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ENHANCING TAX COMPLIANCE AND REVENUE GENERATION IN NIGERIA: STRATEGIES AND CHALLENGES

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ABSTRACT

Tax compliance and revenue generation are critical components of any nation's economic development agenda. In Nigeria, as in many other countries, the effective collection of taxes plays a pivotal role in funding public services, infrastructure development, and social welfare programs. The purpose of this study was to evaluate the impact tax compliance on Nigeria's capacity to collect taxes. An ex-post facto research design was employed in this study. The Central Bank of Nigeria Statistical Bulletin and the Federal Inland Revenue Service Management were the main sources of the secondary data used in this study. The dataset used in this study spanned the years 2001 through 2021, and it was evaluated using Johansen's co-integration test and descriptive statistics. The findings indicated that as the tax rate and penalty rate increase over time, Nigeria's tax revenue tends to rise as well, suggesting that elevated tax rates and stricter penalties are associated with increased tax revenue generation. The study also discovers that increased audit penalty rates may discourage taxpayers from adhering to tax regulations, leading to a reduction in tax revenue, while lower audit penalty rates may encourage compliance and result in higher tax revenue. The study concludes that there exists a statistically significant positive long- and short-term relationship between Nigeria's tax revenue and the tax rate and penalty rate. Based on the findings, it is recommended that policymakers carefully consider the implications of audit penalties on tax collection efforts. Efforts should be made to strike a balance between enforcing tax laws and maintaining an environment conducive to voluntary compliance among taxpayers.

KEYWORDS: Tax compliance, Tax rate, Tax revenue, Tax penalty. Tax audit penalties.

JEL Codes: H2 and H26.

INTRODUCTION

Nigeria, as one of the largest economies in Africa, faces significant challenges in revenue generation despite its vast natural and human resources. The effective mobilization and allocation of revenue are crucial for sustainable economic development, infrastructure improvement, social welfare programs, and poverty alleviation (Awotomilusi et al., 2023; Chukwuma, 2017)). However, the Nigerian government has historically struggled to harness its potential revenue sources efficiently. The Nigerian government relies heavily on revenue from taxes to finance its budgetary needs and drive sustainable economic growth. However, the country's tax-to-GDP ratio remains relatively low compared to other developing nations, indicating significant potential for improvement in tax compliance and revenue mobilization efforts (Aluko et al., 2022; Akintoye & Tashie, 2013).

Tax compliance and revenue generation are critical components of any nation's economic development agenda. In Nigeria, as in many other countries, the effective collection of taxes plays a pivotal role in funding public services, infrastructure development, and social welfare programs. However, despite the importance of taxation, Nigeria continues to face challenges in achieving optimal levels of tax compliance and revenue generation (Onafowokan& Olayinka, 2018).Several factors contribute to the challenges faced by Nigeria in enhancing tax compliance and revenue generation. These include widespread tax evasion and avoidance, inadequate enforcement mechanisms, complex and outdated tax laws, weak institutional capacity, and a large informal sector that operates outside the tax net. Additionally, factors such as corruption, bureaucratic inefficiencies, and a lack of public trust in the government's ability to utilize tax revenues effectively further complicate the tax compliance landscape (Adewara et al., 2023; Akinadewo et al., 2023).

Addressing these challenges requires a multifaceted approach that involves policy reforms, institutional strengthening, capacity building, and public awareness campaigns. Efforts to simplify the tax system, improve transparency and accountability, and enhance taxpayer education and engagement are crucial for fostering voluntary compliance and increasing revenue collection. Moreover, leveraging technology and digital platforms can modernize tax administration processes, improve data collection and analysis, and reduce opportunities for tax evasion and fraud. Strategic partnerships with the private sector, civil society organizations, and international stakeholders can also support efforts to strengthen tax compliance and revenue generation in Nigeria.

This study aims to explore the various dimensions of tax compliance and revenue generation in Nigeria, examining the challenges, opportunities, and strategies for enhancing tax collection effectiveness. Understanding the dynamics of revenue generation in Nigeria is paramount for policymakers, economists, and development practitioners to devise effective strategies for economic growth and stability. Through insightful analysis and case studies, this publication seeks to contribute to the ongoing discourse on tax policy and administration reforms in Nigeria and offer practical recommendations for policymakers, tax authorities, and other stakeholders involved in shaping the country's tax landscape.

