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International Journal of Management, Economics and Social Sciences (IJMESS)

Provided in Cooperation with:
International Journal of Management, Economics and Social Sciences (IJMESS)

Suggested Citation: Aberu, Felix (2023) : Testing the efficacy of sustainable development for the quality of governance and environmental degradation in Nigeria, International Journal of Management, Economics and Social Sciences (IJMESS), ISSN 2304-1366, IJMESS International Publishers, Jersey City, NJ, Vol. 12, Iss. 4, pp. 279-298, https://doi.org/10.32327/IJMESS/12.4.2023.11

This Version is available at:
https://hdl.handle.net/10419/280996

International Journal of Management, Economics and Social Sciences
2023, Vol. 12(4), pp. 279 – 298.
ISSN 2304 – 1366
https://www.ijmess.com

DOI:10.32327/IJMESS.12.4.2023.11

Testing the Efficacy of Sustainable Development for the Quality of Governance and Environmental Degradation in Nigeria

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The puzzle of identifying the determinant of sustainable development in Nigeria has become a question for research, hence, there is a need to determine these unclear a priori expectations and their impacts on the sustainable development process in Nigeria. This study used a comprehensive set of data spanning from the 1996 to 2022 extracted the World Bank database to investigate the sustainable development puzzles in Nigeria with a particular focus on establishing an empirical credence through the governance-environmental degradation hypothesis which will inform an insight into the doubtful relations of the subject matter. The ARDL cointegration estimation technique was adopted to analyze the data. The study found that sustainable development was impeded by poor governance and environmental degradation in Nigeria. Furthermore, findings also show that environmental degradation has a crowd-out relationship from the one-period lag to the fourth-period lag values, while one-period lag to three-period lag values of governance have a negative and significant impact on sustainable development at a 5 percent level of significance, respectively. That is, development in Nigeria essentially depends on the impacts of the previous environment and the quality of governance influences. Hence, short-term policy objectives should be fostered in maintaining the conditions for sustainable development through good governance and a more sustained environment.

Keywords: Sustainable development, governance, environmental degradation ARDL, Nigeria

JEL: E01, G30, Q01

Many academics, experts, and authorities continue to be intensely interested in the economic and development discrepancies between growth and sustainable development among nations. The phrase "sustainable development" is gaining significant attention since it emphasizes not just the type of economic growth but one that is sustained through good governance. In recent times, the economic condition and the execution of sustainable development have been impacted by the distribution of political and civil rights, the quality of the legal system, and the efficacy of the government in developing nations (Epaphra and Kombe, 2018).

Furthermore, it has been documented that the greatest obstacle to the development of many developing nations is the absence of good governance (see Gough *et al.*, 2004). Good governance practices are essential

Manuscript received August 17, 2023; revised November 11, 2023; accepted November 27, 2023.
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for formulating and implementing policies, engaging stakeholders, fostering transparency and accountability, and ensuring long-term planning, all of which are crucial for advancing sustainable development goals.

Moreover, sustainable development refers to a mode of development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. It involves finding a balance between economic growth, social well-being, and environmental protection. Hence, sustainable development aims to address current challenges such as poverty, inequality, climate change, resource depletion, and biodiversity loss while ensuring long-term sustainability (Brundtland Report, 1987).

Governance, environmental degradation, and sustainable development are closely intertwined and mutually reinforcing. Governance offers the framework, regulations, and mechanisms required to combat environmental deterioration and support long-term growth. Societies may safeguard the environment, conserve resources, and ensure a sustainable future for future generations by building effective governance structures. Additionally, effective governance is crucial for achieving sustainable development goals such as policy-making and implementation. Good governance is necessary for formulating and implementing policies that promote sustainable development (Thomsen, 2005).

The literature has abundantly referred to many factors as core determinants of sustainable development, such as income, corruption, small businesses' contribution to the economy, and job opportunities (Abdullah, 2012; Adebisi and Gbegi, 2013; Ademola and Michael, 2012; Babandi, 2017; Radelet *et al.*, 2001; Shehu *et al.*, 2013). However, governance and the environmental impacts as potential factors that determine sustainable development in Nigeria have been grossly understudied.

