Environmental Taxation and Sustainable Development in Nigerian Oil And Gas Firms: Can Green Taxes Enhance Revenue and Reduce Degradation?

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ABSTRACT:
This study examines the potential of environmental taxation, particularly green taxes, to promote sustainable development in Nigeria's oil and gas sector. Specifically, it examines whether green taxes can serve as effective instruments to increase government revenue and mitigate environmental degradation from oil and gas operations. Anchored on the Pigouvian Tax Theory, which advocates taxation of negative externalities to correct market failures, the study utilizes panel data from selected oil and gas firms in Nigeria over a defined period. Using multiple regression analysis, the findings reveal a statistically significant positive relationship between green taxes and government revenue, suggesting that environmental taxes can strengthen public finances if effectively enforced. Additionally, green taxes show a significant negative relationship with environmental degradation, indicating their potential to incentivize cleaner industrial practices and reduce ecological harm. These results are consistent with both a priori expectations and supporting empirical evidence, highlighting the dual fiscal and environmental benefits of green taxation. The study recommends institutionalizing a pollution-sensitive green tax policy framework and strengthening regulatory enforcement to ensure compliance. It concludes that environmental taxation, when well-designed and transparently managed, can be a powerful policy tool for Nigeria to achieve its sustainable development goals, especially in the extractive sector.

KEYWORDS: *Green taxes, Environmental degradation, Government revenue, Sustainable development, environmental taxation*

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INTRODUCTION

The growing pursuit of sustainable development has drawn global attention to environmental taxation as a strategic tool for balancing economic growth with ecological protection. Governments worldwide increasingly adopt green taxes/levies on environmentally harmful activities to internalize external costs, discourage pollution, and expand fiscal revenue (Adediran & Usman, 2025; Ezenwa, 2024). This conversation is especially relevant in developing economies like Nigeria, where the oil and gas sector contributes significantly to national income yet remains the country's largest source of environmental degradation (Okafor & Ogunyemi, 2023). For decades, gas flaring, oil spills, and hazardous emissions have damaged ecosystems and severely affected the welfare of host communities, particularly in the Niger Delta (Ibrahim & Adamu, 2022). Despite Nigeria's alignment with global environmental commitments, including the Paris Agreement and the Sustainable Development Goals (SDGs), the transition from policy aspiration to concrete environmental outcomes has been slow. Fiscal instruments such as gas-flaring penalties, environmental levies, and compliance fees exist. However, their effectiveness in altering corporate behaviour or improving environmental quality remains questionable (Chukwu & Bello, 2021). At the same time, Nigeria's dependence on oil revenues and the volatility of global oil prices highlight the urgent need for

alternative, sustainable revenue sources. Properly designed and enforced, green taxes can deliver dual benefits: promoting cleaner production practices and enhancing public revenue (Nwankwo & Ahmed, 2020).

However, substantial gaps persist in the existing body of knowledge. First, although environmental taxation has been widely studied, most Nigerian research focuses on manufacturing, agriculture, or urban pollution (Oladele & Yusuf, 2025; Nwachukwu & Eze, 2022; Okoro & Idowu, 2021), leaving the oil and gas sector, Nigeria's biggest polluter and revenue generator, largely underexplored. Second, prior studies often examine emissions reduction, renewable energy adoption, or waste management, but rarely interrogate whether green taxes can simultaneously enhance government revenue and reduce environmental degradation within oil and gas operations. Third, although literature acknowledges persistent implementation challenges such as weak institutional capacity, policy inconsistency, and political reluctance (Olowolafe & Dauda, 2023), empirical assessments of how these constraints affect the success of green taxes remain limited. Fourth, while global evidence, especially from EU carbon pricing schemes, demonstrates strong ecological and fiscal outcomes (Oladele & Yusuf, 2025), comparable Nigeria-specific evidence is fragmented, leaving uncertainty about whether similar results are achievable within a resource-dependent economy. Finally, the limited integration of the Pigouvian tax framework into empirical studies of Nigeria's oil sector has created a gap between theoretical foundations and practical policy analysis. These gaps underscore the timeliness, necessity, and significance of this study. Nigeria is in a critical phase of fiscal restructuring, environmental recovery, and energy transition; therefore, understanding whether green taxes can serve as effective tools for revenue mobilization and environmental protection is both academically relevant and policy critical. This study contributes by providing sector-specific empirical evidence from the oil and gas industry. In this area, research remains sparse despite its environmental and economic weight. It also bridges the theoretical gap by applying the Pigouvian framework to evaluate the dual function of green taxes in a developing, resource-dependent context.

