



Internet Payment System and Personal Income Tax Payment in Nigeria

ALI, ANDREW SIMON

Department of Accounting, Faculty of Management Sciences, University Of Port Harcourt.

IRONKWE, UWAOMA IGNATIUS

Professor, Department of Accounting, Faculty of Management Sciences, University Of Port Harcourt.

NWAIWU, JOHNSONN.

Department of Accounting, Faculty of Management Sciences, University Of Port Harcourt.

Corresponding: johnsonnwaiwu@gmail.com

ABSTRACT

Tax revenue generation in Nigeria has faced significant challenges due to issues such as corruption, embezzlement, and the level of electronic payment literacy among users. This paper explores the relationship between the internet payment system and personal income tax revenue generation in Nigeria. Data spanning from 2012 to 2021, obtained from the Federal Inland Revenue Service, Prom ax, the Central Bank of Nigeria, and the National Bureau of Statistics, were analyzed using various statistical methods, including Ordinary Least Square Regression Analysis, Autoregressive Distributed Lag, co integration, stationary tests, Augmented Dickey-Fuller unit root tests, and an error correction model. The empirical results of the study indicate that electronic payment significantly relate to tax revenue generation. The study therefore concludes that internet payment system has the potency to make significant contribution to tax revenue generation and recommends that tax revenue generation should be increased through proper linkage of information on Nigeria's taxable audits like national identity cards numbers, bank verification numbers and individual potential payer's bank accounts details.

KEYWORDS

Internet Payment System, Personal Income Tax, Tax Pro Max, Revenue Generation, Taxation



Introduction

Revenue generation is a fundamental aspect of any nation's economic development, and it presents both a lifeline and a significant challenge for economies worldwide, irrespective of their level of development (Nwaiwu & Joseph, 2023; Nwaiwu & Amah, 2023). The amount of revenue a country generates is a critical determinant of its economic growth and sustainability. Thus, countries are keenly interested in the present and future revenue generation, as it directly reflects their economic development prospects.

In the quest to address the challenge of revenue generation, taxation has emerged as a primary instrument in the financial strategies of governments globally. Taxation encompasses various forms, including personal income tax (Awotomilusi, 2022), value-added tax (Akpobi & Igbekoyi, 2019), corporate taxes (Adegbi & Fakile, 2021), customs and excise duties (Nwaiwu & Okoro, 2018), and more. These forms of taxation have traditionally served as the primary sources of government revenue in economies across the world. However, despite their central role, there remain significant challenges, such as tax evasion and corruption, that hinder the efficient collection of revenue (Organization for Economic Co-operation and Development, 2017).

In countries like the United States, taxation accounts for over 50 percent of all government revenue, with projections indicating that it would contribute a substantial portion of the anticipated \$6.7 trillion in revenue for 2018 (Organization for Economic Co-operation and Development, 2017). Similar trends are observed in high-income countries such as the United Kingdom, France, Sweden, Norway, and others, where taxation remains a dominant source of government revenue.

Even in Africa, taxation has played a crucial role in supporting economic growth and development. Tax-to-GDP ratios in countries like Tunisia, Morocco, Nigeria, South Africa, Senegal, Mauritius, Cote d'Ivoire, and Cameroon ranged from 16.1% to 31.3% in 2015, with Tunisia having the highest tax-to-GDP ratio (31.3%) during that period (OECD, 2017). Interestingly, this figure surpasses the tax-to-GDP ratios of some countries classified as high-income economies by the OECD.

However, in Nigeria, revenue generation presents unique challenges, primarily stemming from the prevalence of corrupt practices within government revenue agencies. The existence of taxation as a source of revenue in Nigeria predates the amalgamation of the North and South protectorates in 1914 to form the country. Historical records indicate that revenue was generated through various means, including homage payments to local leaders, contributions for the maintenance of peace and security, penalties for non-compliance with civil rights, and support for educational development (Ofurum, Bossco, Okonya & Amaefule, 2018; Nwaiwu, 2023).

Over the years, Nigeria has implemented various strategies to enhance revenue generation. Initially, revenue transactions occurred without proper receipts, especially for taxes. Subsequently, to improve revenue collection and accountability, receipts were introduced. However, issues such as forgery and cash-based transactions persisted, leading to the current practice of mandatory cash deposits in banks with receipts issued, albeit with remaining vulnerabilities (Ogbonna & Appah, 2023; Joseph & Micah, 2022).

One state in Nigeria that has garnered significant attention regarding its revenue generation is Lagos State. Before a major reform in 2007, the state generated approximately N600 billion, with Lagos State Internal Revenue Service (LIRS) contributing about 90% of that revenue (LIRS, 2018). Low revenue was attributed to factors like financial illiteracy, poor economic conditions, lack of

accountability, corruption, and embezzlement by government officials and staff (Aregbeyen & Fasanya, 2018; Nwaiwu, 2023).