The provisions for a comprehensive framework that would be implemented through a variety of institutions to address social, economic, and environmental challenges all of which would ultimately improve the standard of living for present and future generations while protecting the planet's resources and overall health are not evident from the outset for Nigeria. Nigeria faces a plethora of serious environmental problems, including habitat destruction, water pollution, and deforestation. These problems are essential to sustainable development because they encourage actions that reduce environmental harm and promote conservation,

such as building resilient infrastructure because of the climate change brought on by greenhouse gas emissions, which has disastrous health effects. Such as infant mortality, maternal mortality ratio, morbidity rates, and so forth. Therefore, prioritizing measures to guarantee advancements in environmental sanitation and healthcare that promote greater health and general well-being through dependable governance is imperative. Consequently, this empirical gap in the literature for Nigeria is crucial for long-term developments and the health of the earth overall, which formed the thrust of this study.

The primary objective of the study is to ascertain how environmental degradation and governance affect sustainable development in Nigeria; for this reason, it is crucial to formulate research questions that will direct the investigation. Is the Nigerian process of sustainable development significantly impacted by environmental degradation? Does Nigerian governance have a significant effect on sustainable development? The answers to these issues will give different economic factors such as people, legislators, public, and private investors a critical understanding of the core determinants of the sustainable development process and would also resolve the policy identification problem associated with the subject matter. The remainder of this research is organized as follows: The literature review is covered in Section 2, the methodology is covered in Section 3, results are presented in Section 4, the discussion, conclusion, implications, limitations, and future directions are presented in Section 5, 6, 7, and 8, respectively.

Environmental Degradation, Governance, and Sustainable Development Nexus

Since CO_2 emission has become a major concern for both national economies and global society, the topics of global warming and climate change have gained attention in the economic and environmental literature (Saud *et al.*, 2019). This issue has grown more pressing in recent years as a result of human-made activities involving oil, gas, and other similar products, which are crucial sources of energy in the industrial, transportation, and service sectors connected to economic growth and development (Hunjra *et al.*, 2020). However, this connection is founded on the quality of the legal framework, social cohesion, and resource allocation efficiency which is referred to as the quality of governance.

The empirical credence of the implications of environmental degradation and the quality of governance as determinants of sustainable development in Nigeria has been grossly understudied as the majority of the documented studies are basically on macroeconomic determinants such as Alonso *et al.* (2020); Gough *et al*., (2004); Salahuddin *et al.* (2018). As such, this study fills the empirical and theoretical gaps in the literature by examining the relationship between sustainable development, governance, and environmental degradation in Nigeria. Furthermore, this study is also poised to validate the position of the environmental Kuznets curve (EKC) hypothesis regarding development amidst environmental factors.

Numerous studies have looked at the relationship between foreign direct investment (FDI) and environmental quality, as well as the relationship between financial development, economic growth, and environmental degradation (Saud *et al*., 2019; Hunjra *et al*., 2020; Baloch *et al*., 2021). To the best of the researcher's knowledge, there is a paucity of literature on Nigeria in this regard. That is, how Nigeria's environmental degradation and governance affect the nation's sustainable development.

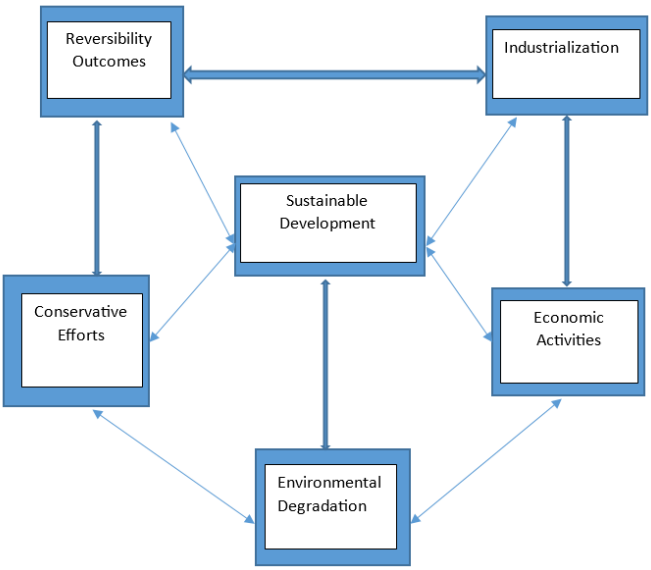
Furthermore, the study's uniqueness is supported by the practical decomposition of governance into political stability, rule of law, and control of corruption effects. Political stability affects sustainable development through policy continuity, which is expected to enhance social cohesion and international cooperation, also, the rule of law affects sustainable development through a dependable legal framework that encourages investment, sustainable development, and the protection of the environment. Corruption affects sustainable development through resource allocation inefficiency and inequality at various levels. Conversely, environmental degradation affects sustainable development through resource depletion (Grossman and Krueger 1995). Consequently, these divides and their policy implications also formed the curiosity of this study.