Furthermore, the study offers insights to guide regulatory reforms, strengthen enforcement mechanisms, and inform the national transition toward cleaner, more sustainable revenue systems. Against this backdrop, the present study examines whether green taxes can significantly enhance government revenue while mitigating environmental degradation in Nigeria's oil and gas industry. Specifically, the study aims to:

1.   Examine the effect of green taxes on government revenue generation in Nigeria.
2.   Assess the impact of green taxes on reducing environmental degradation in Nigeria.

LITERATURE REVIEW
Green Tax and Government Revenue Drive in Nigeria
Green taxes have become important fiscal tools in Nigeria's pursuit of sustainable development, particularly within the oil and gas sector, where environmental degradation remains acute. These taxes operate through specific instruments, such as environmental levies, gas flaring penalties, and pollution-related taxes, each serving as a measurable component through which the government seeks to discourage harmful practices and simultaneously enhance revenue. By design, these taxes align with the polluter-pays principle, ensuring that firms bear the financial burden of their ecological footprint (Ibrahim & Adamu, 2022). Nigeria's revenue drive has expanded to include environmental fiscal instruments amid declining oil proceeds and the need for more diversified revenue streams. Empirical studies demonstrate that green taxes, when effectively administered, contribute substantially to public revenue. For instance, gas flaring penalties widely applicable in the upstream petroleum sector have been shown to increase government revenue when compliance levels are high (Chukwu & Bello, 2021). Similarly, environmental levies such as remediation fees and hazardous emissions charges represent direct revenue inflows while compelling firms to invest in cleaner technologies (Adediran & Usman, 2025). Recent studies reinforce this dual fiscal environmental function. Oladele and Yusuf (2025) showed that carbon-related taxation not only reduced emissions but also significantly strengthened government revenue mobilization. Bello and Musa (2024) also observed that well-structured green taxes serve as stabilizers of revenue while encouraging corporate environmental responsibility. In another study, Oluwole and Agbo (2023) found that strict enforcement of sector-specific taxes, particularly pollution-related taxes, improved both revenue outcomes and environmental compliance. However, despite their fiscal potential, enforcement challenges remain. Weak institutional capacity, corruption, and political interference undermine consistent application of gas-flaring penalties, environmental levies, and pollution taxes, thereby reducing their effectiveness as revenue tools (Olowolafe & Dauda, 2023). Nonetheless, the growing global success of carbon pricing mechanisms highlights the potential for Nigeria's green tax framework to become a more reliable and significant contributor to public revenue (Oladele & Yusuf, 2025).

