54280404.44	43.7
2023q4	7218335.98	35080182.28	68463610.63	43.85