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GREEN GROWTH AND ENVIRONMENTAL SUSTAINABILITY IN NIGERIA: AUTO-REGRESSIVE DISTRIBUTIVE LAG APPRAOCH

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Abstract

This study examines the interaction of green growth and environmental sustainability in Nigeria, solar-energy, hydroelectric power, bio-fuel and natural gas were used as proxy for green growth while carbon dioxide emission captured environmental sustainability. The study covers the period, 1990 to 2021. Data was obtained from World Banks World Development Indicators (WDI), and International Energy Agency (IEA) 2021. Philip perron Unit Root approach was used to test stationarity of the time series data. Results from the Unit Root indicated mixed order of integration. This means that some of the variables were stationary at levels I(0), while others became stationary after first difference I(1). As a result, the study utilized the Auto-regressive distributive lag (ARDL), which indicated existence of long-run correlation between green growth and environmental sustainability in Nigeria. Further findings showed that solar energy and hydroelectric power had a negative correlation with carbon dioxide emission in the short run. Bio-fuel showed negative but unsubstantial correlation with carbon dioxide in the long-run likewise current year period of shortrun, finally, natural gas is positively related to carbon dioxide in the long-run. Hence, it was concluded that green growth has a substantial influence on environmental sustainability in Nigeria. It is recommended amongst others that federal government through

the ministry of environment should mandate the electricity regulatory commission to increase the coverage of hydroelectric power as leading energy source. **Keywords:** Green Growth, Environmental Sustainability, Solar Energy, Hydroelectric Power.

1. Introduction

In an effort to reconcile environmental sustainability with economic development, Nigeria, the most populous nation and largest economy in Africa, encounters substantial obstacles. The country's natural resources and ecosystems have been subjected to an immeasurable amount of pressure due to rapid industrialisation, urbanisation, and population growth, which has exacerbated environmental degradation and poses a threat to long-term sustainability. Consequently, environmental sustainability is a critical issue in the contemporary global discourse, particularly in the context of developing nations such as Nigeria. Consequently, environmental sustainability is the responsible utilisation and management of natural resources to guarantee their availability for future generations, while simultaneously reducing environmental degradation and damage to ecosystems. It entails the fulfilment of current requirements without compromising the capacity of future generations to satisfy their own needs. Kahn (1995) defines environmental sustainability as the utilisation of resources at a rate that exceeds their replenishment, likewise the transition to low carbon emissions in spite of the growing population.

A wide variety of interconnected issues, such as energy efficiency, water management, pollution reduction, sustainable agriculture, biodiversity conservation, and climate change mitigation, are included in the concept of environmental sustainability. To achieve environmental sustainability, it is necessary to take coordinated action at the local, national, and global levels. This involves the collaboration of governments, businesses, communities, and individuals to safeguard and preserve the planet for the present and future generations. Consequently, it is crucial to acknowledge that environmental sustainability is in the face of a multitude of urgent challenges, such as resource depletion, pollution, biodiversity loss, and climate change. On a global scale, these issues present substantial hazards to human well-being, ecosystems, and socioeconomic development. Green development is a comprehensive strategy that arises in response to these challenges by incorporating environmental considerations into economic policies and practices.

Green growth involves a paradigm transition towards economic activities that are socially inclusive, low-carbon, and resource-efficient. This transition has the potential to not only mitigate environmental degradation but also encourage sustainable development in a variety of sectors within the Nigerian context. Consequently, green growth is a development strategy that emphasises economic resilience. and sustainability, while simultaneously minimising progress. environmental degradation. It entails the implementation of policies, practices, and technologies that optimise resource utilisation, reduce greenhouse gas emissions, and increase resilience to environmental hazards. The objective of green growth is to create a transition to a more sustainable and resilient economy that is capable of meeting the requirements of the present without compromising the ability of future generations to meet their own needs by decoupling economic development from environmental impact. Green growth is a policy framework that integrates the economy and the environment. Its objective is to enhance economic growth by increasing income and investment, thereby reducing poverty by providing green

and clean jobs and improving the well-being of its citizens. Additionally, it aims to establish a management policy that checks and controls environmental activities. Green growth is the sole critical strategy that can propel developing countries towards sustainable development by reducing poverty and raising public awareness of environmental concerns, in congruent with Fay (2012).