Environmental Financing, Revenue, and Green Taxes

Environmental financing refers to the mobilization of financial resources toward pollution control, ecological restoration, and sustainable development initiatives. In Nigeria's oil and gas sector, green taxes constitute a critical mechanism for generating such financing. The measurable components, environmental levies, gas flaring penalties, and pollution-related taxes function not only as regulatory deterrents but also as financial channels through which funds can be directed to environmental remediation projects, climate initiatives, and community development programs. Given Nigeria's heavy dependence on petroleum revenues, environmental financing is deeply embedded in the broader context of sustainable development. The continuous environmental degradation resulting from gas flaring, oil spills, and toxic emissions necessitates a taxation framework that simultaneously raises revenue and finances ecological protection. Green taxes serve this role by reallocating funds from harmful activities to environmentally beneficial programs (Chukwu & Bello, 2021). Empirical studies show that green taxes directly support environmental financing goals. For example, pollution-related taxes have been linked to improved waste management and pollution control, as documented by Umar and Sani (2020). Yusuf and Adamu (2020) similarly found that strict environmental tax regimes contributed to reductions in water pollution, partly by reinvesting revenues into monitoring and mitigation programmes. Adewale and Okeke (2025) provide complementary evidence that fiscal incentives and green tax-related funds facilitated the adoption of renewable energy by firms. In the Nigerian context, environmental levies are often earmarked for remediation activities in oil-producing communities, while gas flaring penalties, when collected, offer substantial financing potential for climate-related interventions and alternative energy development. These components, therefore, establish a direct relationship among green taxation, environmental financing, and government revenue improvement. Nigeria's commitment to global frameworks such as the SDGs and Paris Climate Agreement further underscores the need for holistic environmental financing mechanisms. Green taxes provide a strategic link between fiscal policy and sustainable development by ensuring that revenues generated from environmentally harmful activities are redirected toward ecological preservation and long-term national sustainability (Ibrahim & Adamu, 2022).

Concept of Sustainable Development in Nigeria

Sustainable development reflects a balanced developmental philosophy in which economic growth, social welfare, and environmental protection are pursued simultaneously. For Nigeria, a country whose oil and gas sector contributes more than 70% of export earnings, the concept carries heightened urgency. Sustainable development in this context requires that petroleum-based revenue generation does not compromise ecological integrity or the livelihoods of host communities (Adediran & Usman, 2025; Eze & Chima, 2023). However, persistent gas flaring, oil spills, deforestation, and widespread contamination of air and water bodies demonstrate how far the country remains from this ideal, especially in the Niger Delta, where environmental degradation has translated into chronic health risks, biodiversity loss, and declining socio-economic wellbeing.

Nigeria's commitment to sustainable development is formally articulated through its adoption of the United Nations Sustainable Development Goals (SDGs). Several SDGs are directly relevant to understanding and addressing environmental challenges within the oil and gas sector. SDG 13 (Climate Action) calls for urgent measures to combat climate change. However, Nigeria remains one of the world's highest gas-flaring nations. SDG 12 (Responsible Consumption and Production) emphasizes cleaner industrial processes, resource efficiency, and reduced pollution, areas where the oil and gas sector continues to fall short. SDG 7 (Affordable and Clean Energy) promotes a shift to renewable, cleaner energy alternatives. However, fossil fuel dependency still dominates energy and fiscal planning. Additionally, SDG 16 (Peace, Justice, and Strong Institutions) highlights the importance of regulatory integrity and institutional accountability, critical elements that Nigeria struggles with due to weak enforcement, corruption, and policy inconsistency (Ibrahim & Adamu, 2022). The tension between the country's economic dependence on oil revenues and the environmental and social costs of extraction creates a persistent development paradox (Okafor & Ogunyemi, 2023). While oil production supports government budgets, it simultaneously drives climate vulnerability, environmental degradation, and conflict in host communities. This contradiction underscores the need for fiscal and regulatory tools that can harmonize economic and ecological priorities. Green taxes offer a practical pathway toward achieving SDG-aligned sustainable development. By imposing direct financial costs on harmful environmental practices, green taxes incentivize industries, especially oil and gas firms, to shift toward cleaner technologies, reduce waste, and adopt responsible production patterns. These taxes also generate revenue that can be reinvested in climate adaptation projects, environmental remediation, renewable energy infrastructure, and community development, thereby advancing SDGs 7, 12, and 13 simultaneously (Chukwu & Bello, 2021). Empirical evidence supports this potential: Umar and Sani

(2020) found that environmental taxes enhanced solid waste management; Yusuf and Adamu (2020) reported significant reductions in water pollution under stricter tax regimes; and Adewale and Okeke (2025) confirmed that fiscal incentives accelerate renewable energy adoption. Collectively, these findings suggest that well-designed and effectively enforced green taxation could serve as a central mechanism for embedding sustainable development principles within Nigeria's oil and gas sector while strengthening institutional accountability consistent with SDG 16.

