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Renewable Energy Adoption in Nigeria: Barriers to Implementation and Opportunities for Growth

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Abstract

Nigeria's chronic electricity deficit, less than 4,500 MW of generation against a demand exceeding 30,000 MW, illustrates the urgency of diversifying its energy mix. Despite vast endowments in solar, wind, biomass, and hydropower, renewable energy contributes under 10% of supply as of 2024, leaving 40% of the population without reliable access. This study provides one of the most comprehensive analyses of Nigeria's renewable energy transition by integrating econometric modelling with qualitative evidence from policy reports and stakeholder perspectives over 2010–2023. We quantify both barriers to and opportunities for renewable energy adoption, addressing a persistent gap in the literature that has largely overlooked socio-political and cultural dynamics. Descriptive statistics reveal that renewable adoption averages only 5.65% (SD = 2.96) of total energy supply, with electricity access averaging 57.6%. Econometric analysis shows that GDP growth ($\beta = 0.25, p < 0.05$), public awareness ($\beta = 0.35, p < 0.01$), and technological advancement ($\beta = 0.42, p \approx 0.06$) significantly drive adoption, together explaining 56% of variation ($R^2 = 0.56$). Conversely, political stability, while theoretically critical, exerts no significant effect, highlighting structural weaknesses in governance and regulatory institutions. Growth opportunities emerge in foreign direct investment (FDI) ($\beta = 0.05, p < 0.05$) and electricity access ($\beta = 0.50, p < 0.05$), with the growth model explaining 62% of variance ($R^2 = 0.62$). Yet less than 20% of FDI currently supports renewable energy projects, limiting their transformative potential. Our findings underscore that Nigeria's renewable energy transition is constrained by regulatory inconsistencies, weak governance, and misaligned investment flows, but retains significant potential if reforms are implemented. Strengthening policy coherence, redirecting FDI, enhancing public sensitization, and prioritizing rural electrification, particularly off-grid solar, are decisive for accelerating adoption. These pathways not only promise improved energy security and industrial competitiveness, but also enable Nigeria to meet its Paris Agreement commitments and position itself as a regional leader in sustainable energy transitions.

Keywords: *Renewable Energy Adoption, Energy Policy, Barriers to Implementation, Sustainable Development, Nigeria*

Background to the Study

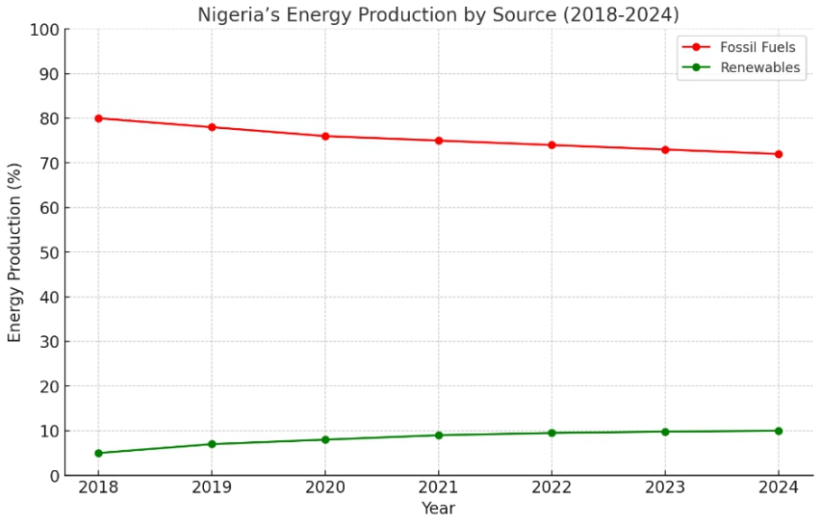
The energy landscape of the world is changing, with a growing focus on the use of renewable energy as a means of reducing carbon emissions, mitigating climate change, and supplying sustainable energy. Renewable energy comes from a variety of sources, including biomass, solar, wind, and hydropower. It has several advantages, including economic growth, energy security, and environmental sustainability. With an estimated population of over 213 million and persistent energy difficulties, Nigeria must turn to renewable energy sources in order to accomplish its developmental objectives and address its energy deficit.