LITERATURE REVIEW

Theoretical Underpinnings

The environmental Kuznets curve (EKC) hypothesis assumes that economic development, particularly in the

early stages, is accompanied by increased pollution and environmental degradation. This assumption is based on the idea that industrialization and economic activities often involve the extraction and consumption of natural resources, energy use, and the release of pollutants into the environment. Additionally, the reversibility of the environmental degradation hypothesis of EKC assumes that environmental degradation is reversible once a certain level of economic development is reached. It suggests that as countries become wealthier, they can invest in environmental restoration and conservation efforts, leading to a decline in pollution levels as shown in Figure 1. However, the assumption of reversibility overlooks the irreversible loss of biodiversity, ecosystem degradation, and long-term impacts of environmental damage.



Source: Grossman & Krueger (1995)

Figure 1. Dimensions of Sustainable Development

Empirical Review

Relatively little research has been done on sustainable development, governance, and environmental degradation nexus in the literature, much less in Nigeria and the majority of studies on growth and development have focused on the economics of developed nations. Most of these empirical studies served as a basis for the sources of economic growth before Solow's (1957) model. The theoretical foundation for determining the

share of conventional inputs and their total factor productivity in the GDP was provided by Solow's neoclassical growth model (Amin, 2002). Romer (1990) believes that innovative ideas and new products are produced by skilled laborers and are the driving force behind technological advancement which in turn facilitates development. He went on to say that nations with sizable and highly educated labor forces tend to grow steadily because new items are introduced more quickly in these countries. Barro (1996) contended that factors such as increased life expectancy and initial education, reduced fertility, less government spending, improved upholding of the rule of law, decreased inflation, and better terms of trade all contribute to growth and development. Nevertheless, the probable consequence of governance and the impacts of environmental degradation were gapped in the growth and development models reviewed, such as (Barro, 1996; Romer, 1990; Solow, 1957). Hence, this study proposes to test the null hypothesis based on these theoretical propositions relative to sustainable development in Nigeria.

Recent studies have highlighted the importance of governance in the process of development and economic advancement in many nations. Several economists have established a significant relationship between governance and per capita gross domestic product (GDP) all across the world. Countries with high-quality governance will encourage investment not just in people and physical capital, but also in high technology, allowing them to improve social conditions and economic performance. Alonso *et al.* (2020) examined the determinants of institutional quality, using the generalized method of moments (GMM) approach, it was found that tax revenue and income per capita (growth) appeared to be reliable indicators of institutional quality and that building strong institutions is made easier by development, and since the inverse seems to be true as well, a positive feedback loop between development and institutional quality exist. A robust budgetary covenant also supports institutional quality. Redistribution (rather than simple inequality) seems to have a significant role as a determinant of institutional quality in relation to inequality, as it captures the active role that the state plays in this regard. Yang *et al.* (2014) examined the impact of institutional quality on real savings in 189 countries from 1980 to 2010. The variables were the Kauffman average governance index, the

Worldwide Governance Indicators (WGI), the International Country Risk Guide (ICRG) Indicator, a database of political systems, a World Bank institutional database, corruption perceptions index, per capita share of GDP, population density, draining energy, religion, eventual life at birth, and the school enrolment rate. They concluded that institutional quality indicators (each governance and corruption perceptions index, as well as the type of political systems) have a significant and positive influence on the rate of actual savings, whereas constitutional constraints (proportional representation in parliament and pluralism) do not.

Sarkodie and Strezov (2019) examined the impact of FDI inflows, economic development, and energy consumption on carbon emissions from 1982 to 2016, focusing on China, India, Iran, Indonesia, and South Africa as the main carbon emitters in emerging economies. The study discovered that energy use had a considerable positive impact on carbon dioxide emissions. According to their final conclusions, FDI inflows can increase eco-technological transfer, workforce upgrading, and eco-friendly management in emerging economies.