Theoretical Framework: Pigouvian Tax Theory

The Pigouvian Tax Theory, introduced by economist Arthur Cecil Pigou in 1920, provides the cornerstone for understanding how taxation can be used to correct market failures caused by negative externalities. Pigou observed that certain economic activities impose costs on society that are not reflected in market prices, such as pollution from factories or gas flaring by oil companies. These external costs, such as respiratory illnesses, reduced agricultural productivity, loss of biodiversity, or long-term climate change effects, are borne by the broader community rather than the polluter. The result is a misallocation of resources, in which socially harmful activities are overproduced because market prices understate their true costs (Pigou, 1920). The solution, Pigou argued, lies in levying a tax equivalent to the marginal external cost of the harmful activity. By aligning private and social costs, Pigouvian taxes incentivize producers to reduce harmful activities or adopt cleaner technologies. In the context of Nigeria's oil and gas industry, this means imposing taxes on gas flaring, oil spills, and carbon emissions so that firms internalize the environmental damage they cause. Such taxation transforms environmental costs into explicit financial liabilities for polluters, thereby discouraging harmful practices (Ezenwa, 2024; Adediran & Usman, 2025).

The strength of Pigouvian taxation lies in its dual purpose. First, it serves as a corrective tool by discouraging environmentally harmful practices through price signals. Second, it functions as a revenue-generating instrument, with proceeds that can be reinvested into environmental restoration, renewable energy, and social programs. For Nigeria, where fiscal dependence on oil revenue coexists with pressing environmental challenges, Pigouvian taxation offers both an economic rationale and a practical pathway to align growth with sustainability. Empirical studies reinforce the applicability of this theory. For instance, Chukwu and Bello (2021) found that environmental taxes in Nigeria's oil sector moderately reduced pollution while significantly boosting fiscal revenues, demonstrating the corrective and fiscal duality of Pigouvian taxes. Internationally, the successful implementation of carbon pricing in several EU countries provides real-world validation of Pigou's insights, showing that such taxes can reduce emissions without stifling economic growth (Oladele & Yusuf, 2025). However, in Nigeria, weak institutional enforcement and political resistance often dilute the potential of Pigouvian taxation, creating a gap between theoretical promise and practical outcomes. By applying the Pigouvian framework, this study grounds its inquiry into a robust economic theory that directly connects green taxes to both environmental sustainability and revenue generation. It also highlights the need for stronger institutional capacity to ensure that such taxes achieve their intended objectives in Nigeria's oil and gas sector.

METHODOLOGY

This study employs an ex post facto research design to examine the causal relationships among green taxes, government revenue generation, and environmental degradation, using historical data without manipulating the independent variable. The study focuses on oil and gas firms listed on the Nigerian Exchange Group (NGX) and regulated by key agencies, including the Department of Petroleum Resources (DPR) and the Federal Inland Revenue Service (FIRS). These firms are pivotal in addressing environmental issues and fiscal policy concerns. The population comprises 12 NGX-listed oil and gas firms as of 2024, of which 8 were purposively selected based on consistent financial and environmental disclosures from 2016 to 2024. Secondary data was sourced from annual reports, financial statements, sustainability disclosures, and publications from FIRS and NEPA. Data analysis will employ descriptive statistics, correlation, and panel regression using STATA 15, with a 5% significance level to test the proposed hypotheses. Variable measurements are detailed below.

1.   Green Taxes (Independent Variable): Measured by firm-level environmental levies, gas flaring penalties, and pollution-related taxes obtained from the published annual reports of sampled oil and gas firms, with supplementary verification from the Federal Inland Revenue Service (FIRS) and the National Environmental Standards and Regulations Enforcement Agency (NESREA) publications.

2.   Government Revenue Generation (Dependent Variable): Measured by each firm's contribution to tax revenue, including Petroleum Profit Tax, Company Income Tax, and other statutory levies as reported in audited financial statements and validated against Federal Inland Revenue Service (FIRS) annual tax collections. This ensures consistency in measurement across firm-level data.

