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Environmental Degradation and Economic Growth: An Empirical Perspective From Nigeria

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ABSTRACT
This study investigated the association between environmental degradation and the economic growth in Nigeria using sample from 2011 to 2020. Three objectives were established to evaluate the effect of foreign direct investment, per capita GDP and population density on the carbon dioxide emission. Ex post factor research design was adopted and time series data was generated from the World Development Indicators. Augmented Dickey Fuller (ADF) test was used to test the stationarity of the data, and when they were proved to be stationary, Johansen Co-integration test was used to test the long run relationships between the response and exogenous variables. The result shows that per capita GDP and population density have significant effect on environmental degradation but foreign direct investment shows no significant effect on the environmental depletion as was measured by carbon dioxide.
Keywords: Environmental Degradation, Pollution, Sustainability

1.0 INTRODUCTION

The rate at which developments are spring up in most economies of the world cannot be without leaving some impact on the environmental sustainability. All the human activities that are targeted towards developments have traces of devastating consequences on the environment as well as being harmful to human beings, animals and plants, and on the long run, have its effect on the generations to come (Kjellstrom & Mercado, 2008; Acho, 1998). In order words, various government policies across the globe had introduced liberalization, privatization and globalization, while the aggressive competition that accompanies the policies had led to greater developments in a very fast rate. However, these improvements in developments had mounted much pressure on the environment where raw materials for various productions are sourced for example; water, forest land and air. Because of the competitiveness in production that triggered high development rate, little or no time is devoted to thinking of the protection of these environmental materials, as they are treated as public goods (Khed, 2016). Hence these environmental factors are likely to suffer sustainability problems. Economic sustainability implies meeting the needs of the present generation without compromising the needs of the future (Brunt land commission, 1987).

Meanwhile, every nation is targeting to increase its economic growth and development through the measure of Gross Domestic Product (GDP). In order way, GDP is the sum total of all economic production of goods and services on the bases of transaction in the domestic market in a period of one year. But the cost of environmental resource depletion is ignored any time GDP is computed. The competition by countries to generate GDP higher than other nations and individuals being in production to out-compete other individuals creates a scenario of ignoring the consequences on the environment and its resources (Khed, 2016). Not minding that the escalation in production of those goods still contribute as a primary factor in increasing atmospheric carbon dioxide emissions that trigger global warming (Harrington & McConnel, 2003). In which carbon dioxide emission also tends to increase along with the increase of industrial value added. However, it is unfortunate that people do not think of what to give back to the environment in return to what the environment gives, what

becomes the installed capacity of the environmental resources, and what becomes of the future if the depletion, degradation of environmental resources leads to exhaustion of such resources, and if this becomes the case, can production and economic growth be continued sustainably. Accordingly, the growth should be limited anyway, but sustainable growth can be achieved by using attainable economic scale of the limited resources.

Pertinently, the trend in environmental degradation acceleration over the centuries has shown its components as green house emissions, loss of biodiversity and deforestation. Moreover, Nick and Richard (1999) reported that these environmental destructions have been increased by economic activities, in which Foreign Direct Investment (FDI) is a great influencing factor; hence it becomes imperative to understand the private investment impact on environmental resources, in order to identify and respond appropriately. To buttress its significance, any world economy must be supported by substantial foreign direct investment and robust capita market.

Prior studies had revealed the relationships between environmental degradation and economic growth as such, Hung and Shaw (2006) provide that simultaneity relationship exists between economic development and environmental quality. Stem (2004) found that through Environmental Kuznets Curve (EKC), environmental degradation and pollution would increase in the early stage of economic activities, but economic growth will tend to lead to improvement in environmental resources at some later period. And on Kuznets hypothesis through Environmental Kuznets Curve (EKC), they found that GDP per capita would affect environmental degradation. Be that as it may, environmental quality could impact positively on GDP per capita. Based on this, this present study intends to investigate the effect of environmental degradation on the economic growth of Nigeria. Where the specific objects include examining the effect of;

1. Foreign direct investment on Nigeria economic growth;
2. Per capita income on economic growth in Nigeria, and
3. Population density on economic growth in Nigeria.

The study however establishes the following hypotheses in line with the objectives;

Ho_1- Foreign direct investments have no significant effect on economic growth in Nigeria.

Ho_2- Per capita income does not have any significant effect on the economic growth in Nigeria.

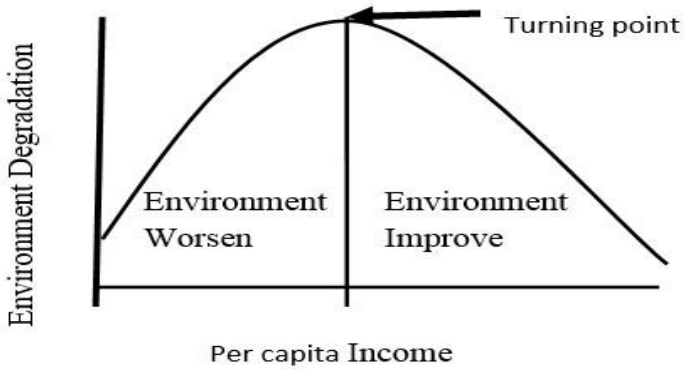
Ho_3-Population density does not have significant effect on economic growth in Nigeria.