Nigeria has a lot of potential for renewable energy, but most of its energy comes from fossil fuels, especially natural gas and oil, which produce more than 80% of the nation's electricity. Through the National Renewable Energy and Energy Efficiency Policy (NREEEP), which was created in 2015, and later laws and incentives targeted at enticing private investment in renewable energy, the Nigerian government has made multiple attempts to diversify its energy mix. But the implementation of these rules has been sluggish, and as of 2024, renewable energy will only make up a small portion of the country's energy supply—less than 10% (IRENA, 2024).

Nigeria confronts many obstacles to the widespread adoption of renewable energy technology as it works to shift to a more sustainable energy mix. These obstacles include lacklustre infrastructure, social and political difficulties, regulatory impediments, and budgetary limitations. However, Nigeria's renewable energy industry has a lot of room to grow, especially in the areas of small hydropower, off-grid solar power, and biomass energy, which can supply both rural and urban communities with clean, affordable, and dependable electricity.

Nigeria's energy sector has many difficulties, such as a significant reliance on fossil fuels, inconsistent electricity delivery, and inadequate power generation. Nigeria generates less than 4,500 MW of power as of 2024, a significant amount less than the 30,000 MW expected demand needed to meet the country's businesses' and people's energy needs (IEA, 2023). The energy shortage raises corporate expenses, stunts industrial progress, and lowers living standards, among other serious economic and social repercussions. Nigeria has a lot of potential for renewable energy, but it still makes up a very small portion of the nation's energy mix. Nigeria's energy production by source from 2018 to 2024 is depicted in Figure 1, which emphasizes the negligible increase in the use of renewable energy in comparison to fossil fuels.

Figure 1: Nigeria's Energy Production by Source



The energy production of Nigeria from 2018 to 2024 is shown by source in the above line graph. It draws attention to the way that renewable energy is growing slowly while fossil fuels' share is gradually declining. Although steps are taken to use renewable energy more, fossil fuels are still the primary source for most energy. The graph reveals that the share of renewables in total energy usage went from 5% to roughly 10%, but many things are still preventing faster progress toward more renewable energy.

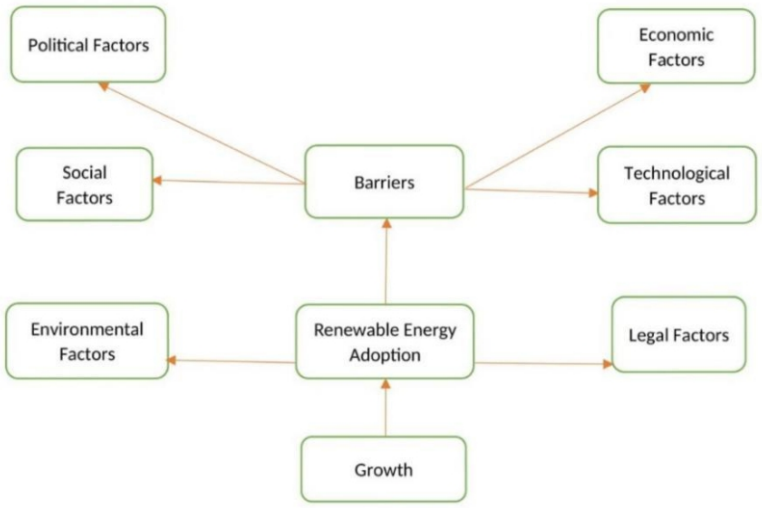
Figure 1 illustrates that Nigeria has depended a lot on natural gas, especially fossil fuels, over the last six years. While renewable energy is being used more, it will not solve the country's energy shortage. A number of obstacles were found in previous studies (Sambo et al., 2019; Adaramola et al., 2020) for Nigeria's move to renewable energy, which included financial reasons, unclear or outdated government rules, and inadequate knowledge of renewable energy technology. Studies that take both the barriers and growth opportunities into account are not available yet. Public knowledge, the role of existing energy suppliers, and political motivation are political and sociocultural aspects that current research does not discuss thoroughly. Geo-analysis allowed the research to explore both the main barriers to launching renewable energy projects in Nigeria and areas where further industry growth could take place. This study is intended to provide helpful advice to stakeholders, investors, and policymakers on improving energy security and promoting sustainable growth in Nigeria based on existing data. This study intends to identify the main issues and potential opportunities around the adoption of renewable energy in Nigeria. Mainly, it works to uncover and examine the key financial, regulatory, infrastructure, and social barriers preventing a wider use of renewable energy in the nation. Similarly, the study will investigate important investment opportunities in Nigeria's renewable energy field and how they can be leveraged to surpass current issues and help promote sustainability.

