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University of Port Harcourt, Choba Port Harcourt.****Abstract**

The study evaluated the implication of tax compliance expenditure on personal income tax in Nigeria over the period of 1981 to 2021. The study employed tax payer education, law enforcement, technology adoption, tax payer service and legal support as proxies for tax compliance expenditures. Secondary data were collected from the Central Bank of Nigeria Statistical Bulletin and the Federal Inland Revenue Service annual report. The analytical techniques used include stationarity, Johansen's co-integration, error correction estimations and Granger causality tests. The study observed that tax payer education is observed to be significant at first lag with a negative relationship with personal income tax in Nigeria. Law enforcement displayed at current level, a positive and significant influence on personal income tax. Technology adoption demonstrated a positive but insignificant influence on variations in personal income tax as government tax revenue collection indicator in Nigeria. Tax payer service showed a positive and insignificant influence on Personal income tax in Nigeria. Legal support (LPS) had at current and first lags a positive and significant influences on personal income tax (PIT). i. Despite the unexpected negative sensitivity of PIT to tax payer education, it is crucial to continue investing in educational initiatives. However, these efforts should be tailored to address specific barriers to compliance. Conducting targeted educational campaigns and workshops could help bridge the gap between tax payer education and actual compliance. ii. Recognizing the positive impact of law enforcement on PIT, there is a need to strengthen legal and regulatory frameworks. This includes improving the enforcement of tax laws and ensuring that legal measures serve as reliable collateral for tax revenue. Policymakers should consider initiatives to enhance the capacity and effectiveness of law enforcement agencies in dealing with tax-related matters.

Keywords: Tax Compliance, Tax Revenue Generation, Personal Income Tax, Company Income Tax, Taxation.

Introduction

Sustainable tax revenue generation requires focusing attention of policy makers and government to achievement of prosperity in the society, such that the objective of taxation as the major source of revenue for most countries is directed at the provision of public goods and infrastructure to meet the expectations of the present and the future hopes of the society. Tax revenue is a portion of the total revenue accruing to government (Tanzi & Zee, 2020; Nwaiwu&Ironkwe, 2021). Taxes accrued from companies' income tax (Agu &Ironkwe, 2021), personal income tax (Alasfour, 2019; Nwaiwu, 2022), petroleum profits tax (Mbillia, Abiire, Atindaura&Ayumpaya, 2020), customs and exercise duties (Olarankinse&Oloruntoba, 2021). Withholding tax from corporate entities and federal capital territory (Assfaw&Sewdhu, 2019; Agu, 2022), value added tax (Olaoge, Ashaolu&Adewoye, 2019). Ozele, Ralph and Atu (2018) underscore the fact that adequate tax revenue generation was predicated on the nature and knowledge of the tax law and regulations Somorn (2020) noted that "government should be transparent in accounting for the revenue it generated through taxation by investing in the provision of infrastructure, public goods and services which earns the government public trust. There is a presupposition in these thoughts that the public are knowledgeable and aware of tax laws and the performance of the government.

Marina (2022) asserts that the sole and realistic way of mobilizing resources to meet public expenditure on goods and services required by the citizenry is taxation. But this is not entirely the cause since same third world countries have alternative sources of revenue besides taxation like user fees and licenses levied on services provided by government ministries, departments and state agencies, including proceeds from the disposal of public assets and denationalization of 'oiling' state corporations. Furthermore, a number of emerging economies rely heavily on external funding as an alternative source of income (Bandura &Weerasouriya, 2019; Nwaiwu& Joseph, 2022).

Generating revenue locally is given precedence by many nations in sub-Saharan Africa (Eragble& Modugu, 2014; Jayewardene & law, 2016). Raising revenue enables many governments in developing countries achieve financial superiority, avail basic state. Amenities to its people, lower dependency on external support which in most cases has strings attached and diversify sources of revenue. On the contrary, tax avoidance and evasion in the local scene has hampered the growth of domestic tax base (IMF, 2011). Even with the increasing and persistent world-wide

challenge of tax non-compliance (Ayumas, 2016; Yunus, Ranli, & Syuhaha, 2017), it is evident that most developing economies especially in the Sub-Saharan Africa are the worst affected (Kosler, Mattono & Kirchler, 2016; Brown & Best, 2022). Masinde and Makan (2020) assert that taxes are critical in budgetary projections of an economy and one of the major reasons why taxes are levied to raise revenue for economic management and allocation of resources for economic stabilization. Numerous interventions in the form of administrative initiatives have been put in place in the past by Nigerian government to enhance revenue generation. Among the interventions implemented to boost tax revenue is self-assessment systems (SAS). The aim of the strategy is to enhance voluntary compliance, ease the complexity involved in evaluating tax returns and made the process of raising tax revenue more effective (cut down the cost of collecting tax revenue) (Abiola, 2016; Chan, Troutman & O'Brayan, 2020). Even with the various tax management changes, the degree to revenue collection regulations has remained minimal (Eriksen & Fallah, 2016; Aderibigbe, Oke & Oyedokun, 2018; Verbom & Dijke, 2021).

Deeman and Klun (2015), Edori, Edori and Idatora (2017) noted that the debates around tax policies and public participation in decision making were a crucial public concern, to individual business enterprises and to the whole economy because of the varied efforts on each of the entities. Consequently, tax related inequalities emanate from differences in the structure and performance of the tax system and therefore it is the responsibility of the state to institute a just and fair tax regime for balanced distribution of income and welfare services to its citizens. Additionally, the other significant indicators of a just and fair tax regime are simplicity, adequacy and neutrality. The promulgation of the new constitution in Nigeria in 2020 has brought about a three tier system of governance; the national and 36 state governments (Mos'ud, Aligu & Ganbo, 2014; Eneje & Ekwueme, 2018).

Strikingly, in developing countries regarding to tax collection many researchers indicated that there is low capacity of tax administration to minister compliance among taxpayers and the potential amount of tax revenue has not been collected in an efficient and equitable manner (Chau, Troutman & O'Bryan, 2020; Ayo, 2021). Moreover, according to the International Monetary Fund (IMF) report the domestic tax bases in most African countries are undermined by widespread tax avoidance and evasion (IMF, 2011). Many researchers works agreed that collecting tax revenue and tax administration is a serious problem due to corruption, smuggling and tax evasion and avoidance in many of sub-Saharan Africa countries (Cobhan, 2015; Fuest and Riedel, 2019; Agu, 2021). Therefore, to overcome these challenges governments, tax policymakers, economic strategist and researcher should design and implement modern tax administration systems which enable to prevent and protect the above and the coming problems. Due to this fact taxation in developing countries is a challenging topic and has attracted increasing attention to the researchers.

Despite decades of implications of tax compliance education in many countries, still the question of how it relate to tax revenue generation is not fully addressed in academic circles. The empirical literature proffers few studies that examined the relationship of tax compliance education and tax revenue generation (Abudul & Wang'Omta, 2018; Adegboye, Alao-Ownna & Eshareubu, 2018; Andrenalet, Evard & Feinstein, 2018; Chan, Troutman & O'Bryan, 2020; Nwaiwu, 2022). However, the findings of these studies are not consistent and have some limitations which encourage further investigation. See, Eviken & Fullah, 2016; Iite & Hasseldine, 2019) found out that tax compliance education significantly and positively relate to tax revenue generation in Nigeria, Kenya and Bangladesh, Nwaiwu (2021) opined that, despite that reforms undertaken in Nigeria, tax laws do not encourage taxpayers to comply. However, this empirical study did not assess the impact of tax compliance education on tax revenue generation in Nigeria.