In the context of post-conflict recovery, the ability to collect and manage public resources is a crucial element in building a stable and prosperous state. Effective revenue collection, allocation, and expenditure management are essential for implementing peace accords and providing public services. Governments need revenue to fund public investments and social services, and taxation is the primary means of raising revenue in both developed and developing countries (Saeed & Sheikah, 2017; Aizanman & Jiajarak, 2018; Ibe, 2023). This study aims to explore the methodologies employed by advanced nations in tracking revenue generation payments and mitigating fraudulent financial activities.

The internet payment system, also known as electronic payment or online payment, has witnessed remarkable growth over the past few decades, largely due to the widespread use of internet-based banking and online shopping. This digital payment system allows users to make transactions and pay for goods and services electronically, eliminating the need for physical cash or checks. As technology continues to advance, numerous internet payment systems and payment processing devices have been developed to enhance efficiency, security, and convenience (Afaha, 2019).

The introduction of e-payment systems has facilitated the circulation of money and reduced the reliance on cash transactions. South Africa and Kenya, for instance, have introduced small electronic payment systems, enabling millions of citizens, particularly low-income families, to conduct transactions more affordably and conveniently (Akintoro, 2022).

In Nigeria, the federal government initiated a cashless transaction policy in January 2012 to modernize and enhance payment systems. This policy aimed to create a safe, efficient, and effective mechanism for making and receiving payments through various electronic channels, reducing the time spent in banks and facilitating fund transfers (PSV, 2020). The implementation of internet payment systems in Nigeria has not only improved financial efficiency but has also played a vital role in financial stability, monetary policy, and overall economic activity.

Despite the potential benefits of internet payment systems in revolutionizing revenue collection and promoting financial stability, Nigeria has faced persistent challenges in revenue generation. These issues include embezzlement, mismanagement of government funds, a lack of financial accountability, revenue siphoning (Nwaiwu & Joseph; Nwaiwu & Amah, 2023), and the inability to track revenue payments effectively (Ogbonna, 2016; Brown, 2023). Consequently, these challenges have led to inadequate revenue generation and hindered Nigeria's economic growth (Ewa, 2021; Nwaiwu, 2023).

The key problem in many Nigerian states, especially those in sub-Saharan Africa, is the limited participation of people and their capital in the formal banking system. Therefore, there is an urgent need to find effective methods to attract more individuals and businesses into the financial system, while simultaneously fostering transparency and accountability. The success of electronic payment systems in reducing the amount of currency outside the banking system and improving monetary policy management underscores their potential significance (Oloyede, 2022; Nwaiwu, 2023).

Empirical studies have attempted to examine the relationship between internet payment systems and tax revenue generation. Some studies suggest a positive correlation (Kessy, 2019; Akpubi & Ighekoyi, 2019; Awotomilusi, Adeghie, & Akintoye, 2019), while others contradict these findings, indicating a negative relationship (Nwaiwu & Okoro, 2018; Olaoye & Ekundayo, 2018). However, these studies

have yielded conflicting results, in part due to variations in research methodologies and the relatively short timeframes considered. Furthermore, these studies often focus on contexts that differ from Nigeria, necessitating a more systematic examination of the relationship between internet payment systems and tax revenue generation, particularly in the Nigerian context. This study seeks to address the observed limitations in the existing literature and provide a comprehensive understanding of the relationship between internet payment systems and tax revenue generation in Nigeria. Such an investigation is essential for informing policy decisions and ensuring the efficient use of technology in revenue collection. This study focuses exclusively on Nigeria, covering the period from 2012 to 2021.

Literature Review

Theoretical Framework

This section provides an overview of theories relevant to electronic payment profiles and tax revenue generation in Nigeria. A theory is defined as a framework comprising interconnected ideas, definitions, and hypotheses designed to explain or predict phenomena (Cooper & Schindler, 2011). Theoretical frameworks offer systematic explanations of the world, enabling predictive modeling under specific conditions and enhancing our understanding of the world as accepted within a particular context (Wepukhulu, 2016; Nwaiwu, 2020). Scholars have developed several theories in support of electronic payment profiles and tax revenue generation (Nwaiwu & Joseph, 2023). This study is anchored in the Innovation Diffusion Theory.

Contingency Theory

Contingency theory posits that organizational performance depends on management strategies tailored to specific conditions and systems. Fred Edward Fiedler (1984) formulated this theory to explain why specific strategies may not be universally applicable in organizational management. According to Vidal et al. (2017), contingency theory describes a dynamic process in organizations that adapts to changing conditions and systems. Effective performance requires organizations to align their internal structures and processes with external contingencies. The management's role is to organize and align the internal structure and processes with contingencies. Poor alignment can negatively impact tax revenue generation. Thus, applying this theory to assess the cooperative effects of electronic payment profiles, including internet payment systems, automated teller machines, point of sale systems, electronic billing machines, and mobile payments on tax revenue generation is essential.

