Non-oil Tax Revenue, Institutional Quality and Natural Resources Management in Nigeria

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Abstract: - Natural resource management attracts investment, fosters innovation, and promotes long-term economic performance. However, research has revealed that Nigeria's rapid economic development has been hampered over time by persistent deficiencies in the management of its natural resources. Studies have identified the effective utilization of non-oil tax revenue as a key component and potential solution for addressing these gaps in natural resource management. Accordingly, this study examined the effect of non-oil tax revenue on natural resource management in Nigeria. The study adopted an *ex-post facto* research design, while purposive sampling was used to determine the sample size. Data covering a 41-year period, from 1984 to 2024, were obtained from the World Bank Development Indicators Database, the National Bureau of Statistics, and the Central Bank of Nigeria Statistical Bulletin. The validity and reliability of the data were established based on the statutory audits of the financial statements of relevant government agencies. The data were analyzed using descriptive and inferential statistics, specifically multiple regression analysis. The findings revealed that non-oil tax revenue had a significant joint effect on natural resource management. The study further established that non-oil tax revenue enhanced natural resource management in Nigeria. It therefore recommended that the government and relevant tax authorities should ensure the effective maximization of non-oil tax revenue to strengthen natural resource management in Nigeria.

Key-Words: - Company income tax, Customs and Excise Duties, Institutional Quality, Natural resources management Value Added Tax.

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1 Introduction

Effective management of natural resources is essential to any country's long-term development. When a country is resilient and able to meet both current and future needs, this is accomplished [1], [2]. In order to lower poverty, gaps, and foster stable macroeconomic conditions for national well-being, natural resources management entails the practical and prudent management of a nation's natural, financial, and human resources [3], [4]. Furthermore, managing natural resources is essential for tackling structural problems related to economic development, like high unemployment, poor infrastructure, and income and regional inequality [5]. In addition, studies have shown that natural resources management is crucial in deepening Nigeria's long-term development by ensuring that the nation's resources are efficiently managed to promote inclusive growth, reduce poverty, and enhance the well-being of citizens across generations [6], [7].

In order to offset potential welfare losses resulting from the management of natural resources, natural resources management is defined as a way to channel revenues from the extraction of natural resources into the development of other forms of capital, especially human and economic capital. According to [8], [9], Nigeria's natural resources management has experienced difficulties over the past 20 years as a result of its prolonged over-reliance on crude oil revenue, which has seen unstable revenue trends and is sensitive to

fluctuations in the global market. Between 2000 and 2014, Nigeria's economy grew significantly and steadily, averaging over 7% annual growth. This expansion was made possible by first-stage structural initiatives, macroeconomic improvements, and favorable international conditions [10], [11].

However, between 2015 and 2022, monetary and exchange rate policy distortions, growing fiscal deficits from decreased oil production and an expensive fuel subsidy program, an increase in trade protectionism, and external shocks like the COVID-19 pandemic caused growth rates to decline and GDP per capita to plateau [12], [13].

[14] added that the country's inflation, which reached a 24-year high of 31.7% in February 2024 as a result of poor economic fundamentals and sluggish growth, has left millions of Nigerians living in poverty. Despite having the largest population and economy in Africa, the majority of Nigerians have limited opportunities. If they have full access to a high standard of living, Nigerians, who have the seventh-lowest human capital index in the world, are expected to be 36% less productive workers in the future. The 3.5 million Nigerians who enter the workforce each year are unable to assimilate due to a lack of entrepreneurial opportunities and inadequate job development; as a result, many decide to emigrate in search of better opportunities [15].

A number of institutional, structural, and environmental issues compromise Nigeria's ability to manage its natural resources. Long-term growth is hampered by a lack of diversification into manufacturing and agriculture, and an excessive reliance on crude oil revenue has produced a weak economic foundation susceptible to changes in world prices. Investor confidence has been damaged, and resources have been diverted from productive sectors due to widespread corruption, poor governance, and mismanagement of public funds. Industrial growth and competitiveness are hampered by inadequate infrastructure, unstable power supplies, and inconsistent policies. In addition, widespread poverty, high unemployment, and fast population growth put pressure on scarce resources, escalating social instability and inequality. Ecological balance and sustainable livelihoods are further threatened by environmental degradation brought on by deforestation, oil exploration, and inadequate waste management. All of these elements have made it more difficult for Nigeria to achieve resilient, inclusive, and sustainable economic growth.

According to [16], non-oil tax revenue plays a crucial role in addressing Nigeria's natural resources management issue in a number of ways. Firstly, it helps maintain Nigeria's stability during oil price shocks by giving the government a stable and predictable revenue base. Secondly, it supports the government's economic growth and development because it is a significant source of income for funding government expenditures and infrastructure projects. By significantly supplementing oil revenue and assisting the government in reducing budget deficits and excessive borrowing, non-oil tax revenue lessens the fiscal strain on the government [17], [18].

Non-oil tax revenue is positively correlated with favorable opportunities for the government by expanding and fostering economic diversifications as the country encourages growth in industries like manufacturing, services, and agriculture, which in turn creates jobs, boosts the economy, exports, and encourages innovation and expansions [19].

The remaining research was conducted in this way: section 2 examined the study's hypothesis test and a critical evaluation of earlier research in the field. The study's methodology, which included a data sample, an explanation of the identified data, analyses, and an empirical review, was covered in section 3. The study examined data analyses, literature, and findings in section 4. The study summary of results, research limitations, and recommendations for additional research were taken into consideration in section 5.

