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Contributions of Tax Revenue and Government Expenditure to Sustainable Development Goals in Nigeria

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Abstract
This study empirically examined the effect of tax revenue and government expenditure on sustainable development goals in Nigeria. The ex-post facto research design was adopted using time series data sourced from the Central Bank of Nigeria's statistical bulletin and World Bank database. The study covered 22 years from 2001 to 2021. Descriptive and inferential statistical tools were used in analyzing the data after carrying out unit root tests on the stationarity of the series to avoid obtaining invalid and unauthentic regression estimates. The Vector Error Correction Model (VECM) was applied in analyzing the relationship. The study found that Tax Revenue (TR) exhibited a negative and significant effect on sustainable development goals, while Government expenditure (GEXP) indicated a positive and significant effect on Sustainable Development Goals (SDGIS) in the long run. Furthermore, the study revealed that in the short-run Tax Revenue (TR) and Government expenditure (GEXP) both had a negative effect on the SDGIS in Nigeria. There is need for government to develop strategies to broaden the tax base and bring more entities into the tax net while ensuring equitable contribution. They should also align budget allocations with SDG priorities to ensure tax revenue is directed sustainable development projects. Hence the study recommended that government should channel its resources towards closing up infrastructural deficits while increasing productive units that would enhance the economy and ensure optimal utilization of tax revenue towards sustainable developments in Nigeria especially in the achievement of the Sustainable development goals.

Keywords: Sustainable Development Goals, Vector Error Correction Model, Government Expenditure, Tax Revenue, Nigeria.

1.0 Introduction

Achieving the Sustainable Development Goals (SDGs) is a major concern to many countries especially emerging and developing nations. The Sustainable Development Goals are a set of 17 global goals established and adopted by the United Nations in September 2015. They are designed to address a wide range of social, economic and environmental challenges by the year 2030. The SDGs, defined as socially equitable, environmentally sound, prosperous, inclusive, and predictable goals build upon the success of the Millennium Development Goals (MDGs 2000-2015)) which included eight goals (including the reduction of poverty, hunger, disease, and access to education (Kouam & Asongu, 2022). These goals are aimed at promoting sustainable development in all countries, regardless of their economic development. The SDGs are interconnected as progress in one area can positively influence outcomes in other areas. The goals include among others eradicating poverty (SDG 1), ensuring quality education (SDG 4), promoting gender equality (SDG 5), combating climate change (SDG 13) (United Nations, 2015). Sustainable development as a concept has been evolving and has received recognition in many countries around the world. This is because the principle of sustainable development promotes the urgent needs to check and manage environmental degradation, population growth, resource depletion, loss of biodiversity and poverty.

Nigeria, being Africa's most populous nation and one of the largest economies play a pivotal role in the achievement of the SDGs in the region. The relevance of the SDGs to Nigeria cannot be over emphasized judging from the country's present challenges in critical areas such as education, healthcare, gender equality, income inequality, poverty reduction and environmental degradation. Though significant strides have been made in closing the disparities in many of the critical areas the disparities still persist mainly due to inadequate funding, infrastructural deficits and high level of corruption. Nadabo, et al, (2024) avers that Nigeria being part of the global community must key into the United Nations Sustainable Development Goals aimed at not leaving anyone behind. Hence, Nigeria must continue to pursue economic development, integrating the SDGs into national policies and strategies as an essential tool for achieving sustainable growth that benefits all citizens (United Nations Development Programme (UNDP), 2023)

According to the United Nations, Sustainable development necessitates the mobilization and efficient utilization of domestic resources to achieve intensive growth. Oto and Wayas (2024) explains intensive growth as growth achieved by using a given number of resources more efficiently. Extant literature assert that fiscal policy instruments stands out as an important driver or tool to achieving these sustainable developments. Taxation and government expenditure are two significant fiscal policy instrument to fund the Sustainable Development Goals (SDGs), as well as to promote inclusive and sustainable growth in other areas. Fiscal policy can simultaneously increase resource mobilization, reduce disparities, and encourage sustainability in consumption and production (Mominur, 2023).