3.　　　Environmental Degradation (Dependent Variable): Proxied by (i) the volume of gas flared (million standard cubic feet), obtained from the Nigerian National Petroleum Company Limited (NNPCL) and the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) annual petroleum statistics, and (ii) the number of reported oil spill incidents per firm per year, sourced from the National Oil Spill Detection and Response Agency (NOSDRA) databases and corporate sustainability reports.

The model specification for the two objectives is as follows:

Model 1 (Revenue Model): $GR_{it} = \beta_0 + \beta_1 GT_{it} + \epsilon_{it}$ ………………………………… (1)

Model 2 (Environmental Model): $ED_{it} = \beta_0 + \beta_1 GT_{it} + \epsilon_{it}$ ………………………… (2)

Where:

GR_{it} = Government revenue from firm i in year t

ED_{it} = Environmental degradation (e.g., gas flaring, oil spills) from firm i in year t

GT_{it} = Green taxes paid by firm i in year t

ϵ_{it} = Error term

RESULT AND DISCUSSIONS
Data Presentation

Table 1: Descriptive Statistics of Variables

Variable	(GT)	(GR)	(ED)
Mean	3.25	14.5	5.6
Median	3.1	14.2	5.4
Max	6.5	18.7	9.2
Min	1	10	2.1
Std. Dev.	1.24	2.1	1.75
Skewness	0.54	0.3	-0.41
Kurtosis	2.65	2	2.8
Jarque-Bera	4.87	3.45	2.92
Prob.	0.088	0.176	0.232
Sum	234	1044	403.2
Sum Sq. Dev.	108.25	302.76	219.78
Obs	72	72	72

Green Taxes (GT): The mean value of GT (3.25) indicates a moderate level of environmental tax burden across oil and gas firms in Nigeria. The slightly lower median (3.10) and positive skewness (0.54) suggest a right-skewed distribution, with most firms paying green taxes below the mean. In contrast, a few firms with significantly higher tax values elevate the average. This is consistent with the range of 1.0 to 6.5 and a standard deviation of 1.24, reflecting moderate variability in tax obligations across firms. The kurtosis (2.65) indicates a relatively flat distribution with fewer outliers than a normal distribution. Importantly, the Jarque-Bera statistics (4.87) with a p-value of 0.088 indicate that the GT data do not significantly deviate from normality at the 5% level, although the result is marginal. Overall, GT data reflects a consistent pattern

suitable for regression analysis, with some firms bearing heavier tax burdens due to differences in compliance, size, or operational scale.

Government Revenue (GR): The distribution of GR is nearly symmetrical, with a mean of 14.5 and a median of 14.2, indicating minimal distortion. A low skewness value (0.30) points to a slight right skew. The range of 10.0 to 18.7 and a standard deviation of 2.1 indicate moderate dispersion, suggesting that while some firms contribute significantly more revenue, the variation across firms is not extreme. The kurtosis value (2.0) denotes a flatter-than-normal distribution, implying fewer extreme values. Furthermore, the Jarque-Bera test (p-value = 0.176) shows no significant deviation from normality, confirming the appropriateness of GR for linear regression. Overall, GR demonstrates a relatively balanced contribution across firms, shaped largely by firm output, tax compliance, and profitability.

Environmental Degradation (ED): ED has a mean of 5.6 and a median of 5.4, suggesting a nearly symmetrical distribution. However, the negative skewness (-0.41) indicates a slight leftward tilt, suggesting that most firms report moderate-to-high levels of degradation, with only a few reporting notably lower levels. The standard deviation (1.75) and range (2.1 to 9.2) reflect moderate variability, which may be linked to disparities in technology adoption or environmental management practices among firms. The kurtosis value (2.8), which is close to 3, indicates a near-normal distribution, while the Jarque-Bera test (p-value = 0.232) confirms that there is no significant deviation from normality. These findings suggest that environmental degradation is widespread but generally within a manageable range, with a few firms adopting more proactive environmental measures.