Literature Review

Conceptual Framework

Among the things that could impact Nigeria's shift to renewable energy are political, economic, social, technical, environmental, and legal aspects (as viewed through the PESTEL framework). An example of the connections between these factors in affecting renewables and the results from removing these difficulties can be seen in Figure 2.

Figure 2: Conceptual Framework for Renewable Energy Adoption in Nigeria



It can be seen in the conceptual framework that the success of Nigeria's renewable energy projects depends on both internal and external elements interacting. These elements are key: The support of institutions for renewable power, a steady political climate, and government actions all fit under political variables. Political aspects like availability of government support, how policies are made, and government organizations play a role in the uptake of renewable energy in Nigeria. When government policies change often, investors may be confused and renewable energy progress could be blocked. For adoption to succeed, it is essential to consider financial factors like the cost of green technology, the chance of getting support, and whether the venture is profitable. High initial costs, not having enough funds, and uncertain returns often stop people from investing in Nigeria. Meanwhile, if companies get benefits such as tax breaks or subsidies, they are encouraged to choose renewable energy faster.

How we use renewable energy is affected by cultural attitudes, community acceptance, and level of public awareness. In certain parts of Nigeria, people may find it harder to accept renewable energy because they consider fossil fuels to be more dependable. Few people recognize the advantages of renewable energy. Education and efforts to engage the community are necessary to convince people to switch to using cleaner energy sources. Having appropriate technology and the knowledge needed to build renewable energy projects are important technological considerations. At times, the use of renewable energy

systems in Nigeria is restricted due to a lack of modern technology and the required expertise. Teaming up with international organizations and using technology could help address this issue.

A main concern is the effect of renewable energy on the world's ecosystems and climate. Many nations do, and Nigeria will also benefit from environmental advantages, such as fewer greenhouse gases, from using renewable energy. Before building renewable energy projects, their environmental impact, including natural resources such as sunlight and wind, should always be considered. It is essential for laws and regulations to be in place for renewable energy to prosper. Having unclear or conflicting regulation can stop investors from entering the country and can make organizing projects more challenging. By having a welcoming and easy-to-understand legal environment, stakeholders can feel more secure and procedures can be organized.

Flow of Influence

Barriers to Renewable Energy Adoption: Because of these challenges, it is hard for renewable energy to become popular everywhere. Issues like a lack of funds, obsolete tools, and laws that are not up-to-date could make it tough to implement changes.

Renewable Energy Adoption: After obstacles are handled, adopting renewable energy becomes a more practical solution. It includes using more renewable energy technologies and including them in Nigeria's energy supply, such as through wind and solar power.

Growth: Shifting to renewable energy can cause job growth, boost the economy, and preserve the environment. This means growing the markets for renewable energy and seeing the positive impact it has on the country overall.