Green growth initiatives have the potential to transform Nigeria's economic landscape while preserving its ecological integrity by utilising renewable energy sources, optimising natural resource management, and implementing eco-friendly technologies. Moreover, green growth emphasises the implementation of pollution prevention and control measures to mitigate the detrimental effects of industrial activities, urbanisation, and agriculture on the quality of air, water, and soil. In an effort to guarantee a healthier and clearer environment for both current and future generations, it is necessary to invest in clean technologies, strengthen environmental regulations, and promote pollution monitoring and enforcement mechanisms. Furthermore, within the context of biodiversity conservation, green growth underscores the significance of sustainable land use planning, ecosystem restoration, and habitat preservation in an effort to protect the services and biodiversity of ecosystems. Green growth aims to safeguard and revitalise ecosystems, likewise to foster sustainable livelihoods and resilient communities, by advocating for biodiversity-friendly agricultural practices, combating deforestation, and confronting invasive species.

In summary, green growth provides a comprehensive and integrated strategy for addressing the intricate challenges of environmental sustainability by fostering economic development that is economically viable, socially inclusive, and environmentally sustainable. Societies can establish a path towards a more sustainable and prosperous future by adopting green growth principles and practices, which will establish a harmonious correlation between economic progress and environmental stewardship. Against this backdrop, this paper aims to address the following enquiries: To what extent has hydroelectric power contributed to environmental sustainability? When it comes to environmental sustainability, does natural gas have any effect? Determine the influence of biofuels on environmental sustainability. Also, determine whether solar energy promotes environmental sustainability. In an effort to achieve this objective, this paper empirically examines the influence of green growth on environmental sustainability in Nigeria.

2. Literature Review

This section explores the written work of many writers on the theories, concepts, and empirical studies.

Neoclassical Economic Theory

In 1933, the neoclassical economic theory was proposed by Jevons. In congruent with this theory, businesses will see a decline in their ability to spend in R&D and an increase in their production costs as a result of environmental restrictions. This, in turn, would have an impact on the performance and capacity of these businesses. In congruent with Bai et al. (2013), R&D innovation activities using a dual-link approach benefit greatly from environmental restrictions. A study conducted by Li et al. (2017) revealed some connections between environmental restrictions, the performance of the circular economy, and other relevant elements. Wang et al. (2016) and Yuan et al. (2015) both verified that environmental rules do in fact affect industry structure. In contrast to the latter's belief that the connection is linearly growing, the former considers it to be nonlinear. In congruent with research by Zhu et al. (2017), there is a 'U'shaped link between the severity of

environmental legislation and the green transformation of industries. In an effort to encourage cleaner industrial activity among foreign investors, environmental restrictions may serve as guidance. While Li et al. (2020) found that environmental regulations positively impacted the GIE which is a green development method Wang et al. (2021) found the opposite to be true that environmental laws negatively impacted agricultural technology innovation.

Classical Growth Theory

Solow first proposed the classical growth theory in 1956. Technology, human capital (A), physical capital (K), and labour (L) are the four inputs that, in congruent with the theory, combine to produce output Y. A common way to express the equation is as follows: Y = f(A, K, L). Increases in production factors K and L, likewise productivity A, are the reasons for rising output. Factors that lead to an increase in labour force participation, population growth, and improvements in education and health are what cause labour force L to rise. The growth of K is due to investment, and most growth models assume that some of the production goes into increasing K's capital stock. Increasing social capital (e.g., stronger institutions and social cohesiveness) and technological progress (e.g., changes to organisational structures and processes) are the main drivers of A's growth. Some models of growth theory (such as Solow's 1956 model) treat labour and total productivity growth as external variables. The amount of production, investments in education, R&D, and learning by doing determine endogenous productivity growth in other models (Mankiw et al., 1992). Economic policies have the power to influence the accumulation of social, human, and physical capital in an effort to maximise production or GDP growth. Although environmental factors may be included via the utility function due to their amenity value, they do not contribute to the success of this method. There is a robust body of work in environmental economics that expands on the idea that natural resource stocks and environmental quality have direct effects on economic productivity, which has been around at least since Malthus (Malthus, 1965).