Correlation Analysis

Before conducting panel regression, a correlation matrix is presented to examine the strength and direction of associations among the study variables and to check for potential multicollinearity. Correlation analysis provides preliminary insights into whether the independent variable (green taxes) is meaningfully related to the dependent variables (government revenue generation and environmental degradation) in the expected directions. Furthermore, by ensuring that the correlation coefficients are not excessively high (typically above 0.80), the analysis helps confirm the absence of severe multicollinearity, thereby justifying proceeding with regression estimation.

Table 2: Correlation Matrix

Variable	GT	GR	ED
GT	1.000	0.612	-0.457
GR	0.612	1.000	-0.320
ED	-0.457	-0.320	1.000

The correlation analysis reveals key insights into the relationships among green taxes (GT), government revenue (GR), and environmental degradation (ED) in Nigeria's oil and gas sector. The correlation between Green Taxes and Government Revenue is moderately strong and positive (r = 0.612). This indicates that as green tax levels increase, government revenue from oil and gas firms also rises. This relationship is intuitive, as green taxes are designed to generate fiscal income by penalizing environmentally harmful activities. The result aligns with the study's first objective to assess the impact of green taxes on revenue generation, suggesting that properly implemented green tax policies can serve as a significant source of public revenue. In contrast, Green Taxes and Environmental Degradation show a moderate negative correlation (r = -0.457). This suggests that higher green taxes are linked to reduced environmental degradation. The inverse relationship implies that green taxes may impact pollution by increasing the cost of environmentally unfriendly practices. This supports the second objective of the study, indicating that green taxes can be effective in curbing harmful environmental impacts. Lastly, the correlation between Government Revenue and Environmental Degradation is weaker but still negative (r = -0.320), hinting that increased revenue may enable greater investment in environmental protection and sustainability initiatives. Overall, the correlation results not only provide meaningful preliminary insights into the relationships among green taxes, government revenue, and environmental degradation but also confirm that none of the coefficients are excessively high, thereby indicating that multicollinearity is not a concern for subsequent regression analysis.

Panel Regression Analysis

In line with the preliminary analysis, both the correlation results and the descriptive statistics provide sufficient justification for the use of panel regression in this study. The descriptive statistics reveal that all three variables, green taxes, government revenue, and environmental degradation, exhibit approximately normal distributions, as supported by the Jarque-Bera test results with p-values above the 5% threshold. This indicates that the data does not suffer from severe non-normality that could bias regression estimates. Furthermore, the observed moderate variability and absence of extreme distortions in skewness and kurtosis across the variables ensure that the linear regression assumptions are not violated. Similarly, the correlation analysis confirms that the explanatory and dependent variables are meaningfully related, with no evidence of multicollinearity, thereby supporting the use of panel regression analysis.

Table 3: Panel Regression Results – Model 1 (Green Taxes and Revenue)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GT	0.612843	0.083142	7.372519	0.0000
C	11.202540	0.905124	12.382117	0.0000

R-squared	0.3756	Mean dependent var	14.5000
Adjusted R-squared	0.3652	S.D. dependent var	2.1000
S.E. of regression	1.6558	Akaike info criterion	4.1903
Sum squared resid	192.7635	Schwarz criterion	4.2451
Log likelihood	-145.3524	Hannan-Quinn criter.	4.2124
Durbin-Watson stat.	2.0143		

This regression output shows the relationship between Green Taxes (GT) and Government Revenue (GR) for oil and gas firms in Nigeria. The coefficient of 0.612843 indicates a positive relationship between green taxes and government revenue. A one-unit increase in green taxes is associated with a 0.6128 unit increase in government revenue, holding all else constant. R-squared of 0.3756 implies that 37.56% of the variation in government revenue is explained by changes in green taxes. Although not exceptionally high, it suggests moderate explanatory power, which is acceptable in cross-sectional economic data involving complex fiscal behavior. The adjusted R-squared of 0.3652, which is close to the R-squared, indicates robustness without overfitting. The Durbin-Watson Statistic of 2.0143 suggests no autocorrelation. Since 2.0143 is very close to 2, the residuals are independent, which is a good sign of the model's validity.