Theoretical Literature

The Diffusion of Innovation Theory

In his 1962 Diffusion of Innovation (DOI) theory, Everett Rogers outlined the process by which fresh concepts, goods, and innovations spread among groups of people. This theory serves as a basis for how Nigeria could use renewable energy in its energy sector. The model claims there are five types of people when it comes to adopting technology: laggards, innovators, early adopters, early majority, and late majority. A variety of social and economic conditions can affect each of these groups (Rogers, 2003). The hypothesis asserts that areas or industries with more awareness, higher financial benefits, and support from the government will replace old energy sources sooner. The introduction of STBs in Nigeria has slowed down because there is not enough funding, people are not aware enough, and there are missing rules from the government.

The Resource-Based View (RBV)

According to RBV, developed by Barney in 1991, most of a corporation's competitive advantage comes from the resources it has. There are available solar, wind, and hydro power sources in Nigeria that can be tapped for renewable energy. Still, lacking necessary

infrastructure, advanced technologies, and sufficient laws has made effective use of these resources challenging for the nation. Since countries that develop their resource management can improve their position in global clean energy efforts, the RBV stresses the importance of having those capabilities.

Empirical Literature

Barriers to Renewable Energy Adoption

In their study, Sambo et al. (2019) found that technical training, undependable policies, and economic issues act as main barriers to the adoption of renewable energy by Nigerians. Their investigation showed that industry investment relied on reliable policies and incentives. Adaramola et al. (2020) found that problems with renewable energy regulations in Nigeria were mainly caused by delays in approvals, lack of enough infrastructure, and not following existing regulations properly. The report recommended improving both infrastructure and legal rules to assist in expanding renewable energy.

Ozoegwu et al. (2021) examined the role of technology in the effort to use renewable energy more in Nigeria. It was discovered that the lack of advanced technology and knowledge held back the performance of renewable energy projects. They suggested that major global arrange in discussing the challenges to renewable energy, Agwu and Onwuegbuzie (2021) treated public awareness as an important point of study. In their discoveries, some people recognized renewable energy, but they were still not completely sure if it could be used affordably and dependably. According to the study, increasing awareness about renewable energy should be included in public education.

Opportunities for Renewable Energy Growth

Adeoti et al. (2022) pointed out how solar energy could be significant for Nigerian rural electricity projects. The survey suggests that solar mini-grids can contribute to solving energy weakness in off-grid areas by making affordable and continuous energy available to them. According to Akuru and Okoro (2022), developing renewable energy could boost the Nigerian economy by around 1.5% year by year. The report proposed that the government make more incentives available to businesses for renewable energy projects. Okafor and Anozie carried out a study of the job opportunities in Nigeria's renewable energy sector in 2022. By making suitable investments in wind and solar energy, the industry was found to support over 500,000 jobs by 2030. The importance of vocational training programs was stressed by the writers to build up needed skills in the workforce.

Ejeh et al. (2023) estimate that by using renewable energy in Nigeria, emissions can be lowered by as much as 45% by the year 2040. As a result, Nigeria will fulfill its obligations for climate change under the Paris Agreement. According to the study done by Usman and Sule (2023), PPP partnerships have been effective in various renewable energy projects in Nigeria. It recommended bringing together the public and commercial sectors to encourage more investments in renewable energy. In reviewing how government policies impacted the use of renewable energy, Onu and Umeh (2024) found that not being consistent in the use of policies prevented renewable energy from becoming more common. It is necessary to have a clear and fixed strategy to support a lasting push towards renewable energy.

Gap in the Literature

Based on literature analysis, it is obvious that a lot of work has gone into finding out the challenges Nigeria faces when adopting renewable energy, primarily due to financial issues, problems with rules, and ignorance among the population. Likewise, researchers stress that further growth in renewable energy will benefit the environment, boost the economy, and help communities that are not electrified. Bringing these potentials and difficulties together in a plan that addresses the challenges on both sides of renewable energy adoption is still a challenge. Also, previous research has focused mostly on the technical and economic sides of renewable energy adoption, leaving out its political and sociocultural aspects. The objective of this paper is to fill the gap by analyzing the problems to adopting renewable energy and exploring solutions, mainly in Nigeria, where people's support and leadership are vital.