Literature also show few empirical studies that the impact of tax compliance on tax revenue generation (James & Alley, 2014, Ahmad & Kedir, 2015; Le, 2016; Mehari, Abdulmgeub & Pashe, 2017; Oyedele, 2019; Tanzi & Zee, 2020). There empirical studies assess tax compliance education in terms of the taxpayer education, taxpayer service on tax revenue only and ignore technology adoption and law enforcement, on tax revenue which are also important variables in assessing tax compliance on tax revenue. However, these studies portray conflicting results, and some studies found that tax compliance improved tax revenue generation (Muhrtalet & Ogundeji, 2013; Feyifimi & Yusuf, 2014) while other empirical studies found that tax compliance failed to improve tax revenue generation (Kirillee, 2007; Liucija, 2013). Moreover, many studies have been conducted in developed countries and ignore many developing countries that also simplified their tax compliance laws. The findings of existing studies can not be applied effectively by developing countries, because of cultural, socio-economic as well as tax system differences. To fill this lacuna, this study explore empirical the relationship between tax compliance expenditure and personal income tax in Nigeria. The scope of this study centred on tax compliance expenditure and its dimensions which are taxpayer education, law enforcement, technology adoption and tax service. It also addressed the measures of tax revenue generation, which are personal income tax, companies' income tax, petroleum profit tax and value added tax.

Literature Review**Theoretical Framework**

The theoretical framework is generally seen as a bedrock on which knowledge is constructed for research work. It provides a platform for understanding and guiding the discussions that underlie the study. In this study, the following theories formed a platform on which the empirical study is placed.

Fiscal Exchange Theory

The proponents of the fiscal exchange theory assert that the occurrence of expenditures by the government a recipe to encourage greater adherence to tax obligations and that state can enhance voluntary submission by availing amenities that people favor in a highly effective and manageable fashion (Cowell & Gordon 1988; Levi 1988; Tilly 1992; Moore 2004; 1998). Alm et al., (1992) noted that tax compliance rises with (perceptions of) the abundance of goods and services of public interest. Accordingly, taxpayers majorly look at the direct benefit for using their resources to pay tax; this may be through provision of public goods and services (quid pro quo). This model interprets the process of taxation and the provision of goods and services of public interest in the form of a contractual connection that binds the government through its tax management authority and the tax paying agents (Moore 2004). Citizens of a country and organizations may voluntarily honor their tax obligations because they appreciate the benefits of the amenities availed by the state, they recognize that their tax remittances are significant by either helping to fund provision of public utilities that include goods and services or by motivating other citizens to voluntarily participate in tax payment (Fjeldstad & Semboja, 2001).

Regulatory Compliance Theory

Regulatory compliance theory was first proposed in the 1970s when the relationship between compliance with rules was compared to compliance with best practice standards and outcome data. The theory of regulatory compliance (TRS) deals with the importance and significance of complying with rules or regulations. This theory has implications for all rule, regulatory, standards development throughout human service and economic domains. It emphasizes on selecting the right rules rather than having more or less rules and the nature of these rules as being significantly predictive of positive outcomes by being in compliance with said rules. The compliance theory provides justification for the empirically established behavior of the tax controllers to institute concurrently numerous, heterogeneous targets (Jayapalam, 2018).

Conceptual Framework

The key concepts of the study are briefly discussed in this sub-section. Specifically, the concepts of tax revenue generation, tax compliance expenditure and its measures, together with the justification for the proxies used are provided.

Conceptual framework is a written or visual presentation that “explains either graphically, or in narrative form, the main things to be studied, the key factors, concepts or variables and the presumed relationship among them (Miles; 1999; Nwaiwu 2021). It can also be defined as a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Wong & Wai-Yee 2015; Nwaiwu & Joseph, 2021). The figure 2.1 below shows the conceptual framework depicting the relationship between tax compliance expenditure and tax revenue generation in Nigeria.

Tax Revenue Generation

Tax revenue is one of the major sources of revenue to government and for financing the government expenditures in terms of programmes and infrastructural developments. Alaray, Mohammed and Bastaman (2018), countries depend on revenue generated from taxes to fund and support government expenditures as highlighted in the annual budget. In both developed and developing economies, taxes are seen as a major source of revenue and ranked high in developed countries like France, Norway, United Kingdom (UK), United States of America, and others (Ofurum, Amaefule, Okonya and Amaefule, 2018). In a developed economy such as USA, report according to organization for Economic Cooperation and Development (OECD), (2017) stipulated that taxes accounted for 50 percent of all government revenues for the past decade while Ofurumetal., (2018), reported that in line with the USA revenue budget for 2018, taxes accounted for higher percentage of the revenue generated by the USA government as highlighted in the 2018 annual budget performance.

Nwaiwu&Ironkwe (2021), tax non-compliance is a form of tax cheating by which the tax payer cheats that this should be a critical concern to government and other relevant stakeholders due to government's inefficiency and ineffectiveness in the discharge of electioneering promises. Despite the various measures and tax reform taken by the government and relevant stakeholders in Nigeria to enhance tax compliance, tax non-compliance still posed serious challenge to revenue generation which hinders management and efficient administration of the nation (Beal & Wayatt, 2017; Kira, 2017). In Nigeria, some researchers had expressed various factors responsible for tax payers compliance behaviour. Some of the relevant studies that had been conducted in the past in respect of tax compliance were public government quality with moderating variable of financial condition and risks performance.

Personal Income Tax

The issue of tax non-compliance cuts across all economies of the world. From developed economies with organized financial markets such as United kingdom, France, Germany, United State of America, Spain, Italy, Japan down to developing (emerging) markets such as the Russia, India, Brazil, South Africa to other less developed (Frontier) markets such as Ethiopia, Ghana, Togo, Zimbabwe, Cameroun and Nigeria amongst other where financial activity is relatively low (Muhrtolal&Ogundeji, 2013; Dasilva, Gnerreiro& Flores, 2019). Tax compliance is the degree to which a tax payer complies with the tax rules of is country (Ahmed & Kedir, 2015). The payment of tax is an obligatory duty for all citizens as their civic responsibility, which they are expected to comply willingly with, but that is not the case with same citizens. The understanding of the factors that influence taxpayers' decision to comply with relevant tax laws is essential to the relevant tax authorities (Feyitimi& Yusuf, 2014). Tax compliance is described as the process of accomplishing the tax payers civic responsibility for tax payment and filing of tax returns including the provision of the required documents and the necessary explanations as required by the tax authority in a timely manner (Onyedele, 2019).

Tax Compliance Expenditure

It is a requirement that all tax management authorities focus their attention on attainment optimum compliance. This implies that overall adherence to taxation laws and regulations should be maximum. To achieve this, authorities have allocated a substantial amount of resources, consequently, a lot of caution should be taken when making decisions on the mode and through which the assigned resources will be used to realize the most superior result as far as enhanced compliance with the revenue collection rules are concerned. One of the major issues that has a close relationship with compliance to the tax requirements, is the fundamental question of determining the priorities for adherence response and the particular activities to be undertaken (Jamel & Michael, 2021). The main objective and concern of any tax administration, is raise the taxes and other levies expected to be paid with regard with established policy and carry out this process in a way that is bound to develop and nurture sustainable trust in the tax regime and its management. Adherence to tax obligations is a critical issue to many tax agents. To persuade taxpayers to conform to the tax regulations is also another demanding task that is not easy to achieve owing to the fact that tax laws are complex, rigid and never precise (James & Alley, 2014).The concept of compliance to taxation requirements in the simplest form possible is often perceived in terms of the extent to which tax paying agents conform with the taxation rules (James, 2019).However, in concurrence with other similar concepts, compliance is always considered to have a range of explanations. One particular dimension fronted and popularly accepted is that the extent of failure to comply may be determined in relation to the „tax gap“. This describes the deviation between the actual tax income raised and the levels projected to be raised if conformity to tax regulations were 100% (James, 2019).