Taxation and government expenditure are widely acknowledged as a crucial source of funding for sustainable development on a global scale. Statistics reveal that, for governments to provide essential public goods and services including infrastructure, healthcare, education, and security, a minimum tax to GDP ratio of 15% is necessary. Nevertheless, despite being the biggest economy in Africa, Nigeria has had trouble generating enough income. Its tax to GDP ratio of 5.3% is much lower than both the regional and sub-Saharan African averages of 16% and 17%, respectively, for Sub-Saharan Africa (World Bank Report). Because of this, Nigeria has struggled to meet its developmental objectives, as seen by its subpar Human Development Index score (0.532) and 157th place overall out of 189 nations. Nigeria must thus act quickly to enhance the equity and efficiency of its tax system in order to achieve the Sustainable Development Goals (SDGs).

There is no question that the type of economy and its structural features affect the ability to tax and the sorts of taxes that may be levied (Olaoye et al, 2019). However, government must ensure a steady flow of funds into its treasuries in order to achieve sustainable economic growth. One such method is taxation, which the government uses as a tool to raise money for public expenditures, redistribute income, stabilize the economy, eliminate externalities, and influence how resources are allocated while also being supportive to the economy. The importance of taxation as a source of revenue in any economy cannot be overstated, as it is the primary fiscal policy factor that affects government revenue and expenditure in pursuit of development objectives and contribute to sustainable economic growth. Tax revenue is the primary source of government income which enables the government to fund public services and infrastructure essential for achieving the SDGs. Government expenditure on the other hand refers to the allocation of revenues to various sectors which are directly linked to the SDGs.

Ajeige, Gandaa and Rawlings (2023) argue that for many years, many Africans were not committed to paying taxes because it is perceived that no benefits are derived therefrom by the taxpayer. This has led to a perennial culture of tax avoidance and outright evasion often leading to constraint in the financial

capacity of the government in addressing issues concerning SDGs. Despite the ambitious agenda set by the Sustainable Development Goals to address critical issues such as poverty,

Education, inequality and health, Nigeria continues to face significant challenges in meeting these targets by 2030. A major impediment is the insufficient and often inefficient mobilization and allocation of financial resources. However, Oseni and Salami (2021) reiterates the fact that tax revenue has become the focal point for funding infrastructure projects, health, education and achieving long term sustainability. Gupta et al, (2021) found that tax revenue from Sub-Saharan Africa was not enough to finance the SDGs, and suggested improvements in tax revenue generation to support the achievement of these goals. Also Nigeria's tax to GDP ratio remains one of the lowest globally, which has limited government's ability to generate necessary revenue to fund critical SDG related projects. Allocation of government expenditure often suffer from mismanagement, inefficiencies and corruption further hampering progress in the SDGs and slow down sustainable development. There is also a dearth of empirical studies that rigorously assess the relationship between the variables under study. Based on the above backdrop, this study seeks to provide empirical evidence on the relationship between tax revenue, government expenditure and their impact on achieving the SDGs in Nigeria.

2.0 Literature Review and Hypotheses Development

Tax Revenue and Sustainable Development Goals (SDGs)

Tax revenue is central to the realization of the sustainable development goals, which aim to end poverty, protect the planet and ensure prosperity for all by the year 2030. As government tries strives to finance the SDGs, tax revenue provides the essential financial resources needed to invest in public services, infrastructure, and social protection. A well designed and effectively implemented tax system can help government align their fiscal policies with the SDGs addressing challenges like inequality, environmental sustainability and economic growth (Mominur, 2023). It is common practice in every country for government to impose tax as mandatory levies on people or things (Samour et al., 2022). Taxes amongst other things encourages economic growth by boosting living standards and promoting employment growth. Taxes are necessary to raise funds for all aspects of a country's development which are also targeted at achieving specific SDGs (McGill, 2010; Mathieu-Bolh, 2017; Samour et al., 2022). Taxes are important sources of funds for achieving SDGs. Through tax revenue governments are able to invest in infrastructure, education, healthcare and other essential areas for sustainable development (Chan et al., 2015).