LITERATURE REVIEW

Tax Compliance

Roth et al. (1989) provided a characterization of tax compliance, describing it as the voluntary submission of all necessary tax documents within the stipulated timeframe by taxpayers, along with accurate declaration of their tax obligations following the relevant legal principles, guidelines, and judicial rulings at the time of submission. Imas and Mareska concur with this definition. Mohammed et al. (2016) similarly defined tax compliance as the voluntary adherence of taxpayers to tax regulations and administrative protocols. James and Alley (2004) also support this interpretation. The timely submission and reporting of tax returns serve as indicators of tax compliance, as outlined by Tilahum (2018), encompassing both the overall number of successfully submitted tax documents and the proportion of tax return forms filed punctually. This research adopts a definition of tax compliance that encompasses the responsibilities of taxpayers, including tax compliance intermediaries. Implementing an intuitive approach is expected to enhance government revenue.

Tax Rate

The term "tax rate" denotes the percentage of taxes that individuals or organizations are obligated to pay. Ali et al. (2013) discovered a significant correlation between the tax rate and compliance with income tax regulations. According to findings by Pommerehne and Weck-Hannemann (1996), Ajzen and Fishbein (1980), Palil (2010), and Park and Hyun (2003), higher tax rates tend to result in decreased compliance. Torgler (2007) argues that while elevated tax rates discourage taxpayer adherence, reducing tax rates may not necessarily decrease tax evasion. Kirchler (2008) suggests that evaluations of compliance are impacted by the prevailing tax rate. In the context of this study, "tax rate" refers to the percentage of taxation imposed on corporate entities. The effective tax rate, which can fluctuate over time, significantly influences this sector. Additionally, the Tax Compendium of the Federal Inland Revenue Service (FIRS) encompasses the tax filings of companies.

Taxation levels, as represented by the tax rate, dictate the amount individuals or businesses are taxed. Ali et al. (2013) identified a statistically significant association between the tax rate and compliance with income tax regulations. Higher tax rates, as posited by Pommerehne and Weck-Hannemann (1996), Ajzen and Fishbein (1980), Palil (2010), and Park and Hyun (2003), act as impediments to compliance. Torgler (2007) argued that although higher tax rates discourage tax compliance, they don't consistently reduce tax evasion. Kirchler (2008) suggested that tax rates influence decisions regarding compliance. In the context of this research, the term "tax rate" pertains to the taxation level applicable to enterprises. Information regarding this can be found in both the business's tax returns and the Federal Inland Revenue Service (FIRS) Tax Compendium. The effective tax rate may vary from one fiscal year to another.

Tax Penalties

Tax penalties, enforced by tax authorities due to noncompliance, represent fines levied on individuals or entities. The specifics of penalties vary across different jurisdictions. Tax authorities regularly apply penalties to taxpayers who fail to fulfill their tax obligations (Ladi& Henry, 2015). The severity of penalties is influenced by the nature of the tax evasion. Oladipupo and Obazee (2015) observed that individuals or businesses filing their excise or income tax returns after the stipulated deadline are subject to fines. Contrary to assertions by Sapiei&Kasipillai (2014) and Walsh (2012), taxpayers assess the benefits of tax evasion against the potential costs of noncompliance. When the perceived advantages of noncompliance outweigh the potential drawbacks, individuals or entities may opt to evade taxes. Friedland et al. (2015), Brautigan et al.

(2008), and Lederman (2003) did not find a direct correlation between compliance with tax penalties and tax revenue. The objective of this study is to enhance understanding of how tax penalties influence tax revenue by increasing outstanding tax liabilities. Although research by Park and Hyun (2005) suggests that taxpayers may respond more positively to tax penalties compared to fines, they still view such additional demands unfavorably.

Tax Audit Penalties

According to Onuoha and Dada (2016), the primary objective of an audit is to enhance the reliability and credibility of an organization's financial data. Audits ensure that financial statements accurately portray the organization's performance and financial status. An on-site audit verifies a quality system's adherence to predetermined standards. Soyemi (2014) suggests that auditing encompasses both primary and secondary objectives. The primary objective involves assessing the accuracy and dependability of an individual's financial report. The secondary objective focuses on evaluating the effectiveness of an organization's internal control system in preventing fraud and errors. This research investigates how tax audits promote taxpayer compliance. It is believed that regular tax audits can mitigate fraud, deter potential offenders, and boost tax revenue for the government.

Tax Revenue

According to Agumas (2016), public entities receive monetary contributions from businesses or individuals, which are then allocated to federal, state, and local administrations. These revenues cover a variety of expenditures, facilitating government spending. Ojo (2017) defines tax revenue as the financial imposition by the government on individual and corporate incomes. Such taxes encompass various sources of income, including wages, business profits, interest, dividends, capital gains, and royalties. Additionally, taxes are levied on revenue generated from petroleum sales, capital transfers, and investments, as discovered by Olaoye and Ekundayo in 2019.