Tax Payer Education

The effort by tax authorities and the state in general to educate taxpayers is among the commonly applied initiatives meant to enhance delivery of services to the taxpayers. It believed that making service delivery better is crucial to promote voluntary compliance to tax requirements. Absence of willingness to comply with tax obligations induces income authorities to employ expensive and punitive approaches to enforce tax (Fjeldstad & Ranker, 2018). Therefore, education for taxpayers is a vital instrument formulated to make it possible and easy for the taxpayers to significantly comprehend the rules and regulations of taxation and processes. It concerns with training of specialized components within the income departments, provision of education, counselling and supporting of the tax paying agents. This is carried out through various forms of media that may include newspapers, televised programs, radio programs, websites, workshops, and customer care desks to help fundamentally distribute crucial information to the taxpayers (Siti, Normala& Sheik, 2017).

Tax Law Enforcement

Enforcement in administration of taxes plays crucial role in enhancing tax compliance. Enforcement task involves the use of myriad of tools in ensuring tax compliance. The essence of enforcement is to ensure strict adherence to various tax compliance ranging from timely filing, accurate filing, to payment of tax liability s at when due. Primarily, enforcement is not for tax defaulters alone who falls in their tax responsibilities but to consistent filers to encourage continuous compliance (Ibrahim, 2016).

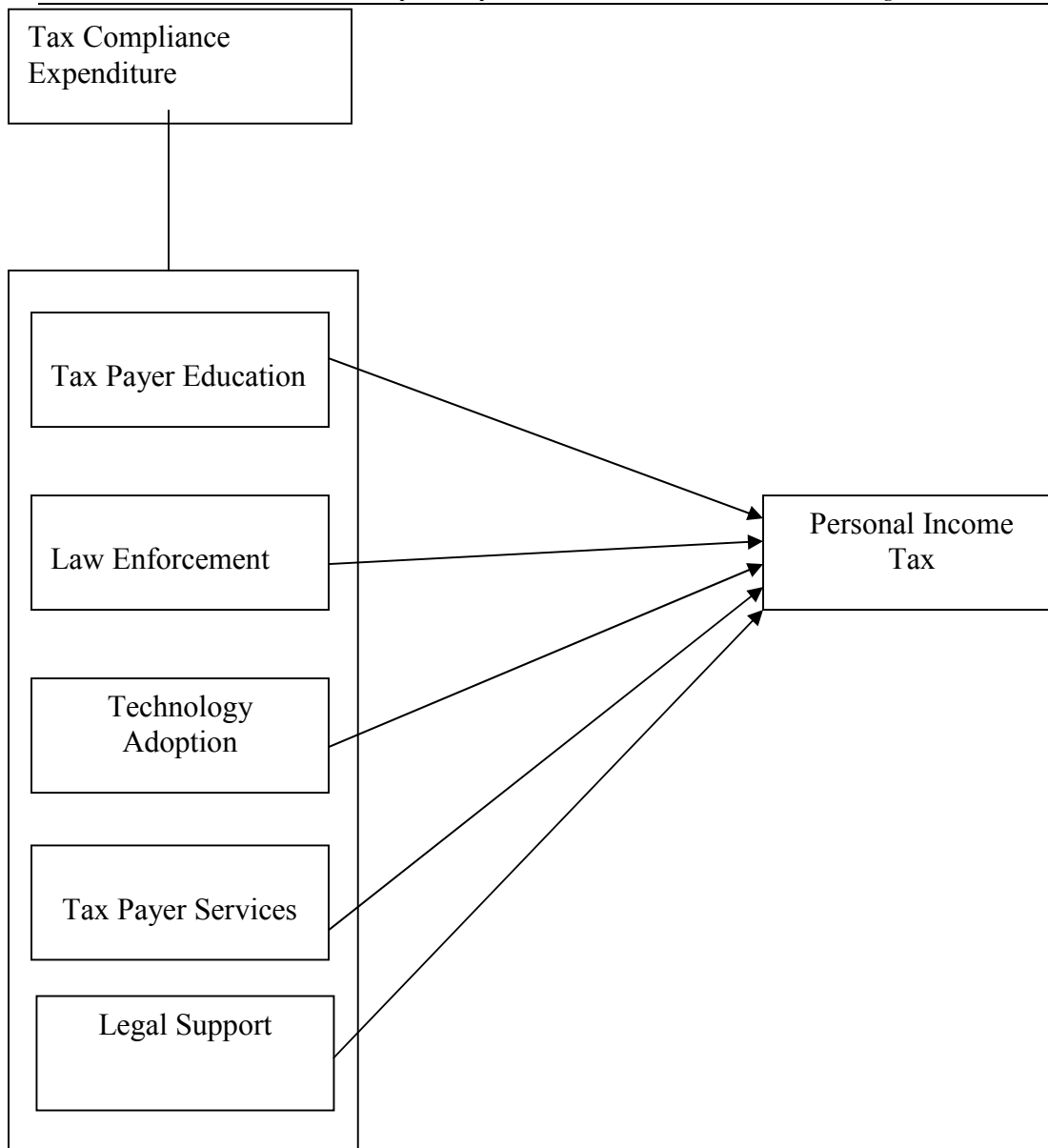
Tax compliance mechanisms my take various forms depending on tax authorities. In modern day, more than often, compliance tools may include levies, search and seizures of defaulting tax payers, fines, seeking and obtaining information from third parties like banks and court actions. Tax enforcement ordinarily refers to an act of ensuring that taxpayer comply with tax law or rules. Enforcement with tax administration takes two forms namely; enforcement of tax laws and enforcement of judgment. There is enforcement of tax which is the application of all those relevant laws that will assist the tax authorities in carrying out their duties, not laws necessarily relating to the taxation but are relevant to the enforcement of tax laws (Nwaiwu, 2022). Enforcement of judgment on the other hand represent already decided court case against defaulted tax payment (Macharia, 2014). In Nigeria tax system, tax administration may not be efficient without tax enforcement because of the sharp practices among larger percentage of taxpayer.

Technology adoption

Use of technology to file tax returns involves the process of forwarding tax information to a revenue authority electronically, often excludes the practice of having to submit paper documents. Currently, filing of tax returns by electronic systems is a government application that is being utilized with increasing frequency all over the world. Such arrangements are in particular useful for governments since they have the ability to reduce and even avoid the mistakes commonly committed by taxpayers during manual filings. They also fundamentally help to deter attempts to evade tax through data matching. (Machogu&Abayi, 2018) suggest that the data base developed using electronic tax filings can allow tax inspectors to analyze declarations more thoroughly, and enable policymakers to develop fairer and more efficient policies.

Taxpayer Services

Mikessel (2018) proposes that the fundamental objective for any revenue authority is to have an effectively and efficiently program of program of taxpayer services .The generally complicated guidelines for tax payment together with the vast and raising numbers of potential taxpayers to be taken care of by a taxation program requires that all revenue authorities should depend considerably on taxpayers' tendency to voluntarily comply in order to realize and even surpass the tax level expected of them. It is clear that if a tax authority has to obtain optimum levels of voluntary conformance, taxpayers and their agents must operate within an efficient standard of services to enable understand that it is their duty according to the law to follow the regulations expected of them in the event of fulfilling tax payment responsibility.