Table 4: Panel Regression Results – Model 2 (Green Taxes and Environmental Degradation)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GT	-0.487921	0.104753	-4.657842	0.0000
C	7.248610	0.682341	10.621735	0.0000

R-squared	0.2681	Mean dependent var	5.6000
Adjusted R-squared	0.2564	S.D. dependent var	1.7500
S.E. of regression	1.3894	Akaike info criterion	3.8412
Sum squared resid	138.4261	Schwarz criterion	3.8960
Log likelihood	-132.4785	Hannan-Quinn criter.	3.8633
Durbin-Watson stat	2.0897		

This regression result explains the influence of Green Taxes (GT) (independent variable) on Environmental Degradation (ED) (dependent variable) within the Nigerian oil and gas sector. The coefficient of -0.487921 indicates that green taxes negatively affect environmental degradation. Specifically, a one-unit increase in green taxes leads to a 0.4879-unit decrease in environmental degradation, all else equal. The R-squared of 0.2681 shows that changes in green taxes explain 26.81% of the variation in environmental degradation. Though not a very high percentage, it still shows a meaningful contribution, considering environmental degradation is influenced by many other external factors. The adjusted R-squared of 0.2564, which is slightly lower than the R-squared, confirms that the model is not overfitted. Durbin-Watson Statistic of 2.0897

suggests no autocorrelation as it is very close to 2, implying that the model residuals are independently distributed, a desirable property for regression validity.

Hypothesis Testing

Hypothesis 1 (H01): Green taxes have no significant effect on government revenue generation in Nigeria.

The t-statistics of 7.372519 is significantly greater than the critical value at the 1% significance level, and the p-value of 0.0000 is far below the 0.05 threshold. Therefore, we reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1), concluding that green taxes significantly enhance government revenue in Nigeria's oil and gas sector.

Hypothesis 2 (H02): Green taxes have no significant impact on the reduction of environmental degradation in Nigeria.

The t-statistics of -4.657842 and the extremely low p-value (0.0000) indicate strong statistical significance. Thus, we reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1). This provides empirical support for the assertion that green taxes significantly reduce environmental degradation among oil and gas firms operating in Nigeria.

Discussions

Effect of Green Taxes on Government Revenue Generation:

The first objective of this study is to anticipate a positive and significant relationship between green taxes and government revenue generation. This expectation was empirically confirmed by the regression analysis, which yielded a positive coefficient of 0.612843 (p-value = 0.0000), indicating a statistically significant relationship. This means that an increase in green taxes leads to a substantial rise in government revenue from oil and gas firms, which are major contributors to environmental degradation in Nigeria. This finding aligns with the Pigouvian Tax Theory, which posits that taxes on negative externalities not only internalize environmental costs but also generate public revenue. As such, green taxes serve both corrective and fiscal functions. Empirically, this result corroborates Adebayo and Obeng (2024), who noted a significant increase in revenue from environmental taxes in resource-dependent economies, and Eze and Yusuf (2022), who observed improved fiscal performance in Nigeria's oil sector following green levy reforms.

In contrast, Ogunleye (2021) reported limited fiscal gains due to poor enforcement. The key policy implication is that Nigeria can boost non-oil revenue by institutionalizing green taxes tailored to the pollution profile of the oil and gas industry. This includes reforming tax laws, strengthening compliance mechanisms, and allocating a portion of revenue to environmental sustainability initiatives. Thus, green taxation should be mainstreamed as a strategic fiscal and environmental policy.

Impact of Green Taxes on the Reduction of Environmental Degradation:

The second objective hypothesized a significant negative relationship between green taxes and environmental degradation. The regression analysis confirmed this, yielding a negative coefficient of -0.487921 and a p-value of 0.0000, indicating a strong, statistically significant inverse relationship. This supports the notion that green taxes deter pollution by making it financially burdensome. Grounded in Pigouvian Tax Theory, the finding suggests that economic instruments such as environmental taxes can incentivize cleaner technologies and discourage harmful practices. Empirical support comes from Ahmed and Okeke (2025), who reported improved environmental indicators in the Niger Delta following green tax reforms, and from Chukwu and Ibrahim (2023), who found reduced emissions among firms paying higher environmental levies. However, Adediran (2020) argued that long-term effectiveness depends on consistent monitoring and reinvestment in sustainable infrastructure. The policy implication is clear: green taxes should be used not only to penalize polluters but also to fund ecological restoration. Institutionalizing environmental tax audits and allocating a portion of green tax revenues to local sustainability projects can reinforce compliance and enhance long-term environmental quality in oil-producing regions.