Conceptual Framework

Personal Income Tax Personal income tax is a form of direct taxation imposed on an individual's income, including their earnings, ownership interests, and income from trusts and estates. The tax rate applied is based on the amount of taxable income attributed to the individual, and it determines their annual tax liability (Nwaiwu, 2022). Taxable income forms the cornerstone of the entire income tax system and plays a crucial role in determining an individual's tax obligations to the government. Taxpayers are entitled to a combined relief of two hundred thousand Naira (N200,000) or 1% of their total income, whichever is higher, and an additional 20% of their overall earnings.

The Personal Income Tax Act Cap P8 LFN 2004, as amended, serves as the legal framework for Personal Income Tax in Nigeria. The tax rate varies, ranging from 7% to 24%, depending on the level of income earned.

Individuals whose annual income falls below N300,000 are subject to a minimum tax of 1% of their gross income. The administration of this tax varies depending on whether an individual is a resident, in which case it is managed by the FCT/States Internal Revenue Service (SIRS). For non-residents, the Armed Forces, the police, and the Nigerian Foreign Service, the Federal Inland Revenue Service (FIRS) is responsible for tax collection. Taxpayers are required to submit their tax returns by March 31st each year, and the deadline for PAYE remittance is the 10th day of the following month. Every company must file a return of employee compensation and the corresponding tax deductions for the preceding year by January 31st. Failure to file a return may result in a fine of N5000, with an additional N100 for each day of non-compliance for up to six (6) months or both. Legal consequences may include fines of N500,000 for the corporate entity and for the individual if convicted.

Internet Payment System The term "Internet Payment System" refers to electronic transactions conducted over the internet using personal computers. Customers who have internet access can perform basic financial transactions online. Similar to mobile payments, internet payments leverage electronic card infrastructure to facilitate the initiation of payment instructions and the final settlement for goods and services conducted online between merchants and customers (Wolcola, 2017; Nwaiwu & Momo-Musa, 2022). In Nigeria, common uses of internet payments include settling commercial bills and purchasing airline tickets through merchants' websites. Essentially, this technology empowers customers with personal computers and internet access to monitor their accounts, generate account statements, and conduct financial transfers from the convenience of their office or home (Gandy, 2023).

Internet payment systems enable customers to engage in transactions with financial institutions without physically visiting their premises. Customers can conduct various business-related transactions with companies via the internet. Company partners can access earnings information, manage their company accounts, and execute transfers through a company-provided website that complies with stringent security regulations. This mode of payment not only streamlines financial interactions but also enhances accessibility and security in the digital age.



Source: Internet Payment Service (Bahaa, 2021; Okoye & Olayinka), Personal Income Tax (Severine, 2019; Abdulmumin, 2020).

Figure 1: Operational Framework of Internet payment system and Personal income tax in Nigeria.

Empirical Review

Numerous empirical studies have been conducted globally, examining the interplay between electronic payment systems and personal income tax, each offering different claims and arguments (Nwaiwu & Joseph, 2023). These empirical investigations delve into various aspects of this relationship, including its impact (Nwaiwu & Momoh-Musa, 2022), influence (Momoh – Musa & Ironkwe, 2021), and association (Zhu, Kraener & Xu, 2023) between internet payment systems and personal income tax (Krapera, 2017; Severine, 2019). Some studies also explore the broader relationship between electronic payment profiles and personal income tax (Sanga, 2015; Cornel, 2017; Alade, 2020). Remarkably, each of these studies employs distinct statistical and econometric

models to analyze their data, resulting in divergent findings and conclusions, albeit with some areas of agreement.

Furthermore, several empirical studies shed light on the relationship between internet payment systems and revenue generation. For instance, Onaolapo, Aworemi, and Ajala (2023) conducted research that examined the impact of value-added tax on revenue generation in Nigeria. Using data from sources such as the Central Bank of Nigeria statistical bulletin, the Federal Inland Revenue Service annual reports, and the Chartered Institute of Taxation of Nigeria journal, they employed stepwise regression analysis to analyze the data. The study's findings indicated that value-added tax has a statistically significant effect on revenue generation in Nigeria.

Ewa (2021) conducted a study titled "Appraisal of Self-Assessment Tax Policy in Nigeria," in which they evaluated the self-assessment tax policy by examining income streams from CIT, PPT, VAT against GDP, and annual budgets from 2002-2019. Their research utilized ordinary least squares statistics and revealed that the impact of the tax stream varied over time. They found that the pre-self-assessment period performed better than the post-self-assessment period, with a higher tax-to-GDP ratio and tax-to-budget ratio. However, the post-self-assessment period saw a decline in performance due to reduced petroleum profit taxes caused by declining profits in the petroleum sub-sector, attributed to global crude oil price slumps.

Bahaa (2021) conducted a study on the role of e-payments in enhancing financial performance, focusing on banks in Palestine. The research aimed to explore how electronic payments, specifically their impact on return on assets, return on equity, and earnings per share, enhance the financial performance of banks. They analyzed bank data from 2010 to 2019 and found that electronic payment methods positively impacted return on assets and equity, reducing costs and increasing profits. However, there was no statistically significant effect on earnings per share. The study recommended improving information security and strengthening the application of electronic payment tools.

