
GOVERNANCE OF NATURAL RESOURCES AND ENERGY TRANSITION IN LEAST DEVELOPED COUNTRIES (LDCs): LESSONS FOR NIGERIA

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Abstract

This study examined the governance of natural resources and energy transition in Least Developed Countries (LDCs), focusing on their alignment with the Sustainable Development Goals (SDGs). It aimed to assess current practices, challenges, and opportunities for improvement in resource management and energy transitions, with a focus on the lessons Nigeria can draw from the experiences of LDCs, as Nigeria faces the dual challenge of managing its abundant fossil fuel resources and transitioning to a more sustainable energy system. The study employs a qualitative method, using an exploratory documentary research method where exploration of documents, official data, journal publications, extant literature, and articles were consulted. The study adopted sustainable development theory as a theoretical guide. Findings reveal that while LDCs have made progress in managing natural resources and adopting renewable energy technologies, significant challenges persist, which include technical challenges, inadequate regulatory frameworks, financial constraints, and societal challenges. Effective international cooperation has been crucial in providing financial and technical support, yet there are gaps in alignment with local needs and inefficiencies in resource allocation. The study highlights successful practices that can be scaled and adapted in energy transition, emphasizing the importance of increasing investment in renewable energy, and how Nigeria can navigate in energy transition and natural resource governance in securing an economic future by contributing to global efforts and sustainable development.

Keywords: Renewable Energy, SDGs, LDCs, Energy Transition, and Natural Resource Governance

1. Introduction

The governance of natural resources and the transition to sustainable energy systems are pressing challenges for many developing nations, including Nigeria. The pursuit of energy transition is a critical issue for Least Developed Countries (LDCs), a group of nations characterized by low income, structural impediments to sustainable development, and high vulnerability to economic and environmental shocks. These countries are often rich in natural resources, such as minerals, fossil fuels, and forests, which have the potential to significantly contribute to their economic development. However, the management of these resources presents a range of challenges, including weak institutional framework, corruption, and conflicts over resource allocation.

At the same time, LDCs are facing increasing pressure to transition towards more sustainable and resilient energy systems. It is well known that the energy transition comes at a high financial cost for all economies, and those with higher financial resources may transit earlier and more easily (Eicke and Goldthau, 2021; Polzin and Sanders, 2020). The slow rate of the clean energy transition is strongly influenced by the difficulties in accessing finance. Finance is required for innovation, manufacturing, and building consumer infrastructure. There is a need to improve the governance of Africa's abundant natural resources, particularly by strengthening institutions and policy frameworks that will reduce the inherent risks and enhance revenue mobilization by providing opportunities to achieve the Sustainable Development Goals (Agenda 2030) through increased investment, employment, and poverty reduction. This emphasizes the need for the role of the state in long-term development planning as a tool for good governance of natural resources. This will also bring about diversification and structural transformation and reforms that will promote social inclusion, curb corruption, and enrich the environment through good governance. African countries will also see the need to build strong and effective institutions for sound planning, development, and implementation of effective strategies to manage their natural resources. These strategies must include industrial policies that foster regulatory frameworks like implementing carbon pricing, subsidies for renewables, etc. There should also be public-private collaborations and partnerships that will encourage collaborations between governments, businesses, and investors. Therefore a well-structured governance framework for managing natural resources and guiding energy transition is essential for achieving long-term sustainability. However, the global energy transition presents both opportunities and challenges for LDCs, as they navigate the complexities of phasing out fossil fuels while ensuring economic stability and social equity. Nigeria on the other hand, has key lessons to learn in navigating through energy transition and resource governance.

1.1.Statement of Problems

The governance of natural resources and energy transition in Least Developed Countries (LDCs) presents significant challenges that hinder sustainable development. Nigeria on the other hand has lessons to learn as a country with rich resources, and facing similar challenges. These problems below impede the progress of transitioning to cleaner energy sources.

