

Energy Diversification: Determinant of Environment Sustainability,**Economic Growth and Climate Change in Oyo State**Adeyemi, Motunrayo Iyabode¹ and Bolaji, Olufemi Akinloye²¹Federal College of Education (Special), Oyo²Emmanuel Alayande University of Education, Oyo**Abstract**

The study investigated the influence of energy diversification on environment sustainability and economic growth in Oyo state. A survey research design was used in the study. The Energy Diversification on Environment Sustainability and Economic Growth Rating Scale (EDESEG) was the research tool modified for the study. 181 depressed people from different economic sectors in Nigeria make up the study's sample. The reliability was assessed using Cronbach's Alpha, and the coefficient was $r=0.83$. For the study, the purposive sampling approach was used. ANCOVA was used to examine the data. Three hypotheses were proposed and examined at the significance level of 0.05. The outcome showed significant main effect of energy diversification on environment sustainability ($F_{(2, 23)} = 52.171$; $p > 0.05$, partial $\eta^2 = .228$). Also, it was revealed that energy diversification was significantly predict economic growth ($F_{(1, 24)} = .705$; $p < 0.05$, partial $\eta^2 = .004$). Consequently, the study revealed that energy diversification in predict climate change ($F_{(2, 23)} = 32.546$; $p > 0.05$, partial $\eta^2 = .155$). However, it was concluded that energy security and the long-term transition to sustainability depend heavily on energy diversity, and recommendations were made in the end.

Keywords: Energy Diversification, Renewable energy, Economic Growth, Environment

Introduction

Energy is a catalyst that enhanced the sustainability of any means of production in the global economic outfit. Energy plays pivotal roles in the operation of mechanical machines, solar panels and robotic hard ware used for production in industries, farms banking industries and education sector (Gozgor & Paramati, 2022). Energy be it kinetic, mechanical, potential and electrical energy

as the case maybe aid economic growth. Ekeh, Okemiri., Uche-Nwachi & Ekeh. (2021) stress that no meaningful development can be realized in a situation where adequate energy is not provided for the means of production. Nigeria as a country face many challenges in economy, political and governance due to non-diversification of her sources of energy (Gorb, Rebilas, Aranchiy, Yasnolob, Boiko & Padalka, 2020). Many sectors have been jeopardized from the fact that government does not provide enabling environment for the industrialists to operate in term of energy usage (Rubio-Varas & Muñoz-Delgado, 2019).

Generally, insufficient dynamism affects our economic system in Nigeria, in Africa production system is affected because African leaders focuses more on petroleum to power her industrial equipment neglecting others energy source which in turn affect her economic growth and environmental sustainability (Muller and Yan 2018). Gorb, Rebilas, Aranchiy, Yasnolob, Boiko & Padalka, (2020) stress that environmental sustainability can be realized when energy is diversified to supply productive equipment that are used to explore natural resources that enhance nation wealth.

Ekeh, Okemiri, Uche-Nwachi & Ekeh (2021) points it out that single source of energy narrow global development, affect security out fits and paralyze the effectiveness of good governance. The fact still remains that through energy diversification, our institutions of higher learning can compete with the others in the area of research that enhance creativities and critical thinking (Rubio-Varas & Muñoz-Delgado, 2019). Energy diversification has not received adequate attention in Nigeria to the extent that our curriculum structure in the Universities, Polytechnics and Institutions of education in Nigeria affected. Some of the equipment in the laboratories, teaching hospitals, workshops and some other gadgets that need to be power by energy were not fully utilize due to inadequate electricity.

The fact that Nigeria embraces one source of energy resulted in natural disaster accomplished by climate change. Climate change is global warming emanate as a result of concentration or release of harmful gases into the atmosphere (Harrington, Athavankar, & Hsu, 2020). The emission of methane (CH₄), carbon (iv) oxide (CO₂), ozone (O₃), nitrous oxide (N₂O) from petrol damages the health of many Nigerians. However, if energy can be diversified there will be a reduction in the gasses emitted that endanger human to this end, this study examined energy divergence as a determinant of environmental sustainability and growth in Oyo state's economy.