Source: Tax Compliance Expenditure (Ibrahim, 2015), Taxpayer Education(Mbilla, Abirie and Atindara, 2010), Law Enforcement (Kehinde, 2017; Oseni (2021), Taxpayer Service (Osho, Omotayo and Ayorinda, 2018), Tax Revenue Generation (Nwaiwu&Ironkwe 2021), Personal Income tax (Olurankinse&Olorumtaba, 2021),.

Figure 2.3: Operational Framework of tax Compliance Expenditure and Personal Income Tax Collection in Nigeria.

Empirical Review

Jackson and Fred (2022) studied effect of taxpayer education and law enforcement strategies on the level of tax revenue in Kenya. This empirical study sought to establish the effect of taxpayer education on government tax revenue in Kenya. The study is pegged on the fiscal regulatory compliance theory. Revenue data between 1980-2020 were used in the study. Ordinary least square technique (OLS) were employed to establish the long run effect of expenditure on taxpayer education and law enforcement on government tax revenues. The effect of variables were established through analysis and regression analysis. The results indicated a positive and significant effect of tax enforcement strategy on tax revenue in Kenya. The study concluded that taxpayer education strategy and law enforcement strategy affected tax revenue in a positive and significant way. The study recommended that government should continue providing taxpayer education. Further, the government should continue to up its tax compliance enforcement efforts.

Karemera (2022), examined the impact of tax audit on taxpayer's compliance in Rwanda. The aim of this research is to assess the impact of tax audit on tax payers' compliance. Towards the fulfillment of general objectives of the research, the following were specific objectives. To assess the extent to which tax audit helps the tax officials to identify the tax evasion and other tax malpractices. To find out if tax audit help in submission of accurate tax return. To find out whether taxpayers cooperate during tax audit exercise. To examine whether outcome of tax audit help improve taxpayers' compliance. For this study, the researcher applied descriptive analysis using the fact that a descriptive research design is used to describe the data and characteristic about what is being studied. The population under this research consisted of tax auditors totally 113. This study incorporated both quantitative and qualitative research approaches. The stratified sampling technique was used to select 88 respondents to be included in the sample. The main finding of the study include among other; revealed that tax audit towards achieving tax target revenue, that tax audit reduce the problems of tax evasion, that tax payers sod not usually cooperation. With tax audit personnel during the exercise.

The Pearson correlation coefficient above reveals that there is a positive moderate relationship between tax audit and tax compliance. Therefore accepted that the hypothesis at tit is shown by the Pearson correlation of 0.673** tested at 0.01 level of significance. Also the correlation shows a gap of 0.327 that needs to be closed by the auditors of Rwanda revenue authority. In concluding, the results not only have the potential to contribute theoretically to public finance but also to the area of institutional performance. the study also recommends that Rwanda revenue Authority auditors should make all possible ways that taxpayers feel comfortable and cooperate during tax auditing exercise and to continue intensify taxpayer education and sensitization programme across the country, it needs to keep strengthening the use of new technologies to ease the work of its partners in business.

Olujobo and Olayinka (2022) Study tax compliance and government revenue growth in Nigeria. The study examines the effects of tax compliance on the growth of government revenue in Nigeria with emphasis on federally collected non-oil revenue. Secondary data were sourced from the Federal Inland Revenue Service Management Bulletin. The data were analyzed using ordinary least square regression. The findings revealed that tax compliance have significant effect on boosting tax revenue generation and that tax default can cause significant variation in government revenue. The variables in the model is significant at the 5% critical level and the regression coefficient reveals tht 88.8% of the total variation in revenue is accounted for by tax compliance with other variables in the stochastic term accounting for their remaining 11.2%. It is recommended that Federal Inland Revenue service should open more offices across the federation to increase the case of paying taxes, set performance targets for managers of tax offices and sanction for non-performance, improve on leadership accountability at all levels of government and ensure that tax revenue is transparently utilized so that taxpayers can see the benefits accruable from tax payment and take ownership of public infrastructures.

Abata (2022). Investigate the impact of tax revenue using questionnaire administered on one hundred staff of federal Board of Inland Revenue in Lagos State to determine the effect of tax evasion on Nigeria economy, the relationship between tax policies and social development, and the effect of incompetent tax officials on Nigeria economy. Chi-square tests were used in analyzing data. The study found that tax avoidance is due to low level of income while failure to pay tax is because people don't feel the impact of doing so. The implementation of government budget is usually not successful in Nigeria because of ineffective tax administrative system, while training and development of tax officials in Nigeria because of ineffective tax administrative system, while training and development of tax officials does not significantly affect the generation of tax revenue in Nigeria. The study recommended that notice of tax returns should be supported with hand bills in local languages such as Yoruba, Hausa, Igbo, and other languages as this will enable illiterates perform their civil responsibilities.

Onafowokam and Olalekan (2022) conducted empirical study on tax compliance and government revenue growth in Nigeria. The study examine the tax compliance on growth of government revenue in Nigeria with emphasis on federally collected non-oil revenue secondary data was sourced from the federal inland revenue service management bulletin. The data were analyzed using ordinary least square regression. The findings revealed that tax compliance have significant effect on boosting tax revenue generation and that tax default can cause significant variation in government revenue. The variables in the model is significant at the 5% critical level and the regression coefficient reveals that 88.8% of the total variation in revenue is accounted for by tax compliance with other variables in the stochastic term accounting for the remaining 11.2%. it is recommended that federal inland revenue service should open more offices across the federation to increase the ease of paying taxes, set performance targets for managers of tax offices and sanction for non-performance, improve on leadership accountability at all levels of government and ensure that tax revenue is transparently utilized so that taxpayers can see the benefits accruable from tax payment and take ownership of public infrastructures.

Abata (2022) investigated the impact of tax revenue generation using questionnaire administered on one hundred staff of federal Inland Revenue service in Lagos State to determine the effect of tax evasion on Nigerian economy, the relationship between tax policies and social development and the effect of incompetent tax officials on Nigerian economy. The study adopted ex-post facto research design and the data were secondary in nature. Chi-square tests were used in analyzing the data collected. The study found that tax avoidance is due to level of income while failure to pay tax is because people don't feel the impact of doing so. The implementation of government budget is usually not successful in Nigeria because of ineffective tax administrative system. While training and development of tax officials does not significantly affect the generation of tax revenue in Nigeria. The study conclude that impact of tax revenue using questionnaire administered does no affect staff of federal inland revenue service in Lagos and recommends that notice of tax revenue should not be supported with hand bills in local languages such as Yoruba, Hausa, Igbo and other languages as this will enable illiterates perform their civil responsibilities

Table 2.1: Webometric Analysis of tax Compliance Expenditure and Tax Revenue Generation in Nigeria.

Name/Year	Country	Methodology	Research Topic	Empirical Findings
Oluyommo and Olayinka (2022)	Nigeria	Ordinary least square regression	Tax compliance and government revenue growth in Nigeria.	The findings revealed that tax compliance have significant effect on boosting tax revenue generation and that tax default can cause significant variation in government revenue.
Abata (2022)	Nigeria	Chi-square tests	Impact of tax revenue administered on staff of federal inland revenue in Lagos state.	The study found that tax avoidance is due to low level of income while failure to pay tax is because people don't feel the impact of dong so.
Karamera (2022)	Rwanda	Descriptive Analysis	Impact of taxpayers compliance in Rwanda.	The empirical study reviewed that tax audit towards achieving tax target revenue, that tax audit reduce the problem of tax evasion, that tax payers but usually cooperation.
Olurankinse and Olaruntoba (2021)	Nigeria	Panel least square regression technique.	Good governance and personal income tax compliance in Nigeria.	It was discovered that there is significant relationship between tax fairness and personal income tax in Nigeria and also there are perceptions of tax payers towards good governance and personal income tax compliance in the country. Specifically, tax fairness enhances the PIT compliance among the sampled respondents and perception tax payer of a good governance contribute significantly to the PIT compliance.
Zelalem (2021)	Addis Ababa	Ordinary least square regression analysis	The influence of tax education on tax compliance attitude.	The results indicted that tax compliance is influenced by tax education.