Government can use tax revenue to finance social safety nets and poverty alleviation programs that directly support vulnerable populations. Tax revenue collected by government provides avenue for wealth redistribution, for instance progressive tax where higher income earners pay a greater percentage of their income as taxes. This enables government to collect more from those with capacity to contribute and redistribute it to fund programs aimed at eradicating poverty. Tax revenue is a crucial enabler of Sustainable Development Goals by providing the financial resources necessary for government to fund essential public services, infrastructure and environmental initiatives. Through effective taxation government can reduce poverty, promote health and education, support industry and innovation and address climate change while reducing inequality. A well-structured tax system, combined with efficient tax collection is fundamental to ensuring that countries Nigeria inclusive, have the capacity to achieve the SDGs by 2030.

Extant literature considers tax revenue as one of the most stable sources of government income essential for financing public services, infrastructure, and social programs that aligns with the SDGs target. Researchers have argued that efforts aimed at improved tax policies, particularly progressive taxation, emphasis on increased tax revenue, effective tax collection and critical tax reforms all put together promotes a nations drive towards economic diversification and enhances is ability to finance its SDG related initiatives. (Acosta-Ormaechea & Yoo, 2020; Adeosun, 2021; Adedokun, 2020; Nwakoby & Okoye, 2021). While Okechukwu and Iroegbu (2022) agrees that a comprehensive tax system can enable government to reallocate resources to underfunded sectors such as education and health care, which are vital for sustainable human development. However, despite the importance of tax to the overall socio-economic development of the nation; various challenges such as tax evasion, non -compliance and inadequate enforcement mechanism and a narrow tax base has hampered many developing countries including Nigeria from attaining the desired revenue potential (Omodero & Ogbonnaya, 2020) thereby restraining the achievement of the SDGs.

Government Expenditure and Sustainable Development Goals

Government spending is a key tool for economic development and control in Nigeria. It plays a crucial role in the achievement of Sustainable Development Goals (SDGs) in Nigeria by allocating resources to critical sectors such as healthcare, education, infrastructure, and social welfare. As Nigeria strives to meet the SDG target by 2030, public spending is instrumental in addressing poverty, inequality, and environmental sustainability challenges. Government expenditure in Nigeria through social protection programs like National Social Investment Program, Universal Basic Education Commission, BOI initiatives and Niger Delta Development Commission are all targeted at specific SDGs. These programs are deliberate actions taken by government to solve social problems or matters of concern (Maitalata & Aliegba, 2023) Government through these programs and many more help alleviate poverty (World Bank, 2021), provide access to healthcare, support expansion of educational opportunities (UNICEF, 2020), stimulate growth and infrastructural stability and provide environmental protection (UNDP, 2021) while also reducing inequality. Through proper government spending, the Nigerian government directs resources toward the attainment of macroeconomic stability, encourage economic growth, and improve the welfare of the citizens.

Government expenditure is an essential component of fiscal policy and plays a critical role in promoting economic growth and development in Nigeria. However, the country faces several challenges, including high recurrent expenditure, corruption, revenue mobilization issues, and debt servicing burdens. To maximize the impact of government spending, there is a need for reforms that prioritize capital expenditure, improve fiscal management, and enhance the transparency and efficiency of public funds allocation. Effective government expenditure, particularly in education, healthcare, and infrastructure, holds the potential to foster inclusive growth and improve the overall welfare of Nigeria's citizens. Government spending helps to improve quality of life particularly in sectors such as healthcare, education and social protection (Adewuyi & Babatunde, 2020). Empirical research on the impact of government expenditure on economic growth in Nigeria provide varied results. Some studies claim that increased public spending, particularly on capital expenditure, boosts economic growth by upgrading infrastructure, healthcare, and education, therefore enhancing productivity (Udoh & Ogbuagu, 2020). On the other hand, some argue that high debt levels, inefficient public spending, and excessive recurrent expenditure are detrimental to long-term economic growth (Adedokun, 2021).

A critical insight from Barro and Lindner (2020) indicate that not all forms of government expenditure contribute equally to sustainable development. Recent research underscores the need for fiscal

responsibility and efficient use of resources. Osinubi et al. (2023) highlight that mismanagement of public funds and corruption can severely hinder the positive effects of government expenditure on SDGs. Their research suggests that to maximize the impact of tax revenue on sustainable development, stringent measures to ensure transparency and accountability in public spending are crucial. The effectiveness of government spending depends heavily on the quality of governance and the efficient allocation of resources; misallocation and wasteful spending can result in poor outcomes thereby hindering progress towards achieving SDG targets (Onuoha & Ugwuanyi, 2021).