Tax Compliance and Tax Revenue

Various academic studies have delved into the realms of global tax revenue and the roles played by tax compliance mediators. Saffay, Majed, and Wilson et al. (2019) posit that tax compliance mediators play a vital role in facilitating tax collection for the government. They argue that a nation's tax system's ability to generate internal resources can further spur development and progress. Adediran et al. (2013) assert that tax audits, similar to financial audits, contribute to increasing government revenue. Similarly, Harelimana (2018) suggests that tax audits not only boost tax revenue but also enhance the overall effectiveness of the tax system. Additionally, Siregar (2017) highlights that the imposition of fines serves as a mechanism to enhance tax compliance and increase revenue generation. Furthermore, as citizens become more cognizant of how taxes contribute to funding public amenities and infrastructure, there has been observed an increase in tax compliance. This heightened awareness regarding the utilization of tax funds for essential public needs has played a significant role in fostering greater adherence to tax regulations and thereby bolstering revenue collection efforts.

Theoretical Review

This study draws its theoretical framework from two key perspectives: deterrence theory and conventional tax compliance theory. The roots of tax compliance theory can be traced back to the ideas proposed by Adam Smith in 1776. According to this theory, taxpayers evaluate the benefits of evading taxes against the risks of detection and punishment by tax authorities. This perspective, as highlighted by Kircher (2007), aligns closely with deterrence theory, which originated from the works of Jeremy Bentham and Cesare Beccaria in 1764. Deterrence theory posits that individuals

are dissuaded from engaging in harmful behavior when the perceived costs outweigh the benefits. Mohammed and Mohammed (2012) underscore the significance of deterrence theory in tax compliance, particularly emphasizing the role of tax audits and fines in deterring non-compliance. Compliance with tax laws, therefore, signifies taxpayers' adherence to legal norms driven by concerns for their own security.

Both deterrence theory and conventional tax compliance theory delve into the underlying motivations behind non-compliance. They suggest that individuals may break tax laws when they perceive the benefits of non-compliance to outweigh the risks, conducting a cost-benefit analysis of their actions. These theories emphasize the importance of penalties in deterring tax violations, suggesting that the severity and certainty of penalties play a crucial role in shaping taxpayers' behavior. Tax avoidance is discouraged by the increased likelihood of detection and punishment, as well as the perceived effectiveness of penalties in deterring non-compliance. Ultimately, the effectiveness of deterrence mechanisms hinges on the severity and efficiency of penalties relative to the perceived benefits of non-compliance.

Empirical Review

Adebola-Olufemi (2021) explores the impact of tax audits on taxpayer compliance in the Southwest region. Primary data was collected and analyzed through a questionnaire, revealing statistically significant associations between tax audits and taxpayer compliance in Southwest Nigeria. Jan-Emmanuel et al. (2021) affirm the influence of tax administration on taxpayer compliance in Kogi State. The study gathered primary data via questionnaires and employed the chi-square method for analysis, highlighting significant effects of administrative tax compliance expenses on tax adherence in Kogi State.

Bandara and Weerasooriya (2021) underscore the importance of comparing diverse expert perspectives on tax compliance and its interrelations with other variables. Numerous secondary studies have explored this area, indicating that variables such as tax rate, tax information, taxpayer perceptions, legal framework, and cost of tax compliance can predict tax adherence. Ayneshet (2020) investigated the impact of tax audits, fines, penalties, tax education, and awareness on tax compliance in Hawassa City, South Nations, Nationalities, and Peoples' Regional State. Primary data from original sources were analyzed using correlation and multiple regression, revealing significant relationships between tax literacy, educational attainment, tax awareness, and the likelihood of undergoing a tax audit.

Olubode et al. (2019) conducted a study focusing on the challenges, awareness, and compliance of Small and Medium Enterprises (SMEs) with tax regulations in South-Western Nigeria, particularly on Mondays. Analysis of primary data using chi-square and OLS multiple regression revealed that while SMEs are generally aware of tax regulations, compliance is lacking. Muyiwa et al. (2019) investigated the impact of tax enforcement techniques on tax compliance and revenue generation. Primary data were collected via a questionnaire, and regression analysis using ordinary least squares demonstrated a strong correlation between tax audits, penalties, and adherence to tax rules. Richard (2018) examined the effects of tax audits and fines on compliance among Nigerian corporate income taxpayers. Detailed information was gathered through surveys and evaluated using least squares regression, revealing a statistically significant positive correlation between tax audits, penalties, and compliance.