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Olurankuse and Oloruntoba (2021)	Nigeria	Panel least square regression technique.	Good governance and personal income tax compliance.	It was discovered that there is no significant relationship between tax fairness and personal income tax in Nigeria and also there are perceptions of tax payers towards good governance and personal income tax compliance in the country. Specifically tax fairness enhances the personal income tax compliance among the sample respondents and perception tax payer of a good governance contribution significantly to the personal income tax compliance.
Andrew (2020)	Zambia	Pearson Chi-square test	The effect of taxpayer education on voluntary tax compliance by SMEs in Zambia.	Findings revealed that tax education has a significant positive impact on voluntary tax compliance by small and medium enterprises in Lusaka CBD.
Anbesa (2020)	ARB Merkato no. 2 Branch office.	Multiple regression model	Effect of tax audit on revenue collection evidence from the ARB Merkato. No. 2 Branch office.	The findings of the study reveals that, revenue protection system, and audit course selection has positive and significant effect on revenue collection and statistically significant at 5% and 1% significant level respectively.
Khalfan, Kitiadi and Chola(2020)	Zanzibar	Descriptive and structural equation model	Income tax law simplification and tax compliance: A case of medium tax payers in Zanzibar.	The findings reveal that tax compliance level of medium taxpayers is high and the ITL simplification positively and significantly influence tax compliance among medium taxpayers in Zanzibar.
Anbesa (2020)	Addis Ababa	Multiple regression model.	The effect of tax audit on revenue collection evidenced from ARB Markato no. 2 branch office.	The findings of the study reveals that revenue protection system, and audit case selection has positive and significant effect on revenue collection and statistically significant at 5% and 1% significance level respectively. Further more, revenue after audit, auditors capacity and tax automation has positive and significant even at 10% significance levels. Apart from this, the variable tax audit resource and before audit amount ahs a negative effect on revenue collection and statistically significant at 5% and /significance levels respectively.

The topic of tax compliance expenditure and personal income tax generation in Nigeria has not been holistically studied. Although, there have been many empirical studies done on tax compliance, other study don't have an immediate study done to reveal the relationship between tax compliance expenditure and tax revenue generation (Okafor, 2012; Ladi& Henry, 2015; Marange, 2018; Olaode, Aribeha, Ahmoda, Yusa & Alade, 2019; Olaoye, Ashaola&Adewoye, 2019). Beside, although the topic on tax compliance has been exhaustively done in developed countries such as United States of America, Russia, China, United Kingdom, there exist major gap in the Horn Africa and Most importantly in Nigeria, a developing country whose main income comes from oil revenue and taxation since the study don't have any published source for the same. This study aim to full this gap.

Methodology

The population of the study is Nigeria measured by the personal income tax, companies income tax value added tax, petroleum profit tax, taxpayer education, law enforcement, technological adoption and taxpayer service for the period of twenty-seven (27) years (1981 - 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 tax compliance expenditure to justify with tax revenue generation. Such were sourced from the Central Bank of Nigeria Statistical bulletin, and Federal Inland Revenue Service. The choice of secondary data and its sources were based on the fact that they assumed to be reliable, adequate and are assumed to be error free (Nwaiwu, 2015; Nwaiwu & Joseph, 2022).

Operational Measurement of Variable

The technical concepts among the study variables are measure operationally for analytical convenience under this subheading. The study will employ proxies in the literature to measure the criterion variable (tax revenue generation) as personal income tax, companies income tax, value added tax and petroleum profit tax. These dependent variables depict the adjustments that exist in tax revenue generation due to tax compliance expenditure. It was also employed in some empirical studies (Aladejebi, 2018). Similarly, the explanatory variable (tax compliance expenditure) which is discussed with its dimensions as taxpayer education, law enforcement, technology adoption and taxpayer services respectively (Mbilla, Abiire, Atindaara, Ayimpoya, (2020).

Model Specification

This study employed the investigative research process. It will be reinforced with three fundamental models arising from theoretical constructs. This study employed personal income tax as a proxy for government tax revenue collection. Accordingly, the empirical model is formulated in a functional form as follows;

$$PIT = f(TEDU_t, LEMF_t, TCAD_t, TPSV_t, LPS_t) \quad 3.1$$

Where;

PIT = Personal income tax

TEDU = Tax payer education

LEMF = Law enforcement

TCAD = Technology adoption

TPSV = Tax payer service

LPS = Legal support

For estimation purposes, equations 3.1 is re-written as follows to accommodate the estimation parameters;

$$PIT_t = \alpha_0 + \alpha_1 TEDU_t + \alpha_2 LEMF_t + \alpha_3 TCAD_t + \alpha_4 TPSV_t + \alpha_5 LPS_t + \mu_t \quad 3.2$$

Methods of Data Analysis

This study will employ various methods of statistical analysis. For the purpose of clarity, the study proposes to proceed with presentation of the following analytical tools;

Stationarity (Unit Root) Test:

Given the specific objectives of this study, unit root tests were conducted on all the study time-series variables in order to ascertain the extent or not, the data could be relied upon for further estimates in order to avoid spurious estimates. Maddala (2007), as well as Gujarati and Porter (2009), spell out the unit root procedure as for a given time series within the differencing framework. However, if the time series are found stationary at levels, i.e. $I(0)$, then there was need for any further differencing. Accordingly, equation 3.7 below provides a general framework for differencing as follows;

$$\Delta Y_t = \alpha + \beta T + \delta Y_{t-1} + \gamma_i \Delta Y_{t-i} + \varepsilon_t \quad 3.7$$

Where;

Y is the dependent variable of choice.

α is the slope, while Δ is the first difference operator.

β_i (for $i = 1$ and 2) and δ_i (for $i = 1, 2 - \delta$) are given parameters.

ε equals the stochastic process which is assumed stationary

t is the number of lags preferred in accordance with Akaike criterion in order to ensure that ε_t remains white noise.

Accordingly, the resulting hypothetical situations for possible testing arising from equation 3.7 above are;

$H_0: \beta_i = 0$. This implies that there is a unit root. As such, the time series data collected is non-stationary and,

$H_A: \beta_i \neq 0$. This implies that there is no unit root in the time series. As such, series is stationary.

Following this, the decision rule for unit root test is that the Augmented Dickey-Fuller (ADF) test statistics should in absolute terms, be higher than all the corresponding McKinnon's critical values at 1%, 5% and 10% levels of significance. Consequently, a rejection of the null hypothesis will for all-time series variables constitute sufficient basis for reliance of the time-series data for subsequent analyses and employment of same for Johansen's co-

integration test. However, if the null hypothesis fails to be rejected at first differencing, further differencing will be conducted on the first differenced variants in order to achieve stationarity in accordance with equation 3.8 below:

$$\Delta^2 \ddot{Y}_t = \ddot{Y} \Delta Y_{t-1} + \beta T + \delta Y_{t-1} + \gamma_i \Delta Y_{t-i} + \varepsilon_t \tag{3.8}$$

Given this further differencing in equation 3.8 above, the resulting hypotheses for testing will be;

H0: $\ddot{Y}_i = 0$, implies the existence of a unit root. Consequently, time series is non-stationary

H0: $\ddot{Y}_i \neq 0$, implies non-existence of a unit root. As such, time series is stationary.