Concept of Green Growth

Economic activities that are low-carbon, resource-efficient, and socially inclusive are at the heart of green growth, which calls for a paradigm shift. This change might promote sustainable growth in many different areas of Nigerian society while also reducing environmental deterioration. Therefore, green growth is an approach to development that prioritises reducing environmental degradation while concurrently fostering economic advancement, resilience, and sustainability. It comprises making use of rules, procedures, and technology that make the most efficient use of resources, lessen the production of greenhouse gases, and make people more resistant to environmental dangers. By separating economic development from environmental effect, green growth aims to build a more resilient and sustainable economy that can fulfil current demands without jeopardising future generations' capacity to do the same. To put it simply, green growth is an economic and environmental policy framework. The plan's end goal is to raise living standards for all residents by boosting investment and revenue, which in turn will lessen poverty via the creation of environmentally friendly employment. In addition, it seeks to set up a policy for management that regulates and oversees actions that impact the environment. In congruent with Fay (2012), poor nations can only achieve sustainable development via green growth, which aims to decrease poverty and increase public awareness of environmental issues.

For the Organisation for Economic Co-operation and Development (2011), "green growth" means fostering economic development and growth while ensuring that natural assets maintain the supply of resources and environmental services that are vital to our welfare. To adapt to and lessen the impact of climate change, green development is crucial because it encourages the use of renewable energy, makes energy use more efficient, and funds infrastructure that can withstand extreme weather. By lowering emissions of greenhouse gases and making communities and economies more resistant to climate change, these actions ensure a better, safer future for everyone. By encouraging economically viable, socially inclusive, and ecologically sustainable economic development, green growth really offers a thorough and integrated approach to handling the complex issues of environmental sustainability. Adopting green growth concepts and practices may help societies create a better future, one in which economic prosperity and environmental cares are not at odds with each other.

Environmental Sustainability

To be environmentally sustainable is to use and manage natural resources in a way that ensures they will be available for future generations while minimising harm to ecosystems and other forms of environmental deterioration. It comprises meeting present demands without jeopardising future generations' ability to do the same. The shift to low carbon emissions despite the expanding population and the prevention of resource depletion at a pace exceeding their replenishment are the processes that make up environmental sustainability, in congruent with Kahn (1995). The term "environmental sustainability" encompasses a broad range of interrelated topics, including but not limited to: water management, energy efficiency, sustainable agriculture, protection of biodiversity, and mitigation of climate change. Achieving environmental sustainability requires concerted effort on all scales, from the neighbourhood to the country to the world. Protecting Earth for current and future generations requires concerted effort by governments, corporations, communities, and people. Resource depletion, pollution, biodiversity loss, and climate change are just a few of the pressing issues that threaten environmental sustainability. Concerning human health, ecology, and economic growth, these problems pose serious threats on a worldwide basis. In light of these difficulties, the concept of "green development" has emerged as an allencompassing approach to economic policy and practice that takes environmental factors into account.

3. Empirical Review

In their 2023 study, Agan and Balcilar investigate how important it is to promote green development by adapting to climate change and spreading green technology. In addition, the study looks at how different social, environmental, and economic factors affect green development. We use an annual panel dataset covering the years 1990–2020 that contains data from 38 OECD member nations to estimate a series of dynamic panel data models using the system generalised method of moments (GMM) technique. The empirical findings provide strong and new evidence that green technology spread and adaption to climate change greatly benefit green development. The findings also highlight the importance of institutional, social, macroeconomic, and policy-related aspects in promoting green development.

Nourhane et al. (2023) examine the GDP per capita, total unemployment rate, and poverty level as independent variables in connection to the GE using cross-sectional data from 60 developing nations in 2018. Scientific strategy: Implementing the generalised least squares (GLS) approach. The empirical data showed that in emerging nations, the GE had a negative correlation with poverty rates but a positive correlation with GDP per capita and overall unemployment rates. Considerations for policymakers:

Tang et al. (2022) study the impact of green financing on the biological environment in the Yangtze River Economic Belt. The bulk of the article is devoted to panel data from eleven municipalities and provinces along the Yangtze River Economic Belt in China from 2011 to 2020. Chemical oxygen demand (COD), harmless treatment rate of household garbage (ITR), and green coverage rate of built-up are three of the seven indicators used to create an ecological and environmental quality assessment index system. Using the entropy technique, we evaluate the ecological environment quality level and green finance development level of different provinces and localities in the Yangtze River Economic Belt. Between 2011 and 2020, the Yangtze River Economic Belt's ecological environment and green finance development level both saw substantial improvements. Also, the growth of green finance has done wonders for the Yangtze River Economic Belt's ecological situation.

Tawiah et al. (2021) looked at what makes a difference to green growth in rich and poor countries alike. Using data from 123 industrialised and developing nations, this research examines the variables that impact green development. Economic development positively affects green growth, in congruent with the empirical results. When compared to 26 green growth, trade openness is worse. We find that energy consumption hinders green development, but the consumption of renewable energy sources greatly improves it, when considering energy-related aspects. Our research reveals that these variables' effects differ across 29 industrialised and poor nations.