The relationship between effective tax revenue mobilization and strategic government spending is integral to the attainment of sustainable development goals in Nigeria. Implementation of fiscal policies requires strong institutional frameworks and political will. Mobilizing tax revenue provides government with the necessary funds to finance SDG related projects while strategic public expenditure ensures that funds are allocated efficiently. However, for this relationship to translate into sustainable development, issues such as tax evasion, fiscal mismanagement and corruption must be addressed. Reforms aimed at expanding the tax base, enhancing transparency in government spending and improving governance are imperative for achieving long-term sustainability goals.

According to Todaro and Smith (2020), nations are better positioned to achieve long-term sustainable growth when tax revenue collection and government spending are kept in a healthy balance. A balanced approach, where tax revenue is efficiently collected and government expenditure is wisely allocated, is necessary for optimal outcomes. For developing economies like Nigeria mobilizing tax revenues and ensuring efficient public expenditure are critical in achieving these goals. As such governments worldwide, including Nigeria, have been incorporating these goals into their national development strategies, primarily through public revenue generation (e.g., tax revenue) and expenditures.

Theoretical Review

The pursuit of the Sustainable Development Goals (SDGs) requires an efficient allocation of resources largely dependent on the availability of tax revenue and the effectiveness of government expenditures. The fiscal policy theory explains the effect of taxes and government expenditure on sustainable development goals. The theory explores how government taxation and expenditure decisions influence economic growth, income distribution and the overall well-being of the society which are all crucial elements of the SDGs. The fiscal policy theory provides a framework for understanding how taxes and government expenditures can be strategically designed to support the achievement of the Sustainable development goals. Through progressive taxation targeted public spending and investments in key sectors, government can mobilize resources (Mominur, 2023) to address various social, environmental and economic maladies bedevilling the nation.

Fiscal policy measures have been recognized as an essential tool for government to mobilize revenue for public goods and services (Azian Annuar et al., 2018). Keynesian economics avers that government intervention through fiscal policy is necessary to stabilize the economy especially during downturns (Romer, 2020). This model suggests that when tax revenues are collected efficiently, government can use the revenue to stimulate the economy through strategic spending on infrastructure, education, healthcare, and social welfare programs. Effective governance, fiscal responsibility and transparent use of public funds are crucial to ensuring that fiscal policy contributes meaningfully to sustainable development. Government expenditure driven by tax revenue can reduce poverty, improve healthcare and enhance education, contributing to overall social welfare. This theory is critical for understanding

how tax revenue mobilization and government expenditures can directly influence economic and social outcomes, making it relevant for analyzing their impact on various SDGs.

Empirical Review

Sustainable development is a principle that aims to meet human development goals while also enabling natural systems to provide necessary natural resources and ecosystem services to humans. The desired result is a society where living conditions and resources meet human needs without undermining the planetary integrity and stability of the natural system (Mensah, 2019). Sustainable development tries to find a balance between economic development, environmental protection, and social well-being. Bearing in mind the above the following works were reviewed;

Ajeigbe, Gandal and Rawlings (2023) examined the impact of Sustainable Tax Revenue and Expenditure on the achievement of Sustainable Development Goals in African countries using secondary data. The data set was extracted from the World Development Indicators database. The large gap between developed and developing countries when comparing the probability of them achieving the SDGs was the main motivation behind this study. Data retrieved from 45 countries comprised of both African and developed countries for the period 2010–2020. The Generalized Method of Moments technique was used. The results revealed that the coefficients of grants received, various forms of taxes, and other revenue have a positive effect on economic growth but a negative effect on poverty and unemployment for African and developed countries. This finding suggests that improvements in tax revenue generation, grants and other revenue accumulation across different sources boost economic performance and the welfare of individuals in the analyzed countries. The outcome is an indication that accumulating more grants from different sources will help to achieve sustainable development, improve financial stability, contributes to the economic growth and development in these countries. Governments and other policymakers must ensure the efficient generation and sustainable utilization of revenue generated from taxes and other revenues to spur the growth and development of their countries. They should have Growth-Sustainability-Oriented Fiscal Adjustment Programs and Sustainable Government Expenditure that can help push and redirect governments to achieve the SDGs in Africa.