Festus and Olabosipo (2020) conducted a study on the electronic payment system's impact on revenue generation in Lagos State. Their research aimed to evaluate the effect of electronic payment on revenue generation. They used survey research and found that electronic payment variables (ATM and ETC) had a significant and positive effect on personal income tax and penalties. The study concluded that electronic payment systems influenced revenue generation in Lagos State and recommended transparent and flexible leadership styles for government organizations.

Abdulmumin (2020) conducted a study on the role of e-payment systems in economic growth in Nigeria. The study analyzed the role of e-payment systems in economic growth using value and volume of e-payment transactions. They used multiple regression analysis, cointegration tests, granger causality tests, and vector error correction models. The results indicated that ATM and Internet transactions had a positive but insignificant relationship with economic growth. There was a negative and insignificant relationship between POS transactions and real GDP. The study recommended government investments in communication and internet infrastructure to capture a higher percentage of the population on e-payment platforms.

Oni, Musa, and Oni (2020) conducted a study on e-revenue adoption in State Internal Revenue Service, investigating factors affecting e-revenue adoption. They developed a conceptual research model that integrated technology, organization, and environment factors. The study found that financial cost, satisfaction with the existing system, internal need, government regulation, and competitive pressure significantly influenced the adoption of e-revenue in Nigeria.

Severine (2019) examined the role of e-payment on revenue collection in local government authorities in Tanzania. Their research found that e-payment increased tax compliance and provided a competitive edge in monitoring revenue sources and financial reporting. Challenges included poor connectivity and awareness, lack of technical assistance, and unreliable power supply. The study recommended addressing these challenges and integrating geographical information systems in the e-payment system.

Kessy (2019) conducted a study on electronic payment and revenue collection in local government authorities in Tanzania. The research concluded that e-payment influenced revenue collection by increasing tax compliance and improving financial reporting. Challenges included poor connectivity, limited awareness, lack of technical assistance, and poor technology experience among tax collectors. The study recommended addressing these challenges and integrating geographical information systems into the e-payment system.

Saidi (2018) studied the effect of e-payment technology on bank performance in emerging economies, using Nigeria as a case study. The research found that the introduction of electronic payment systems increased bank performance, especially with online channels, MMT, and POS technologies. The study recommended government examination of charges on online and mobile money payment transactions and increasing investment in internet security.

Olaoye and Atilola (2018) examined the effect of e-tax payment on revenue generation in Nigeria. Their research found an insignificant positive difference between pre and post value-added tax revenue, indicating that e-tax payment had an insignificant positive effect on value-added tax revenue in Nigeria.

Table 1 Webometric Investigation of Internet payment system and personal income tax.

Author/Year	Country	Predictor Variable	Criterion variable	Methodology	Empirical Findings
Nwankwo, Ugarn and Chukwu (2022)	Nigeria	Electronic Payment System	Personal income tax	Descriptive Statistics, unit root tests and ordinary least square regression.	The out come of the analytical tests revealed that automated teller machine payment, mobile banking payment, web-transfer payment had both positive and significant influence on tax revenue, while point of sales had positive and insignificant effect on personal income tax in Nigeria within the period reviewed. That the implication of these findings is that the adoption of electronic payment in Nigeria has significantly influenced, personal income tax.
Bahaa (2021)	Palestine	E-payment	Financial Performance	Descriptive and analytical approach.	The findings show the electronic payment methods have an important impact on the banks financial performance, through the return on assets and equity indicators, which helps to reduce cost and thus increase profits. However, there is no statistically significant effect on the earnings per share.
Okeye and Olayinka	Nigeria	Electronic taxation	Revenue Generation	Linear regression	The empirical result of the analysis showed that electronic tax payment,

(2021)				model and analysis of variance.	electronic tax clearance certificate issuance has significant effect on revenue generation in Lagos State. The result also indicated that the interaction of electronic tax payment, electronic tax filing and electronic tax clearance certificate issuance significantly influence personal income tax in Lagos State.
Abdulmum in (2020)	Nigeria	E-payment systems	Economic growth	Multiple regression analysis. Johansen cointegration test, Granger causality test and vector error correction model.	The results of the multiple regression analysis for model 1 and 2 shows that ATM and internet transactions is positive and insignificantly related to economic growth while there is a negative and insignificant relationship between POS transactions and real GDP in Nigeria. The result also shows that volume of mobile transactions is positive and significantly related to economic growth in Nigeria. The Granger causality test for model 1 shows the existence of a unidirectional causal relationship between value of POS, ATM and mobile transactions and real GDP. The Granger causality test for model 2, shows there is a unidirectional causal relationship from volume of POS, Mobile and internet transactions to real GDP. The Johansen cointegration test for both model 1 and 2 establishes the existence of a long run equilibrium relationship between e-payment systems and economic growth in Nigeria. The vector error corrections model results for model 1 & 2 shows the existence of short run between e-payment system and economic growth in Nigeria.
Adeybie and Akinyemi (2010)	Nigeria	Electronic payment system	Revenue generation	Percentage frequency table, analysis of variance and multiple linear regression technique.	The empirical study found out that electronic payment variables (ATM & ETC) have significant and positive effect on personal income tax. e-payment has significant and positive effect on rate and lastly, e-payment has significant and positive effect on penalty.
Olushola, Utibe, Okon and Osang	Nigeria	Nigeria's tax income	Economic Development	Ordinary least square regression.	Using GDP as an index economy, the results indicates a favourable connection between tax revenue and economic growth.