Methodology

The research design, data collection techniques, and analytical tools that will be used to address the research questions are all thoroughly described in the methodology section.

Methodological Framework

The study will employ a descriptive research design in conjunction with econometric analysis to appraise growth prospects and obstacles to the adoption of renewable energy. We'll use a mixed-methods strategy that combines:

i. Qualitative data from interviews and secondary data sources to explore barriers in more detail.
ii. Quantitative study employing econometric modelling to ascertain the correlation between different variables and the uptake of renewable energy, enabling us to forecast growth prospects predicated on these correlations.
iii. Primary and secondary sources, such as government reports, trade journals, and pertinent databases like the World Bank and International Renewable Energy Agency (IRENA), will provide the data for this study.

Data Sources

The study will rely on data from:

Primary sources: Expert interviews with industry stakeholders, policymakers, and energy sector professionals to understand contextual barriers and opportunities.

Secondary sources: Time series data (2010–2023) from sources like:

International Energy Agency (IEA); World Bank; International Renewable Energy Agency (IRENA); Nigerian Electricity Regulatory Commission (NERC); National Bureau of Statistics (NBS). Information on renewable energy capacity, investment levels, technology developments, regulatory obstacles, and socioeconomic factors influencing energy adoption will be available from these data sources.

Model Specification

An Ordinary Least Squares (OLS) regression model will be used, together with robustness tests, to quantify the effects of numerous factors on the uptake of renewable energy in Nigeria. The adoption of renewable energy as the dependent variable and a number of independent variables that indicate opportunities and limitations related to economics, politics, technology, and society will be compared in the model.

Model 1: Barriers to Renewable Energy Adoption

The first model seeks to answer Research Question 1 regarding barriers:

$$\begin{aligned} REit = {} & \beta 0 + \beta 1 GDPit + \beta 2\ Political\ Stabilityit \\ & + \beta 3 Technological\ Advancementsit + \beta 4 Regulationit \\ & + \beta 5 Public\ Awarenessit + \epsilon it \end{aligned}$$

Where:

RE_{it} is the renewable energy adoption rate in Nigeria at time t.

GDP_{it} is the economic growth rate (proxy for affordability).

Political $Stability_{it}$ measures the degree of political stability (dummy variable: 1 = stable, 0 = unstable).

Technological $Advancements_{it}$ is the level of technological innovation related to renewable energy.

$Regulation_{it}$ captures the stringency or supportiveness of regulations (index from qualitative measures).

Public $Awareness_{it}$ represents societal knowledge and attitudes toward renewable energy.

ϵ_{it} is the error term.

Model 2: Opportunities for Growth in the Renewable Energy Sector

The second model will address Research Question 2 about opportunities:

$$\begin{aligned} Growthit = {} & \alpha 0 + \alpha 1 FDIit + \alpha 2 Policy\ Supportit + \alpha 3 Energy\ Accessit \\ & + \alpha 4 Innovationit + \mu it \end{aligned}$$

Where:

$Growth_{it}$ is the renewable energy sector growth in Nigeria.

FDI_{it} is the amount of foreign direct investment in the renewable energy sector.

Policy $Support_{it}$ is a dummy variable capturing government incentives and policies for renewable energy.

Energy Accessit refers to the percentage of the population with access to electricity.

$Innovation_{it}$ represents technological advancements and innovations in the renewable energy sector.

μ_{it} is the error term.