Adewale, Amos and Oladimeji (2022) examined the contribution of various tax components to the attainment of sustainable economic growth in Nigeria over a period of 1987-2019, using time series data to analyze the relationship. The ARDL bound testing approach to cointegration was employed to determine the long-term correlation and the rate of adjustment (short-term) in the analysis. The results indicated that Petroleum Profit Tax (PPT), Company Tax (VAT) and Personal Income Tax (PIO) had a positive short-term correlation with GDP growth, while Customs (CDS) and Excise Duty (EID) had a negative correlation in both the short-term and long-term. As a result, strong institutional reforms are recommended for the Department of Customs to address the identified leakages in other units in order to ensure that the revenue generated by the unit reaches its desired level by 2030.

Kouam and Asongu (2022) provided a comprehensive overview of research conducted on the implications of taxation for social innovation and its implications for the attainment of Sustainable Development Goals in developing countries, taking a three-pronged approach: thematic, chronological, and methodological. It is generally agreed that high taxes in businesses impede social innovation, thus hindering the attainment of SDGs. This is due to the fact that social innovation is a key factor in the attainment of most SDGs, with business being the primary driver. Most of the selected studies relied on primary data collected from samples whose representative of the target population (notably businesses) has not yet been explicitly established.

Mominur (2022) in his study examined the effects of the corporate tax rate on sustainable development in the BRIC and CIVETS countries. The research used a panel dataset for 2000–2021 years and applies panel data regression model to analyse the data. The study confirms the results checking the robustness through the fully modified ordinary least square and the dynamic ordinary least square panel estimate methods. The research finds that the corporate tax rate is positively and significantly associated with the sustainable development goals (SDG). The result implies that a higher rate of corporate tax plays vital role in achieving the sustainable development goals in the emerging economies. By including personal income tax, sales tax, and theoretical arguments, the study contributes to the debate on the corporate tax rate and the achievement of SDG in the emerging countries. The study applies both individual effects and combined effects of corporate tax rate, personal income tax, sales tax, and effective tax rate with SDG. In both cases, the research finds significant and positive association of taxation with SDG. Thus, the study argues that achieving the SDG of emerging economies depends on the countries' taxation rate and policy. Thus, the findings generated from this study can be a policy dialogue for the academics, policy-makers and government bodies of BRIC and CIVETS countries and other emerging economies as well.

Omar and Gonzalo (2022) developed a bottom-up causal framework to study the impact of public spending on high-dimensional and interdependent policy spaces in the context of socioeconomic and environmental development. Using data across 140 countries, they estimate the indicator-country-specific development gaps that will remain open in 2030. They found large heterogeneity in development gaps, and non-linear responses to changes in the total amount of government expenditure. Importantly, their method identifies bounds to how much a gap can be reduced by 2030 through sheer increments in public spending. It was shown that these structural bottlenecks cannot be addressed through expenditure on the existing government programs, but require novel micro-policies intended to affect behaviors, technologies, and organizational practices. One particular set of bottlenecks that stood out relates to the environmental issues contained in the sustainable development goals 14 and 15. In the same vein Oseni and Salami (2021) carried out a cross sectional panel data analysis to assess the role of government expenditure in reducing poverty and inequality in Nigeria focusing on SDG 1(no poverty) and 10 (reduced inequality). Data from 36 states spanning 2000 to 2020 were collected and analysed. Findings indicate that increased government expenditure on social protection and welfare programs had a significant negative impacts on poverty levels while expenditure on infrastructure was found to have a mixed impact on inequality. They therefore advocated for a more equitable distribution of infrastructural investments.

Adewuyi and Babatunde (2020) conducting an empirical analysis using time series dataset form 1999-2018 to evaluate the impact of government expenditure on human capital development in Nigeria, found that higher public investment in education and healthcare has a direct positive impact on human capital development which is vital in achieving SDG 3 (good health and well-being) and SDG 4 (quality education). They however noted inefficiencies in the allocation of government funds, particularly in the healthcare sector. Adedokun (2020) analysed the relationship between tax revenue, government expenditure and environmental sustainability in Nigeria using a dataset covering 2001 to 2019 and applying a Generalized Method of Moments Estimation Techniques (GMM). The findings indicated that tax revenue positively impacted environmental sustainability whereas government expenditures were found to be negatively associated with environmental sustainability. Based on the above review we therefore hypothesize that:

H1: There is an association between tax revenue and SDGs in Nigeria.