(2020)					
Severine (2019)	Tanzania	Electronic Payment	Revenue Collection	Descriptive statistics and linear regression.	The empirical findings revealed a positive linear relationship between e-payment and revenue collection in terms of tax compliance, monitoring of revenue sources, and financial reporting.
Severine (2019)	Tanzania	Electronic Payment	Revenue Collection	Descriptive statistics and linear regression.	The findings revealed that most of the respondents admitted that e-payment influences revenue collection by enabling the municipal increase tax compliance. Furthermore, the findings revealed a positive linear relationship between e-payment and revenue collection in terms of tax compliance, monitoring of revenue sources, and financial reporting.
Olaoye and Atilola (2018)	Nigeria	E-tax Payment	Revenue Generation	Trend analysis, descriptive statistics of mean and standard deviation, paired t-test.	The empirical findings revealed that there was insignificant positive difference between pre and post value added tax revenue with t-statistics and p-value of 0.520 and 0.612 respectively. This connotes that e-tax payment has insignificant positive effect on Value Added Tax revenue in Nigeria. Similarly, it was discovered that there was a positive insignificant difference between pre and post company income to revenue with t-statistics and p-value reported to be 0.833 and 0.421 respectively. That is e-tax payment has negative insignificant impact on Value Added Tax Revenue. Lastly, the findings revealed that a positive insignificant difference between pre and post capital gain tax revenue with t-statistics and p-value of 1.218 and 0.247 reported.
Burhan., Rashidah., Asifa., Adil and Shahal (2017)	Malaysia	Online Payment Systems	Future Considerations	Panel regression analysis.	The can be seen a huge growth in mobile payment methods globally beating both debit and credit card payments, all due to the convenience and security offered by them.

Methodology

The research design applied is causal – comparative design which attempts to explore the cause-effect relationship between two or more variables. The empirical study is to discover the effect of all electronic payment profile on personal income tax and establish the causal relationship of the variables. The study proposed that overall electronic payment profile have no-long run and short equilibrium relationship with personal income tax. The study adopts a natural scientific epistemological position acknowledged as a positivistic approach. The idea of positivism is that the nature of knowledge exists and that it can be measured by objective methods rather than subjective

judgment which mean that the social phenomena are independent of people. The study investigates the relationship between electronic payment profile and personal income tax in Nigeria. Therefore, the research population consists of fourteen (14) years spanning from 2008-2021. The data for the study were entirely secondary in nature because its design suggested content analysis of data in historical economic events and business transactions which were reported as electronic payment profile to justify with personal income tax. Such were sourced from the central bank of Nigeria statistical bulletin, annual reports of central bank of Nigeria, National Bureau of statistics and federal Inland Revenue Service. The choice of secondary data and its source were based on the fact that they are assumed to be reliable (Jones, Ihendinhu & Ibanichuka, 2015), adequate (Herbert, 2018) and are assume to be error free (Nwaiwu & Brown, 2021).

Model Specification

The model specification is based on the theory that electronic payment profile contribute to personal income tax in Nigeria (Ihendinihu, Jones & Nwaiwu, 2015; Nwaiwu, 2020). Specifically, the model from related empirical evidence used by Momoh-Musa and Nwaiwu (2021), Momoh-Musa and Ironkwe (2021), Nwaiwu and Momoh-Musa (2021), Nwaiwu and Joseph (2021), Nwaiwu and Amah (2021), Nwaiwu and Yekwe (2022) were adopted but the study made modifications. The econometric study generated three model specifications to achieve the objectives and answer the corresponding research questions. Consequently, the model specification were formulated in the following functional forms as thus;

$$PIT_{it} = \beta_0 + \beta_1(IPS_{it}) \tag{1}$$

Where the operational definitions are

PIT_{it} = Personal Income Tax ‘i’ for the period time ‘t’

IPS_{it} = Internet Payment System ‘i’ for the period time ‘t’

From the functional form, the study derive the mathematical model of the equations as follows;

$$PIT_{it} = \alpha_{oit} + \alpha_1 IPS_{it} \tag{2}$$

Converting the above mathematical form to econometric model by the application of constant term, coefficient and stochastic variable, the above model are represented as;

$$PIT_{it} = \beta_{oit} + \beta_1 IPS_{it} + \mu_{it} \tag{3}$$

Where: β_{oit} , λ_{oit} , δ_{oit} , γ_{oit} = Intercept term (parameter)

β_{1it} = Partial slope coefficients

μ_{it} = Error Term

it = for the period of time.