Salahuddin *et al*. (2018) examined the relationships between energy consumption, financial advancement, economic expansion, foreign direct investment, and CO_2 emissions in Kuwait, from 1980 to 2013. The study found that CO_2 emissions rise due to energy use, economic growth, and FDI in both the long-run and short-run using co-integration, autoregressive distributed lag (ARDL), and Granger causality.

Acemoglu *et al*., (2020), Dima *et al*., (2013), and Bhattacharjee (2017) examined the relationship between environmental degradation and sustainable development in Nigeria using the ARDL technique applying on data from 1990 to 2020. They found that environmental degradation has a negative significant effect on sustainable development in Nigeria. Therefore, based on what the literature holds regarding the subject matters, it becomes imperative to investigate the effects of governance and environmental degradation on the sustainable development process in Nigeria which have always been a question for research and issues of discussion. Hence, the following hypotheses are proposed based on the theoretical propositions underpinning this study.

H_{01}: Governance does not have a significant effect on sustainable development in Nigeria.

H_{02}: Environmental degradation does not have a significant effect on sustainable development in Nigeria.

METHODOLOGY

Sample and Procedure

This study examined the impact of governance and environmental degradation on sustainable development in Nigeria based on the poor performances of its growth indexes such as health and education sectors, inadequate infrastructures, and poor capita formation puzzle. Furthermore, the determinants of the sustainable development process in Nigeria still remain *a priori* undetermined regardless of the abundant resources, and institutional and sectorial reforms in Nigeria over time. With a reference to the literature, the ARDL includes data on carbon emission as a proxy for environmental degradation (Hollanders, 2019), political stability, and control of corruption, and the rule of law as a proxy for governance (Akpo and Hassan, 2015; Ali, *et al.*, 2010; Busse and Hefeker, 2007). While the level of literacy is a proxy for sustainable development (Dana *et al.*, 2020). The variables definitions and measurement sources for variables are shown in Table 1 (see Appendix-I).

Data Analysis Technique

This section discusses the study's data descriptions, methodology, sources, and estimation techniques (pre-estimation, estimation, and post-estimation). Data used in this study were estimated using the ARDL and are secondary in nature, which are governance indicators such as political stability, control of corruption, and rule of law, while sustainable development is a proxy for the level of literacy, and environmental degradation is a proxy for Carbon emission per capita (GFCF) spanning 1996 to 2022 (27 years). The data were sourced from World Development Indicators (WDI), Worldwide Governance Indicators (WGI), the International Energy Agency (IEA), and the United Nations Development Programme (UNDP). To avoid false regression results and incorrect inference, the preliminary analysis includes pre-estimation testing. The stationarity or otherwise

of statistical data was determined using the Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979) and the Phillips-Perron unit root test (Breitung and Franses, 1998).

Model Specification

The model was centered on Grossman and Krueger's (1995) hypothesis of the environmental Kuznets curve (EKC), hence, the model is specified in the form of a co-integration autoregressive lag equation such that sustainable development is expressed as a function of governance and environmental degradation. The econometric equation is stated as follows:

$$HDI = B_0 + B_1\ CEPC + B_2\ POLISTA + B_3\ COR + B_4\ RULAW + \varepsilon_t \qquad (1)$$

Where HDI implies the Human Development Index, CEPC implies Carbon Emission Per Capita, POLISTA implies Political Instability, COR implies Control for Corruption, and RULAW implies the Rule of Law. However, the bid to investigate the impacts of governance and environmental degradation on sustainable development in Nigeria within the framework of the ARDL approach is specified as:

$$\Delta HDI_t = B_0 + \sum_{i=1}^{N1} \delta_1\ \Delta HDI_{t-k} + \sum_{j=0}^{N2} \delta_2\ \Delta CEPC_{t-k} + \sum_{j=0}^{N3} \delta_3\ \Delta POLISTA_{t-k} + \sum_{j=0}^{N4} \delta_4\ \Delta COR_{t-k} + \sum_{j=0}^{N5} \delta_5\ \Delta RULAW_{t-k} + U_t \qquad (2)$$

Equation (2) presents the standard ARDL modeling which consists of the parameters of the regressors. Hence, δ_{t-1} is the calculated lagged error correction coefficient. $\delta_{t-1} = HDI_{t-1} - \varnothing CEPC_{t-1} - \varphi POLISTA_{t-1} - \omega COR_{t-1} - \theta RULAW_{t-1}$ is expected to be negative and statistically significant for long-run equilibrium to exist.