However, if stationarity is not achieved at the first and second stages of differencing, either due to fractional integration or the problem of small sample/lower time coverage, then Auto Regressive Distributed Lag Bound (ARDL) test will be employed.

Co-integration Test:

This test will be employed to evaluate the extent of the prevailing long-run relationship between each set of the study variables to be employed as expressed in equations 3.1, 3.2 and 3.3.

Given a time series with assumed stationary disturbances as well as a defined order of integration say n, the set of time series variables are said to be consequently integrated of order n also. Brooks (2009) observed that where a given set of variables prevail, which consist of a minimum of two variables, it necessitates setting up a variance auto regression (VAR) model that equally accommodates the variables in their differenced first forms inclusive of given k lags of the nature k-1 which is associated with a matrix of T-coefficient in nature. Accordingly, Brooks (2009) expressed the nature of Johansen’s co-integration within a multivariate framework with a given number of g variables as expressed below in equation 3.9.

$$\Delta X_t = \tau_1 \Delta X_{t-1} + \dots + \tau_{k-1} \Delta X_{t-k+1} + \pi X_{t-k} + \varepsilon \tag{3.9}$$

The decision rule is that the trace statistics value should be higher than the critical value at the 0.05 level.

Equilibrium/Error Correction Estimations:

To evaluate the nature of long-run/short-run relationships that may prevail between the dependent variable in each set of equation and each of the explanatory variable as well as the rate at which the relationship is corrected to equilibrium in the long-run, the Error Correction estimation technique is employed. If all study variables converge to a given set of long-term values, they by implication, will not change. Hence, everything in the expression would cancel out. However, Brooks (2009) observed that error correction model approach can avert this problem by employing combinations of the first differences as well as lagged values of the co-integrated time series in accordance with equation 3.12 below:

$$\Delta X_t = \lambda_0 + \lambda_1 X_{t-1} + \lambda_2 T + \sum_{i=1}^n \phi_i \Delta X_{t-i} + \varepsilon \tag{3.10}$$

Where:

$\lambda_1 X_{t-1} + \lambda_2 T$ represents the error correction term. Θ represents the long-term relationship between the time series variables x and y. λ_t is the short-term relationship between x and y while λ_2 represents the speed at which the variables adjust to equilibrium.

Granger Causality Test

The standard pair-wise Granger causality test seeks to examine the extent to which variations in a given set of time series say Y, tend to promote, support or reinforce growth in another variable say X. It also, evaluates the extent to which inclusion of the lagged values of the variables would tend to significantly improve the explanation by virtue of the significance of their coefficients in a regression framework. In this sense, Brooks (2009), Maddala (2007) as well as Gujarati and Porter (2009) advance a formulation for the Pair-wise Granger causality framework as below in equation 3.11.

$$X_t = \beta_0 + \sum_{j=1}^p \alpha_{11j} X_1(t-j) + \sum_{j=1}^p \alpha_{12j} X_2(t-j) + \mu_t \tag{3.11}$$

$$Y_t = \alpha_0 + \sum_{j=1}^p \alpha_{21j} X_1(t-j) + \sum_{j=1}^p \alpha_{22j} X_2(t-j) + \nu_t \tag{3.12}$$

Where;

X_t and Y_t are the time series variables under evaluation. μ_t and ν_t constitute the idiosyncratic (white noise) errors embodying all variations in X_t and Y_t which are not incorporated in their lagged values. A maximum lag length of 2 will be stipulated.

Results and Discussion

Presentation of Data

The employed time series data are presented in this section as follows to reflect the numerical trend of employed variables over the study period 1981- 2021.

Table 4.1 Data on Personal income tax (PIT), Tax payer education (TEDU), Law enforcement (LEMF), Technology adoption (TCAD), Tax payer service (TPSV) and Legal support (LPS), Government policy (GVP) in Nigeria over the period of 1981 - 2021.

Year	PIT	TEDU	LEMF	TCAD	TPSV	LPS
1981	1,997.30	0.486	7.285	3.107	1.735	0.246
1982	732.5	0.506	9.068	3.867	2.16	0.239
1983	710.1	0.457	9.918	4.23	2.363	0.334
1984	580.9	0.464	10.593	4.518	2.524	0.397
1985	938.9	0.465	11.11	4.738	2.647	0.386
1986	433.7	0.518	12.96	5.527	3.088	1.469
1987	407.6	0.556	17.921	7.643	4.269	2.728
1988	540.5	0.797	23.227	9.906	5.534	4.193
1989	938	0.962	25.843	11.021	6.157	6.743
1990	1,724.00	1.261	28.516	12.161	6.793	5.553
1991	3,040.40	2.211	35.15	14.99	8.374	1.082
1992	4,903.10	2.946	49.405	21.07	11.77	16.507
1993	5,626.50	4.713	108.05	46.08	25.741	23.446
1994	3,888.20	5.547	71.994	32.025	16.564	15.53
1995	20,436.40	7.053	80.503	36.251	18.326	50.76
1996	3,407.00	9.884	91.214	41.854	20.418	43.847
1997	8,340.00	14.071	103.826	48.645	22.795	46.932
1998	11,400.00	15.521	112.253	52.82	24.544	41.756
1999	20,100.00	21.892	125.026	59.712	26.945	87.484
2000	38,100.00	34.976	139.798	67.852	29.646	132.14
2001	44,400.00	64.835	168.108	84.455	34.377	250.737
2002	68,100.00	76.211	189.513	96.741	38.073	350.439
2003	54,200.00	90.099	210.968	109.059	41.777	378.372
2004	58,900.00	87.217	248.333	131.32	47.867	405.726
2005	212,100.00	79.156	294.857	159.306	55.33	415.734
2006	33,300.00	128.311	344.931	189.511	63.327	1,232.40
2007	268,700.00	732.947	487.586	277.579	85.21	888.336
2008	178,500.00	892.908	915.486	543.925	149.88	1,459.16
2009	227,900.00	927.236	1,119.38	670.268	180.95	1,208.80
2010	712,000.00	1,082.38	1,187.09	711.496	191.591	1,210.52
2011	806,000.00	1,245.14	1,100.13	656.052	179.032	1,606.49
2012	963,200.00	1,301.54	1,474.34	888.844	235.649	1,885.16
2013	963,200.00	1,447.61	1,595.97	963.77	254.379	2,101.34
2014	973,200.00	1,368.00	1,829.98	1,108.94	289.965	1,894.08
2015	976,533.00	1,458.04	2,028.38	1,231.84	320.209	1,493.04
2016	1,051,800.00	1,822.94	2,266.91	1,379.83	356.475	1,765.58
2017	1,079,111.00	1,782.67	2,354.75	1433.642	370.1363	1,987.89
2018	1,086,042.80	1,892.30	2,527.97	1540.811	396.6041	2,063.95

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2019	1,122,369.20	1,995.78	2,701.19	1647.981	423.0719	2,140.01
2020	1,158,344.64	2,099.25	2,874.40	1755.15	449.5396	2,216.07
2021	1,189,821.39	2,202.73	3,047.62	1862.319	476.0074	2,292.13

Source: Central Bank of Nigeria Statistical Bulletin (2021).