Apriori Expectation

Based on theories and empirical studies, the predictor variables are expected to display positive relationship with the criterion variable (personal income tax) which is therefore mathematically stated as;

Model 1: $\alpha_1 > 0$

The above signifies a positive relationship and movement of exogenous variable and endogenous variable. It is theoretically expected that increased internet payment system as detailed in this study will boost the pool of spendable government income. It is theoretically expected to enhance the government’s capacity to execute projects which will have multiplier effects on the general economy and through the economic multiplier effects, enhance Nigeria’s personal income tax, increase petroleum profit tax, value added tax, and customs and excise duties.

Data Analysis Technique

The data analyses were performed with descriptive statistic techniques and ordinary least square regression analysis to explore the relationship between the variables as expressed by the hypotheses. Other diagnostic test is conducted to establish validity. Such include stationarity test (Ihendinihu, Jones & Ibanichuka, 2014), Augmented Dickey-Fuller unit root test (Jones, Ihendinihu & Nwaiwu, 2015), Lag order selection criteria (Nwaiwu & Joseph, 2023), Autoregressive Distributed Lag Model (Nwaiwu, 2023), Bonds testing (Nwaiwu & Nwaiwu, 2022), Wald test (Joseph & Ironkwe, 2022),

Granger Causality(Joseph & Micah, 2022), Error Correction Model (Nwaiwu & Yekwe, 2022) with the aid of E-view version 12.

Results and Discussion

Presentation of Data

Table 2 Data Presentation of Personal income tax (PIT) and Internet payment system (IPS) in Nigeria 2009 – 2021.

Year	PIT	IPS
2009	227,900.00	24,573.09
2010	712,000.00	27,736.94
2011	806,000.00	29,095.04
2012	963,200.00	30,249.74
2013	963,200.00	32,785.73
2014	973,200.00	35,030.24
2015	976,533.00	36,705.05
2016	1,051,800.00	36,405.75
2017	1,079,111.00	36,073.21
2018	1,086,042.80	36,732.37
2019	1,122,369.20	37,546.90
2020	1,286,216.90	36,712.48
2021	1,349,656.75	38771.49

Source: Federal Inland Revenue Service (2021), Central Bank of Nigeria Statistical Bulletin (2021).

**Data Analysis
Stationarity Test**

This study proceeds to evaluate the stationarity of employed variables over the study period, which results are presented in table 2;

Table 3 Results of Unit Root Test (Augmented Dickey Fuller) at level

Variable	ADFT- statistics At Level	Mackinnon's test critical values @			Probability Level	Order of Integration	Decision
		1%	5%	10%			
Log(PIT)	-1.395056	-3.605593	-2.936942	-2.606857	0.5751	0(0)	Not stationary
Log(IPS)	-0.721062	-3.615588	-2.941145	-2.609066	0.8293	0(0)	Not stationary

Source: Extracts from E-Views 13.0 output.

The results of the test for the stationarity of employed variables at levels shown in table 4.3 above indicate that none of the study variable is stationary at level, since all the ADF t-statistics are on absolute basis lower than all Mackinnon’s test critical values at 1%, 5% and 10% respectively with all their significance levels far lower than 0.05 minimum acceptance level. Due to the insignificance of the study variables at level, the study proceeds to evaluate the stationarity of the employed variables at the first difference. The results are presented in Table 3.

Table 4: Results of Unit Root Test: (Augmented Dickey Fuller) at First Difference

Variable	ADFT- statistics	Mackinnon's test critical values @			Probability Level	Order of Integration	Decision
	At Level	1%	5%	10%			
D(Log(PIT))	-3.725984***	-3.610453	-2.938987	-2.607932	0.0059	1(1)	Stationary
D(Log(IPS))	-4.001623***	-4.296729	-3.568379	-3.218382	0.0050	1(1)	Stationary

*** sign at 10%, ** sign at 5% and * sign at 1%.

Source: Extracts from E-Views 13.0 output.

The stationarity test results at first difference presented in Table 4 above shows that all the employed variables are significant at first difference. The results therefore confirm absence of any unit root in the time series. To that extent therefore, all the employed variables are confirmed reliable for further estimations with minimal possibility of biases in long run estimations as well as satisfy conditions for employment in Bonds Test analysis. In light of the observe stationarity, the study therefore proceeds to the cointegration test.

Presentation of Bonds Test for Study

To evaluate the extent to which a valuable long run relationship prevailed among the employed variables, the study employed the Johansen’s cointegration technique. The results of the Johansen’s cointegration analysis are presented in table 4.5 below for the first study model, which employed personal income tax as the dependent variables.