2 Literature Review

2.1 Conceptual Review

2.1.1 Natural Resources Management

Natural resources management describes practices and regulations that support long-term economic expansion without negatively impacting society's social, environmental, and cultural well-being [20]. It includes procedures meant to control the economic, social, and environmental effects of governmental and organizational actions while also promoting long-term national development. Effective natural resources management promotes human capital development, workforce productivity, job creation, and higher living standards in addition to environmental conservation. Therefore, balancing economic growth and profit-making with investments in people, skill development, decent work opportunities, and environmental protection is

necessary for sustainable management of natural resources. The United Nations Sustainable Development Goals (SDGs), a set of 17 interrelated objectives intended to advance inclusive and sustainable development, are in line with natural resources management, according to [21]. In addition to environmental sustainability, these objectives place a strong emphasis on social aspects like respect for human rights, fair labor standards, decent work, gender equality, and high-quality education. Therefore, by generating environmentally sustainable jobs, improving labor market outcomes, and raising citizens' productive potential, sustainable resource management supports workforce development.

Every economy still depends heavily on tax revenue, which is also a key tool for economic change. It is flexible and sensitive to current economic conditions, giving governments the financial resources required to fulfill their commitments to development [5]. In addition to funding public spending, non-oil tax revenue can improve the sustainability of natural resources by funding infrastructure, healthcare, education, vocational training, and economic sectors that create jobs. These investments support inclusive and sustainable economic development, enhance workforce competitiveness, and strengthen the formation of human capital.

2.1.2 Non-Oil Tax Revenue

Non-oil tax revenue is any type of tax income received by the government that does not include taxes from petroleum profits or revenue related to oil [22]. The non-oil sector includes economic activities such as telecommunications, financial services, real estate, construction, tourism, and related industries that are not directly related to the petroleum and gas industry [23], [24]. Similar to this, non-oil exports apart from petroleum products consist of domestically produced goods from the mining, quarrying, agricultural, and industrial sectors that are exported to generate revenue for economic growth. Coal, cotton, timber, groundnuts, cocoa, beans, palm kernels, palm oil, hides and skins, and livestock are examples of these exports [25], [26]. Empirical evidence indicates that non-oil tax revenue has remained the dominant contributor to federation revenue, accounting for approximately 83.0 per cent, while oil revenue contributed the remaining 17.0 per cent in Nigeria over the years [24], [25].

2.1.2.1 Value Added Tax

Value Added Tax (VAT) is a tax imposed on the value that a supplier or seller adds to a product or service prior to selling it [26]. Value-added tax (VAT), also referred to as consumption tax, is imposed on consumed goods and services. According to [27], VAT is a consumption tax that is paid by consumers. Therefore, refusing to buy and use goods and services that are subject to Value Added Tax is the only way for an individual or organization to avoid paying VAT. From a historical standpoint, the Nigerian VAT was established by VAT Decree No. 103 of 1993, which became operative on December 1, 1993, but the invoicing date was January 1, 1994. The Finance Act of 2023 introduces modifications to the VAT Act.

2.1.2.2 Company Income Tax

According to [28], company income tax (CIT) is a tax levied on businesses' profits that originate in, are derived from, are brought into, or are received in Nigeria in connection with any trade or business, rent, premiums, dividends, interest, royalties, and any other source of annual profit, excluding profits from companies engaged in upstream operations. Nigerian-incorporated businesses are subject to corporation income tax on all profits made, derived from, brought into, or received in Nigeria. According to [29], [30], non-resident companies' profits from conducting business in Nigeria were also subject to this type of tax. The Company Income Tax Act (CITA) of 1979 established CIT and regulated the processes for assessment and collection.

2.1.2.3 Custom and Excise Duty Tax

Products and services imported into Nigeria are subject to customs duties. It is imposed either as a percentage of the value of imported goods or services or as a fixed amount dependent on the quantity of goods (unit tax) [31], [32]. The government imposes indirect taxes known as customs duties on goods entering and leaving the nation. In contrast, excise duties are indirect taxes levied on domestically produced and consumed goods in order to control their consumption. The government of a nation uses customs and excise duties (CED) to support economic growth and development. In order to protect the nation's new businesses and to raise money, high import taxes are imposed [33], [34].

2.1.3 Institutional Quality

The study presents institutional quality as a means of managing the impact of non-oil tax revenue on the management of natural resources. Some studies have looked at the relationship between non-oil tax revenue and the management of natural resources, but they haven't considered the consequences of the level of institutional interaction in enforcing compliance from tax administrations and taxpayers. For instance, the impact of non-oil tax revenue on Nigeria's growth was examined by [35] using gross domestic product. This investigation was prompted primarily by the abandonment of the non-oil industry in favor of the oil sector. This has prevented Nigeria's non-oil sector from growing, which would boost the country's GDP if it were to resurrect.

2.2 Theoretical Framework

The study draws on theories considered relevant to its objectives and adopts the Endogenous Growth Theory and the Ability-to-Pay Theory as its theoretical foundations. The Endogenous Growth Theory is particularly relevant in explaining natural resources management in Nigeria, as it emphasizes the role of internal factors such as human capital development, institutional effectiveness, technological innovation, and sustainable fiscal policies in driving long-term economic growth and environmental sustainability.