RESULTS

The study employs three-pronged econometric methodologies to assess the quality of governance and environmental degradation on sustainable development in Nigeria. To begin, the Augmented-Dickey-Fuller (ADF) and the Phillips-Perron unit root tests were used to determine the level of integration of the variable.

Second, the Auto Regressive Distributed Lag (ARDL) model developed by Pesaran and Shin (2001) was

used; nevertheless, the ARDL model offers the advantage of not having all variables be I(1), and ultimately, the post-estimation technique established the model's resilience. The ADF estimate was conducted to test for the variables' levels of stationary. The ADF test consists of the following processes:

$$\Delta Y_t = \alpha + \beta_t + \delta Y_{T-1} + \sum_{i=1}^{m} \omega i \Delta Y_{t-1} + \in_t \qquad (3)$$

Where α represents the drift, t represents the deterministic trend and m is an optimal lag length, and $\in_t$ is a white noise error term.

Unit Root Test

In the unit root test, the sustainable development variable was stationary at levels I(0) while environmental degradation, political stability, control for corruption, and rule of law were stationary at first difference I(1) in the ADF and PP unit root tests, except for control for corruption which shows I(1) in the PP (see Table 2 - Appendix- II). However, one of the estimations that are best considered as being appropriate for analyzing the combination of the I(1) and I(0) stationarity variable is the co-integration ARDL model.

Furthermore, the bound test implies basically the f-test to test the assumption of no co-integration among the variables against the premise of its existence as expressed thus:

$H0$: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$; that is, there is no co-integration among variables.

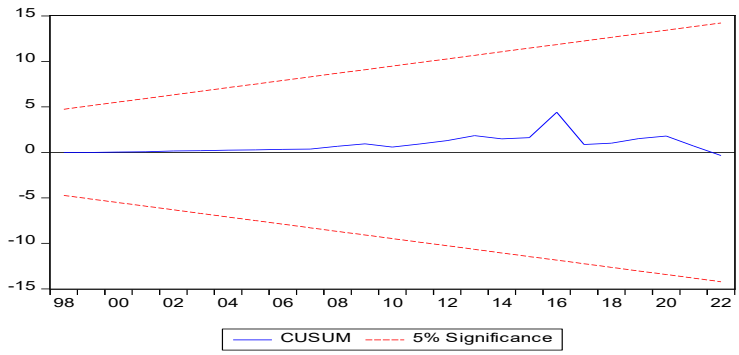
$H1$: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$; That is, co-integration exist among variable. (see Table 3 - Appendix- III).

Estimation Results

The ARDL result shows that the one-period lag and two-period lag values of sustainable development are negative and statistically significant, additionally, from one-period lag to fourth-period lag values of environmental degradation are negative and statistically significant, from lag one-period to the fourth lag periods of control for corruption are negative and statistically significant, furthermore, one-period lag to two-period lag values of political stability is positive, and statistically significant, while in the rule of law, the two-

period lag to the fourth-period lags is also negative and statistically significant at 5% level, respectively (see Table 4 - Appendix-IV). Furthermore, the findings of this study show a rejection decision for both hypotheses one and two as both target variables (sustainable development and environmental degradation) were found significant in their respective lags.

Figure 2 demonstrates that the cumulative sum (CUSUM) line falls within the bounds of a 5% level of significance indicating structural stability for the model.



Source: Author's presentation

Figure 2. CUSUM Stability Test

DISCUSSION

This study determined the effect of environmental degradation and governance on sustainable development in Nigeria by using the co-integration Autoregressive Distributed Lag (ARDL) technique. Table 4 confirmed a negative and significant relationship in the one and two lag periods of sustainable development. This implies that the past sustainable development process best explained the present nature of sustainable development in Nigeria, this further explains that every governmental effort put in place to enhance sustainable development in the past has had little or no positive effects on sustainable development in Nigeria.

Also, political stability's first and second lag periods were positive and statistically significant at 5% (Table 4). This implies that a unit increase in political stability would inform an 18-unit increase in sustainable development in Nigeria. Furthermore, the first to the fourth lag periods of control of corruption and rule of law

were negative and statistically significant at a 5% level, consequently, the rule of law and control of corruption has a crowd-out effect on sustainable development in Nigeria. If corruption and undependable rule of law increase by one unit, sustainable development will decrease by 0.001, 0.29, 0.322, 0.185 for one to the fourth lag periods and 0.160, 0.292, 0.291, 0.238, 0.308 for the same lag lengths, respectively.