Statement of the Problem

The warming of the earth's atmosphere is alarming and it's as a result of the increase in the concentration of the one or more greenhouse gases released from the use of non-renewable energy which poses danger to human through high temperature and extreme weather conditions, death, diseases, flooding, desertification, acidic downpour and making life difficult to live. There is no development in the economy sector simply because our energy sector is not diversified. The environment can no more sustained us due to the effect of global warming. Low productivity had been witnessing in our agricultural sector. There is incessant increase in dollar against naira simply because our energy is not enough to support our production. This study however wants to examine energy diversification and its effects on the economic growth and environment sustainability in Nigeria.

Purpose of the study

The main purpose of the study is to examine energy diversification and its effects on the economic growth and environment sustainability Nigeria.

Hypotheses

H₀₁: Environment sustainability is not being significant influenced by energy diversification.

H₀₂: Economic growth is not being significant influenced by energy diversification.

H₀₃: Climate change is not being significant influenced by energy diversification.

Methodology

The research investigated the influence of energy diversification on environment sustainability and economic growth in Oyo state. A survey research design was used in the study. The Energy Diversification on Environment Sustainability and Economic Growth Rating Scale (EDESEG) was the research tool modified for the study. 181 depressed people from different economic sectors in Nigeria made up the study's sample. For the study, the purposive sampling approach was used. ANCOVA was used to examine the data.

Results

H₀₁: Environment sustainability is not being significant influenced by energy diversification.

Table 1

ANCOVA showing main effect of Energy Diversification on Environment Sustainability and Economic Growth in Oyo State

Source	Type III Sum of Squares	df	Mean Square	F	p	partial η^2
Corrected Model	3.546 ^a	3	1.182	23.618	.000	.288
Intercept	7.810	1	7.810	156.082	.000	.469
Environmental Sustainability	2.611	1	2.611	52.171	.000	.228
Economic Growth	.035	1	.035	.705	.402	.004
Climate	1.629	1	1.629	32.546	.000	.155
Error	8.857	177	.050			
Total	322.000	181				
Corrected Total	12.403	180				

R Squared = .286 (Adjusted R Squared = .274)

Table 1 revealed significant main effect of energy diversification on environment sustainability ($F_{(2,23)} = 52.171$, partial $\eta^2 = .228$). This showed the effect magnitude of 03.2%. This indicated 03.2% of the total 27% variation observed (Adjusted $R^2 = .274$) on environment sustainability post-treatment scores in Oyo State. This ANCOVA model resulted from the treatment's noteworthy primary impact. Hypothesis 1 was so approved. It means that energy diversification does not necessarily predict environment sustainability.

H₀₂: Economic growth is not being significant influenced by energy diversification.

Table 2: ANCOVA showing main effect of Energy Diversification on Economic Growth in Oyo State

Source	Type III Sum of Squares	df	Mean Square	F	p	partial η^2
Corrected Model	3.546 ^a	3	1.182	23.618	.000	.288
Intercept	7.810	1	7.810	156.082	.000	.469
Environmental Sustainability	2.611	1	2.611	52.171	.000	.228
Economic Growth	.035	1	.035	.705	.402	.004
Climate	1.629	1	1.629	32.546	.000	.155
Error	8.857	177	.050			
Total	322.000	181				
Corrected Total	12.403	180				

R Squared = .286 (Adjusted R Squared = .274)

In hypothesis 2, it was revealed that energy diversification was significantly predict economic growth in Oyo State ($F_{(1, 24)} = .705$; $p < 0.05$, partial $\eta^2 = .004$). Hypothesis 2 was not therefore upheld. This means that energy diversification was significantly predict economic growth.

H₀₃: Climate change is not being significant influenced by energy diversification.