The issue of weak institutional framework and the inability to access green technologies in many LDCs has led to inadequacies in harnessing renewable energy potentials.

Over-dependence on fossil fuels is an issue that has made the transition to renewable energy slow and difficult in most LDCs. When there is no clear or well-implemented energy transition roadmap it hampers efforts towards sustainability.

In fostering a positive climate change and an eco-friendly environment there is a need for effective utilization of the abundant natural resources, this is to ensure that the considerable resource endowment generates renewable energy for a more sustainable ecosystem for the people in LDCS.

1.2.Objectives of the Study

The broad objective of this study is to critically examine the natural resource management and the transition to renewable energy in LDCS, deducing lessons for Nigeria in its alignment with the Sustainable Development Goals (SDGs).

While the specific objectives are:

1. To ascertain how institutional frameworks and access to green technology contribute to the transition to renewable energy in LDCs.
2. To ascertain the potential of renewable energy over fossil fuel in alignment with the Sustainable Development Goals (SDGs).

2. Literature Review

2.1 Conceptual Clarification

2.1.1 Renewable Energy and Clean Energy

Renewable Energy as defined by the United Nations is energy derived naturally over time, through continuously replenishing processes like sunlight and wind. This category includes solar power, wind energy, hydroelectricity, and geothermal power, known for their sustainability.

While Clean Energy is the generation of energy that does not produce greenhouse gas emissions, it also includes technologies like carbon capture, which although not renewable, significantly reduce emissions.

2.1.2 Sustainable Development Goals (SDGs)

Sustainable Development Goal 7 (SDG7) calls for “affordable, reliable. sustainable and modern energy for all” by 2030. It’s these three core targets are the foundation that drives the below targets by the UN.

- By 2030, ensure universal access to affordable, reliable, and modern energy services.
- By 2030, increase substantially the share of renewable energy in the global energy mix.
- By 2030, double the global rate of improvement in energy efficiency.
- By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency, and advanced and cleaner fossil-fuel technology and promote investment in energy infrastructure and clean energy technology.
- By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular Least Developed Countries (LDCs), Small Island Developing States, and Land-Locked

developing Countries, by their respective programmes of support, **Source:** (UN, SDG7).

2.1.3 Least Developed Countries (LDCs)

LDCs are a category of countries recognized by the United Nations as having the lowest indicators of socio-economic development. These countries typically have low income per capita, weak human assets (like health and education), and high economic vulnerability.

2.1.4 Energy Transition

Energy transition refers to the global shift from fossil-based energy systems (like coal, oil, and natural gas) to renewable energy sources (such as solar, wind, and hydropower), driven by the need to reduce carbon emissions and combat climate change.

Key Drivers of Energy Transition:

- **Climate Change Mitigation:** Reducing greenhouse gas emissions to limit global warming and its associated impacts.
- **Energy Security:** Reducing reliance on imported fossil fuels and diversifying energy sources to enhance stability and independence.
- **Economic Development:** Creating new industries and jobs in the renewable energy sector can be particularly beneficial for LDCs.

2.1.5 Natural Resource Governance

The governance of natural resources refers to the policies, institutions, and practices that determine how a country or region manages its natural wealth. According to Fukuyama (2013), governance is the ability to create, enforce and deliver services. (Nwosu, Dike & Ananti, 2024) posited that the performing agency that carries out the wishes of the masses ensures progress and sustainability in the best possible way, thereby creating effective governance in ensuring that resources are used sustainably, equitably, and transparently to benefit the present and future generation. In the discharge of tasks, the public service emerges as the main machinery of government, strengthening institutions, promoting transparency, and ensuring community participation in fostering governance (Nwosu & Ananti, 2024). The key elements of resource governance rely on effective legal and institutional frameworks because strong institutions ensure compliance and enforcement of regulations; these integrate renewable energy into governance strategies that support sustainability.