H2: There is a link between government expenditure and SDGs in Nigeria.

3.0 Methodology

The data for the variables of this study were extracted from the statistical bulletin of the Central Bank of Nigeria (CBN, 2021) and human development report of United Nations Development Programme for the year 2023. The dataset covered from 2000 to 2021. The model of this study is as stated in equation (i). Descriptive statistics were employed for pre-estimation analysis alongside Augmented Dickey- Fuller (ADF) unit root test to establish the order of integration of the variables employed in the study and the preferred estimation technique to use in order to avoid spurious results. The ADF test result indicated all variables were integrated in the first order (1(1) 1st difference) as such a co-integration test was necessary to establish the long run relationship subsisting among the variables. The Vector Error Correction Model (VECM) was applied to analyze the co-integrated variables and provide a mechanism to understand the long-run as well as the short-run behaviour of the variables in the system and how quickly any deviations in the short run reverts back to equilibrium in the long-run. Post estimation tests conducted included the Jarque-Bera Normality Test and heteroscedasticity test. The model for this study is specified in *equations* below;

Sustainable Development = f (Tax Revenue, Government expenditure)

$SDG_t = \beta 0 + \beta 1 TR_t + \beta 2 GEXP_t + \mu$ …….…. (1)

The model is presented in a log form as;

$ln SDG_t = \beta 0 + \beta 1\ ln TR_t + \beta 2\ ln GEXP_t +$ …….. (2)

Ln = the natural log of the variables
SDG= Sustainable development Goals (Measured as sustainable development goals index score)
TR= Tax Revenue
GEXP= Government Expenditure
$\beta 0, \beta 1, \beta 2,$ are parameter estimates
Ut = Error term
A priori Expectation: $\beta 1, \beta 2, > 0$

4.0 Results and Discussion

Pre Estimation Test

Descriptive Statistics of the Variables

The table below presents that summary statistics for the variables employed for this study.

Table 1: Descriptive Statistics

	LOGSDGIS	LOGTR	LOGGEXP
Mean	1.700	3.382	3.510
Median	1.705	3.496	3.612
Maximum	1.733	3.806	4.067
Minimum	1.664	2.637	2.846
Std. Dev.	0.023	0.370	0.342
Skewness	-0.179	-0.864	-0.277
Kurtosis	1.534	2.462	2.163
Jarque-Bera	2.088	3.002	0.923
Probability	0.352	0.223	0.631
Sum	37.393	74.401	77.222
Sum Sq. Dev.	0.011	2.867	2.455
Observations	22	22	22

Source: Author, 2024

The descriptive examines the characteristics of the variables of interest. Table 1 reveal that the means and medians of all the variables lie within the maximum and minimum values indicating that the variables had high tendency to be normally distributed. The kurtosis statistics showed that SDGIS, TR, and GEXP were platykurtic, suggesting that their distributions were flat relative to a normal distribution. Skewness indicates the variables are negatively skewed as indicated by the values (-0.179088, -0.863857, -0.276643). The standard deviation also indicates the spread of the model. The Jarque-Bera statistics shows that the series is normally distributed since the p-values of all the series are not statistically significant at 5% level. Thus informing the acceptance of null hypothesis that says each variable is normally distributed.

Stationarity of the Time Series Data

Table 2: Unit Root Test: Augmented Dickey-Fuller Test (ADF)

Variables	ADF statistics	Critical Value	Level of Sig.	Order of Integration
LnSDGIS	-6.863	-3.021	5%	I(1)
LnTR	-4.386	-3.021	5%	I(1)
lnGEXP	-5.644	-3.021	5%	I(1)

Source: Author Output from E-views 9, 2024

Table 2 displays the times series properties of the variables of interest using the Augmented Dickey Fuller (ADF) test of stationarity to avoid spurious results. The result indicates that sustainable development goals index score (SDGIS), tax revenue (TR) and government expenditure (GEXP) were all stationary at 1st difference implying a first level order of integration. This therefore suggests the likelihood of a long-run relationship subsisting among the variables. Hence the researcher subjected the data series to a Johansen Co-integration test.

