

Chapter 7

Promoting Environmental Sustainability with Tax Revenue and Governance Quality: Insights from Sub-Saharan African Countries

Timilehin Olasoji Olubi

 <https://orcid.org/0000-0003-0690-7722>

Babcock University, Ilishan-Remo, Nigeria

Olaitan Comfort Bamidele

School of Management Sciences, Babcock University, Nigeria

Adesanmi Timothy Adegbayibi

Faculty of Administration and Management Sciences, Adekunle Ajasin University, Nigeria

Akinpelu Ayobami Kolade

 <https://orcid.org/0009-0006-2488-5036>

Faculty of Management Sciences, Osun State University, Okuku, Nigeria

ABSTRACT

Environmental Sustainability is a global call to act in the interest of protecting and preserving the environmental resources today for a better future. This could be achieved through effective tax policies and good governance. However, many countries in Sub-Saharan Africa are faced with environmental sustainability problems

DOI: 10.4018/979-8-3373-0613-1.ch007

s. The study examined the effect of tax revenue and governance on environmental sustainability in Sub-Saharan African countries. Ex-post facto research design was adopted. The population of the study was forty-eight (48) Sub-Saharan African countries. The data were sourced from the World Development Database covering 21 years (2001-2021). Findings revealed that tax revenue significantly mediated the effect of tax revenue on environmental sustainability in Sub-Saharan African countries. The study concluded that tax revenue improved environmental sustainability in Sub-Saharan African countries. The study recommended that government should ensure an effective use of tax revenue to promote environmental sustainability

INTRODUCTION

Inabilities to safeguard the natural resources had led to distortions and dangerous negative climatic interference globally. Environmental Sustainability is a global challenge that is affecting the economy of the world. The pillars of sustainable development are environmental sustainability. This is a decision and conduct of activity that ensure continuous plan over an indefinite future in the improvement and maintenance of ecosystems; a purposeful transition towards sustainable futures requires the guidance of new social imaginaries, strict and logical workable replacement for environmental sustainable structural policy. It helps in the reduction of diarrhea related death rates. Environment sustainability is everything that affects our life to live (Leke & Leke, 2019; Reidy & Waddock 2022; Maurya et al 2020; Sharma & Snilstveit, 2009; Scoones, 2018). Environmental Sustainability is meeting today's economic needs without jeopardizing the ability of future generations to meet their needs. It involves taking action in protecting the environment air, water, land, and ecosystems in ways that are economically viable beneficial and friendly to human health, well-being, and socially just. It is also a condition where human and nature live together by interrelating with the ecosystem space without affecting one another. It is also fulfilling the economic, social and the natural productive harmony for the future generations (Environmental Protection Agency, 1969; EPA, 2023; United Nation, 1987).

Governments at different levels employed measures to generate funds needed to provide certain infrastructural and basic social amenities that will meet the needs of her citizenry. Tax rate must be predictable in order to encourage environmentally-friendly activities (Brown, 2022; Ideh 2019). Tax revenue are enforced payment collections from individuals, groups, institutions, and companies to the made to the government (Akintoye et al, 2019) One major primary task of governments at all levels is the provision of basic infrastructural development, the provision of social goods and services, maintenance of law and order amongst other to the citizenry of

any country. To meet up with these expenditures, government activities is tailored towards generating revenue in a bid to execute such tasks, hence the need for tax revenue an essential means through which governments generate the needed revenue to meet financial demands and execute other functions as well for environmental sustainability (Azubike, 2009; Edame, 2011).

Taxation is a determinant factor in the growth of middle- and low-income countries (Russell, 2010). Governance quality is the fundamental predictor of tax collection in both developing and developed countries, low tax revenue collections are the major causes of abysmal tax collection as been witnessed in many Sub-Saharan African countries (Ghura, 1998) Tax revenue collected by developing countries are insufficient due to bad governance issues such as corruption, political instability, effective governance, economic effectiveness, regulatory governance and ineffective tax administration, policies, and legislation. Tax policy administrative system are considered important for increasing the amount of tax income generated in emerging countries while maintaining governance quality (Ajaz & Ahmad, 2010). Tax revenue and governance will help in putting in place infrastructural developmental moves, in term of environmental sustainability. The quality of governance improves tax collection. Sub-Saharan African countries are faced with ecological challenges attributable to lack or insufficient funding mobilized fund in the present to protect the future. Weak and inefficient governance had been a ban on tax effectiveness. Tax revenue collections could help to finance marine and Amazon struggles putting stop to deforestation of land; exposing human to rise in temperature because of depletion of ozone layers, and promoting eco-friendly activities (Baker & Anderson, 2011; Frey & Togler, 2007; Jonhson & Omodero, 2021; Joseph, 2022; UN, 2021; Rodriguez, 2019).

Quality of governance is a major determinant of tax revenue generation to any society (Jonhson and Omodero 2021) In the bid to focus on promoting mechanisms, to raising capacity for planning and management, in preventing further ecological threat, there is need to raise funding within Sub-Saharan African countries as major global exporters of resources in order to curtail the challenges facing environmental sustainability of the region, mostly in an economy that is dependent on taxation, the more reasons government at various level focused on improving its tax system to get more tax revenue (Gupta, 2007). The essential determinant for any growing nation most importantly in the provision of technology capable of controlling the negative impact in the ecological system is hinged on level of tax collectables. Amadou, et al (2019) posited that to mobilize fund in the present for the future development and environmental sustainability, there is a need for an efficient and effective tax revenue governance in the Sub-Saharan African countries. Revenue generation enhances environmental protection and better governance. Lack of accountability and voice, corruption, weak institution, Inefficient and ineffective governance have been a bane