Onafowokan and Olayinka (2018) examined the relationship between tax compliance and government revenue in Nigeria using data from FIRS bulletins. Regression analysis revealed that

taxpayers contribute significantly to government revenue. Nida et al. (2020) investigated the impact of tax penalties, audits, and taxpayer knowledge on corporate taxpayer compliance behavior, as well as the influence of compliance intentions on this behavior. The study employed both multiple regression analysis (MLR) and moderated regression analysis (MRA). The target audience comprised corporate taxpayers registered with the North Banjarmasin Tax Office in 2019, with a sample size of 142 corporate taxpayers selected through convenience sampling. The findings of the study indicate that tax penalties, audits, and taxpayer awareness all contribute to promoting compliance with tax regulations among business taxpayers.

In a separate study, Olaoye and Ekundayo (2018) examined the effects of desk audits on tax compliance in Ekiti State, Nigeria. Sixty questionnaires were distributed randomly to personnel from the Federal Inland Revenue Service and the Ekiti State Board of Internal Revenue Service. The study utilized a multinomial logistic regression approach for estimation. The results suggest that tax audits could influence tax compliance, although there was no definitive link found between accurate tax filing and compliance. The study also observed that tax legislation plays a role in shaping tax compliance, whereas tax procedures had no significant impact during the examination process. Contrary to expectations, tax audits did not significantly affect tax compliance, according to the research. The authors suggest that to foster public trust, the government should transparently allocate tax revenues.

Timgo et al. (2018) undertook an empirical investigation focusing on the impacts of tax investigation, penalty assessment, and audit productivity on tax compliance. The study utilized descriptive and inferential statistics to analyze previously gathered data, revealing that audit productivity contributes to increased voluntary compliance. Chukwumah (2017) investigated the effects of tax policy constraints on the Nigerian government's tax collection efforts, focusing on Small and Medium Enterprises (SMEs) in Port Harcourt. The study involved distributing 297 questionnaires to SME staff, IRS agents, auditors, and tax experts, followed by statistical analysis including mean calculation, standard deviation, regression, and correlation. The study uncovered challenges such as flawed databases and suspicious cash transactions, which hinder the government's ability to print its own currency.

Soyinka et al. (2016) conducted a study examining the relationship between the likelihood and frequency of tax audits and Nigerian business tax compliance. Primary data were analyzed using descriptive statistics, correlation analysis, and least squares regression. The findings indicate that the probability and frequency of tax audits influence firm tax compliance, while tax penalties do not appear to have a beneficial effect on business tax adherence. Oladipupo and Obazee (2016) explored the impact of sanctions and taxpayer knowledge on tax compliance among Nigerian SMEs. Ordinary least squares regression was employed to analyze the data, revealing that individuals are more inclined to comply with tax laws when they have a better understanding of them. Tax penalties were found to have a modest yet positive effect on tax compliance.

Ibrahim et al. (2014) investigated the effects of ongoing tax audits and inquiries on Nigerian tax receipts, collecting primary data from 410 respondents, including members of the FIRS and the Edo State Board of Internal Revenue. The Pearson Correlation Coefficient was used to test hypotheses, with findings suggesting that tax audits and investigations can contribute to revenue generation. Modugu and Anyaduba (2014) investigated the impacts of tax audits and fines on tax compliance in Nigerian enterprises, distributing structured questionnaires to employees from various organizations across Nigeria's five geopolitical zones. Ordered logistic regression was used to analyze responses, indicating that tax audits significantly influence tax compliance. Oriakhi and Osemwengie (2013)

examined the incentives, benefits, and revenue generation in the Nigerian tax system from 1981 to 2009, recommending increased unpredictability and frequency of tax audits. Linear regression was employed to analyze secondary data, revealing a strong correlation between tax incentives and revenue generation.

After conducting a comprehensive analysis of pertinent academic literature, several inaccuracies have been identified. Primarily, while numerous studies have investigated the impacts of institutional, societal, and individual factors on tax compliance, less attention has been given to objectively measurable factors such as the tax rate, tax penalties, and the probability of audits. Previous research has often relied more heavily on subjective original data rather than utilizing publicly available data from tax authorities. Leveraging existing data can enhance the accuracy and understanding of taxpayers' tax compliance behaviors. Furthermore, the majority of investigations have focused on perceptions and attitudes, while non-economic factors have been largely overlooked in earlier studies. This oversight makes it challenging to predict how compliance characteristics may influence tax collection in Nigeria. Therefore, there is a need for further research that incorporates objective measures and considers a broader range of factors beyond just subjective perceptions and attitudes. The null hypotheses, which were formulated in accordance with the specified objectives, are as follows: the specific objectives:

H_{01}: There is no significant relationship between tax rate and tax revenue in Nigeria.