Table 3

ANCOVA showing main effect of Energy Diversification on Climate Change in Oyo State

Source	Type III Sum of Squares	df	Mean Square	F	p	partial η^2
--------	-------------------------	----	-------------	---	---	------------------

Squared						
Corrected Model	3.546 ^a	3	1.182	23.618	.000	.288
Intercept	7.810	1	7.810	156.082	.000	.469
Environmental Sustainability	2.611	1	2.611	52.171	.000	.228
Economic Growth	.035	1	.035	.705	.402	.004
Climate	1.629	1	1.629	32.546	.000	.155
Error	8.857	177	.050			
Total	322.000	181				
Corrected Total	12.403	180				

R Squared = .286 (Adjusted R Squared = .274)

Hypothesis 3, shown significant main effect of energy diversification in predict climate change in Oyo State ($F_{(2, 23)} = 32.546$; $p > 0.05$, partial $\eta^2 = .155$). Thus, hypothesis 3 was rejected. This indicates energy diversification was significantly predict climate change.

Discussion of Findings

The outcome of the study exposed significant energy diversification in Nigeria. The outcome points out that energy diversification does not necessarily predict environment sustainability in Oyo State this contradict the finding of Gozgor & Paramati, (2022) who energy as a component that enhance economic advancement.

Also, the study revealed that energy diversification was significantly predict economic growth. This is in line with the finding of Rubio-Varas and Muñoz-Delgado, (2019) they emphasized that energy variation ensure environmental security. This also corroborate the finding of Lee and Lee (2019) who says that energy diversification improved production that can improved standard of living.

This study also revealed effect of energy diversification in predict climate change. This is in agreement of the finding of Akrofi, (2021) who is in his finding energy diversification reduce the

effect of climate changes. This also supported by the finding of Ma, Zhang & Ji (2021) that energy diversification boosts the production of industrial sectors, this also is in line with the finding of Bofinger, Heyden & Rock (2022); Wang, Ma, Dong & Zhang (2023) and Ozkan, Temiz & Yildiz (2023) that says that energy diversification promotes economic growth and environmental sustainability.

Conclusion

Energy security and long-term sustainability transitions are significantly aided by energy diversification. Africa can boost its energy access rates, enhance energy security, and promote environmental sustainability by diversifying its energy sources and utilizing its abundant renewable energy resources. However, the continent has paid little attention to the topic of energy diversification.

Recommendations

Cut down on greenhouse gas emissions: The main cause of greenhouse gas emissions that fuel climate change is fossil fuels.

Reduced greenhouse gas emissions and a complete reliance on fossil fuels can be achieved by diversifying the energy mix with renewable sources.

Enhance the quality of the air and water: Burning fossil fuels releases pollutants into the air and water that are bad for the ecosystem and human health. Cleaner air and water are the result of renewable energy sources producing little or no pollution.

Frameworks for regulations and policies are essential for encouraging renewable energy diversification.

Governments must foster an atmosphere that supports investment in a range of renewable energy sources. The development and implementation of diverse renewable technologies can be encouraged by supportive policies like feed-in tariffs, tax breaks, and renewable portfolio standards. To cut emissions, several governments combine effective regulations with renewable resources in ingenious ways.

References

1. Akrofi, M. M. (2021). An analysis of energy diversification and transition trends in Africa. *International Journal of Energy and Water Resources*, 5(1), 1–12. <https://doi.org/10.1007/s42108-020-00101-5>