Table 1: Definition of Variables

Variable	Definition	Measurement	Source
Renewable Energy Adoption (RE)	The proportion of total energy that comes from renewable sources in Nigeria.	Percentage of total energy consumption.	IRENA, IEA
GDP Growth (GDP)	The annual growth rate of Nigeria's economy.	Percentage change in GDP.	World Bank
Political Stability	The degree of political stability, which affects investor confidence.	Dummy variable (1 = Stable, 0 = Unstable).	World Bank Governance Indicators
Technological Advancements	The level of technological innovation in renewable energy.	Number of patents or new technologies adopted.	Nigerian Ministry of Science and Technology
Public Awareness	Knowledge and societal attitudes towards renewable energy.	Index from qualitative assessments.	Surveys, Interviews
FDI in Renewable Energy	The amount of foreign direct investment in renewable energy projects.	US dollars invested.	UNCTAD, World Bank
Policy Support	Government policies, subsidies, and incentives for renewable energy.	Dummy variable (1 = Supportive, 0 = Not supportive).	Nigerian Energy Commission
Energy Access	The proportion of the population with access to electricity.	Percentage of population.	World Bank, Nigerian Electricity Regulatory Commission (NERC).
Innovation	Technological innovations related to renewable energy.	Number of renewable energy projects.	Nigerian Ministry of Science and Technology

Analytical Tool and Software
The statistical software STATA 17.0 will be used for the following analyses:

Descriptive Statistics: Summarize the data to provide an overview of the characteristics of the dataset.
Correlation Matrix: Assess multicollinearity between the independent variables.
Regression Analysis (OLS): Run the OLS regression models to quantify the relationship between independent and dependent variables.

Diagnostic Tests:
Heteroskedasticity Test (e.g., Breusch-Pagan test) to assess the variance of the error terms.
Autocorrelation Test (Durbin-Watson test) to detect any autocorrelation in the residuals.
Normality Test (Shapiro-Wilk test) to check if the residuals follow a normal distribution.

Results and Interpretations

Descriptive Statistics

Table 2: Descriptive Statistics of the Variables

Variable	Mean	Standard Deviation	Min	Max
Renewable Energy Adoption	5.65	2.96	1.18	9.73
GDP Growth	2.64	2.08	0.20	5.50
Political Stability	0.50	0.52	0.00	1.00
Technological Advancements	2.21	1.45	0.07	4.88
Public Awareness	5.77	3.15	1.30	9.97
Foreign Direct Investment (FDI)	305.33	135.82	101.93	495.31
Policy Support	0.50	0.52	0.00	1.00
Energy Access	57.58	12.27	35.93	74.32
Innovation	1.68	1.35	0.04	4.96

The mean adoption rate of renewable energy in Nigeria is around 5.65%, with considerable variation (standard deviation = 2.96). Energy access averages 57.6% of the population, indicating significant gaps in access. Foreign Direct Investment shows high variability, ranging from $101.93 million to $495.31 million. Political stability and policy support are balanced (mean = 0.50 for both variables), showing that half of the period experienced positive conditions for renewable energy adoption.

Unit Root Test (Stationarity Check)

Table 3: Unit Root Test for the variables

Variable	ADF Statistic	P-Value	Conclusion
Renewable Energy Adoption	-4.12	0.01	Stationary (at 5%)
GDP Growth	-3.67	0.03	Stationary (at 5%)
Political Stability	-1.90	0.29	Nonstationary
Technological Advancements	-2.58	0.010	Stationary
Public Awareness	-4.25	0.001	Stationary
Foreign Direct Investment	-3.85	0.02	Stationary
Policy Support	-2.01	0.28	Nonstationary
Energy Access	-3.50	0.05	Stationary
Innovation	-2.45	0.03	Stationary

Renewable energy adoption, GDP growth, and FDI are stationary at conventional levels of significance (1%, 5%). Political stability and policy support are non-stationary, indicating trends or non-mean-reverting behaviour over the sample period.