H_{02}: There is no significant relationship between tax audit rate/audit possibility and tax collections in Nigeria.

H_{03}: There is no significant relationship between penalty rate and tax income in Nigeria.

METHODOLOGY

To achieve its objectives, this study relied on *ex-post facto* research. Public Notices, quarterly publications, and information circulars from the Federal Inland Revenue Service (FIRS) collection were employed in this study. The analysis also used the CBN statistical bulletins for the years 2001 through 2021. To account for both the immediate and long-term implications of the Finance Act amendments on the independent variables, 2001 was used as the base year. The data were evaluated using descriptive statistics, regression analysis, and the Johansen test of Co-integration.

Model Specification

The researchers Soyinka, Jinadu, and Sunday (2016) altered their original model to analyse the effects of tax rate, audit likelihood, and penalty rate on tax revenue. Soyinka, Jinadu, and Sunday used tax likelihood, tax frequency, and tax penalty as measurement variables in a study that was published in 2016. In addition to the Tax penalty variable, the Tax rate and Audit likelihood were also considered in this research. The recommended model resembles this in some ways:

$TRV = f(TR, PR, AP,)$ …………………………………………… eqn (1)

$TRV_t = \beta_0 + \beta_1 TR_t + \beta_2 PR_t + \beta_3 AP_t + \mu_t$ ……………….. eqn (2)

Where:
TRV = Tax Revenue
TR = Tax rate
AP = Audit possibility

PR = Penalty rate
Subscript i= Segrement
Subscript t= Years ranging from 2012 to 2012
β_1, β_2 = Unknown Coefficient of Estimates of the independent variable
μ it = Error term
A priori expectation = $\beta_1 > 0$; $\beta_2 > 0$

Table 1: Summary of variables, measurement and sources

Sn	Variable	Description	Measurement	Source
	Tax Revenue	Constitutes the revenues generated from corporate taxes	Calculated using CIT,VAT, PPT,EDT,NITDF. Computed from Central Bank of Nigeria Stastitical bulletin	Ebiringa&Emeh (2014)
	Tax rate	Tax rate changeable by the tax authority. This is fixed by the government and subjected to change at its discretion	Computed from data to be obtained directly from FIRS, Planning, Reporting and Statistics Department	Ebiringa&Emeh (2014
	Penalty rate	Payment in addition to actual tax payable as deterrent to tax default	Computed from data to be obtained directly from FIRS, Planning, Reporting and Statistics Department	Ebiringa&Emeh (2014
	Audit possibility	Measured by determining the proportion of Audit Tax Conducted (ATAC) to Expected Total Audit (ETA)	Computed from data to be obtained directly from FIRS, Planning, Reporting and Statistics Department	Ebiringa&Emeh (2014

Source: Researcher's Compilation (2023)

DATA ANALYSIS AND DISCUSSION OF FINDINGS

Descriptive Statistics

Tax revenue (TRV) as shown in Table 2 is 8.753193 with a standard deviation of 0.540594. When compared to the mean, the standard deviation is minimal. The average tax rate is 3.025325, while the standard deviation is 0.177385. Low standard deviation of the variable shows little discrepancy. The Jarque-Bera statistics' p-value is more than 5%, which supports the normal distribution of the tax rate variable.With a standard deviation of 0.181053 and an average penalty rate of 2.644518, 18% of the data points deviate from the mean. The p-value of the Jarque-Bera test, 0.177250, is greater than 5%, indicating a normal distribution. With an average of 3.987490, the audit potential runs from 3.342862 to 4.550714. 0.355939 is below the average.

Table 2: Descriptive Statistics

Variables	TRV	TR	PR	AP
Obs	21	21	21	21
Mean	8.753193	3.025325	2.644518	3.987490
Std. Deviation	0.540594	0.177385	0.181053	0.355939
Minimum	7.456938	2.858193	2.302585	3.342862
Maximum	9.316217	3.222868	2.995732	4.550714
Skewness	-1.060023	0.097846	-0.971061	-0.359870
Kurtosis	3.172391	1.014852	3.427651	2.016442
Jarque-Bera	3.958775	3.481720	3.460386	1.299735
Probability	0.138154	0.175370	0.177250	0.522115

Source: Researcher's Compilation (2023)

Test of Variables

Normality Test

Table 3 shows the results of a histogram normality test on Nigeria's tax compliance mediators and tax revenue. The Jarque-Bera statistics value of 2.103415 has a probability value of 0.349341, exceeding the 5% criterion. This shows that Nigerian tax compliance mediators and tax revenue sample means follow a normal distribution.