to tax revenue collection drive in Sub-Saharan African countries. The lack of voice and accountability, quality regulatory system, effective economy system, political instability, corruption, absence of rule of law, if present, may reduce tax collections that could have helped with promoting environmental sustainability (Anderson 2017; Everest & Sandall, 2009, & Frey & Togler, 2007; Günay, & Topal, 2020; IMF, 2023 & Salman, et al 2019). Osemeke, *et al*, (2020). The capacity of the government to formulate effective and sound tax policies is a must at every level. Bogacki and Wołowiec (2021) harmonization of tax will enhance better economy performance. More so, they believe that to experience harmonization between macro economy that brings healthy economy and environmental integration, tax revenue is vital. Joseph *et al* (2022), revealed that tax revenue helps with the establishment and the maintenance of public goods that individuals in the society may be unable to fund; for government to deliver on its primary mandates tax is the major source of doing it (Abiola & Asiweh, 2012; Appah 2010 & Azubike, 2009). Solheim (2018) opined that to correct environmental issues, there is need for trade taxes and environmental governance, so as to foster resilience involving good practices, sustainable production system and consumption that encourages investments in the environment, and the development of green technologies at all layers of trading activities. Taxes on productions of goods and services must be eco-friendly making sure goods are reusable, while related services like transportation services come with reduction of carbon emission among different sectors.

Inabilities to safeguard the natural resources had led to distortions and dangerous negative climatic interference globally.

Environmental Sustainability is a global challenge that is affecting the economy of the world. The pillars of sustainable development are environmental sustainability. This is a decision and conduct of activity that ensure continuous plan over an indefinite future in the improvement and maintenance of ecosystems; a purposeful transition towards sustainable futures requires the guidance of new social imaginaries, strict and logical workable replacement for environmental sustainable structural policy. It helps in the reduction of diarrhea related death rates. Environment sustainability is everything that affects our life to live (Leke & Leke, 2019; Reidy & Waddock 2022; Maurya et al 2020; Sharma & Snilstveit, 2009; Scoones, 2018). Where there were environmental sustainability impieties in economic activities within a nation, it could lead to reduced productivity, the loss of ecosystem, loss of coastal wetlands. Resulting to long-term sustained human pressure, and other developmental activities have led to natural hazards; increased in the health care expenditures, environmental deterioration, biodiversity, oceans filled with, electronic plastic and toxic wastes. The impacts of plastic debris on the marine life are on the increase, causing harm to the eco-system habitats and terrestrial ecosystem beyond acceptable level. Thus, it requires an urgent need to develop and promote human interactive policies with

eco-biodiversity. (Adger et al 2009; Dow & Downing, 2013; Hidayat & Hidayat 2021 & Paul, 2015 Kiruba-Sankar, & Barman 2024; De Jesus, 2024).

The Sustainable Development Goals (SDGs) provide a golden opportunity to support and promote sustainable development and as well meet the Agenda 2063 of the African Union. Attaining this pursuit is quite challenging, putting in mind the low response to environmental sustainability within SSA countries due to rapid demographic, socio-economic and environmental change, and the prevailing lack of resources and low capacity to correct ills in the eco-system (Juju & Mudarikiri 2020) Environment refers to everything that whatever that surrounds us, gives food, water, and air to breathe, and other essentials for daily existence, and provide life-support system (Brown 2022). Environmental sustainability is a deliberate act of preserving natural resources and safeguarding global ecosystems in order to provide support to human health and wellbeing, both now and in the future (Sphere, 2024). Environmental Sustainability is meeting today's economic needs without jeopardizing the ability of future generations to meet their needs. It involves taking action in protecting the environment air, water, land, and ecosystems in ways that are economically viable beneficial and friendly to human health, well-being, and socially just. It is also a condition where human and nature live together by interrelating with the ecosystem space without affecting one another. It is also fulfilling the economic, social and the natural productive harmony for the future generations (Environmental Protection Agency, 1969; EPA, 2023; United Nation, 1987).

The importance of environmental sustainability to nations' building cannot be overemphasized in this age of environmental distress; hence the need to appreciate the importance of environmental protection, as reflected in 2030 Sustainable Development Goals (SDGs) towards an environmental protection system. This may be achieved by reversing the climate disaster occurring on our planet without which our future is unsecured, (Sebela, 2022). To achieved environmental sustainability, most importantly in Sub-Saharan African countries, effective tax revenue drive as well as governance quality are key in attaining this desired goal. Hence, it is of essence to note that tax revenue is one of the essential means through which the governments monitor and control the macroeconomic activities and plays a vital role in promoting environmental protection and sustainable development (Hessa & Haitham, 2020).

Ajeigbe, et al, (2023) opine that improvements in tax revenue generation, across different sources do boost economic performance, welfare of individuals, sustainable development, improve financial stability, contributes to the economic growth and help in addressing environmental sustainability advancement in countries. Quest for Economic development in Sub-Saharan African countries comes with huge vulnerability. Tax revenue expansion would address both economic development as well as environmental sustainability challenges (Adel Ben & Mounir, 2024). Therefore, the study highlights the problem of lack of clean water and sanitation, inefficient policy

plan on climate action, the lack of protection system of life below the water, and the lack or ineffective policy, protecting life on the land, are the problem the study is interested in solving in Sub-Saharan African countries. Therefore, the focused of this paper is to examine the effect of tax revenue and governance on the attainment of environmental sustainability in Sub-Saharan African countries. On the basis of the aforementioned, hypothesize as follows were investigated. H_{01} : Tax revenue does not have significant effect on the attainment of Environmental sustainability in Sub-Saharan African countries. H_{02} : Governance does not significantly mediate the effect of tax revenue on the attainment of Environmental sustainability in Sub-Saharan African countries.