Presentation of Bonds Test Analysis

Table 5: Results of Bonds Test Analysis for

ARDL Bounds Test

Included observations: 13

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	17.18625	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: E-Views 13.0 output extract

The above table shows that the F-statistics value of 17.18625 is significant at all probability levels. This shows to a large extent the presence of a long run relationship between all employed variables. This therefore leads to the need for an error correction estimation for the model.

Determination of Lag Lengths Selection Criteria for Employment of Error Correction Model:

Establishment of lag lengths is essential for error correction estimations. Principally because of the fact that past investments of revenues may begin to have effects on personal income tax in a later period. To ascertain the most suitable lag for the time series, the study proceeds to evaluate the lag length selection criteria. Before undertaking the error correction model, the study proceeds to evaluate the lag length selection criteria. Basically, suitable lag length determination enables the study determine the appropriate lag to infuse into the error correction model as shown in table 4.6 below.

Lag Length Selection for Model 1: Personal income tax (PIT).

Table 6 below shows the results of lag length selection for personal income tax model’s Error Correction Model.

Table 6: Results of Lag Length Selection for Model 1: Personal income tax (PIT).

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1959.771	NA	2.45e+41	112.3298	112.5964	112.4218
1	-1796.581	261.1036*	1.77e+38*	105.0618*	106.9282*	105.7061*
2	-1737.609	74.13701	5.75e+37	103.7491	107.2153	104.9456
3	-1620.038	107.4936	9.53e+35	99.08786	104.1539	100.8366

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: E-Views 13.0 output extract

Table 6 above shows that a maximum lag of 1 is ideal for the estimated model (1). In all, the various criteria values employed suggest that the first (1) lag of Log(PIT) Log(MOP) Log(POS), Log(IPS), and Log(ATM) which represent the respective differenced values of personal income tax, mobile payment, point of sale, internet payment service, and automated teller machine are ideal and appropriate. In the light of the results presented in Table 6 above, the study proceeds to use the first lag (1) of all employed variables in the first model, Personal income tax (PIT).

Presentation of Error Correction Model Estimations;

To ascertain the nature of long ran dynamics in the study models, the Error Correction Model was employed. The results are presented in table 6 below;

Error Correction Model Estimation for Model 1: Personal income tax (PIT)

Table 7: Results of Error Correction Estimation for Personal income tax (Model 1):

Vector Auto Regression Estimates
 Included observations: 13 after adjustments
 Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1				
LOG(PIT(-1))	1.000000				
LOG(IPS(-1))	18.23664 (8.18175) [2.22894]				
LOG(ATM(-1))	-11.64354 (8.63202) [-1.34888]				
C	252.3270				
Error Correction:	D(LOG(PIT))	D(LOG(MOP))	D(LOG(POS))	D(LOG(IPS))	D(LOG(ATM))
CointEq1	-0.053481 (0.09012) [-5.93321]	0.001640 (0.00691) [0.23723]	0.015193 (0.00412) [3.68582]	-0.000412 (0.00280) [-0.14687]	0.036472 (0.00846) [0.36472]
D(LOG(IPS(-1)))	-0.479452 (0.53006) [-0.90453]	0.376540 (0.40658) [0.92611]	0.047329 (0.24240) [0.19525]	0.481988 (0.16487) [2.92336]	0.376440 (0.40648) [0.92611]
D(LOG(IPS(-2)))	0.249782 (0.51537) [0.48466]	-0.216928 (0.39532) [-0.54874]	0.109563 (0.23569) [0.46486]	0.113524 (0.16031) [0.70817]	-0.216928 (0.39432) [-0.44874]
C	0.090580 (0.04447) [2.03706]	0.050070 (0.03411) [1.46797]	-0.038979 (0.02034) [-1.91682]	0.008016 (0.01383) [0.57956]	0.040070 (0.03411) [1.46797]
R-squared	0.702526	0.645315	0.418861	0.642089	0.644314
Adj. R-squared	0.610480	0.629405	0.232066	0.527046	0.629404
Sum sq. resids	0.286545	0.168597	0.059928	0.027724	0.168497
S.E. equation	0.101162	0.077597	0.046263	0.031467	0.077497
F-statistic	2.095993	0.528956	2.242361	5.581304	0.428946
Log likelihood	38.94182	49.01908	68.67216	83.31810	49.01908
Akaike AIC	-1.523254	-2.053636	-3.088009	-3.858847	-2.043636
Schwarz SC	-1.092310	-1.622692	-2.657065	-3.427903	-1.622692
Mean dependent	0.158744	0.053982	0.015509	0.051089	0.043982
S.D. dependent	0.113851	0.073017	0.052793	0.045755	0.073017
Determinant resid covariance (dof adj.)	8.96E-11				
Determinant resid covariance	2.64E-11				
Log likelihood	247.0997				

Akaike information criterion	-10.68946
Schwarz criterion	-8.793307
Number of coefficients	44

Source: E-Views 13.0 output extract

From the results of Error Correction estimations for personal income tax (PIT) model 1, it can be observed that after adjusting for short-run distortions, variations in the study's explanatory variables jointly explain 70.25% of variations in Personal income tax (PIT). The absolute value of the ECM is 5.35%. This implies that 91.86% of the disequilibrium in Nigeria's Personal income tax is offset by short-run adjustments in the study's explanatory (predictor) variables yearly. The ECM value of 5.35% is also associated with a probability value of 0.0000, which is statistically significant at the 0.05 level. The results indicate that in the long run, lagged values of mobile payment, current values of point of sale have significant influences on Nigeria's personal income tax (PIT) as a proxy for personal income tax.