Table 4 also shows that as environmental degradation increases randomly, sustainable development reduces over time. This is in tandem with Grossman and Krueger's (1995) EKC hypothesis, the reversibility of the environmental degradation hypothesis of EKC assumes that environmental degradation is reversible once a certain level of economic development is reached. It suggests that as countries' development stages begin, they should invest in environmental restoration and conservation efforts, which will inform a reduction in environmental threats. However, the findings of the study statistically confirmed that sustainable development is occasioned in Nigeria as a result of governance influences and environmental degradation which establishes an extension of the theoretical framework of this study and other theoretical propositions on growth and sustainable development hypotheses, such as Barro (1996), Romer (1990), and Solow (1957); but validated the EKC hypothesis of Grossman and Krueger (1995), though, the EKC hypothesis is gapped as confirmed by the result in overlooking the influence of governance as a channel through which its reversibility assumption could be applied.

According to the findings, governance had a crowd-out effect on the sustainable development process in Nigeria, governance negatively influenced sustainable development, and as poor governance increases in Nigeria, sustainable development decreases. Therefore, hypothesis H_{01}, which states that governance does not have a significant effect on sustainable development is rejected at a 5% level of significance.

On the other hand, environmental degradation also had crowd-out effects on sustainable development in Nigeria, hence the H_{02} hypothesis which stipulates that environmental degradation does not have significant effects on sustainable development in Nigeria was also rejected at a 5% level of significance, confirming that, a continual increase in the levels of depletion of the environment would not guarantee a sustainable

development for Nigeria.

Consequently, our hypotheses were verified, indicating that Nigeria's delayed progress toward sustainable development was partly responsible for issues with governance and environmental deterioration. This result is in tandem with the findings of (Acemoglu *et al.*, 2020; Bhattacharjee, 2017; Dima *et al.*, 2013).

CONCLUSION

The quest for sustainable development has been the objective of developing countries, Nigeria inclusive, with less or no efforts to look beyond macroeconomic variables as factors capable of mitigating sustainable development. More so, scholars have primarily concentrated on the relationship bet ween sustainable development and macroeconomic variables as their focus (see Alonso *et al.,* 2020; Gough *et al.*, 2004; Salahuddin, and Gow, 2018). While the impacts of environment and governance as potential factors have been grossly understudied. Hence, this study investigates the impacts of governance and environmental degradation on sustainable development in Nigeria in order to provide an empirical credence to the various contending issues relating to sustainable development; such as policy identification puzzles stemming from the theoretical propositions. The autoregressive distributed lag (ARDL) technique was adopted to estimate using the dataset from 1996 to 2022.

The results show thought-provoking outcomes; that is, up to the fourth lag length, the results show a consistency of no positive improvement of the investigated variables on sustainable development in Nigeria during the study periods, which implies that through the study periods, governance and environmental degradation has been a threat to sustainable development in Nigeria.

IMPLICATIONS

The study established that environmental degradation and governance influence sustainable development processes in Nigeria. As a result, it is imperative to consider output-oriented recommendations to improve their effects on sustainable development in Nigeria.

Furthermore, the study provides significant theoretical implications for the government of Nigeria which established that sustainable development is supported by good governance and a secure environment through the reversibility hypothesis of EKC with reservations for environmental conservation through governance, hence, the Nigerian government should expedite action to ensure that all factors responsible for environmental degradation and poor governance such as emissions, pollution, and other forms of negative externalities, corruption, political instability, and poor rule of law must be decisively addressed.

Additionally, the theoretical and practical implications of the EKC hypothesis also argued that when a nation begins to experience a development process, environmental degradation would also increase, however, indicators of environmental degradation are expected to reduce as a result of government investment in conserving the environment which is jettisoned in the Nigerian context.

LIMITATIONS AND FUTURE DIRECTIONS

The limitations of this study were the inability to examine all the components of governance, such as government effectiveness, ease of doing business, and government regulations. Though, the study basically focused on current issues highlighting demand in Nigeria, such as political instability, corruption, and rule of law as useful components of governance, furthermore, the issues of multicollinearity had also informed the exclusion of some components of governance such as government effectiveness, and government regulations. More so, the scope of the study is limited to Nigeria from 1996 to 2022 which constrained the generalization of findings to all African nations and the rest of the world.