LITERATURE REVIEW

The conceptual framework examines many concepts of tax revenue as independent variable proxies by Taxes on Export (TEPOT); Taxes on Goods and Services (TGS), Taxes on Income Profit and Capital Gain Tax (TIPCG), Taxes on International Trade and Transactions (TIIT)

Taxes on Customs and Import Duties (CIDT) as well as governance quality as a mediating variable been proxies by Voice and Accountability (VACP), Political Governance (POSP)

Economic Governance (GOEP), Regulatory Quality (REQP), Rule Quality (ROLP) Control of Corruption (COCP), Governance Quality (GOQP), and environmental sustainability as dependent variable proxies CWAS (Clean water and sanitation), CLMA (Climate Action)

LIBW (Life Below water), LIOL (Life on Land) This framework explains the notion, which improves the comparability of the variables in this study. A conceptual framework represents the researcher's synthesis of the literature on explaining a phenomenon.

In addition, the conceptual framework is the researcher's understanding of how the variables in his study connect (Regoniell, 2015). Tax revenue is defined as the revenues collected from taxes on income and profits, social security contributions, taxes levied on goods and services, payroll taxes, taxes on the ownership and transfer of property, and other taxes (OECD, 2023). Isola (2011) defined taxation as equality, convenience, certainty, economy, productivity, flexibility, simplicity, and diversity. Similarly, tax according to Worlu and Emeka (2012) is a compulsory fee levied by the government on incomes, activities, products and properties by a government. Governance refers to having in place political, economic, and administrative quality and authority in managing the resources of a country towards development (Country Governance Assessment 2005). The Asian Development Bank (ADB) and NEDA,

(2006), refer to governance as the exercise of economic, political and administrative authority to manage the nation's affairs at all levels. Environmental sustainability creates balance between social, economic and other environmental needs of people and the society in which human beings operate, that guarantees health and safe environment (Edubirdie, 2022). More so, environmental health is the sum of all factors in man's physical environment that causes a dexterous effect on his physical health, development and its overall survival (Akter et al. 2016)

EMPIRICAL REVIEW

Kao et al. (2022) and Jiangbo et al. (2023) analyze how natural resources impact environmental and economic outcomes in Africa and China, respectively. Both studies emphasize the need for careful management of natural resources to avoid negative outcomes such as reduced longevity and hindered green economic growth. Also, Kao et al. (2022) highlight the detrimental effects of environmental pollution on life expectancy in African countries, a concern that is indirectly echoed in Jiangbo et al. (2023), where carbon emissions are found to negatively impact green economic growth in China. Both studies suggest that environmental degradation, whether through pollution or carbon emissions, has significant long-term consequences for both human health and economic sustainability. Salman et al. (2022) focus on the role of governance in tax revenue performance in West African countries, which is crucial for funding sustainable development. This theme is connected to the findings of Jiangbo et al. (2023), where financial development (a product of effective governance) is seen as vital for promoting green economic recovery in China. The importance of governance quality, particularly in the context of resource-rich countries, is a common thread across these studies. Gaps in the studies discuss the immediate effects of resource management, pollution, and governance, there is a gap in exploring the long-term sustainability of the policies proposed.

The studies could benefit from a more detailed analysis of how these policies would unfold over decades, particularly in the context of changing global environmental standards. Although the studies focus on different regions (Africa, China, and West Africa), Effective governance not only improves tax revenue performance, as seen in West Africa, but also supports green economic recovery, as evidenced in China. This suggests a need for policies that mitigate the environmental and economic risks associated with resource dependency. More so, environmental pollution is consistently identified as a major obstacle to achieving sustainability. Kao et al. (2022) focus on its impact on human health, while Jiangbo et al. (2023) link it to economic challenges. Both studies imply that reducing pollution is a key component of any sustainable development strategy. The studies concluded that sustainable develop-

ment in resource-rich regions requires an integrated approach that combines effective governance, environmental protection, and economic diversification. Without such an approach, the negative impacts of resource exploitation and environmental degradation are likely to undermine long-term sustainability. And strong governance emerges as a central pillar in achieving sustainable development. Whether through improving tax revenue performance or supporting green economic growth, effective governance structures are essential for managing the complex interactions between natural resources, economic development, and environmental health.

In his study Ibrahim (2020) investigates the role of governance and strong institutions in promoting environmental sustainability in Africa, focusing on the period from 1996 to 2017.

Tang et al. (2023) examined how environmental governance contributes to the improvement of urbanization quality in China from 2000 to 2017. While, Mohammed et al. (2023) explored the global perspective, linking governance with environmental quality across 180 nations from 1999 to 2021 and Zhang et al. (2022) assessed the relationship between governance quality, environmental quality, and human health, specifically in low-income countries, from 1996 to 2020. Furthermore, Ibrahim (2020) carried out a study on the search for environmental sustainability in Africa, relating to effective governance. The study estimated the unbalanced panel data of the indices of good governance and strong institutions to explain the transformation to environmental sustainability using the dynamic system generalized method of moment estimator from 1996 to 2017, while, Tang et al (2023) explored the effect of environmental governance in quality improvement of urbanization with evidence from China 2000–2017. Mohammed et al (2023) explored linking governance with environmental quality: a global perspective. This study looks at how governance affects environmental quality in 180 nations between 1999 and 2021 and Zhang et al (2022) accessed a study on Human health, environmental quality and governance quality, the study conducts an empirical analysis using the annual data of low-income countries from 1996 to 2020. The gaps show differences in how governance affects environmental outcomes across regions. For example, the challenges in Africa (Ibrahim, 2020) differ from those in China (Tang et al., 2023), and the global analysis (Mohammed et al., 2023) captures a broad spectrum of governance-environmental interactions. Zhang et al. (2022) focus on low-income countries, underscoring the unique challenges these nations face in linking governance to environmental and health outcomes.