Table 3: Normality Test

Normality Test		
Null Hypothesis	**Statistics**	**Probability**
The residuals is normally distributed (P>0.05)	2.103415	0.349341

Source: Researcher's Compilation (2023)

Linearity Test

According to Table 4, tax revenue rises as the tax rate does. According to the correlation of 0.614, tax increases will increase government revenue. The correlation between tax revenue (TRV) and penalty rate (PR) is positive (0.848). This implies that increasing the penalty rate increases tax income to the government. These variables are linked together, as evidenced by the p-value of 0.000, which is less than the 5% cutoff.

Tax revenue (TRV) and audit likelihood have a positive correlation (0.874). This demonstrates that increased audit likelihood will increase tax revenue for the government. The correlation between the tax rate and the penalty rate is positive, as indicated by the coefficient of 0.510. The correlation between tax rate and audit likelihood is 0.850. The probability of an audit is also elevated by the penalty rate by 0.810. This suggests that any independent variable has a large impact on tax revenue in Nigeria.

Table 4:Correlation Analysis of Study Variables

	TRV	TR	PR	AP
TRV	1.0000			
TR	0.614** (0.003)	1.0000		
PR	0.848** (0.000)	0.510* (0.018)	1.0000	
AP	0.874** (0.000)	0.850** (0.000)	0.810** (0.000)	1.0000

Source:Researcher'sCompilation (2023)

Augmented Dickey Fuller (ADF) Unit Root Test

Table 5 shows that the variables had a short-lived random walk pattern. Since all variables are stationarity at first difference (I(1)), the Johansen co-integration test is needed to confirm a long-term link between them.

Table 5: Augmented Dickey Fuller (ADF) Unit Root Test

Variables	ADF Test at Level	Critical Values at 5%	ADF Test at FD	Critical Values at 5%	Decision
TRV	-1.879575	-3.020686	-4.407505	-3.029970	I(1)
TR	-0.821609	-3.020686	-4.402956	-3.029970	I(1)
PR	-1.411972	-3.020686	-3.794591	-3.029970	I(1)
AP	-0.582677	-3.020686	-3.953060	-3.029970	I(1)

Source: Researcher's Compilation (2023)

Multicollinearity Test of the Variables

The tax rate is 0.186, the penalty rate is 0.230, and the audit probability is 0.146 within the tolerance, according to Tables 6a and 6b. These numbers surpass 0.10. No variable multicollinearity is implied by this. The tax rate, penalty rate, and audit probability are all determined by the Variance Inflation Factor (VIF), which is 5.381. Every value is less than 10. The Breusch-Godfrey Serial Correlation LM Test was used for serial correlation testing. Above the 5% cutoff, the R square was 4.724314 and the probability was 0.0942. There was no serial association in the series residual, according to the research.

Table 6a: Post Estimation Test Results

Null Hypothesis	**Statistics**	**Probability**
There is no Serial Correlation(P>0.05)	4.724314	0.0942
Heteroskedasticity Test: Breusch-Pagan-Godfrey		
Null Hypothesis	**Statistics**	**Probability**
no heteroskedasticity of the residuals (P>0.05)	1.404541	0.7045
Tolerance and VIF Value		
Null Hypothesis	**VIF**	**1/VIF**
Absence of multicollinearity among the variables (1/VIF >0.10)		5.438

Source: Researcher's Compilation (2023)

Table 6b: Tolerance and VIF Value

Variable	VIF	1/VIF
ERD	5.381	0.186
FSZ	4.354	0.229
EPCP	6.580	0.152
Mean VIF	5.438	

Source: Researcher's Computation (2023)

Johansen Test of Co-integration

The results shown in Table 5 show that all of the variables exhibit first-order integration, abbreviated as I(1). In order to ascertain whether a long-term link exists inside the model, the Johansen co-integration test is therefore deemed necessary. The results shown in Table 6 show that tax compliance mediators and tax revenue in Nigeria have a long-term relationship that is known as co-integration. The tax revenue volatility (TRV), tax rate (TR), penalty rate (PR), and audit probability (AP) were the tax compliance mediators taking into account in this study. This finding is supported by the Trace Statistics of the first row in the third column, which displayed a value over the 5% critical value in the first row of the fourth column. As a result, at a significance level of 5%, the alternative hypothesis (H1) of co-integration is accepted and the null hypothesis (H0) of no co-integration is rejected.