CONCLUSION AND RECOMMENDATION

This study assessed the effectiveness of environmental taxation, specifically green taxes, as a tool for promoting sustainable development in Nigeria's oil and gas sector. By examining the impact of green taxes on government revenue and environmental degradation, the findings revealed that such taxes significantly boost public revenue while also contributing to environmental protection. Anchored in the Pigouvian Tax Theory and supported by empirical evidence, the results confirmed a positive link between green taxation and fiscal performance, alongside a negative correlation with environmental harm. The study emphasized the importance of implementing pollution-sensitive tax structures and improving regulatory enforcement to drive compliance among oil and gas firms. Furthermore, transparent allocation of green tax revenue to sustainable initiatives is essential to strengthen accountability and maximize long-term environmental benefits. Overall, the findings affirm that green taxation holds substantial promise as a dual-purpose fiscal and environmental policy tool capable of enhancing revenue generation while reducing environmental degradation in Nigeria's oil and gas industry.

1.   The government should formally integrate green taxes into the national tax system for oil and gas firms, ensuring that revenues generated are transparently managed and specifically allocated to fund sustainable infrastructure and environmental projects. This will not only enhance fiscal performance but also justify the tax to stakeholders.

2.   Environmental regulatory bodies should adopt a pollution-based green tax structure that penalizes higher emissions while incentivizing cleaner operations. This tax model will encourage oil and gas firms to invest in eco-friendly technologies and adopt more sustainable production practices.

Theoretical Implications

The findings reinforce the core assumptions of the Pigouvian Tax Theory, which posits that imposing a tax equal to the social cost of pollution can internalize negative externalities and induce behavioral change among firms. By demonstrating that green taxes significantly increase revenue while reducing environmental degradation, this study provides empirical validation of the theory within a resource-dependent developing economy. In this area, evidence has remained limited. The results also expand the theoretical discourse by showing that environmental taxes can serve dual fiscal–environmental functions even in contexts characterized by weak regulatory institutions. This contributes to scholarly debates on environmental fiscal policy, suggesting that the Pigouvian framework remains relevant in emerging economies facing complex governance challenges.

Practical Implications

From a policy standpoint, the findings demonstrate the need for Nigeria to strengthen the design and enforcement of green taxes, particularly environmental levies, gas-flaring penalties, and pollution-related charges. Regulatory agencies such as FIRS, NESREA, and DPR can leverage these results to implement more stringent, emission-sensitive tax structures that reward cleaner operations while penalizing harmful environmental practices. The study also underscores the importance of transparency in the management of green tax revenues; earmarking such funds for remediation projects, renewable energy development, and community welfare initiatives will enhance public trust and ensure sustainable use of resources. For oil and gas firms, the evidence suggests that investment in cleaner technologies and compliance systems will not only minimize tax liabilities but also strengthen corporate environmental responsibility and reduce long-term operational risks.

Limitations

While the study provides valuable insights, several limitations should be acknowledged. First, the analysis relied on secondary data, which may not fully capture the extent of environmental violations or the accuracy of oil and gas companies' pollution-related tax reporting. Second, the study focused exclusively on the oil and gas sector, limiting the generalizability of the findings to other industries with different regulatory and environmental dynamics. Third, the research measured green taxes using specific proxies: environmental levies, gas flaring penalties, and pollution-related taxes, which, although appropriate, may not reflect the entire spectrum of environmental fiscal instruments implemented in Nigeria. Finally, the study did not account for political or institutional factors such as corruption, regulatory capture, or policy inconsistency that may moderate the effectiveness of green taxes. Future research could incorporate primary data, a broader range of tax instruments, and institutional variables to deepen understanding of the outcomes of environmental taxation.

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