THEORETICAL FRAMEWORK

The research paper is based on benefits received theory of taxation (BRTT). This theory is believed to have been initiated by Knut Wicksell and popularized by Erik Lindahl (Cooper, 1994; Trotman Dickenson, 1996). Proponents of the theory argue that relationship do exist between the government and the tax payers that is based on mutual trust. On the basis of this relationship therefore, the government has a responsibility of providing goods, services and basic infrastructures for use by members of the society, who in return are expected to make contributions through taxation in proportion to whatever benefits that may have been derived from their access to the amenities, infrastructures, goods and services that are solely provided by government (Trotman Dickenson, 1996; Bhartia, 2009; Ihenyen and Mieseigha, 2014)

METHODOLOGY

For the purpose of this study *Ex-post facto* research design was adopted. The population of the study was forty-eight (48) Sub-Saharan African countries. A sample size of Thirty-six (36) countries was purposively selected based on the availability of data. The data were sourced from the World Development Database covering 21 years (2001-2021). Validity and reliability were premised on the verified data in the website of World Bank Database. The data were analysed using descriptive and inferential (Multiple Regression) statistics at 5% level of significance

MODEL

$$\text{ENVS} = f(\text{CIDT}, \text{TIIT}, \text{TGS}, \text{TIPCG}, \text{TEPOT})$$

=====Equation. 1

$$\text{ENVS} = f(\text{CIDT}, \text{TIIT}, \text{TGS}, \text{TIPCG}, \text{TEPOT}, \text{VACP}, \text{POSP}, \text{GOEP}, \text{REQP}, \text{ROLP}, \text{COCP}, \text{GOQP})$$

=====Equation 2

$$\text{ENVS}_{it} = \alpha_0 + \beta_1 \text{CIDT}_{it} + \beta_2 \text{TIIT}_{it} + \beta_3 \text{TGS}_{it} + \beta_4 \text{TIPCG}_{it} + \beta_5 \text{TEPOT}_{it} + \text{VACP} + \text{POSP} + \text{GOEP} + \text{REQP} + \text{ROLP} + \text{COQP} + \mu_{it}$$

Research Hypothesis H_{01} : Tax revenue does not have significant effect on the attainment of Environmental sustainability in Sub-Saharan African countries.

Research Hypothesis H_{02} : Governance does not significantly mediate the effect of tax revenue on the attainment of Environmental sustainability in Sub-Saharan African countries.

Table 1. Effect of Tax Revenue & Governance on Environmental sustainability in SSA outline

WITHOUT CONTROL VARIABLE					WITH CONTROL VARIABLE				Difference	
Main Model					Main Model				Coeff	Prob
Variable	Coeff	Std. Err	T-Stat	Prob	Coeff	Std. Err	T-Stat	Prob		
Constant	64.04	0.997	64.21	0.000	64.96	0.86	75.31	0.000		
CIDT	0.178	0.021	8.01	0.000	0.199	0.0027	7.26	0.000	+/. Inc	Sig/Sig
TIIT	-0.108	0.010	-10.53	0.000	-0.135	0.017	-7.74	0.000	-/. Inc	Sig/Sig
TGS	0.0125	0.006	2.10	0.169	0.019	0.006	3.36	0.001	+/. Inc	Insig/Sig
TIPCP	0.045	0.009	4.89	0.000	0.039	0.009	4.26	0.000	+/. Dec	Sig/Sig
TEPOT	0.231	0.021	10.95	0.000	0.188	0.038	4.96	0.000	+/. Dec	Sig/Sig
VACP					-0.004	0.012	-0.36	0.719		
POSP					0.053	0.014	3.58	0.000		
GOEP					-0.001	0.009	-0.15	0.881		
REQP					-0.006	0.016	-0.36	0.722		
ROLP					-0.119	0.014	-8.83	0.000		
COQP					0.06	0.026	2.36	0.018		
Adj R ²	0.16				0.224				0.7	
F-Stat/Wald Stat (Prob)	102145.09 (0.000)				44148.50(0.0000)					
Hausman Test	$\chi^2_{(2)} = 3.29 (0.6549)$				$= 6.99 (0.7995)$					
Testparm Test/LM Test	$\chi^2_{(1)} = 4361.38 (0.0000)$				$\chi^2_{(1)} = 3985.18 (0.0000)$					
Heteroskedasticity Test	$\chi^2_{(13)} = 0.05 (0.8177)$				$\chi^2_{(1)} = 9.10 (0.0026)$					

continued on following page

Table 1. Continued

WITHOUT CONTROL VARIABLE					WITH CONTROL VARIABLE				Difference	
Main Model					Main Model				Coeff	Prob
Variable	Coeff	Std. Err	T-Stat	Prob	Coeff	Std. Err	T-Stat	Prob		
Autocorrelation Test	$F_{(1,33)} = 423.897 (0.0000)$				$F_{(1,33)} = 481.291(0.0000)$					
Cross sectional independence test	21.089 (0.0000)				15.253 (0.000)					

Source: World Bank Database, World-Wide Governance & SDGs% estimation Atlas

Note: Test of Hypotheses 1 & 2 Main Model (without & with mediating variable)

Dependent Variable: Envs@5% level of significance

RESULT DISCUSSION AND FINDINGS

The result of the study as revealed in Table1.1 shows that tax revenue exerted positive significant effect on environmental sustainability in sub-Saharan African countries and it was in line with the a priori expectation for the study. The study reveals that TGS ($p = 0.0552$) exerted a strong significant effect on EVNS unlike others (CIDT, $p = 8.01$, TIIT, $p = -0.4439$, TIPCG, $p = 0.115$, TEPO, $p = 0.261$, that are positive but very small and at the same time a negatively significant p value. The implication here was that other tax net was not performing well, special attention should be given to tax on trade and international trade, a signal that at international trading level, economic activities at that level was not yielding a sufficient tax revenue into the revenue base of the countries involved.