2.2.1 Endogenous Growth Theory

The endogenous growth theory, which was put forth by Romer in the year 1986 and Lucas asserts that internal elements like the development of human capital, innovation, prudent fiscal policies, and effective institutional frameworks are what drive long-term economic growth. The theory emphasizes that consistent reinvestment of public revenue, particularly from taxes, into productivity-enhancing sectors like infrastructure and technology is the only way to achieve sustainable economic progress in Nigeria. The theory offers a solid explanation for how efficient fiscal management of non-oil tax revenue can promote equitable, stable, and environmentally responsible economic growth by highlighting the role of policy-driven incentives and knowledge accumulation.

2.2.2 Ability to pay Theory

The study used Adam Smith [36], [37], Ability-to-Pay Theory of Taxation to explain the non-oil tax revenue dimension. According to the ability to pay theory, which is a traditional tax theory, people and businesses should pay taxes in accordance with their capacity to earn income. It places a strong emphasis on equity, fairness, and wider tax coverage all of which are essential for raising non-oil tax revenue. According to studies, Adams Smith first proposed the ability to pay theory in his 1776 book "The Wealth of Nations." In 1776, Adams Smith developed the ability to pay theory [38]. There are other proponents of the ability to pay hypothesis, which maintains that taxes should be distributed in a way that strengthens taxpayers' finances [39]. Taxpayers' perceptions are heightened when they pay taxes under duress and beyond their means. According to the affordability and income level of the payers, tax payments should be convincing and mutually affordable [40].

2.3 Empirical Review

In this section, the study considers some empirical studies on the topic non-oil tax revenue and natural resources management in the academic literature both developing and advanced economies. Whereas the conflicting findings in the literature about whether or not non-oil tax revenue has the ability to cause sufficient natural resources management.

2.3.1 Past findings

There are some few studies that have considered the relationship between non-oil tax revenue and natural resources management in Nigeria. However, among these few studies, there are divergent opinions and mixed empirical findings in the academic literature about whether or not non-oil tax revenue have resulted in natural resources management.

2.3.2 The Positive Relationship between Non-Oil Tax Revenue and Natural Resources Management

Prior studies [41], [42], [43], non-oil-tax revenue is one of the major revenue sources and offers promising prospects and the capacity to deepen government revenue to finance essential public goods like infrastructure, healthcare, and education, supporting inclusive growth and long-term development efficiency, and encouraging the formation of economic activities. According to [44], non-oil tax revenue enhances fiscal resilience, increases the effectiveness of revenue mobilization, and formalizes economic activities in nations. Studies that have shown the benefits of non-oil tax revenue are listed in Table 1 (Appendix). For example, [45] investigated the impact of non-oil tax revenue on economic growth in non-oil producing countries. The study employed Panel Vector Autoregressive (PVAR) analysis on data gathered

from 83 non-oil-producing nations between 1990 and 2015 and the findings indicated that government spending on non-oil income has significant impact on economic growth.

Similarly, [46] investigated how non-oil tax revenue is used to prepare Nigeria's estimated budget for 2025. This study found that non-oil tax revenue had significant contribution to government budgets using a review of the literature and fiscal data, offering recommendations for improving its efficacy in reaching the nation's financial objectives. In the same manner, [47] investigated how Nigeria's GDP was affected by non-oil tax revenue and the findings showed that non-oil tax revenue had a short and long-term, positive, and significant impact on GDP; also, empirical causality analysis of transaction taxes, Company income tax, and other non-oil tax items of government revenue. According to the findings, tax laws and their later changes had effect on the government's non-oil tax collection during that period, even though income tax and stamp duty revenue dramatically increased federally generated revenue. Table 1 (Appendix) presents the rest of the other studies that have found positive effects.

2.3.3 The Negative Relationship between Non-Oil Tax Revenue and Natural Resources Management

Conversely, other research has looked at non-oil tax revenue and economic development; while these studies have confirmed the importance of non-oil tax revenue, they have also shown detrimental effects [45], [47], [48], [49], for instance, examined the impact of tax revenue on Nigeria's economic growth between 1998 and 2021. The results confirmed that non-oil tax revenue boosts the growth of the Nigerian economy and demonstrated that while company income tax has a statistically significant negative impact on Nigeria's GDP (economic growth), petroleum profits tax, customs and excise duty, value added tax, and education tax have a statistically positive and significant impact. Additionally, [56] investigated the effect of indirect taxes on the management of natural resources in Nigeria; however, the study did not provide the operationalization of variables, the functional relationship between indirect taxes and natural resources management, or the measurement of the variables used in the study. As a result, there are methodological and empirical gaps in Nigerian literature.

In a similar vein, [57] from Pakistan examined non-oil tax revenue from emission taxes on developing nations such as Iran. While D'Errico empirically investigated the implications and effects of non-oil tax revenue from sources like energy and security using a stochastic frontiers analysis of cross-OECD countries, the study's regression analysis revealed that non-oil tax revenue from emission tax was good but had a negative impact on Iran's economy. The study confirmed detrimental effects on the sampled countries' economies. The other studies that have reported negative effects are shown in Table 2 (Appendix).

2.3.4 Hypothesis Development

Even though managing natural resources is becoming more widely acknowledged as a key component of long-term development, progress in this area is still limited, especially in Nigeria, where the country's fiscal structure is still largely reliant on oil. More importantly, existing research on the relationship between non-oil tax revenue and natural resources management is scant and disjointed [35], [42], [52]. The debate is mainly inconclusive and the evidence base is inadequately developed because the few empirical studies that are currently available report conflicting findings, divergent interpretations, and inconsistent results. This ongoing lack of agreement highlights a substantial gap that calls for more thorough empirical investigation.