Estimation Results
Johansen Co-Integration Estimate

Table 3: Johansen Co-Integration Test
Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.783	43.058	29.797	0.001
At most 1	0.510	14.149	15.495	0.079
At most 2	0.031	0.599	3.842	0.439

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.782	28.909	21.132	0.003
At most 1	0.510	13.550	14.265	0.065
At most 2	0.031	0.599	3.842	0.439

Max-eigenvalue test indicates 1 cointegrating eqn (s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors Output from E-views 9, 2024

Table 3 as shown displays the result for the Johansen Cointegrat0.0ion test for the data series. From the table it can be seen that both the Trace statistic and the Max-Eigen statistic reports at least one Co-integrating equation at a value of 43.05 and 28.91 which is higher than the critical values at 0.05 respectively. Hence it is said that the series are related and can be combined in a linear form. This means that any shock in the short run which may have effect on the series would be corrected in the long run. Given the results generated, the null hypothesis of no Co-integrating equation is rejected at 5% level. We therefore conclude that the data series being investigated has a long run relationship. Following this we go ahead to estimate the Vector Error Correction Model that will allow us to estimate both the long run and the short-run deviations from the equilibrium and how they are corrected.

Vector Error Correction Model

Table 4: VECM Estimation

Cointegrating Eq:	CointEq1		
LOGSDGIS(-1)	1.000		
LOGTR(-1)	-0.425		
	(0.127)		
	[-3.334]		
LOGGEXP(-1)	0.339		
	(0.143)		
	[2.376]		
C	-1.450		
Error Correction:	D(LOGSDGIS)	D(LOGTR)	D(LOGGEXP)
CointEq1	-0.003	1.469	0.394
	(0.021)	(0.532)	(0.230)
	[-0.149]	[2.76]	[1.713]
D(LOGSDGIS(-1))	-0.401	6.567	-1.644
	(0.237)	(5.898)	(2.546)
	[-1.693]	[1.113]	[-0.646]
D(LOGTR(-1))	-0.007	0.286	0.107
	(0.011)	(0.280)	(0.121)
	[-0.592]	[1.022]	[0.889]
D(LOGGEXP(-1))	-0.0001	-0.848	-0.357
	(0.024)	(0.608)	(0.262)
	[-0.005}	[-1.395]	[-1.360]
C	0.005	0.065	0.073
	(0.002)	(0.041)	(0.018}
	[3.122]	[1.606]	[4.180]
R-squared	0.228	0.366	0.214
Adj. R-squared	0.022	0.197	0.004
Sum sq. resids	0.0003	0.162	0.030
S.E. equation	0.004	0.104	0.045
F-statistic	1.104	2.167	1.018
Log likelihood	84.130	19.807	36.609
Akaike AIC	-7.913	-1.481	-3.161
Schwarz SC	-7.664	-1.232	-2.912
Mean dependent	0.004	0.052	0.053
S.D. dependent	0.004	0.116	0.045
Determinant resid covariance (dof adj.)		1.92E-10	
Determinant resid covariance		8.11E-11	
Log likelihood		147.2194	
Akaike information criterion		-12.92194	
Schwarz criterion		-12.02578	
Number of coefficients		18	

Source: Authors Output from E-views 9, 2024

The VECM estimates as displayed in table 4.4 contain the short-run impacts, short-run adjustment coefficients as well as the long-run Cointegrating relationship among the variables. From the table the long run co-integrating equation is represented mathematically as;