The increase that should be coming from international market is not felt in the revenue reserves. Showing a colossal loss to the nations involved. It thus indicated that tax authorities in countries of concern are lagging back in making sure that what belongs to them is not systematically taken away through corrupt practices as witnessed in the figure analyzed regarding REQP and ROLP with p value of -0.1403, 0.228 respectively. Hassan et al. (2021), Johnson and Omodero (2021) Rao, (2023), result findings collaborated the findings of this study that governance, tax revenue does improve environmental sustainability. Suffice to note was the fact as presented above that for a state to witness environmental sustainability, the following were expedient; the rule of law, regulatory quality, tax payment and accountability and are fundamental key. Hence, state representative at international level should make sure trading is eco-friendly; as well as making sure tax nets were not cornered by a few so as to have an environment that are sustained for all, either on land or in the sea.

At a 5% level of significance of 0.05, and the degree of freedom was 11,786, F-statistics was 44148, while, probability of F-statistics was 0.000. This was less than adopted level of significance. Therefore, the study rejected the Null hypotheses and accepted the Alternate hypotheses, which implied that governance, tax revenue significantly affects the attainment of environmental sustainability (ENVS) in Sub-Saharan African countries. In general, F-statistics with a probability value of 0.000 implied that CIDT, TIIT, TGS, TIPCG and TEPOT, VACP, GOEP, REOP and ROLP jointly significantly affected the attainment of ENVS, in Sub-Saharan African countries.

SUMMARY, CONCLUSION AND RECOMMENDATION

Many Sub-Saharan African countries are in denial of what environmental challenges are causing both to life existing on land and in the sea. Climate change that had resulted in increase in temperature, melting of north and South Pole ice, rise in the sea level resulting into flooding and causing loss of lives and property; lack of clean drinkable water and sanitation system. Despite that, Sub-Saharan African countries were not one of the major polluters of the environment. This study showed that if government at every level refuses to put in place tax revenue policy, environmental sustainability could be difficult to control due to insufficient funding. The more human activities increase the greater ecological problem, and more findings and governance would need to curtail problem. The study discovered that, Sub-Saharan countries have weak governance control policies when it comes to environmental governance, which could have helped in restoring the environment degradation. The result of findings showed that tax revenue significantly affected the attainment of life on land in Sub-Saharan African countries and governance control, tax revenue equally affects the attainment of life on land in SSA countries. The main objective of the study findings showed that tax revenue do significantly affected the attainment of environmental sustainability in Sub-Saharan African countries, as well as governance and tax revenue significantly affected the attainment of environmental sustainability in sub-Saharan African countries. The study recommended that governments of the region should be deliberate in funding environmental related matter by including environmental budget estimate into the annual budget, in re-addressing environmental challenges in the region. It also recommended that, government at every level include in educational syllabus, environmental related topics that would served as a means awareness creation on the need to be eco-friendly. Sub-Saharan African countries were advised to work on tax revenue and governance factors that are not faring well as discovered from the study. As a means of checkmating the

public on the necessity of clean environment, the study recommended that, AI be introduced to fight against environmental polluters in each sectors of the economy.

REFERENCES

- Abiola, I., & Asiweh, M. (2012). The impact of tax administration on government revenue in a developing economy: A case study of Nigeria. *International Journal of Business and Social Science*, 3(8), 99–113.
- Adel Ben, M., & Mounir, A. (2024). Tax revenue expansion and its role in sustainable development: Evidence from Sub-Saharan Africa. *Journal of Economic Development Studies*, 39(2), 45–67.
- Adger, W. N., Arnell, N. W., & Tompkins, E. L. (2009). Successful adaptation to climate change across scales. *Global Environmental Change*, 19(2), 120–132. DOI: 10.1016/j.gloenvcha.2008.12.005
- Ajeigbe, O., Olatunji, M. A., & Bamidele, I. (2023). Tax revenue and governance quality in the development of Sub-Saharan Africa: A focus on environmental sustainability. *African Journal of Economic and Sustainable Development*, 27(1), 72–88.
- Akintoye, I. R.. (2019). Tax revenue and its role in the development of government projects. *Journal of Financial Economics*, 12(2), 45–58.
- Amadou, M., Sarr, D., & Wane, A. (2019). Effective tax revenue governance for environmental sustainability in Sub-Saharan Africa. *Environmental Policy and Governance*, 29(3), 198–213. DOI: 10.1002/eet.1865
- Anderson, A. (2017). Governance and sustainable development: The role of tax revenue. *Environmental Sustainability Journal*, 5(2), 99–115.
- Appah, E. (2010). Taxation and economic development in Nigeria. *International Journal of Economic Development*, 8(4), 233–249.
- Azubike, M. O. (2009). The role of tax revenue in achieving environmental sustainability. *Environmental Economics and Policy Studies*, 15(3), 105–121.
- Azubike, O. (2009). Taxation and the economic development of Nigeria: The role of governance. *The International Business & Economics Research Journal*, 7(1), 1–12.
- Baker, R., & Anderson, G. (2011). Governance quality and tax revenue generation in Africa. *Journal of Public Policy and Governance*, 23(4), 87–101.
- Bhartia, H. L. (2009). *Public finance: Taxation theory and practice*. Vikas Publishing House.
- Brown, P. (2022). Environment, economy, and sustainability: A global perspective. *Global Environmental Studies Journal*, 31(2), 57–71.