Furthermore, the true efficacy of these interventions is still unclear, despite the fact that successive governments have implemented tax reforms, fiscal programs, and policy initiatives aimed at increasing non-oil tax revenue primarily to reduce budget deficits, close infrastructure gaps, and alleviate poverty. Previous research [15], [16], [26] raises significant concerns regarding the effectiveness of policies and the dynamics of their implementation because it is unclear whether these efforts have resulted in quantifiable improvements in natural resources management outcomes.

Therefore, this study aims to investigate the impact of non-oil tax revenue on economic sustainability in Nigeria in order to advance knowledge and address economic sustainability. In light of the aforementioned discussions, these theories thus.

Hypothesis 1 (H_1): There is no relationship between non-oil tax revenue and natural resources management in Nigeria.

Hypothesis 2 (H_2): Institutional quality does not significantly moderate the relationship

between non-oil tax revenue and natural resources management in Nigeria.

Against this backdrop, the current study is both essential and timely. This study's goal is to contribute to the body of knowledge by offering solid empirical evidence regarding the function, effectiveness, and importance of non-oil tax revenue in resolving Nigeria's natural resources management issues. By doing this, it directly addresses significant gaps in earlier research. For instance, while [51], [55], [56] clearly-established that non-oil tax revenue-positively-influences-alternative-funding for infrastructure-development, their study stops short of unpacking-the-specific-transmission-mechanisms-through which such revenue drives these-outcomes. Furthermore, it does not provide practical policy pathways for leveraging new fiscal opportunities or scaling these alternative financing options. By addressing these omissions, this study moves beyond broad associations to offer a more nuanced and policy-relevant understanding of how non-oil tax revenue can be strategically harnessed to foster sustainable economic development in Nigeria.

3 Methodology

In this section, the study presented the population, sample size and data collection methods adopted in this study. It further presented data analysis, results of the analysis and interpretation of findings.

The study examined the Nigerian economy over a 41-year period (1994–2024) using identified proxies of non-oil tax revenue and natural resources management. The 41-year period was selected to provide a comprehensive view by capturing the entire spectrum of non-oil tax revenue components that act as explanatory variables. This time frame is also justified because it included stages of Nigerian natural resources management that went through various economic policies and governments. The Federal Inland Revenue Service (now Nigeria Revenue Service) statistical bulletin and the National Bureau of Statistics (NBS) bulletin for the 41-year period from 1984 to 2024 were used to extract pertinent data. The World Development Indicator Database, the Central Bank of Nigeria Statistical Bulletin were additional sources of data for the 41-year period. The reliability of the instruments was also reinforced by the fact that these databases were maintained and audited by credible national and international institutions, ensuring consistency and accuracy suitable for academic research

This study established the causal and effect relationship between independent variable and its proxies on the dependent variable and its measures were found to have a causal and effect relationship in this study. The study used both descriptive time series statistics and inferential statistics to achieve this. Descriptive and inferential statistics were the two phases of the data analysis process. The research used a variety of unit root testing techniques from earlier studies, such as the Augmented Dickey-Fuller (ADF) proposed by Dickey and Fuller in 1979, the NG-Perron unit root proposed by Ng and Perron in 1996, the Breakpoint unit root, which helped the study test and improve the robustness of the result, and the stationarity test, also known as the Kwiatkowski-Philips-Schmidt-Shin developed by KPSS in 1992.

For the given model, the unit root test thus verified whether the series showed a combination of stationarity at level and first difference stationary series. Additionally, the variance Inflation Factor (Multicollinearity test), Serial Correlation LM test, normality test, and heteroskedasticity test were carefully performed in conjunction with other diagnostic tests.

The following models were formulated for the study:

$$Y_t = \alpha_0 + \beta XZ_t + \mu_t$$

$$NRM_t = \beta_o + \beta_1 VAT_t + \beta_2 CITA_t + \beta_3 CUED_t + \mu_t \quad (1)$$

$$NRM_t = \beta_o + \beta_1 VAT_t + \beta_2 CITA_t + \beta_3 CUED_t + INQT_t + \mu_t \quad (2)$$

where
ECSTB = Natural resources management, VAT = Value Added Tax, CITA = Company income tax, CUED = Custom and Excise Duty Tax, ‘t’ represents company in year ‘t.’ β_o is constant, β_1-β_3 are the coefficients, μ = Stochastic Variable (Error Term), $_t$ = Time Series

The study presents in Table 3 (Appendix) the measurement and sources of the identified variables used in the study.

4 Data Analysis, Results and Discussions

This section considers data analysis, results, interpretations and discussions of findings.

4.1 Result of the Optimal Lag Length Selection Criteria

The best lag structure for accurately capturing the dynamic interaction between Natural resources management (LNRM), non-oil tax revenue components (LVAT, LCIT, and LCED), and institutional quality (INQ) must be found before estimating the ARDL model with INQ as a control variable. For dynamic modeling to guarantee unbiased parameter estimation, remove serial correlation, capture delayed adjustment mechanisms, and prevent over-parameterization, proper lag specification is essential.

The study uses the Sequential Modified Likelihood Ratio (LR) test, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan–Quinn (HQ) criterion to determine the proper lag order. Together, these standards assess the parsimony and adequacy of the model. The LR statistic selects lag 1, according to the results shown in Table 4 (Appendix). In a similar vein, lag 1 is the ideal lag order where the FPE, AIC, SC, and HQ criteria consistently converge. Adopting lag 1 in the ARDL estimation is strongly supported empirically by the consistency of the selection across all criteria. This result implies that the dynamic transmission of fiscal policy effects on natural resources management is sufficiently captured within a single period when institutional quality is included in the model. This suggests that institutional mechanisms may accelerate the adjustment process by strengthening policy implementation and enhancing distributive channels. Consequently, lag 1 is adopted as the maximum lag structure in estimating the Model.