Fengsheng et al. (2021) examine the connection between green growth and carbon neutrality goals within the US setting. With the expected negative sign for the different quantiles, the QARDL approach showed that the error correction coefficient was substantial and negative. Green growth, ecological innovation, environmental levies, and the square of green growth all had a negative and statistically substantial impact on the long-term estimate of CO2 emissions from the US economy. The short-term estimate also confirmed the considerable negative correlation between the present and lagged CO₂ emission levels and their previous and lagged counterparts. When it came to reducing particle pollution, particularly PM2.5, the opposite was true: ecological innovation, environmental taxes, renewable energy, green growth, and the square of green growth had a substantial role. This inquiry also takes into account the limitations and policy consequences.

In their analysis of Green Finance's impact on China's high-quality economic growth, Yang et al. (2020) use a VAR model. Improving China's Economic Quality Index and implementing Green Finance go hand in hand. With more green financial investment, China's industrial structure is becoming smarter and more sophisticated, and the country's new driving force for economic growth is getting stronger all the time. Improving the quality of China's economy is the goal here. There is also an improvement to the natural environment. Finally, the report concludes with policy suggestions supported by the research.

Using data collected in Nigeria between 1980 and 2015, Ibitoye et al. (2017) examine the correlation between green growth and a number of environmental factors, such as energy depletion, deforestation, and CO2 emissions. This research used the ARDL bound testing approach to cointegration in an effort to probe these enduring connections. As a result of using bound testing as a measure for the green growth variable, we find that renewable energy, environmental degradation, and carbon dioxide emissions all have a negative long-term association. The opposite is true: deforestation and the green growth variable are positively correlated over the long run.

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In an effort to help the Nigerian economy expand and flourish sustainably, Osmond and Uwazie (2015) look at the Green economy framework. This research uses a political economics lens to examine key ideas, deciphering what the phrase "sustainable development" really means. There was a lack of research on the green growth strategies that may help Nigeria's economy shift to a green economy. The research showed that there are many opportunities in the green economy, especially for the industries that were considered.

From 1995 to 2021, Isbat et al. (2013) analyse how financial innovation and green financing impact China's environmental character. Using the ARDL model, we investigated the interplay between money and the environment. The findings back up the claim that green finance's long-term projection substantially affects CO_2 emissions. The CO2 emission models also show a favourable and statistically substantial long-term prediction of financial innovation. This research shows that CO_2 emissions go down as green financing is up in China. This leads to an improvement in the state of the ecosystem. When considering short-term effects on carbon dioxide emissions, green financing is clear winner. In congruent with the results, there are a number of important policy considerations.

Gap and Value Addition

The evaluation of numerous prior studies on green growth in relation to environmental sustainability yielded conflicting results. For example, Agan and Balcilar (20230); Nourhane et al (2023); Tang et al (20220); Tawiah et al (20210); and Yang et al (2020) conducted studies that demonstrated the substantial positive effects of green growth on the environment. Conversely, Fengsheng et al (20210), Ibitoye et al (2017), and Isbat et al (2013) in their research demonstrated that the correlation between environmental sustainability and green growth is detrimental. Additionally, it was found that the majorities of the previous studies were not conducted in Nigeria and were focused on green finance or green economy. In fact, there were very few works on green economy that were conducted in Nigeria. This implies a deficiency in the existing body of literature. Consequently, this paper will contribute to the existing body of literature by empirically examining the influence of green growth, including hydroelectric power, solar energy, natural gas, and biofuel, on environmental sustainability using carbon dioxide emissions.

4. Methodology

This investigation implemented the ex-post facto research design, which employed secondary data. The data encompassed the years 1990 through 2021. The basis for the study's model specification is the:

Ibitoye et al. (2017) model;

GRG = f(DEF, EDP, NRE, CO2)

Where;

GRG = Green growth, DEF = Deforestation, NRE = Non Renewable Energy. CO2 = Carbon Dioxide

To achieve the objective of this study; the new expanded model was presented as follows:

Co2	1	=	f(SLE,		HEP,		BNE		&		NGS)
Co2	1	=	βο+β1	SLE	+β2	HEF) +	33 BN	E	+β4	NGS
Co2 3	4	=	βο+β1	SLE	+β2	HEP	+β3	BNE	+β4	NGS	+μ
Where:	Co2	= Co2	emission;	SLE =	Solar B	Energy,	HEP =	= Hydroel	ectric	Power,	BNE
= Bio-f	uel,	NGS =	- Natural	Gas,	= error	term,	βo= (constant,	β1-β	64=estin	nated

parameters. A priori expectation: $\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are less than zero. The used econometric approaches included the ADF test for unit roots, the ARDL model for cointegration, the ARDL bounds test, and the ARDL error correction model. Furthermore, we conducted tests for normality, serial correlation using the LM test, Ramsey reset, and cumulative sum of squares (CUSUM).