The study result will be beneficial to the government as it will be a guide for establishment and moderation of environmental policies. And the industry as well as individuals will see their productive depletive impact on the environment and think of ways to make the resources sustainable, also think of how to give back to the environment. The study is structured in a way that section two reviewed related literature on the title, following is the methodology, section four discusses data analysis and interpretation, while the last section contains the conclusion.

2.0 REVIEW OF RELATED LITERATURE

Theoretical Framework

The Environmental Kuznets Curve (EKC) hypothesis that was propounded by Nobel laureate Simon Kuznets in 1955, where he gave a famous hypothesis an inverse 'U' shaped income- inequality relationship named as Kuznets Curve. The hypothesis proposes that as production and income grows, so does pollution increases but would decline later on the ground that growth continues to increase for a longer period. The reality of this statement represents a powerful and attractive policy message, suggesting that the pursuit of economic growth and cleaner environment can be attained simultaneously in the same time frame. That is, growth will eventually lead to greening over time after establishing a reasonable turning point- the income level beyond which growth causes pollution to decline (Deacon and Norman 2004). Akbostanci, Turut-Asik and Tunc (2009) describes "Environmental Kuznets Curve as an inverted U-shaped relationship between environmental degradation and income, is a hypothesized relationship between various indicators of environmental degradation and income per capita". The early stages of economic growth usually witness pollution increases but as income exceeds a certain threshold which varies for different indicators, the trend reverses; so that at high income levels, economic growth leads to environmental improvement (Stern, 2004; Azomahou & Van Phu, 2006; Yi et al., 2008; Panayotou, 2000). (from: Alege & Ogundipe, 2013).



Environmental Kuznets Curve (EKC)

Empirical Review

Ominyi and Abu (2017) rejected the concept of Environmental Kuznets Curve (EKC) s it shows that the environment improves at low income levels while it gets worse at high income levels. This result emanated at the investigation of sustainable economic development and environmental degradation using Nigeria economy from 1986 to 2015 fiscal years and by applying Vector Autoregression (VAR) technique.

Omotor (2016) set to determine the relationship that existed between economic progress and emissions, through the hypothesis of Environmental Kuznets Curve (EKC). The study found out that there is an existence of Environmental Kuznets Curve (EKC) between Carbon Dioxide (Co_2) and Sulfur Dioxide (So_2) after applying ordinary least square (OLS) panel data regression analysis.

Similar study by Ogboru and Angu (2015) examined the association between environmental degradation and economic growth using a theoretical perspective. Their result shows that many cases of illness such as tuberculosis, cancer, viral infections are consequences of polluted environment.

Fidel (2015) x-rayed the environmental quality and economic development in low income countries by employing the Environmental Quality Trajectory (EQT) model. He got a result that provides a support to the Ruttan-Kuznets proposition about the relationship between income and environmental quality.

Another study by Karsalari (2014) investigated the association among economic progress, international trade and environmental quality that span from 1970 to 2011. The study applied ordinary least square (OLS) panel regression analysis and found that Carbon Dioxide emission has long term effect on the per capita income and international trade.

Allege and Ogundipe (2013) further took up environmental quality and economic growth to assess the relationship between the two variables. The study covered 1970 to 2011 fiscal years while fractional cointegration technique was used. The findings indicate that environmental degradations are increased by weak institutions and unrestricted trade openness.

The study by Awan (2013) found that developed and developing nations all responsible and instrumental to environmental hazards. This finding was made on the examination of the effect of environmental degradation on economic development.

More results disclosed that slight improvement in economic growth was triggered by some trend of environmental degradation. This finding was reported by Adeleye (2012) when he investigated the effect of economic growth on the environmental quality taking sample from 1998 to 2013 fiscal years. The data was analysed using panel least square regression analysis.

Drabo (2011) investigated of the relationship amongst health, environmental quality and economic growth applying the Environmental Kuznets Curve (EKC) hypothesis and found that environmental degradation has negative relationship with economic growth.

Omojolabi (2010) earlier investigated the effect of environmental quality on economic growth in West African countries which spanned from 1970 to 2006 fiscal years. He employed the use of panel data regression analysis, and the pooled least squares result proved that there is existence of the Environmental Kuznets Curve (EKC), though the Fixed Effect (FE) result was at variance with the Environmental Kuznets Curve (EKC) in West African states.

3.0 METHODOLOGY

The study adopted *ex-post facto* research design which allowed it to collect time series data without any intention to manipulate them. The data were got from World Development Indicators for the period 2011 to 2020.