Considering these limitations, future research can explore the influence of environmental degradation and governance on sustainable development in Africa, this could provide a general understanding of the policy identification puzzle plaguing Africa. More so, future research can be designed to include more of the components of governance, such as government regulation, and government effectiveness. This may enhance continental policy redefines considering countries' specifics.

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Appendix-I

Variable	Descriptions	Source(s)	
Political (POV)	The political dimension of institutional quality represents the foundation for the efficient functioning of any state	WGI	Busse & Hefeker (2007)
Rule of law (RUL)	The extent to which agents have confidence in and abide by the rules of the society	WGI	Akpo & Hassan (2015)
Control of corruption (COC)	The extent to which public power is exercised for private gain, including both petty and grand forms of corruption	WGI	Ali *et al,* (2010)
Carbon emission per capita (GFCF)	This represents carbon emission per capita	(IEA)	Hollanders (2019).
Sustainable development	This is the composition of the Human Development Index which is a statistical composite of life expectancy, education, and per capita income	(UNDP)	Dana *et al.* (2020)

Source: Author's presentation

Table 1. Variables Description and Sources

Appendix-II

ADF test	Critical Value	Order	Philip Perron test (PP)	
Variables	at 5%		Critical Value at 5%	Order
HDI	-2.986225	I (0)	-2.6066	I (0)
CEPC	-2.960411	I(1)	-2.5051	I(1)
POLISTA	-2.963972	I(1)	-3.6350	I(1)
COR	-2.981038	I(1)	-2.6912	I(0)
RULAW	-2.963972	I(1)	-3.74540	I(1)

Source: Author's computation

Table 2. Unit Root Test

Appendix-III

***f*-Bounds Test**				
Test Statistic	Value	Sig.	I(0)	I(1)
f-statistic	1.666065	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Author's computation

Table 3. Bound Test Result

Appendix-IV

Variable	Coefficient	Std. Error	*t*-Statistic	Prob.*
D(HDI(-1))	-1.050348	0.214924	-4.887060	0.0081
D(HDI(-2))	-1.000249	0.253937	-3.938968	0.0170
D(HDI(-3))	-0.555647	0.243967	-2.277546	0.0850
D(HDI(-4))	-0.132924	0.190373	-0.698232	0.5235
D(CEPC)	-1.099997	0.319206	-3.446040	0.0261
D(CEPC(-1))	-1.050975	0.384526	-2.733166	0.0523
D(CEPC(-2))	-1.930565	0.346164	-5.577029	0.0051
D(CEPC(-3))	-1.665278	0.418549	-3.978690	0.0164
D(CEPC(-4))	-0.821969	0.227283	-3.616496	0.0224
D(POLISTA)	0.181025	0.058142	3.113515	0.0358
D(POLISTA(-1))	0.191272	0.062513	3.059693	0.0377
D(POLISTA(-2))	0.157894	0.043054	3.667389	0.0214
D(POLISTA(-3))	0.084654	0.047007	1.800862	0.1461
D(COR)	-0.160257	0.053093	-3.018422	0.0392
D(COR(-1))	-0.292921	0.068627	-4.268278	0.0130
D(COR(-2))	-0.291421	0.088087	-3.308349	0.0297
D(COR(-3))	-0.238254	0.078754	-3.025290	0.0390
D(COR(-4))	-0.308490	0.089049	-3.464269	0.0257
D(RULAW)	0.174785	0.084540	2.067486	0.1075
D(RULAW(-1))	-0.001003	0.070529	-0.014222	0.9893
D(RULAW(-2))	-0.291588	0.075340	-3.870292	0.0180
D(RULAW(-3))	-0.322035	0.076200	-4.226213	0.0134
D(RULAW(-4))	-0.185255	0.044039	-4.206666	0.0136
C	-0.040127	0.009681	-4.144926	0.0143
R-squared	0.924368	Mean dependent var		0.000929
Adjusted R-squared	0.489481	S.D. dependent var		0.029081
S.E. of regression	0.020778	Akaike info criterion		-5.141423
Sum squared resid	0.001727	Schwarz criterion		-3.999533
Log-likelihood	95.97992	Hannan-Quinn criterion		-4.792336
f-statistic	2.125538	Durbin-Watson stat		2.187412
Prob(*f*-statistic)	0.243162			

Source: Author's computation

Table 4. ARDL Results