D(LOGSDGIS) = C(1) *(LOGSDGIS(-1) – 0.424678*LOGTR(-1) + 0.339421*LOGGEXP(-1) -1.450434

This reveals the Cointegrating equation and depicts the long run estimates of the data series employed in the study. This result reveals a negative relationship subsisting between tax revenue and sustainable development goals while a positive relationship subsists between government expenditure and sustainable development goals in Nigeria. This implies that a unit change in Tax revenue will result in a decrease in sustainable development goals index. This means that though tax revenue is increasing the effect is not being felt in achieving the sustainable development goals. Tax is intrinsically linked to development as taxation provides the revenue that states need to mobilize resources and reinforce a country's infrastructure. Taxation plays an essential role in achieving the SDGs. Taxes is required for governments to make the necessary environmental and social investments (Jahnsen & Pomerleau, 2017). Tax plays an important role in generating revenues for the government, while a unit change in the government expenditure will bring about an increase in the sustainable development goals index. These has a great bearing for policy implications in the management of tax revenue in Nigeria and channelling these resources towards the achievement of the sustainable development goals as outlined by the committee of united nations in the long run. On the other hand, government expenditure variable showed a positive influence on the SDGIS implying that when government follow well thought out expenditure framework mostly on investments that are developmental in nature then the nation stands to benefit especially the SDG's. The short-run result indicated a negative relationship between the dependent and the independent variables. From the outcome, a percentage change in tax revenue and government expenditure is associated with 0.007 and 0.0001 decrease in sustainable development goals all things being equal. However, the adjustment coefficient depicting the short-run relationship is rightly signed that is negative and significant which indicates that the previous period deviation from long-run equilibrium is corrected in the current period at the speed of 0.003.

Hypothesis Testing

H_0: **Tax revenue has no significant effect on sustainable development goals in Nigeria.**

The result in table 4.4 indicates that TR with a t-statistic of -3.333416 is significant at 5% level (p= 0.00012). Based on this result the H_{01} is rejected and the study concludes that in the long run tax revenue has significant effect on the sustainable development goals in Nigeria.

H_0: **Government expenditure has no significant effect on sustainable development goals in Nigeria.**

Considering the result as shown in table 4.4 which show that GEXP reported a t-statistic of 2.37577 is significant at 5% level of significance (p= 0.028). We reject the null hypothesis that government expenditure has no significant effect on sustainable development goals in Nigeria.

5.0 Conclusion and Recommendations

This study examined the relationship between tax revenue and SDGs and government expenditure and SDGs in Nigeria using SDGIS. The study built on the fiscal policy theory holds that government taxation and expenditure decisions influence economic growth, income distribution and the overall well-being of the society which are all crucial elements of the SDGs. The result indicated that tax revenue has a negative and insignificant effect on Sustainable Development Goals index score. The VECM results reveal a positive long–run relationship subsisting between the tax revenue and SDGIS. The result also affirms a short-run relationship with deviations from equilibrium being corrected at the rate of 0.003

percent. On the other hand, the result indicates a positive and significant relationship between government expenditure and SDGIS. The implication is that tax revenue is not making as much impact on sustainable development goals like government expenditure despite reported increase in tax revenue especially in the short run. The increasing amount generated from tax every year should have ensured improved economic well-being resulting in sustainable development, but the present positions of SDGIS have not changed significantly over the years.

Baghebo (2012) in his study on efficient utilization of tax revenue in Nigeria notes that high rate of poverty, unemployment, inflation, insecurity, and inadequate healthcare delivery still prevails despite the increase in tax revenue. This was attributed to an ineffective and inefficient utilisation of tax revenue. Availability and mobilization of income are the primary factors on which economic development are managed and sustained. Global Alliance for Tax Justice (2015) considers tax as the most important, reliable, beneficial, and sustainable source of finance for development. Therefore, to ensure sustainable economic development, generated tax revenue must be sufficient, efficiently and judiciously utilized. The government should pay attention to encouraging her citizens to build trust in it by tax accountability, ensuring that the promises made to the citizens are highly delivered. It should also ensure that the tax system is very transparent and the proceeds from taxes used honestly for the betterment of the citizens. Provision of facilities that will ensure the comfortable existence of necessary amenities for the well-being of the majority of citizens of the state must not be treated with levity. If individuals and companies have no safe drinking water, no good road network, improved healthcare system and educational system, and have to live in perpetual fear, why would they be willing to pay tax. The citizens must feel the impact of development so as to pay tax voluntarily. The study therefore recommends that Nigeria should channel its resources towards closing up infrastructural deficits and productive units that would enhance the economy and ensure optimal utilization of tax revenue towards achieving sustainable development in Nigeria.

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