Table 7 Presentation of Johansen Co-Integration Result

	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.727358	51.18167	47.85613	0.0236
At most 1	0.672926	26.48936	29.79707	0.1147
At most 2	0.238927	5.255579	15.49471	0.7811
At most 3	0.003577	0.068085	3.841466	0.7941

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
Source: Researcher's Compilation (2023)

Long-Run Model

Table 8 presents the findings, indicating that a one-unit increase in the penalty rate corresponds to a 13.78384 unit increase in government tax income. On the contrary, the potential of an audit exhibited an inverse connection with a coefficient of 12.49234 units. The findings suggest that a one-unit increase in the likelihood of an audit is associated with a drop of 12.49234 units in the tax income generated by the Nigerian government.

Table 8 Long-Run Model

TRV	TR	PR	AP
1.000000	16.15367	13.78384	-12.49234
	(3.30721)	(2.81614)	(2.39552)

Source: Researcher's Compilation (2023)

Tax Compliance Mediators and Tax Revenue in Nigeria

Table 8 shows the conservative short-run dynamics of tax compliance mediators, including tax rate (TR), penalty rate (PR), and audit possibility (AP), on Nigerian tax revenue. After the Johansen co-integration test reveals a long-run link, the described model generates these dynamics. R-square, also known as the multiple determination coefficient, had a value of 0.799; when corrected, it had a value of 0.763. While 24% of the fluctuation in tax revenue can be attributed to stochastic or mistaken variables, 76% of the variation can be attributable to independent sources. The total statistical significance of the model was shown by its F-statistic of 50.417 and p-value of 0.000.The error-correcting mechanism (ECM) also assesses the rate of adaptation of the dependent variable to modifications in the independent variable. -0.177788 was the ECM. Statistics are significant when the coefficient has a negative sign. The result of -0.177788 shows that the model can account for 18% of the fluctuations from short to long-term equilibrium. This means that tax revenue responds gradually to changes in the tax rate, the penalty rate, and the potential for an audit of up to 18%.

The parameter coefficients of the dependent variable are shown in Table 9. Tax revenue lagged's negative correlation is 0.196269. It has a 0.4594 likelihood of not accounting for Nigeria's tax income. The results show that a one unit increase in lag tax revenue leads to a decrease in its current value. The coefficient for the prior year's tax rate is positive but statistically insignificant at 0.601666 units. This analysis shows that an increase in the tax rate of one unit from the prior year resulted in an increase in tax income of 0.601666 units. The lagged penalty rate coefficient is statistically insignificantly positive and has a magnitude of 1.128941 units. As a result, it is clear that a one-unit late payment penalty rate increases Nigeria's tax revenue by 1.128941 units. The past audit chance is associated negatively by 2.229374 units, which is statistically negligible. This proves that for every unit rise in the lag value of audit possibilities, there is a corresponding decrease in tax revenue in Nigeria of 2.229374 units. There are several political repercussions of this outcome. Tax rates and revenue are found to be positively correlated by the short-run error correction process. The findings of Johansen co-integration confirmed the positive correlation. The results concur with those from Emmanuel et al. (2021), Chukwumah (2017), Asela and Bandara (2019), Onafowokan and Oluyombo (2018), Ali (2008), Kirchler (2008), and other researchers. In addition to Yinka and Okeke (2021), Monday, Olubode, and Abiodun (2019), Pommerehne and Weck-Hannemann (1996), Torgler (2007), Palil (2010), Park and Hyun (2003), and others, tax rate increases have been shown to reduce government revenue.

A moderately beneficial association between tax income and Nigeria's penalty rate was found via research on Parsimonious Short-run Dynamics (Vector Error Correction Mechanism). The outcome was confirmed by Johansen co-integration, which showed a favourable correlation between tax revenue. Despite the lack of a significant correlation, the data suggest that increasing penalty rates in Nigeria might boost tax collection. This study's findings are in line with those of Monday, Olubode, and Abiodun (2019), Timgo, Dinku, and Alamirew (2018), Oladipupo and Obazee (2016), Park and Hyun (2015), and another research of a similar sort. Nida and associates. The authors of Friedland et al. (2015), Brautigan et al. (2008), and other studies claim that tax penalty rates have no influence on timely tax filing.

In Nigeria, audits and tax revenue have an antagonistic relationship over the long and short terms. Tax revenue in Nigeria decreases due to audit risk. Nigeria's inefficient tax administration and system may be the cause of the unfavourable relationship. The results also imply that the Nigerian tax system's auditing capabilities may limit the government's ability to raise income. Several experts, including Adebola and Olufemi (2021), Nida et al. (2020), Ayneshet (2020), Soyinka (2016), Ibrahim (2014), Modugu and Anyaduba (2014), and others, disagree with the findings.