Stationarity Test

This study proceeds to evaluate the stationarity of employed variables over the study period, which results are presented in table 4.3;

Table 4.3 Results of Unit Root Test (Augmented Dickey Fuller) at level

Variable	ADF T-statistics At Level	Mackinnon’s test critical values @			Probability Level	Order of Integrati on	Decision
		1%	5%	10%			
PIT	-2.323661	-3.632900	-2.948404	-2.612874	0.9399	0(0)	Not stationary
TEDU	-1.372329	-3.699871	-2.976263	-2.627420	0.6986	0(0)	Not stationary
LEMF	-1.530918	-3.699871	-2.976263	-2.627420	0.7392	0(0)	Not stationary
TCAD	-2.034835	-3.626784	-2.945842	-2.611531	0.1102	0(0)	Not stationary
TPSV	-2.308877	-3.626784	-2.945842	-2.611531	0.2115	0(0)	Not stationary
LPS	-0.146279	-3.752946	-2.998064	-2.638752	0.9327	0(0)	Not stationary

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 below in Table 4.4.

Table 4.4: Results of Unit Root Test: (Augmented Dickey Fuller) at First Difference.

Variable	ADF T-statistics	Mackinnon's test critical values @			Probability Level	Order of Integratio n	Decision
		1%	5%	10%			
D(PIT)	-4.899645***	-4.243644	-3.544284	-3.204699	0.0007	I(1)	Stationary
D(TEDU)	-5.737456***	-3.769597	-3.004861	-2.642242	0.0001	I(1)	Stationary
D(LEMF)	-4.553106***	-3.699871	-2.976263	-2.627420	0.0000	I(1)	Stationary
D(TCAD)	-8.767163***	-3.632900	-2.948404	-2.612874	0.0000	I(1)	Stationary
D(TPSV)	-8.802553***	-3.632900	-2.948404	-2.612874	0.0000	I(1)	Stationary
D(LPS)	-4.990043***	-4.571559	-3.690814	-3.286909	0.0046	I(1)	Stationary

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

The stationarity test results at first difference presented in table 4.4 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 Johansen Co-integration analysis. In light of the observe stationarity, the study therefore proceeds to the cointegration test.

Presentation of Johansen Co-integration Analysis

Model 1: Personal income tax (PIT)

Table 4.5: Results of Johansen Cointegration Analysis for Model 1: Personal income tax Model (PIT)

Date: 11/01/23 Time: 11:35

Sample (adjusted): 1984 2021

Included observations: 37 after adjustments

Trend assumption: Linear deterministic trend

Series: D(PIT) D(TEDU) D(LEMF) D(TCAD) D(TPSV) D(LPS)

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.925799	194.6783	95.75366	0.0000
At most 1 *	0.656510	106.2449	69.81889	0.0000
At most 2 *	0.564132	69.91259	47.85613	0.0001
At most 3 *	0.483942	41.67842	29.79707	0.0014
At most 4 *	0.418378	19.18617	15.49471	0.0132
At most 5	0.022117	0.760405	3.841466	0.3832

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.925799	88.43338	40.07757	0.0000
At most 1 *	0.656510	36.33230	33.87687	0.0249
At most 2 *	0.564132	28.23417	27.58434	0.0413
At most 3 *	0.483942	22.49225	21.13162	0.0320
At most 4 *	0.418378	18.42577	14.26460	0.0104
At most 5	0.022117	0.760405	3.841466	0.3832

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

The results of Johansen’s Cointegration analysis shown in table 4.5 above for both Trace and Max-Eigen Statistics indicate five (5) significant co-integrating equations. The results therefore provide evidence to assert the prevalence of significant long run relationship between the tax compliance expenditure and personal income tax (PIT) as a proxy for government tax revenue collection. It further provides evidence of non-prevalence of full-rank situation.

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 compliance expenditure may begin to have effects on government tax revenue collection 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 4.8 below.

Lag Length Selection

Table 4.8 below shows the results of lag length selection for personal income tax model’s ErrorCorrection Model.

Table 4.8: Results of Lag Length Selection

VAR Lag Order Selection Criteria

Endogenous variables: D(PIT) D(TEDU) D(LEMF) D(TCAD) D(TPSV) D(LPS)

Exogenous variables: C

Included observations: 41

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

Table 4.8 above shows that a maximum lag of 1 is ideal for estimated model (1). In all, the various criteria values employed suggest that the first (1) lags of D(PIT) D(TEDU) D(LEMF) D(TCAD), D(TPSV) and D(LPS) which represent the respective differenced values of personal income tax, tax payer education, law enforcement, Technology adoption, tax payer service and legal support are ideal and appropriate. In the light of the results presented in table 4.8 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 run dynamics in the study models, the Error Correction Model was employed. The results are presented in table 4.11 to 4.13 below;

Error Correction Model Estimation

The results of error correction estimation for personal income tax (PIT) model one is shown intable 4.11 below:

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Table 4.11: Results of Error Correction Estimation for Personal income tax (Model 1):

Error Correction Model

Dependent Variable: D(PIT)

Date: 11/01/23 Time: 11:59

Sample (adjusted): 1983 2021

Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	140.2799	12.98535	10.80294	0.0000
D(TEDU)	-2.706120	2.093533	-1.292609	0.2067
D(TEDU-1)	-11.28522	2.396129	-4.709771	0.0001
D(LEMF)	3.374303	11.10025	3.039843	0.0051
D(LEMF-1)	-0.264312	0.182076	-1.451654	0.1586
D(TCAD)	9.157880	4.992558	1.834306	0.0773
D(TCAD-1)	-10.49090	6.225922	-1.685035	0.1039
D(TPSV)	0.307619	1.162791	0.264552	0.7933
D(TPSV-1)	0.385722	1.374768	0.280572	0.7813
D(LPS)	3.858007	0.539441	7.151867	0.0000
D(LPS-1)	2.378865	0.635797	3.741548	0.0009
ECM(-1)	-0.918624	0.094914	-9.678512	0.0000
R-squared	0.860203	Mean dependent var		16962.94
Adjusted R-squared	0.830246	S.D. dependent var		17319.52
S.E. of regression	7135.844	Akaike info criterion		20.76051
Sum squared resid	1.43E+09	Schwarz criterion		21.07157
Log likelihood	-356.3088	Hannan-Quinn criter.		20.86789
F-statistic	28.71505	Durbin-Watson stat		1.965226
Prob(F-statistic)	0.000000			

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 86.02% of variations in Personal income tax (PIT). The ECM has the expected negative sign and its associated F-statistic value of 28.71505 is significant. It confirms a good line of fit. Further, the Durbin-Watson statistic of 1.965226 is within the acceptable range. The absolute value of the ECM is 91.86%. This implies that 91.86% of the disequilibrium in Nigeria’ Personal income tax is offset by short-run adjustments in the study’s explanatory (predictor) variables yearly. The ECM value of 91.86% is also associated with a probability value of 0.0000, which is statistically significant at the 0.05 level.

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The results indicate that in the long run, lagged values of tax payer education, current values of law enforcement as well as both the current and lagged values of Legal support (LPS) have significant influences on personal income tax (PIT) as a proxy for government tax revenue collection.