The model is:

$CO_2 = f(Y, Y^2, FDI, PD)$ where, Y is per capita GDP, FDI is foreign direct investment, PD is population density

The econometric model is:

$\log CO_{2t} = \alpha_0 + \alpha_1 \text{IogGDP}_t + \alpha_2 (\text{IogGDP}_t)^2 + \alpha_3 \log FDI_t + \alpha_4 \log PD_t + e_t$

where, CO_{2t} is Carbon dioxide in year t; Y_t is Gross Domestic Product per capita in year t; FDI_t is foreign direct investment in year t and PD_t is population density in year t.

We included GDP per caoita income in this study because it was included in the works of Oriavwote and oyovwi (2019); and khed (2016).

In this equation, whenever the coefficient of the logY is positive and that of Y2 is negative; it indicates the existence of the EKC hypothesis. The analysis starts by testing the stationarity of the available data using conventional time series unit root test by using Augmented Dickey Fuller (ADF) test. Then, co-integration test will be used once the stationarity of all data is detected. The Johansen co-integration test has been used in order to see if there exists a long run relationship between the variables.

4.0 Data interpretation

The result of the ADF unit root test is shown in the table below:

Table1: Summary of ADF Unit root test

Variables	Level data	First difference	Order of integration
GDP	-3.81	-6.24	I(0)
GDP^2	-4.42	-1.91	I(0)
FDI	-2.02	-6.48	I(1)
PD	-1.02	-4.11	I(1)
CE	-1.21	-4.34	I(1)

NB: 1% critical value is -3.86

The result indicates that per capita income and the square of per capita income were stationary at the level but the other variables were not stationary and became stationary only after the first difference was taken for ADF Unit root test. These result confirmed that the model meet the requirement to proceed with panel Co-integration test. Once all series are confirmed to be categorizing as stationary, the Johansen Co-integration test is used to test whether the dependent variable and all the independent variables in all the equations exhibit fundamental long-run relationship among each other.

The result of the Johansen co-integration test is shown below:

Table of Long-run Elasticity

VARIABLES	INDICES
Constant	-1.06***
GDP	-0.77**
GDP^2	1.65***
FDI	1.32
PD	1.63***
Adjusted R^2	0.78
F-Value	84.95
DW Statistic	1.62

Note: *** and ** denote significant at the 1%, and 5% significance levels, respectively.

From the adjusted R^2, F-statistic and Durbin-Watson statistic test, the result presents that the model shows goodness of fit, that model is valid and that there is no auto correlation respectively.

And most of the coefficients show expected signs and high significance values. As for the pollutant CO_2 the anticipated Environmental Kuznets Curve (EKC) is not found to exist. The coefficient of logGDP is -0.77 and $\log GDP^2$ is 1.65. This fallows 'U' shape instated of inverted 'U' shape curve for our sample. The result shows that increase in economic growth will lead to decreases in Carbon

Dioxide. Nigeria experienced a slight economic growth in years under review, and that growth can lead to improvement in living conditions of Nigerians if it can be handled without excessive adverse effect on environmental quality. Persistent growth in raw material consumption and resource usage will lead to serious long term harm to the environment. The growth came with cost to the environment. The deterioration of environment begins to have direct impact on the quality of human life, or even a threat to the survival of mankind. Therefore, environmental regulation needs to be stringent and strengthened in order to have the harmonized development.

The coefficient of FDI on pollution is positive. This shows that the more Foreign Direct investment (FDI) the society has the higher pollution. The coefficient of regression of 1.32 shows that the increase in FDI will increase Carbon Dioxide emission. And the probability value shows that FDI is not significant at determine the volume of CO_2. The message that this result transmits is that increase in economic activities of individuals and corporate bodies that promote FDI will trigger that off rise in pollution though it is not a determinant factor for the emission.

The empirical result also shows that Population Density is significant determinant of the Carbon Dioxide emission. Likewise, a 1% increase in Population Density will lead to a rise in CO_2 by 1.63% if other variables are held constant. The result of the study shows that sustained growth in Population Density is a major cause of environmental degradation in Nigeria. The assertion holds because human activities have contributed to the release of pollutants into the atmosphere which are a threat to health and the natural ecosystem, and also add to the greenhouse effect (Kennedy, 1999). We should have perfect the Population growth policy and environmental protection laws.

5.0 CONCLUSION

The study sought for to establish the relationship that exists between environmental degradation and economic growth in Nigeria to bridge the gap in knowledge within emerging market in Africa especially Nigeria where dearth of research on the subject matter lies. Data were sampled for ten years spanning from 2011 to 2020whic was sorted out from World Development Indicators. Such proxies as per capita GDP. Population Density and Foreign Direct Investment were used for economic growth while Carbon Dioxide emission was a measure for environmental degradation. Time series data collected was tested with Augmented Dickey Fuller for the stationarity of the data, while Co-integration test was applied to ascertain the long term relationships amongst the variables. The result concludes that policy formulation should follow consumption of natural or environmental resources so as to have reservation for the need of the same environmental resources for the future.

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