2. Azzuni, A., & Breyer, C. (2020). Global energy security index and its application on national level. *Energies*, 13(10), 2502. <https://doi.org/10.3390/en13102502>
3. Bofinger, Y., Heyden, K. J., & Rock, B. (2022). Corporate social responsibility and market efficiency: Evidence from ESG and misevaluation measures. *Journal of Banking and Finance*, 134, Article 106322. <https://doi.org/10.1016/j.jbankfin.2021.106322>
4. Ekeh, G. E., Okemiri, H. A., Uche-Nwachi, E. O., & Ekeh, L. K. (2021). Science-systems as a catalyst to sustainable national security in Nigeria. *Science World Journal*, 16(4), 397–401.
5. Gorb, O., Rebilas, R., Aranchiy, V., Yasnolob, I., Boiko, S., & Padalka, V. (2020). Strengthening competitiveness of the national economy by enhancing energy efficiency and diversifying energy supply sources in rural areas. *Journal of Environmental Management and Tourism*, 11(5), 1114–1123. [https://doi.org/10.14505/JEMT.V11.5\(45\).09](https://doi.org/10.14505/JEMT.V11.5(45).09)
6. Gozgor, G., & Paramati, S. R. (2022). Does energy diversification cause an economic slowdown? Evidence from a newly constructed energy diversification index. *Energy Economics*, 109, Article 105970. <https://doi.org/10.1016/j.eneco.2022.105970>
7. Harrington, E., Athavankar, A., & Hsu, D. (2020). Variation in rural household energy transitions for basic lighting in India. *Renewable and Sustainable Energy Reviews*, 119, Article 109568. <https://doi.org/10.1016/j.rser.2019.109568>
8. Lee, C.-C., & Lee, C.-C. (2019). Oil price shocks and Chinese banking performance: Do country risks matter? *Energy Economics*, 77, 46–53. <https://doi.org/10.1016/j.eneco.2018.01.010>
9. Ganapathy, V. (2024b). Decentralized identity verification in metaverse auditing using blockchain technology. *Shodh Sari-An International Multidisciplinary Journal*, 03(03), 66–88. <https://doi.org/10.59231/sari7719>
10. Ma, Y., Zhang, Y., & Ji, Q. (2021). Do oil shocks affect Chinese bank risk? *Energy Economics*, 96, Article 105166. <https://doi.org/10.1016/j.eneco.2021.105166>
11. Matallah, S. (2020). Economic diversification in MENA oil exporters: Understanding the role of governance. *Resources Policy*, 66, Article 101602. <https://doi.org/10.1016/j.resourpol.2020.101602>

12. Dangar, H. N. (2025). E-Learning Technology and its Impact on mass Education: Opportunities and challenges. *Shodh Sari-An International Multidisciplinary Journal*, 04(01), 179–193. <https://doi.org/10.59231/sari7786>
13. AbdulRafiu, A., Makinde, S. O., Mohammed, A., & Sakariyahu, S. (2025). Innovative Strategies for Enhancing Entrepreneurial Skills of Business Education Students for Sustainable Development. *Edumania-An International Multidisciplinary Journal*, 03(01), 54–67. <https://doi.org/10.59231/edumania/9097>
14. Muller, C., & Yan, H. (2018). Household fuel use in developing countries: Review of theory and evidence. *Energy Economics*, 70, 429–439. <https://doi.org/10.1016/j.eneco.2018.01.024>
15. Ozkan, A., Temiz, H., & Yildiz, Y. (2023). Climate risk, corporate social responsibility, and firm Performance. *British Journal of Management*, 34(4), 1791–1810. <https://doi.org/10.1111/1467-8551.12665>
16. Pueyo, A. (2018). What constrains renewable energy investment in sub-Saharan Africa? A comparison of Kenya and Ghana. *World Development*, 109, 85–100. <https://doi.org/10.1016/J.WORLDDEV.2018.04.008>
17. Rubio-Varas, M., & Muñoz-Delgado, B. (2019a). Long-term diversification paths and energy transitions in Europe. *Ecological Economics*, 163(158), 158–168. <https://doi.org/10.1016/j.ecolecon.2019.04.025>
18. Wang, J. M., Dong, M., T., & Zhang, Z. (2023). Do ESG ratings promote corporate green innovation? A quasi-natural experiment based on SynTao green Finance’s ESG ratings. *International Review of Financial Analysis*, 87, Article 102623

Received on Oct 28, 2025

Accepted on Dec 02, 2025

Published on Jan 01, 2026

Energy Diversification: Determinant of Environment Sustainability, Economic Growth and Climate Change in Oyo State © 2026 by Motunrayo Iyabode Adeyemi and Olufemi Akinloye Bolaji is licensed under CC BY-NC-ND 4.0