Analysis and Results

The section attained to pre-estimation and post-estimation tests. Table 1. Unit Root Test on Green Finance and Environmental Ouality Model

Variables	ariables Le		First Diffe	Order of				
	ADF	5% Critical	ADF	5% Critical	Integration			
	Statistics	Value	Statistics	Value				
LCO2	-1.270644	-2.960411	-8.811685	-2.963972	0.0000			
LSLE	4.476961	-2.960411			0.0000			
LHEP	-0.403475	-2.960411	-6.271493	-2.963972	0.0000			
LBNE	1.343380	-2.960411	-5.383773	-2.963972	0.0001			
LNGS	0.616794	-2.960411	-7.419535	-2.963972	0.0000			

Source: Author Computation 2024* Level of significance at 5%

The ADF unit root tests were used in this investigation to make sure that the variables were integrated in the correct sequence. The findings of this investigation are shown in the table.1. The findings of the ADF analysis demonstrated that the variables are integrated in a different order or in a mix of the I(0) and I(1) series. After first differencing 1(1), the ADF result showed that LSLE is stationary at levels 1(0), but LCO2_LHEP, LBNE, and LNGS are all stationary after the first differencing. Due to the presence of this condition, the ARDL Bounds test technique to co-integration is suitable for the purpose of examining the long-term connection that exists between these variables.

Table 2 ARDL Bound	d Test
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Test Statistics	Value	K	
F-statistics	6.739390	4	
Significance	I (O)	1(1)	
10%	2.45	3.52	
5%	2.85	4.01	
2.5%	3.25	4.49	
1%	3.74	5.06	

Source: Authors computation 2024

The F-statistic value of 6.739390 above both the lower and upper limit critical values, indicating the existence of long term correlations among the variables (Table 2). We conclude that there must be a long-term association and reject the alternative hypothesis. So, in the long term, green development does lead to environmental sustainability in Nigeria.

 Table 3 ARDL Long-run Result (LCO2)

Variables	Coefficient	Std. error	t-Statistic	Prob-Value
LSLE	0.163322	0.345011	0.473384	0.6452
LHEP	4.852181	1.957238	2.479096	0.0306
LBNE	-8.076204	5.701385	-1.416534	0.1843
LNGS	-0.989293	1.649586	-0.599722	0.5608

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Source: Authors computation 2024

Table 3 demonstrates that there was a positive (+0.163322) but negligible link between environmental sustainability and the log value of solar energy (LSLE) in Nigeria. More so, there was a positive and statistically substantial association between environmental sustainability in Nigeria and the log value of hydroelectric power (LHEP) (+4.852181). In congruent with the long-term ARDL, there was a weak and negative correlation between environmental sustainability in Nigeria and the log value of biofuel (LBNE), with a value of -8.076204. The research concluded that there was no statistically substantial correlation between the log value of natural gas (LNGS) and environmental sustainability in Nigeria, with a negative value of -0.989293.

Table Triable Short Tull Result (De02)							
Variable	Coefficient	Std. Error	t-Statistics	Prob			
С	0.252281	0.058438	4.317065	00012			
D(LSLE)	-0.662930	0.240238	-2.759473	0.0062			
D(LSLE (-1)	-0.069179	0.756072	-0.091497	0.9287			
D(LSLE (-2)	-0.584170	0.568804	-1.027014	0.3265			
D(LHEP)	1.724397	1.077013	1.601093	0.1377			
D(LHEP(-1)	-1.501689	1.291218	-1.163002	0.2694			
D(LHEP(-2)	-0.881455	0.292949	-3.008903	0.0027			
D(LBNE)	-4.244887	2.9324425	-1.508952	0.1595			
D(LBNE(-1)	4.178516	3.109873	1.343629	0.2061			
D(LBNE(-2)	0.385026	2.903295	0.132617	0.8969			
D(LNGS)	2.548446	1.313267	1.940539	0.0784			
D(LNGS(-1)	2.161144	1.171616	1.844583	0.0922			
D(LNGS(-2)	1.884186	1.458270	1.292069	0.2228			
Ecm (-1)*	-0.959190	0.221944	4.321766	0.0012			
Adi R2 = 0.458044, F-statistics = 2.820363 (0.028985), DW = 2.217756							