Having determined the optimal lag structure, the study proceeds to examine the existence of a long-run equilibrium relationship among the variables.

4.2 Co-integration Test Results

Following the determination of the optimal lag length, the Johansen cointegration test was conducted to examine whether a stable long-run equilibrium relationship exists
among natural resources management (LNRM), non-oil tax revenue components (LVAT, LCIT, LCED) and institutional quality (INQ).

The findings indicate that the Maximum Eigenvalue statistic (19.155) and the Trace statistic (19.155) both surpass the 5 percent critical value of 3.841. The corresponding probability value of 0.013 is below the significance level of 0.05. Consequently, the null hypothesis that there is no cointegration is disproved. This result validates that the system contains a single cointegrating equation. It suggests that while non-oil tax revenue components and natural resources management may behave non-stationarily on their own, they have a long-term equilibrium relationship. To put it another way, deviations from equilibrium are transient and the variables move together over time. On the other hand, the adjustment coefficient (-0.011) is small but negative. The small size suggests a slow rate of adjustment toward long-run equilibrium, even though the negative sign satisfies theoretical expectations for convergence. This implies that rather than being corrected quickly, fiscal shocks that have an impact on natural resources management are corrected gradually.

4.3 Autoregressive Distributed Lag (ARDL) Model Results

Having established the presence of a long-run relationship, the ARDL framework was employed to estimate both short-run dynamics and long-run equilibrium effects of non-oil tax revenue and institutional quality on natural resources management.

ARDL Bounds Test and Cointegration:

The F-statistic obtained from the ARDL bounds test is 15.601. The lower bound critical value is 2.86 and the upper bound critical value is 4.01 at the five percent significance level. The null hypothesis that there is no long-term relationship is rejected because the calculated F-statistic significantly exceeds the upper bound critical value. This demonstrates a robust and steady long-term equilibrium relationship between Nigeria's institutional quality, non-oil tax revenue components, and natural resources management. The F-statistic's magnitude shows that, in comparison to Model, the system's long-term association is strengthened when institutional quality is included.

Diagnostic Test Results

Several post-estimation diagnostic tests were carried out to guarantee the robustness and validity of the estimated ARDL model. The residuals are normally distributed, meeting the normality assumption necessary for sound statistical inference, according to the Jarque–Bera statistic (1.217) with a probability value of 0.544.

The Breusch–Godfrey LM test yields a statistic of 1.377 with a probability value of 0.275 for serial correlation. Since the probability-value is higher than 0.05, it is not possible to reject the null

hypothesis that there is no serial correlation. This conclusion is further supported by the Durbin-Watson statistic of 2.494, which indicates the absence of first-order autocorrelation. The Breusch Pagan–Godfrey test for heteroskedasticity yields a probability value of 0.452, indicating that the residuals are homoscedastic and the variance of the error term is constant across observations. The Ramsey-RESET test yields a probability value of 0.100, indicating that the model is correctly specified and does not have functional form misspecification.

Additionally, the recursive residuals stay within the 5 percent critical bounds during the sample period, according to the CUSUM and CUSUMSQ stability tests. This confirms that the estimated parameters are stable and that the model does not exhibit structural instability.

Collectively, these diagnostic results demonstrate that Model satisfies the classical regression assumptions and is statistically robust and reliable for policy inference.

In Figure 1 (Appendix), the study presents plot of cumulative sum of recursive residuals for the Model

In Figure 2 (Appendix), the study presents Plot of Cumulative sum square of recursive residuals for the Model.

Short-Run Dynamics (Conditional ECM Interpretation)

The estimated conditional ECM equation for the Model is written as:

$$\Delta LNRM_t = 2.208 - 0.255LGDPC_{t-1} + 0.049LVAT_{t-1} + 0.018LCIT_t - 0.043LCED_{t-1} - 0.345INQ_t - 0.018\Delta LVAT_t - 0.027\Delta LCED_t + \varepsilon_t$$

The lag dependent variable LNRM(–1) has a probability value of 0.000 and a coefficient of -0.255. The existence of a legitimate error correction mechanism is confirmed by the negative and highly significant coefficient. The magnitude suggests that within a single period, about 25.5% of the short-run disequilibrium is corrected. In comparison to the Model, this indicates a significantly faster rate of adjustment, suggesting that the inclusion of institutional quality improves convergence toward long-run equilibrium.

With a probability value of 0.000, the institutional quality coefficient (INQ) is -0.345. In the short term, improvements in institutional quality lessen natural resources management, according to this negative and statistically significant coefficient. Improved institutional performance, stronger governance, and more effective regulations seem to directly equalize the Nigerian economy. The lagged value of customs and excise duties (–0.043, p = 0.018) is statistically significant and negative, suggesting that trade-related taxes have a short-term impact on lowering natural resources management. When institutional quality is taken into account, the coefficient of VAT is positive but statistically insignificant (0.049, p = 0.174), indicating that VAT has no discernible short-term effect on natural resources management.

Similarly, company income tax is statistically insignificant in the short run (p = 0.489), indicating that its short-run distributive effect weakens once institutional quality is incorporated.