2.2. What Are Least Developed Countries?

The United Nations designated 44 nations as the current least developed countries (LDCs) entitling them to preferential market access, aid, special technical assistance, and capacity-building on technology among other concessions.

These 44 LDCs are distributed among the following regions:

1. **Africa (32):** Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Somalia, South Sudan, Sudan, Togo, Uganda, United Republic of Tanzania and Zambia
2. **Asia (8):** Afghanistan, Bangladesh, Cambodia, Lao People's Democratic Republic, Myanmar, Nepal, Timor-Leste and Yemen

3. Caribbean (1): Haiti

4. Pacific (3): Kiribati, Solomon Islands and Tuvalu

The United Nations Economic and Social Council reviews the list of LDCs every three years in light of the recommendation by the Committee for Development Policy (CDP), which uses the following three criteria by the CDP to determine LDC status.

- Per Capita Income (Gross National Income Per Capita)
- Human Assets (Indicators of nutrition, health, school enrolment and literacy)
- Economic Vulnerability (Indicators of natural and trade-related shocks, physical and economic exposure to shocks, smallness and remoteness)

The next triennial review is scheduled to take place in 2027. The CDP is bound to apply the above criteria and the thresholds for inclusion into the LDC category or graduation from the category of LDC.

To graduate from the LDC category a country must meet the established graduation thresholds of at least two of the criteria for two consecutive triennial reviews. Countries that are highly vulnerable, or have very low human assets are eligible for graduation only if they meet the other two criteria by a sufficiently high margin. As an exception, a country whose Per Capita Income is sustainably above the "income-only" graduation threshold, set at three times the graduation threshold (\$3,918), becomes eligible for graduation even if it fails to meet the other two criteria (unctad.org).

2.2.1 Challenges faced by LDCS in transition to Renewable Energy

The rapid growth in technologies for renewable energy has contributed to the development of several green technologies that are widely used globally. Many of these technologies are not produced within LDCs, as these countries rely heavily on imports, so to have access to green technologies it has to be imported with associated components. LDCs need these green technologies to transition to clean energy and help mitigate climate change. Trade and investment can facilitate access to these technologies via the exchange of equipment, machinery, and knowledge, yet LDCs find it difficult to access these technologies through these channels. Transitioning to clean energy can be costly and the LDCs lack the financial capability and human resources to upgrade networks and integrate various renewable energy sources. New Technologies require battery and long-duration energy storage in harnessing offshore wind and green hydrogen which does not come cheap, hindering access to these technologies (Zhuanu and Garg, 2023).

The situation in LDCs is worsened by their lack of institutional framework, poor environmental policies, shortage of skilled manpower, and limited finance in implementing and enforcing policy measures related to accessing these green technologies (WTO, 2005). Moreover, it is difficult to obtain finance for climate-related technology in LDCs due to uncertainty and risks that are not easy to mitigate in private finance markets, poor creditworthiness, lack of guarantees, and limited capital for public investments.

2.2.2 Promoting Access to Green Technology and Institution Framework for Renewable Energy in LDCs

The United Nation's Doha Programme of Action (DPoA), which runs from 2022-2031, includes commitments to help LDCs build their technological capacity and accelerate their development of renewable energy systems. The DPoA emphasizes the importance of the role of the United Nations Technology Bank for LDCs as a focal point to strengthen the Science, Technology, and Innovation (STI) capacity in the world's poorest countries. The work of the Technology Bank, which began operations in 2018, is to focus on enhancing the contribution of STI to sustainable development in LDCs; it fosters international research collaboration and capacity development initiatives to stimulate the production of high-quality research in LDCs. The Technology Bank also supports LDCs to undertake technology needs assessments to identify technological solutions to address their development challenges.