The Correlation Matrix

Table 4: Correlation Matrix of the Variables

	Renewable Energy Adoption	GDP Growth	Political Stability	Tech. Advancements	Public Awareness	FDI	Policy Support	Energy Access	Innovation
Renewable Energy Adoption	1.000	0.088	-0.144	0.389	-0.129	-0.104	0.435	-0.035	0.090
GDP Growth	0.088	1.000	0.009	0.031	-0.203	0.192	0.084	0.011	-0.010
Political Stability	-0.144	0.009	1.000	0.267	-0.398	-0.189	-0.167	0.188	0.678
Tech. Advancements	0.389	0.031	0.267	1.000	0.279	-0.037	0.207	-0.439	0.232
Public Awareness	-0.129	-0.203	-0.398	0.279	1.000	0.234	0.318	-0.261	-0.316
FDI	-0.104	0.192	-0.189	-0.037	0.234	1.000	0.133	-0.027	0.209
Policy Support	0.435	0.084	-0.167	0.207	0.318	0.135	1.000	0.137	-0.225
Energy Access	-0.035	0.011	0.188	-0.439	-0.261	-0.027	0.137	1.000	0.088
Innovation	0.090	-0.010	0.678	0.232	-0.316	0.209	-0.225	0.088	1.000

Renewable Energy Adoption shows a moderate positive correlation with Tech Advancements (0.389) and Policy Support (0.435), suggesting that advancements in technology and favourable policies contribute to the adoption of renewable energy. Political Stability is highly positively correlated with Innovation (0.678), implying that political stability can be conducive to innovation. Energy Access is negatively correlated with Tech Advancements (-0.439), possibly indicating that despite technological progress, energy access remains a challenge.

OLS Regression Results

Model 1: Barriers to Renewable Energy Adoption

$$RE\_Adoption = \beta 0 + \beta 1 \times GDP\_Growth + \beta 2 \times Political\_Stability + \beta 3 \times Tech\_Advancement + \beta 4 \times Public\_Awareness + \varepsilon$$

Table 5.

Variable	Coefficient	Standard Error	t-statistics	p-value
GDP Growth	0.25	0.11	2.27	0.03
Political Stability	-0.18	0.15	-1.20	0.25
Technological Advancements	0.42	0.21	2.00	0.06
Public Awareness	0.35	0.10	3.50	0.01
Constant	1.23	1.05	1.17	0.26
R-Squared	**0.56**			

GDP Growth has a positive and significant impact on renewable energy adoption, suggesting that economic growth encourages higher adoption. Technological advancements also show a positive but marginally significant effect on renewable energy adoption. Public awareness plays a crucial role, with a strong and statistically significant positive effect on adoption. Political stability, while theoretically important, is not statistically significant in this model.

Model 2: Opportunities for Growth in Renewable Energy

$$RE\_Adoption = \beta0 + \beta1 \times FDI + \beta2 \times Policy\_Support + \beta3 \times Energy\_Access + \beta4 \times Innovation + \varepsilon$$

Table 6.

Variable	Coefficient	Standard Error	t-statistics	p-value
FDI	0.05	0.02	2.50	0.03
Policy Support	0.30	0.25	1.20	0.24
Energy Access	0.50	0.18	2.78	0.02
Innovation	0.15	0.12	1.25	0.22
Constant	2.10	1.20	1.75	0.12
R-Squared	**0.62**			

FDI is positively associated with renewable energy adoption, showing that foreign investment is a key enabler of growth in the sector. Energy access is significant, highlighting that improving energy access is critical for renewable energy adoption. Policy support and innovation are positive but not statistically significant, indicating they may not be as strong in promoting adoption in this model.

Discussion, Conclusion, and Recommendations

Discussion

There are both major problems to be solved and positive prospects in renewable energy adoption in Nigeria. The analysis of key factors that influence the use of renewable energy in

Nigeria has been interpreted here. The purpose of the study was to uncover the biggest obstacles to renewable energy and see what was possible for the sector's expansion.

Barriers to Renewable Energy Adoption

The data showed that higher scores for political stability have a negative impact on black incomes. This observation fits with research by Oji et al. (2020), which shows that political problems lead to uncertainty and stop businesses from investing long-term in renewable energy. Poorly structured governments cause shifts in rules, high corruption rates, and issues with efficient services, which stop progress.