Long-Run Level Equation the Model

The long-run equilibrium relationship is expressed as:

$$LNRM_t = 0.191LVAT_t + 0.071LCIT_t - 0.170LCED_t - 1.357INQ_t + \varepsilon_t$$

The t-statistic is –4.916, the probability value is 0.000, the coefficient of institutional quality (INQ) is –1.357, and the standard error is 0.276. This suggests that over time, natural resources management is reduced by about 1.36 percent for every 1 percent improvement in institutional quality. The coefficient confirms that institutional strength is a crucial equalizing factor in Nigeria and is both statistically significant and economically significant. The coefficient of customs and excise duties (-0.170) has a probability value of 0.024, a t-statistic of -2.429, and a standard error of 0.070. This suggests that, over time, natural resources management is reduced by about 0.17 percent for every 1 percent increase in trade-related tax revenue. The statistically significant coefficient indicates that long-term redistribution is facilitated by customs and excise taxes.

In the long term, the coefficients of company income tax (0.071, p = 0.470) and VAT (0.191, p = 0.196) are not statistically significant. This suggests that when institutional quality is taken into account in the model, these tax components do not have statistically significant long-term effects on natural resources management. When combined, the long-term findings show that trade-related taxes and institutional quality are the main long-term forces behind the Model's reduction of natural resources management.

Significance of Joint Effect of the Variables
With an R-squared value of 0.996 and an adjusted R-squared value of 0.995, the model demonstrates strong explanatory power. This shows that the combined effects of non-oil tax revenue and institutional quality account for about 99.6% of the variation in natural resources management; the remaining 4% is attributed to other factors not included in the model. The explanatory variables collectively have a statistically significant impact on natural resources management at the five percent level, as confirmed by the overall F-statistic of 757.268 with a probability value of 0.000.

5 Conclusion and Recommendations

This study examined the relationship between non-oil tax revenue and natural resources management in Nigeria, with emphasis on the implications for sustainable human capital development, workforce productivity, and institutional effectiveness. The study utilized secondary data obtained from the Federal Inland Revenue Service (FIRS) Statistical Bulletin and the National Bureau of Statistics (NBS) publications over a 41-year period spanning from 1984 to 2024. Additional data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the World Development Indicators (WDI) database. To ensure robustness and reliability of the empirical analysis, the study employed multiple unit root and stationarity testing techniques, including the Augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller, the Ng-Perron unit root test proposed by Ng and Perron, the Breakpoint unit root test to account for structural breaks, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test developed in 1992. These techniques enhanced the validity of the long-run estimations and minimized the risks of spurious regression outcomes.

The findings revealed that non-oil tax revenue exerted a significant joint effect on GDP per capita and sustainable natural resources management in Nigeria. Specifically, the long-run estimates indicated that value-added tax (VAT) positively influenced natural resources management by providing stable fiscal capacity capable of supporting investments in environmental sustainability, public infrastructure, human capital development, and workforce enhancement initiatives. Conversely, company income tax and customs and excise duties demonstrated mitigating effects, suggesting that excessive dependence on these revenue sources may increase production costs, discourage business expansion, reduce employment opportunities, and weaken sustainable economic activities when not efficiently administered. Institutional quality exhibited a significant moderating influence by strengthening fiscal transparency, accountability, regulatory efficiency, and the effective utilization of tax revenues for sustainable development objectives.

The study further established that effective non-oil tax administration contributes to sustainable workforce development through increased government capacity to finance education, vocational training, healthcare delivery, green infrastructure, renewable energy projects, and environmentally responsible industrialization. These investments enhance labour productivity, improve human capital accumulation, stimulate decent job creation, and promote long-term socioeconomic resilience. Thus, the nexus between taxation, institutional quality, and natural resources management extends beyond environmental conservation to encompass inclusive employment generation and sustainable human resources development.

The results carry significant implications for governments, policymakers, corporate organizations, taxpayers, development partners, investors, and the accounting profession. The findings suggest that governments should prioritize tax reforms aimed at improving tax efficiency, compliance, accountability, and transparency in tax collection and remittance processes. The existence of a long-run cointegration relationship indicates that properly managed non-oil tax revenue can substantially contribute to sustainable natural resources management and broader developmental outcomes. However, the negative relationship associated with company income tax and customs duties suggests the need for balanced fiscal policies capable of minimizing excessive tax burdens that may discourage entrepreneurship, workforce expansion, and productive investment.

In line with the empirical findings, the study recommends that the government should intensify efforts toward the optimal utilization of non-oil tax revenue in promoting sustainable natural resources management and human capital development in Nigeria. Greater emphasis should be placed on value-added tax due to its relative stability and lower distortionary effects on productive investment and employment generation. Policymakers should also introduce targeted fiscal incentives such as tax credits, tax holidays, green tax rebates, and employment-based incentives to encourage environmentally responsible corporate practices, workforce expansion, and sustainable

industrial growth. Furthermore, tax revenues should be strategically invested in education, technical skills acquisition, digital workforce development, renewable energy infrastructure, environmental conservation programmes, and labour-intensive sectors capable of generating sustainable employment opportunities.

Despite its contributions, the study has some limitations. The study focused primarily on non-oil tax revenue and may not fully capture the broader diversity of government revenue sources in Nigeria. Additionally, the scarcity of closely related empirical literature posed some challenges in undertaking broader comparative synthesis. Nevertheless, the study contributes fresh empirical evidence to the literature by integrating taxation, institutional quality, natural resources management, and human capital sustainability within a unified analytical framework.

The study contributes to knowledge by demonstrating how fiscal capacity and institutional effectiveness jointly influence sustainable development outcomes, particularly in relation to environmental sustainability, workforce productivity, and human resource development. It highlights the importance of strengthening institutional frameworks and tax administration systems to support sustainable economic transformation, inclusive labour market growth, and long-term human capital formation. The study also provides practical insights for managers, policymakers, and investors regarding the role of strategic tax planning, governance quality, and sustainable fiscal policies in reducing economic risk and fostering long-term investment confidence.