Brown, S. (2022). Tax rates and their impact on environmentally-friendly activities: A global perspective. *Journal of Environmental Policy*, 29(1), 33–47.

Cooper, R. (1994). *The benefits received theory of taxation*. Oxford University Press.

Country Governance Assessment. (2005). Governance in Africa: Challenges and solutions. World Bank Report.

De Jesus, J. R. (2024). The role of governance in environmental sustainability: A case study on Sub-Saharan Africa. *Sustainable Development Studies*, 18(4), 143–159. DOI: 10.1016/j.susdev.2024.02.001

Dow, K., & Downing, T. E. (2013). The human dimension of global environmental change. *Global Environmental Change*, 23(4), 954–963. DOI: 10.1016/j.gloenvcha.2013.02.007

Edame, G. O. (2011). The importance of taxation for public infrastructure and environmental sustainability. *African Development Review*, 23(4), 421–433.

Edubirdie. (2022). Environmental sustainability and governance in developing nations. *Journal of Environmental Impact*, 19(3), 72–84.

Environmental Protection Agency. (1969). Environmental protection and sustainability: The role of government in managing natural resources. *EPA Report*, 57(2), 77–92.

Environmental Protection Agency. (1969). *Environmental protection policy and practices*. U.S. Government Printing Office.

Environmental Protection Agency. (2023). The future of sustainable governance and environmental taxation. *EPA Journal*, 45(1), 13–25.

Environmental Protection Agency. (2023). Environmental sustainability report. EPA Reports, 2023.

Everest, J., & Sandall, D. (2009). The impact of weak governance on tax revenue collection in Sub-Saharan Africa. *Development Economics Journal*, 21(1), 34–50.

Frey, B. S., & Togler, B. (2007). Tax compliance and governance: A cross-cultural comparison. *Public Finance Review*, 35(5), 63–87.

Frey, B. S., & Togler, B. (2007). Tax policy, administrative systems, and environmental sustainability. *Public Administration Review*, 54(6), 189–204.

Ghura, D. (1998). Tax collection in Sub-Saharan Africa: Challenges and opportunities. *The American Economic Review*, 12(3), 211–225.

Gupta, S. (2007). The effects of tax policy on government revenue in developing countries. *World Development Review*, 33(4), 379–395.

Hessa, H. M., & Haitham, H. H. (2020). The impact of tax revenue on environmental sustainability in Sub-Saharan Africa. *Environmental Economics and Policy Studies*, 18(2), 127–142. DOI: 10.1007/s10018-020-00261-w

Hidayat, S., & Hidayat, H. (2021). Tax governance and its impact on environmental sustainability in Sub-Saharan Africa. *International Journal of Environmental Management*, 28(1), 45–58.

Ideh, F. (2019). Taxation policies and their role in environmental sustainability in Sub-Saharan Africa. *American Journal of Economics*, 10(2), 50–68.

IMF (2023). Sub-Saharan Africa tax revenue performance and governance quality. International Monetary Fund Report, 2023.

Isola, A. M. (2011). *Principles of taxation: A comparative analysis*. Oxford University Press.

Johnson, A., & Omodero, S. (2021). Governance quality and tax revenue generation in Sub-Saharan Africa. *Environmental Economics Journal*, 34(4), 150–167.

Juju, I., & Mudarikiri, M. (2020). Challenges of environmental sustainability in Sub-Saharan Africa: A governance approach. *African Development Journal*, 15(3), 113–127.

Kao, C., Fan, Z., & Chen, C. (2022). Natural resources, environmental pollution, and sustainability in Africa: Implications for health and economic growth. *Journal of Environmental Economics*, 41(3), 210–228.

Kiruba-Sankar, R., & Barman, D. (2024). The role of governance in mitigating environmental hazards: A policy perspective. *Environmental Policy Journal*, 9(2), 49–67.

Leke, A., & Leke, M. (2019). Environmental sustainability in Sub-Saharan Africa: Key drivers and challenges. *Sustainable Development Review*, 12(4), 85–101.

Leke, A., & Leke, S. (2019). Environmental sustainability and its impact on human health and well-being. *Journal of Sustainable Development*, 14(1), 102–115.

Maurya, D., Singh, R., & Yadav, K. (2020). Environmental sustainability in the context of economic development. *Global Sustainability Review*, 7(5), 152–165.

Maurya, S.. (2020). The role of environmental sustainability in reducing public health risks. *The International Journal of Environmental Studies*, 28(2), 76–88.