Hypotheses Testing

H₀: There is no significant relationship between internet payment service and personal income tax in Nigeria.

Going by the long run estimates in Table 7, the internet payment service (IPS) in both current and one-year lagged forms show t-values of 2.22894 and -0.90453 respectively. The study therefore accepts the null hypothesis for Internet Payment Service and invariably reject the alternate hypothesis. We therefore conclude that Internet Payment Service does not significantly influence personal income tax in Nigeria as a personal income tax indicator. Internet payment services (IPS) may indirectly affect personal income tax revenue in a similar way to point of sale (POS) transactions. If the growth of IPS leads to an increase in economic activity, this could result in more income being earned by individuals, which could, in turn, increase the amount of personal income tax revenue collected by the government. Moreover, the use of IPS can enable businesses and individuals to conduct transactions more efficiently, securely, and at a lower cost, which can lead to an increase in business activity and economic growth. This, in turn, can lead to an increase in the number of taxable transactions, resulting in higher personal income tax revenue for the government. However, as with POS, the impact of IPS on personal income tax revenue would depend on various factors, such as the level of adoption of IPS, the types of transactions conducted using IPS, and the tax policies of the government. It is also worth noting that the use of IPS may create opportunities for tax evasion, which would have a negative impact on personal income tax revenue.

Internet Payment Service and Personal income tax: This variable demonstrates a positive but insignificant influence on variations in Personal income tax (PIT) as personal income tax indicator in Nigeria. The results probably emanate from the obvious fact that Internet Payment Services are more difficult to collect in Nigeria arising from issues bordering on inaccurate declarations of income by traders.

Conclusion and Recommendations

This study evaluated the nature of prevailing interrelationships between internet payment system in Nigeria and her personal income tax indicators over the period 2009 - 2021. The study employed both the current and one-year lagged values of the internet payment system elements as appropriately determined through the lag-length selection test, which was used to determine the optimal lag length appropriate. This is because of the profound fact that some current government internet payment system expenditures on personal income tax projects could become of significant effect on the nation's personal income tax indicators in later periods. The study accordingly employed both the current and one-period lagged values of Internet Payment Service (IPS). Further, the study employed stationarity test and observed all the variables to be stationary at the first difference. The study

proceeded to evaluate the nature of prevailing long-run relationships by employing the Bonds Test method. The results show significant long-run relationships between all employed variables per model of the study. In the long run, the study assessed the varying influences of employed electronic payment usage level on Nigeria's personal income tax and observed that; internet Payment Service (IPS) demonstrated a positive but insignificantly relate to variations in Personal Income Tax (PIT) as personal income tax indicator in Nigeria.

Internet Payment Service demonstrates a positive but insignificant influence on variations in Personal income tax (PIT) in Nigeria. The results probably emanate from the obvious fact that Internet Payment Services are more difficult to collect in Nigeria arising from issues bordering on inaccurate declarations of income by workers.

Recommendations

In accordance with the results of this study, the following recommendations are made;

- i. The government can incentivize individuals and businesses to adopt electronic payment systems by offering tax credits, reducing transaction fees, or providing other financial incentives. This would encourage more people to use electronic payment systems, leading to increased transaction volumes and higher revenue.
- ii. Security concerns are a significant barrier to the adoption of electronic payment systems. The government can work with financial institutions to improve the security and reliability of electronic payment systems, thereby boosting confidence in the systems and encouraging more people to use them.
- iii. The government can work with financial institutions and other stakeholders to expand access to electronic payment infrastructure, particularly in rural areas where access is limited. This would increase the number of people using electronic payment systems and boost transaction volumes, leading to higher revenue.
- iv. Many people in Nigeria may be hesitant to adopt electronic payment systems because they are unfamiliar with them. The government can launch campaigns to enhance financial literacy and educate people about the benefits of electronic payment systems. This would encourage more people to use electronic payment systems and boost transaction volumes.
- v. The government can use electronic payment systems to enforce tax compliance by requiring individuals and businesses to use electronic payment systems for certain types of transactions. This would reduce tax evasion and increase revenue collection.
- vi. Stakeholders should place high emphasis on technology and internet infrastructure in order to make access to these e-payment channels and structure cheaper for the population. This will increase e-payment structure in the country and improve efficiency in trade, marketing and payment of goods and services in Nigeria.

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