Olaoye and Ekundayo (2018), Onafowokan and Oluyombo (2018), and other sources' empirical findings concur with it.

Table 9 Parsimonious Short-run Dynamics (Vector Error Correction Mechanism)

	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.177788	0.059083	-3.009146	0.0101
D(TRV(-1))	-0.196269	0.257413	-0.762468	0.4594
D(TR(-1))	0.601666	0.905139	0.664723	0.5178
D(PR(-1))	1.128941	0.746276	1.512766	0.1543
D(AP(-1))	-2.229374	1.494556	-1.491663	0.1597
C	0.194818	0.084257	2.312201	0.0378
R Square	0.799			
Adjusted R^2	0.763			
F Statistics	50.417			
Prob. F Statistics	0.000			

Source: Researcher'sCompilation (2023)

Discussion of Findings

Due to the challenges posed by low tax compliance in revenue collection, governments at all levels express significant concern. This study utilizes the Augmented Dickey Fuller (ADF) Unit Root Test to identify the most efficient estimation techniques. The unit root test reveals that all variables exhibit stationarity at order one, necessitating the application of the Johansen co-integration test. Through this investigation, Johansen co-integration and vector error correction techniques were employed.The findings of this study illustrated a persistent relationship between tax revenue in Nigeria and intermediaries of tax compliance. The trace test indicates the presence of just one cointegrating equation at the 0.05 significance level, suggesting the absence of any long-term exclusionary correlation between the variables. Furthermore, for error correction in the short run towards long-run equilibrium, a moderate adjustment magnitude of 18% is demonstrated.

According to the parameter coefficients, there exists a statistically significant positive long- and short-term relationship between Nigeria's tax revenue and the tax rate and penalty rate. This highlights the importance of enhancing Nigeria's tax structure to bolster tax collection efforts. This indicates that as the tax rate and penalty rate rise over time, Nigeria's tax revenue typically rises as well. This suggests that elevated tax rates and more stringent penalties are linked to increased tax revenue generation for the country over an extended period. Moreover, it suggests that in the short term, variations in the tax rate and penalty rate also positively influence changes in Nigeria's tax revenue.

Conversely, the tax audit penalties exhibited a statistically insignificant negative correlation, suggesting unreliability within Nigeria's tax law system.This discovery suggests that increased audit penalty rates have a tendency to dissuade taxpayers from adhering to tax regulations, which could ultimately lead to a reduction in tax revenue collected by the government. Conversely, when audit penalty rates are lower, taxpayers may feel less deterred and more inclined to comply with tax laws, potentially resulting in higher tax revenue.The significant negative impact of the audit penalty rate on tax revenue underscores the importance of carefully considering the implications of audit penalties on tax collection efforts.

CONCLUSION AND RECOMMENDATIONS

The study addresses the significant concern expressed by governments regarding low tax compliance and its impact on revenue collection. The findings indicated that as the tax rate and penalty rate increase over time, Nigeria's tax revenue tends to rise as well, suggesting that elevated tax rates and stricter penalties are associated with increased tax revenue generation. However, the audit probability exhibits a statistically insignificant negative correlation, implying unreliability within Nigeria's tax law system. The study also discovers that increased audit penalty rates may discourage taxpayers from adhering to tax regulations, leading to a reduction in tax revenue, while lower audit penalty rates may encourage compliance and result in higher tax revenue.The study concludes that there exists a statistically significant positive long- and short-term relationship between Nigeria's tax revenue and the tax rate and penalty rate. This highlights the importance of enhancing Nigeria's tax structure to bolster tax collection efforts.

Based on the findings, it is recommended that policymakers carefully consider the implications of audit penalties on tax collection efforts. Efforts should be made to strike a balance between enforcing tax laws and maintaining an environment conducive to voluntary compliance among taxpayers. Additionally, enhancements to Nigeria's tax structure, including adjustments to tax rates and penalties, should be considered to optimize tax revenue generation.

This study contributes to the existing knowledge by providing empirical evidence of the relationship between tax revenue and intermediaries of tax compliance in Nigeria. The utilization of advanced econometric techniques, such as the ADF Unit Root Test and Johansen co-integration analysis, enhances the understanding of the dynamics between tax revenue, tax rates, penalty rates, and audit probability. Furthermore, the study sheds light on the importance of tax structure enhancements and the implications of audit penalties on tax compliance and revenue collection efforts, offering valuable insights for policymakers and practitioners in the field of taxation.

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