For future research, scholars may consider disaggregating non-oil tax revenue components further, incorporating broader governance indicators, and adopting longitudinal or cross-country comparative approaches to better understand the evolving interactions among taxation, institutional quality, workforce development, and sustainable economic performance.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work, the author(s) utilized artificial intelligence (AI) technologies solely for the purpose of linguistic refinement and grammatical correction. Following the application of these tools, the author(s) comprehensively reviewed, verified, and edited the resulting text. The author(s) maintain full accountability and responsibility for the accuracy, integrity, and final content of the publication.

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Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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APPENDIX

The study presents literature on the positive relationship between non-oil tax revenue and natural resources management in Table 1

Table 1. Literature on the positive relationship between non-oil tax revenue and natural resources management

Author(s)	Non-oil tax revenue measure	Natural resources management measures	Location	Findings
[48]	Customs and excise duties, Company income tax	GDP Growth	Nigeria	Positive Relationship.
[49]	Value added tax, Customs and Excise duties	GDP growth, Infrastructural development	Nigeria	Positive relationship
[50]	Export duties, Import duties	GDP Growth, Infrastructural development,	Korea	Positive relationship
[51]	Custom duties, Export duties	Government expenditure	Germany	Positive relationship
[52]	Company income tax, Customs duties	Social welfare, GDP growth	Pakistan	Positive relationship
[53]	Customs duties, Excise duties, GDP ratio	GDP ratio, reduction in income inequality	Asia Pacific	Positive relationship
[54]	Custom duties,	GDP, Employment	Ghana	Positive relationship
[55]	Export duties	Infrastructures, Social welfare	South Africa	Positive relationship

Source: Researchers' compilation

The literature on the negative relationship between non-oil tax revenue and natural resources management is presented in Table 2.

Table 2. Literature on the negative relationship between non-oil tax revenue and natural resources management

Author(s)	Non-oil tax revenue measure	Natural resources management measures	Location	Findings
[45]	Company income tax, education tax, value-added tax	GDP Growth, Infrastructural development,	Nigeria	Negative relationship
[46]	Custom duties, Export duties	Government expenditure	Nigeria	Negative relationship
[47]	Custom duties, Excise duties	Infrastructural development	Nigeria	Negative Relationship
[48]	Export duties Customs duties Excise duties	Social welfare, GDP growth	Nigeria	Negative relationship
[49]	Custom duties, Excise duties	GDP ratio, reduction in income inequality	United States	Negative relationship
[51]	Custom duties, Export duties	GDP Growth, Infrastructural development,	China	Negative relationship
[45]	Import duties Export duties	Government expenditure	OECD Countries	Negative relationship
[53]	Export duties Customs duties Import duties	Infrastructural development	Iran	Negative relationship

Source: Researchers' compilation (2026)

The study presents the measurement of identified variables used in Table 3.

Table 3. Measurement of Identified Variables used.

Variables	Types of Variables	Measurements	Sources/References
Natural resources management	Dependent Variable	Percentage of mineral reserves extracted annually relative to remaining reserves and economic output	[55] [56]
Value Added Tax	Independent Variable	Log of total amount of Value Added Tax revenue at year end.	[51]
Company income tax	Independent Variable	Log of total amount of Company income tax revenue at year end.	[52]
Customs and Excise Duties	Independent Variable	Log of total amount of Customs and Excise Duties at year end.	[50]
Institutional Quality	Control Variable	Indexes of control of corruption, rule of law, regulatory quality, government effectiveness, political stability and absence of violence/voice and accountability	[49]

Source: Researchers' compilation (2026)

In Table 4, the study presents result of the optimal lag length selection criteria for hypothesis one with control variable.

Table 4. Result of the Optimal Lag Length Selection Criteria for Hypothesis One (with Control)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	35.865	NA	0.006	-2.286	-2.046	-2.215
1	75.777	62.085*	0.000*	-5.169*	-4.881*	-5.083*
2	75.800	0.034	0.000	-5.096	-4.760	-4.996
3	75.977	0.248	0.000	-5.035	-4.651	-4.921
4	76.487	0.680	0.000	-4.999	-4.567	-4.871

* Indicates lag order selected by the criterion
Source: Researcher's Computation, (2026)

In Table 5, the stud presents the result of co-integration test.

Table 5. Result of the Co-integration Test

Test Type	Hypothesized CE(s)	Eigenvalue	Statistic	0.05 Critical Value	Prob.	Cointegrating Coef. (LNRM)	Adjustment Coef. α D(LNRM)
Trace Test	None*	0.495	19.155	3.841	0.000	13.585	-0.014
Max-Eigen Test	None*	0.495	19.155	3.841	0.000	13.585	-0.014

Source: Researcher's Computation, (2026)

In Table 6, the study presents the auto regression distribution lag Model (ARDL) for hypothesis two withh control variable.