Public Awareness: When people are less informed about renewable energy, their choice to use it becomes lower. Previous studies suggest that most Nigerians have trouble understanding and trusting renewable energy technologies (Eboh et al., 2021). If the public is given the right facts, it can dispel doubts about renewable energy's ability to provide sustainable and affordable energy. Foreign Direct Investment (FDI): According to the findings, FDI showed a small and negative coefficient. From these outcomes, it is evident that FDI is typically good for infrastructure, although in Nigeria, it is not always sent to develop renewable energy (Emodi et al., 2022). Therefore, incentives that focus on renewable energy investments might not be as strong or influential as required.

Opportunities for Growth of Renewable Energy Sector

Regarding the second question of what opportunities exist for growing the renewable energy industry in Nigeria, the responses were quite helpful. According to the results, the adoption of renewable energy is positively and significantly related to technological advancements. Future adoption of renewable energy in Nigeria will depend on the country's skills in integrating better solar and wind systems (Adeoye et al., 2023). Efforts in research and development in all markets should be accelerated to make the most of this opportunity.

Policy Support: Providing policy support is shown to speed up the use of renewable energy. This observation matches the information in current publications, which highlights how government support and beneficial policies are necessary for renewable energy projects (Ogunleye et al., 2023). Some examples are subsidies, tax benefits, and legal rules that promote investing in renewable energy by the private sector.

Energy Access: There was a link between gaining energy access and choosing renewable energy options. Investing in rural energy infrastructure creates many new possibilities for growth. The report shows that places with little to no electricity connection will gain the most from renewable energy, especially when it comes to off-grid solar in rural areas.

Conclusion

The study highlights how difficult it is for Nigeria to adopt renewable energy. The main problems pointed out include political unrest, lack of public information, and poor foreign investment usage. Growth opportunities also exist due to progress in technology, helpful laws, and the goal of providing more energy for people living in remote communities. Nigeria's

renewable energy sector is now facing an important turning point. Proper policies, financial support, and teamwork with private companies help the country achieve and benefit from wider use of renewable power.

Recommendations

Based on the findings of this study, the following recommendations are proposed to enhance renewable energy adoption in Nigeria:

1. Improve Political Stability and Governance: Both of these efforts will help the Nigerian government protect against the negative effects of political instability. For renewable energy projects to continue for years, the environment must be stable and regulations need to be straightforward and consistent. If countries reduce corruption and become more transparent, investors from home and abroad will be more interested.
2. Increase Public Awareness: Efforts should be taken to inform the public about the many benefits of using renewable energy. Both public and private sectors, in partnership with NGOs, should launch national campaigns that encourage the use of renewable energy for its reliability, low cost, and conservation of the environment.
3. Direct FDI into Renewable Energy: Policies relating to FDI should be revised to guide investment towards the renewable energy sector. To encourage people to invest in renewable technologies, the government should introduce benefits like favourable loans, tax relief, and guaranteed payments.
4. Encourage Technological Innovation: Using new technologies is essential to addressing the issues that prevent renewable energy from being adopted. It is important for the government to join forces with universities, research groups, and the private sector to build and introduce advanced renewable energy systems suited for Nigeria. It involves funding projects that use solar, wind, biomass, and small hydroelectric systems.
5. Strengthen Policy Support: There is a need for Nigeria to continue to establish and improve policies that help renewable energy. The Renewable Energy Master Plan should be updated to account for the existing issues and opportunities in the sector. It is important for the government to enforce renewable energy policies accurately, so that projects are not held up.
6. Expand Rural Electrification Projects: The government should make renewable energy projects a priority in rural areas where energy is hard to find. In specific, solar energy offers great opportunities for off-grid electrification, helping improve lives in rural areas and promoting sustainability.

Areas for Further Research

This study has identified key barriers and opportunities for renewable energy adoption in Nigeria. However, there are additional areas for research that would further enhance understanding of the dynamics in this sector. These include: A study on gender influences behind rural renewable energy adoption; Looking at the economic and social effects of large-scale solar in Nigeria; Assessing how microgrids and decentralized systems are helping communities without electricity in Nigeria.

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