- Mohammed, A. S.. (2023). Governance and environmental quality: A global perspective on sustainability. *Environmental Governance Journal*, 26(1), 56–75.
- OECD. (2023). Revenue statistics in Africa 2023. Organisation for Economic Co-operation and Development Report. <https://www.oecd.org>
- Paul, A. (2015). Tax revenue governance and its role in environmental sustainability. *The International Journal of Environmental Studies*, 22(3), 167–184.
- Regoniel, P. (2015). The role of conceptual frameworks in research. *The International Journal of Social Sciences (Islamabad)*, 3(2), 45–59.
- Reidy, D., & Waddock, S. (2022). Innovative policies for environmental sustainability and development. *Journal of Environmental Governance*, 18(3), 250–265.
- Rodriguez, S. (2019). Taxation and governance for environmental protection. *Global Environmental Journal*, 29(6), 112–130.
- Russell, P. (2010). Taxation and economic growth in middle- and low-income countries. *World Economic Review*, 16(4), 347–360.
- Salman, M.. (2019). Governance, accountability, and environmental sustainability in Sub-Saharan Africa. *Environmental Policy and Governance*, 29(5), 234–245.
- Scoones, I. (2018). Sustainable futures: Bridging the gap between environmental and social sustainability. *Global Environmental Change*, 28(1), 21–35.
- Sharma, R., & Snilstveit, B. (2009). The impact of environmental sustainability on global economies. *International Review of Environmental Economics*, 17(3), 234–247.
- Solheim, R. (2018). Trade taxes and environmental governance: Fostering sustainable development. *Journal of Environmental Policy*, 27(4), 143–159.
- Sphere. (2024). Environmental sustainability and its role in human health. *Sphere Environmental Studies*, 21(3), 44–52.
- Trotman Dickenson, S. (1996). The benefits received theory of taxation. *Journal of Public Economics*, 28(3), 175–189.
- UN. (2021). The role of governance in achieving sustainable development. United Nations Development Report, 2021.
- United Nations. (1987). *Our common future: Report of the World Commission on Environment and Development*. United Nations Publications.
- Worlu, O., & Emeka, D. (2012). Taxation and economic growth in Nigeria. *Journal of Development Economics*, 19(4), 112–130.

Zhang, Q., Li, H., & Zhou, F. (2022). Environmental quality and governance in low-income countries: A case study. *Environmental Policy Journal*, 38(2), 76–91.

APPENDIX

Main Model A

```
. hausman fe re
---- Coefficients ----
| (b) (B) (b-B) sqrt(diag(V_b-V_B))
| fe re Difference S.E.
-----+-----
cidt | -.0221459 -.0191165 -.0030293 .0026248
tiit | -.0006181 -.0033204 .0027023 .0046205
tgs | .0013546 -.0000778 .0014324 .0034742
tipcg | .0441547 .0427897 .0013649 .0029904
tepot | .0425608 .0498001 -.0072393 .0068114
-----+-----

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 3.29
Prob>chi2 = 0.6549
xttest0
Breusch and Pagan Lagrangian multiplier test for random effects
envs[cid,t] = Xb + u[cid] + e[cid,t]
Estimated results:
| Var sd = sqrt(Var)
Pesaran's test of cross sectional independence = 21.089, Pr = 0.0000
Average absolute value of the off-diagonal elements = 0.541
estat hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of envs
chi2(1) = 0.05
Prob > chi2 = 0.8177
. xtserial envs cidt tiit tgs tipcg tepot
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
F(1,33) = 423.897
Prob > F = 0.0000
```

```
. xtpcse envs cidt tiit tgs tipcg tepot i.year
(note: the number of observations per panel, e(n_sigma) = 7.411764705882353,
used to compute the disturbance of covariance matrix e(Sigma)
is less than half of the average number of observations per panel,
e(n_avg) = 18.205882; you may want to consider the pairwise option)
Linear regression, correlated panels corrected standard errors (PCSEs)
Group variable: cid Number of obs = 619
Time variable: year Number of groups = 34
Panels: correlated (unbalanced) Obs per group: min = 7
Autocorrelation: no autocorrelation avg = 18.20588
Sigma computed by casewise selection max = 21
Estimated covariances = 595 R-squared = 0.1609
Estimated autocorrelations = 0 Wald chi2(19) = 102145.09
Estimated coefficients = 26 Prob > chi2 = 0.0000
```

| Panel-corrected

envs | Coef. Std. Err. z P>|z| [95% Conf. Interval]

```
-----+-----
cidt | .1780429 .0219746 8.10 0.000 .1349735 .2211123
tiit | -.1086049 .0103168 -10.53 0.000 -.1288255 -.0883844
tgs | .0124896 .0059385 2.10 0.035 .0008504 .0241287
tipcg | .0449606 .0089795 5.01 0.000 .0273611 .06256
tepot | .2306768 .021067 10.95 0.000 .1893861 .2719674
|
year |
2002 | .150395 .6400815 0.23 0.814 -1.104142 1.404932
2003 | .3678483 .5863068 0.63 0.530 -.781292 1.516989
2004 | 1.007878 .4754615 2.12 0.034 .0759909 1.939766
2005 | 1.465227 .5113938 2.87 0.004 .4629134 2.46754
2006 | 1.787875 .5231674 3.42 0.001 .7624858 2.813264
2007 | 1.728057 .5011299 3.45 0.001 .7458607 2.710254
2008 | 1.921821 .4998126 3.85 0.000 .9422066 2.901436
2009 | 2.253641 .5132934 4.39 0.000 1.247605 3.259678
2010 | 2.739479 .4820266 5.68 0.000 1.794724 3.684234
2011 | 2.874751 .4882907 5.89 0.000 1.917718 3.831783
2012 | 3.179707 .4898584 6.49 0.000 2.219603 4.139812
2013 | 3.21429 .4918551 6.54 0.000 2.250272 4.178309
2014 | 3.467159 .4932565 7.03 0.000 2.500394 4.433924
2015 | 3.842615 .4893436 7.85 0.000 2.883519 4.801711
2016 | 4.13825 .4863573 8.51 0.000 3.185008 5.091493
```

```

2017 | 4.418226 .4821548 9.16 0.000 3.47322 5.363232
2018 | 4.043903 .4822915 8.38 0.000 3.098629 4.989177
2019 | 4.146887 .4826185 8.59 0.000 3.200972 5.092802
2020 | 4.137784 .4825794 8.57 0.000 3.191946 5.083622
2021 | 4.447544 .4835893 9.20 0.000 3.499726 5.395362
|
_cons | 64.03885 .9973698 64.21 0.000 62.08404 65.99366
-----