Table 4 ARDL Short-run Result (LCO2)

Source: Authors computation 2024

At the 0.05 level of significance, the coefficient estimate for the error correcting term, ECM(-1) has a negative value. It shows that the model will settle into long-term equilibrium at a rate of 0.96 percent each year. This means that a yearly adjustment speed of 0.96% can fix the inaccuracy from the prior year. In congruent with the corrected R-Square (R2) value, the independent variables (SLE, HEP, BNE, and NGS) account for 45% of the total variance in the dependent variable (Co2). At the 5% level of significance, the F-statistic is statistically substantial, suggesting that the entire model is substantial. A Durbin-Watson score of 2.217756, which is close to 2, indicates that the model does not include serial correlation. Additionally, in the most recent era of the short-run, Table 4 showed that there was a negative (-0.662930) but statistically substantial association between environmental sustainability and the log value of solar energy in Nigeria (LSLE). Similarly, in the second year of the short-run, there is a negative correlation between the log value of hydroelectric power (LHEP) in Nigeria and environmental sustainability (-0.881455). Similarly, in the present, the preceding, and the second year of the short-run, the log value of bio-fuel (LBNE) in Nigeria showed a positive but statistically insubstantial association with environmental sustainability. Log value of natural gas (LNGS) demonstrated a positive but statistically insubstantial correlation with environmental sustainability in the current, previous, and second year period of the short-run, while gross fixed capital formation (LGFCF) had a negative (-0.242670) and insubstantial correlation.

Table 5 Ramsey Reset Test, Serial Correlation LM Test and Homoscedasticity Test

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	F-Statistic	Prob-Value
Ramsey Reset Test	3.142918	0.1067
Breusch-Godfrey Serial Correlation LM Test	0.805147	0.4768
Breusch-Pagan-Godfrey Heteroskedasticity Test	0.488403	0.9107

Source: Authors computation 2024

As per the data in Table 5. In congruent with the results of the Ramsey Reset test, the f-statistic (3.142918) and estimated p-value (0.1067) are larger than the 5% (0.05) critical value; hence, the research rejects the null hypothesis and concludes that the model is appropriate. A Breusch-Godfrey Serial Correlation LM Test for Serial or Autocorrelation yielded an f-statistic of 0.805147 and a Chi-Square probability value of 0.4768. The investigation demonstrates that there is no serial correlation in the model since the probability value of roughly 48% (0.4768) is less than the crucial value of 10% (0.05). Since the probability Chi-square value is more than 5% (P >0.05), the Breusch-Pegan-Godfrey test found an f-statistic of 0.488403 and a Chi-Square probability value of 0.9107, ruling out the possibility of heteroskedasticity in the model. Thus, residuals are homoscedastic, meaning they have a constant variance, an ideal property for regression.

At the 0.05 level of significance, the residuals are considered normally distributed, as shown in Figure 1's description of the normalcy test, which yielded a Jarque-Bara value of 0.544106 and a corresponding probability value of 0.761814.





The model's stability is demonstrated in Figure 1.1, as the blue line within the graph is situated between the two red lines. This also suggests that the level of significance is less than 0.05.

5. Conclusions and Recommendations

This investigation concentrates on Nigeria's environmental sustainability and green development. The findings indicated that the correlation between solar energy (SLE) and carbon dioxide emissions (CO2) was detrimental but substantial during the most recent short-term period. In addition, the second year of the short-term, there was a negative and substantial correlation between carbon dioxide emissions (Co2) and hydroelectric power (HEP). In addition, the correlation between bio-fuel (BNE), natural gas (NGS), and carbon dioxide emissions (Co2) was positive but statistically insubstantial in the current, previous, and second-year periods of the short-term. The study therefore concludes that green development has a substantial impact on the enhancement of environmental sustainability in Nigeria. The federal government should mandate the electricity regulatory commission to increase the use of hydroelectric as a substantial source of power, as per the findings, through the ministry of environment. Furthermore, the government should intensify its efforts to promote the use of renewable energy sources. Lastly, the federal government should forge a strategic partnership with the private sector

to substantially enhance investment in renewable energy. The model's unique variables and the current character of the study's explication on the relative impact of green finance on environmental quality are the substantial contributions.

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