Pairwise Granger Causality Estimation:

To ascertain the extent to which the employed variable of this study support, promote and/or re-inforce themselves in the process of growth, this study executed the pair-wise Granger causality tests. The results are shown below for all the models employed in this study as below: The results of Pair-wise Granger causality for personal income tax (PIT) model 1 is shown below;

Table 4.14: Results for Pairwise Granger Causality Test Estimation for Personal income tax (PIT), Model 1:
Pairwise Granger Causality Tests

Date: 11/01/23 Time: 12:15

Sample: 1981 2021

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(TEDU) does not Granger Cause D(PIT)	36	1.92865	0.1635
D(PIT) does not Granger Cause D(TEDU)		1.85987	0.1738
D(LEMF) does not Granger Cause D(PIT)	36	0.30573	0.7389
D(PIT) does not Granger Cause D(LEMF)		7.61194	0.0092
D(TCAD) does not Granger Cause D(PIT)	36	2.04906	0.1471
D(PIT) does not Granger Cause D(TCAD)		2.13618	0.1363
D(TPSV) does not Granger Cause D(PIT)	36	0.09917	0.9059
D(PIT) does not Granger Cause D(TPSV)		0.22699	0.7983
D(LPS) does not Granger Cause D(PIT)	36	5.09318	0.0415
D(PIT) does not Granger Cause D(LPS)		1.53443	0.2326

The results of Pairwise Granger Causality shown in table 4.14 indicate two significant unidirectional relationships from (i) personal income tax to law enforcement and (ii), from legal support to personal income tax. To this extent, it implies that growth in Nigeria' personal income tax supports and/or promotes growth in law enforcement. Further, growth in legal support equally support/promote growth in Nigeria' personal income tax.

For the test of hypotheses, the results of the nature of causality between personal income tax and each of the elements of tax payer education, law enforcement, Technology adoption, tax payer service and legal support are presented in table 4.14. The causalities flowing from personal income tax to law enforcement, as well as that flowing from legal support to personal income tax are significant at 0.0092 and 0.0415 levels respectively. These are higher than the critical 0.05 level. We therefore reject the null hypothesis in this respect and accept the alternate. Conclusively, it is stated that personal income tax in Nigeria significantly promotes law enforcement, while legal support valuably supports Personal income tax as government tax revenue collection indicator. For the rest of tax payer education, Technology adoption and tax payer service, we retain the null hypothesis for them and do not accept the alternate hypothesis.

$PIT = f(TEDU, LEMF, TCAD, TPSV, LPS)$.

Tax payer education (TEDU): The results of model I as shown in tables 4.11 and 4.14 indicate that tax payer education is significant at first lag with a negative coefficient of 4.709771 which is significant at 0.001 level. However, the negative sign is not in consonance with the apriori expectation as Personal income tax is negatively and significantly sensitive to change in tax payer education. The Granger causality results in table 4.14 further indicate that tax payer education and Personal income tax do not support or promote themselves in the operational environment of Nigeria. The negative coefficient of tax payer education with PIT, although unexpected, suggests that personal income tax is negatively sensitive to changes in tax payer education. This could imply that despite education efforts, there might be challenges in correlating tax payer education with personal income tax collection. The lack of support between tax payer education and PIT, as indicated by Granger causality results, suggests a disconnect between the two.

Law enforcement (LEMF): This variable displayed at current level, a positive and significant influence on personal income tax (PIT). The result provides evidence that law enforcement provides very reliable and predictable compliance expenditure. In all, law enforcement are more reliable and predictable in Nigeria compared with tax payer education which experience higher default collection rate. The Granger Causality show that law enforcement supports Personal income tax as shown in table 4.14. The positive and significant influence of law enforcement on PIT indicates that law enforcement provides a reliable and predictable compliance expenditure. This suggests that legal measures contribute positively to the predictability of personal income tax. The Granger causality results further support the idea that law enforcement supports personal income tax.

Technology adoption (TCAD): This variable demonstrates a positive but insignificant influence on variations in Personal income tax (PIT) as government tax revenue collection indicator in Nigeria. Also, the Granger Causality results provide no evidence of any significant support and/or promotion between these two indicators. The positive but insignificant influence of technology adoption on PIT suggests that, in the context of Nigeria, technology adoption may not significantly impact variations in personal income tax. The lack of significant support or promotion between these indicators, as indicated by Granger causality results, highlights a neutral relationship.

Tax payer service (TPSV): Changes in this variable indicate a positive and insignificant influence on Personal income tax (PIT) in Nigeria. These results are significantly contrary to expectations. The causality results confirm same. The results reflect substantial failure in Nigeria' tax payer service which have attracted various enquires over the years. The positive and insignificant influence of tax payer service on PIT contradicts expectations. The results imply substantial failure in Nigeria's tax payer service, attracting inquiries over the years. The lack of support or promotional relationship, as confirmed by Granger causality results, indicates challenges in the effectiveness of tax payer services in promoting personal income tax. The positive and insignificant influence of tax payer service on PIT contradicts expectations. The results imply substantial failure in Nigeria's tax payer service, attracting inquiries over the years. The lack of support or promotional relationship, as confirmed by Granger causality results, indicates challenges in the effectiveness of tax payer services in promoting personal income tax.

Legal support (LPS): This variable showed at current and first lags positive and significant influences on Personal income tax (PIT). The results demonstrate efficiency and relatively more reliable compliance expenditure in the form of legal support affects the personal income tax. The Granger Causality results in table 4.14 also supports the above analysis that legal support in Nigeria promotes her personal income tax. The positive and significant influences of legal support on PIT demonstrate efficiency and reliability in legal support as compliance expenditure for personal income tax. The Granger causality results support the idea that legal support in Nigeria promotes personal income tax.

Conclusion, and Recommendations

This study evaluated the nature of prevailing interrelationships between tax compliance expenditure and her government tax revenue collection over the period 1981-2021. The study employed both the current and one-year lagged values of the tax compliance expenditure as appropriately determined through the appropriate lag-length selection test to determine the optimal lag length appropriate. This is because of the profound fact that some current compliance expenditure could become of significant effect on government tax revenue collection in later periods. The study accordingly employed both the current and one-period lagged values of Tax compliance expenditure on basis. These include tax payer education (TEDU), law enforcement (LEMF), technology adoption (TCAD), tax payer service (TPSV) and Legal support (LPS). It was observed that; Tax payer education (TEDU) is observed to be significant at first lag with a negative relationship with personal income tax in Nigeria. Law enforcement (LEMF) displayed at current level, a positive and significant influence on personal income tax (PIT). Technology adoption (TCAD) demonstrated a positive but insignificant influence on variations in personal income tax (PIT) as government tax revenue collection indicator in Nigeria. Tax payer service (TPSV) showed a positive and insignificant influence on Personal income tax (PIT) in Nigeria. Legal support (LPS) had at current and first lags a positive and significant influences on personal income tax (PIT).

Recommendations

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

- i. Despite the unexpected negative sensitivity of PIT to tax payer education, it is crucial to continue investing in educational initiatives. However, these efforts should be tailored to address specific barriers to compliance. Conducting targeted educational campaigns and workshops could help bridge the gap between tax payer education and actual compliance.
- ii. Recognizing the positive impact of law enforcement on PIT, there is a need to strengthen legal and regulatory frameworks. This includes improving the enforcement of tax laws and ensuring that legal measures serve as reliable collateral for tax revenue. Policymakers should consider initiatives to enhance the capacity and effectiveness of law enforcement agencies in dealing with tax-related matters.
- iii. Given the generally insignificant impact of technology adoption, policymakers should reassess the role of technology in tax administration.
- iv. The positive but insignificant influence of tax payer services on PIT suggest challenges in the effectiveness of service delivery. Policymakers should conduct a thorough review of existing tax payer services, identify bottlenecks, and implement reforms to enhance the quality and accessibility of services. This may involve leveraging technology for efficient service delivery and providing clearer and more user-friendly information.
- v. In light of the dynamic nature of tax compliance factors, policymakers should establish mechanisms for continuous monitoring and evaluation. Regular assessments of the effectiveness of implemented policies and the identification of emerging challenges will enable timely adjustments and improvements in tax administration.

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