```

Main Model B

```

. hausman fe re
---- Coefficients ----
| (b) (B) (b-B) sqrt(diag(V_b-V_B))
| fe re Difference S.E.
-----+-----
cidt | -.0086845 -.0076665 -.0010181 .0027323
tiit | -.0154291 -.0175478 .0021187 .0044495
tgs | .0084912 .0055076 .0029836 .0035606
tipcg | .041225 .0400738 .0011511 .0027774
tepot | .0448753 .04844 -.0035647 .0061898
vacp | -.0344361 -.0341137 -.0003224 .0041148
posp | -.0932121 -.087855 -.0053571 .0043042
goep | -.0562937 -.0535606 -.0027331 .0046722
reqp | -.0702066 -.0690977 -.0011089 .0039564
rolp | -.0010431 .0016243 -.0026674 .0051842
goqp | .2492102 .2292824 .0199278 .0230982
-----

```

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg Test: Ho:

difference in coefficients not systematic

$\chi^2(11) = (b-B)'[(V_b-V_B)^{-1}](b-B)$

= 6.99 Prob> χ^2 = 0.7995 xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

$envs[cid,t] = Xb + u[cid] + e[cid,t]$

Estimated results:

| Var sd = sqrt(Var)

-----+-----

envs | 19.77382 4.446776

e | 2.44322 1.56308

```

u | 17.20578 4.147985
Test: Var(u) = 0
chibar2(01) = 3985.18
Prob > chibar2 = 0.0000
xtcsd, pesaran abs
Pesaran's test of cross sectional independence = 15.253, Pr = 0.0000
Average absolute value of the off-diagonal elements = 0.434
estat hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of envs
chi2(1) = 9.10
Prob > chi2 = 0.0026
xtserial envs cidt tiit tgs tipcg tepot vacp posp goep reqp rolp goqp
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
F(1, 33) = 481.291
Prob > F = 0.0000
xtpcse envs cidt tiit tgs tipcg tepot vacp posp goep reqp rolp goqp I year
(note: the number of observations per panel, e(n_sigma) = 7.411764705882353,
used to compute the disturbance of covariance matrix e(Sigma)
is less than half of the average number of observations per panel,
e(n_avg) = 18.176471; you may want to consider the pairwise option)
Linear regression, correlated panels corrected standard errors (PCSEs)
Group variable: cid Number of obs = 618
Time variable: year Number of groups = 34
Panels: correlated (unbalanced) Obs per group: min = 7
Autocorrelation: no autocorrelation avg = 18.17647
Sigma computed by casewise selection max = 21
Estimated covariances = 595 R-squared = 0.2241
Estimated autocorrelations = 0 Wald chi2(25) = 44148.50
Estimated coefficients = 32 Prob > chi2 = 0.0000
-----
| Panel-corrected
envs | Coef. Std. Err. z P>|z| [95% Conf. Interval]
-----+-----
cidt | .1999958 .0275553 7.26 0.000 .1459884 .2540033
tiit | -.1353519 .0174783 -7.74 0.000 -.1696087 -.1010952
tgs | .0190352 .0056619 3.36 0.001 .0079381 .0301324
tipcg | .0394436 .0092491 4.26 0.000 .0213156 .0575716

```

```

tepot | .1877338 .0378529 4.96 0.000 .1135434 .2619241
vacp | -.0043074 .0119924 -0.36 0.719 -.0278122 .0191973
posp | .0528909 .0147537 3.58 0.000 .0239742 .0818076
goep | -.001421 .0094596 -0.15 0.881 -.0199615 .0171194
reqp | -.0060414 .0169576 -0.36 0.722 -.0392778 .0271949
rolp | -.1199201 .0135809 -8.83 0.000 -.1465381 -.093302
goqp | .0610703 .0259181 2.36 0.018 .0102717 .1118689
|
year |
2002 | .1002463 .1734041 0.58 0.563 -.2396196 .4401122
2003 | .1310484 .1645361 0.80 0.426 -.1914364 .4535333
2004 | .5491078 .2742435 2.00 0.045 .0116005 1.086615
2005 | 1.141517 .1655628 6.89 0.000 .81702 1.466014
2006 | 1.699537 .1814281 9.37 0.000 1.343944 2.055129
2007 | 1.544282 .1911163 8.08 0.000 1.169701 1.918863
2008 | 1.738067 .1791715 9.70 0.000 1.386897 2.089237
2009 | 2.136341 .1898287 11.25 0.000 1.764284 2.508399
2010 | 2.603724 .2120352 12.28 0.000 2.188143 3.019305
2011 | 2.697999 .2010214 13.42 0.000 2.304004 3.091993
2012 | 3.049166 .2033484 14.99 0.000 2.65061 3.447721
2013 | 3.183667 .199974 15.92 0.000 2.791726 3.575609
2014 | 3.941126 .2321838 16.97 0.000 3.486054 4.396197
2015 | 3.943827 .2268717 17.38 0.000 3.499167 4.388487
2016 | 4.117969 .2190421 18.80 0.000 3.688655 4.547284
2017 | 4.452871 .2176722 20.46 0.000 4.026242 4.879501
2018 | 4.063704 .2140074 18.99 0.000 3.644257 4.483151
2019 | 4.070573 .2163733 18.81 0.000 3.646489 4.494657
2020 | 4.058997 .2182926 18.59 0.000 3.631152 4.486843
2021 | 4.419272 .2193093 20.15 0.000 3.989434 4.849111
|
_cons | 64.96163 .8626141 75.31 0.000 63.27094 66.65232

```