Table 6. Auto regression Distributed Lag Model (ARDL) for Hypothesis Two with Control

Conditional ECM Regression				
Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	2.208	0.447	4.941	0.000
LNRM(-1)*	-0.255	0.046	-5.574	0.000
LVAT(-1)	0.049	0.035	1.404	0.174
LCIT**	0.018	0.026	0.704	0.489
LCED(-1)	-0.043	0.017	-2.567	0.018
INQ**	-0.345	0.050	-6.957	0.000
D(LVAT)	-0.018	0.036	-0.489	0.629
D(LCED)	-0.027	0.012	-2.188	0.040
Level Equation Estimate				
Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LVAT	0.191	0.143	1.334	0.196
LCIT	0.071	0.097	0.735	0.470
LCED	-0.170	0.070	-2.429	0.024
INQ	-1.357	0.276	-4.916	0.000

ARDL Bound Test @ 5%: $F - stat$ = 15.601 $(I\ (0) = 2.86, I\ (1) = 4.01$

R^2 = 0.996 $Adj.R^2$ = 0.995; F- $stat$ = 757.268 (0.000)

$X^2_{JB} = 1.217(0.544); X^2_{LM} = 1.377\ (0.275); X^2_{BPG} = 1.008\ (0.452);\ X^2_{RR} = 2.960\ (0.100); DW = 2.494$ $STABILITY: CUSUM\ \&\ CUSUMSQ$

Source: Researcher's Computation, (2026).

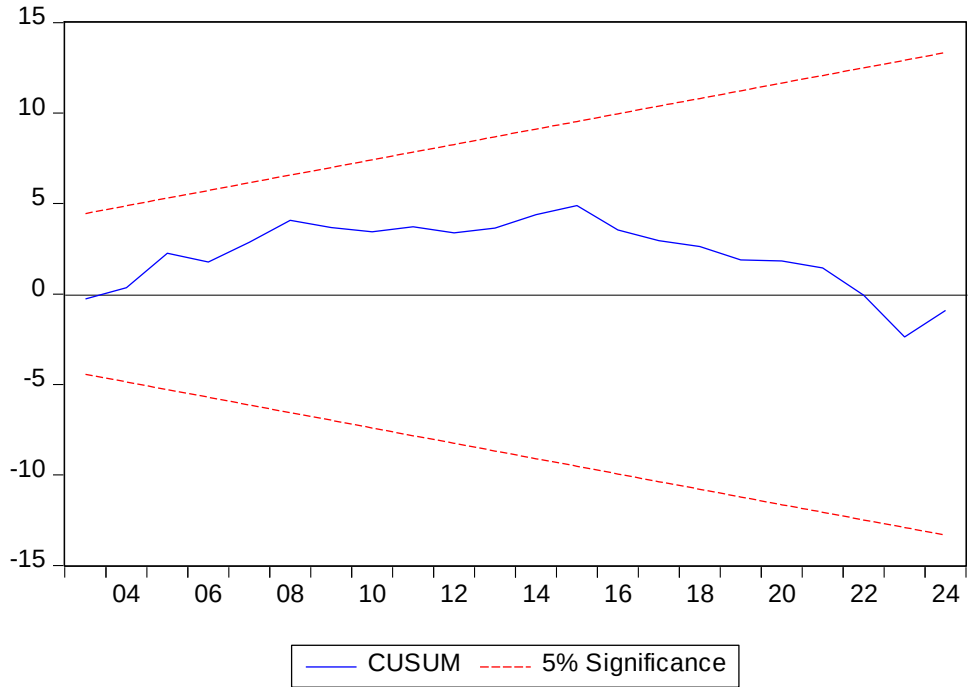


Fig. 1: Plot of Cumulative sum of recursive residuals for the Model

Note: The blue line is the solid line, while the red lines that bound the blue line are the critical bounds at 0.05

Source: Author's compilation from E-views 12 output (2026)

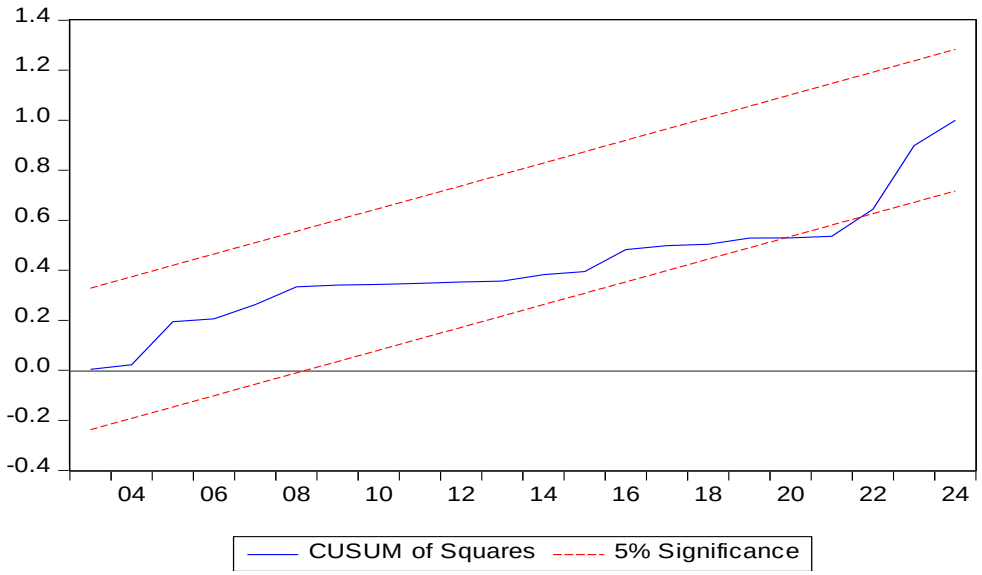


Fig. 2: Plot of Cumulative sum square of recursive residuals for the Model

Note: The blue line is the solid line, while the red lines that bound the blue line are the critical bounds at 0.05

Source: *Author's compilation from E-views 12 output (2026)*