Other major networks and initiatives also play a vital role in supporting the renewable energy technology needs of the LDCs for instance, the Climate Technology Centre and Network (CTCN) established by the United Nations Framework Convention on Climate Change (UNFCCC) in 2011, serves as the implementation arm of the Technology mechanism of the UN, providing technology solutions, capacity building and advice on policy, legal and regulatory framework tailored to the needs of individual countries. The CTCN has been instrumental in the support of LDCs in their energy transitions, for instance in 2015, it facilitated technical assistance to Uganda to formulate a geothermal energy policy and legal and regulatory framework, and to Tanzania to promote the sustainable use of solar photovoltaic technology.

A strong institutional framework is crucial for LDCs to successfully transition to renewable energy. It provides the legal, regulatory, and organizational structure needed to attract investment, ensure policy continuity, and drive effective implementation of renewable energy projects. There are key challenges in institutional framework development, these challenges are: weak enforcement of policies, policy inconsistency, bureaucratic inefficiencies, and limited funding. These challenges can be cautioned through setting clear renewable energy targets, such as net-zero targets, and enforcing effective laws that will regulate energy generate, distribute, and monitor the consumption of energy while ensuring fair competition and sustainability. Attracting private investments and government seeking access to climate finance by establishing frameworks to access international funding sources, such as the Green Climate Fund and funds from Development Banks will help in their transition. A robust institutional framework is essential for overcoming governance-related barriers, it strengthens laws, improves coordination, attracts investments, and promotes capacity building through research and development. LDCs can create a stable environment that accelerates clean energy adoption.

2.2.3 The Potential of Renewable Energy over Fossil Fuel

Sustainable energy practices, policies, and technologies offer numerous economic benefits, including cost savings, job creation, and increased competitiveness. The adoption of renewable energy sources can reduce dependence on fossil fuels, which are susceptible to price volatility and supply disruptions. According to the 2020 International Renewable Energy Agency (IRENA) report, around the world, there are around 11.5 million green-collar workers, half a million more compared with 2018. These professions are concentrated predominantly in China, the United States, and the European Union, with prevalence in the

renewable energy sector: the majority of workers are employed in photovoltaic (33% of the total, or around 3 million people), in particular in Asia, where two-third of green-collar workers can be found. According to the Global Renewable Outlook 2020, which was also published by IRENA, the renewable energy sector alone will produce 42 million jobs by 2050, nearly four times as many as today.

Businesses that adopt sustainable energy practices and technologies can reduce energy costs, enhance their reputation, and meet the growing demand for sustainable products and services, leading to increased market share and profitability, (Bulaveskaya and Reynes, 2018; Osorio-Aravena et al., 2021; Dong et al., 2022; Wang et al., 2023). The shift towards a sustainable energy future can have a positive impact on public health by decreasing air pollution, which has severe health consequences.

For instance in Nigeria, the energy transition represents a shift from a fossil fuel-dependent economy to one that integrates more renewable and sustainable energy sources. Given Nigeria's vast oil and gas reserves, this transition presents great opportunities. For economic diversity, transitioning to renewable energy could help diversify the economy, and will reduce heavy dependency on crude oil, by creating new green industries and jobs. The continent has the highest number of people without access to electricity globally; the World Bank and the African Development Bank (AFDB) launched "Mission 300" which is the race to connect homes to power by 2030. The push aims to unlock at least \$90 billion in capital from multilateral development banks, development agencies, finance institutions, private businesses, and philanthropies, according to the Rockefeller Foundation Nigeria, Senegal, Zambia, and Tanzania were among a dozen countries that are committed to reform their electricity utility companies, push renewable energy integration and raise national electricity connection targets. Providing 300 million people with access to electricity is a crucial building block for boosting Africa's development by creating new jobs (Reuters.com).

By leveraging local renewable resources, LDCs can reduce reliance on imported fuels, enhancing energy security and economic stability. Decentralized renewable energy systems (solar mini-grids, solar home systems, small hydro) can electrify rural areas without the need for large-scale grid infrastructure. This improves access to education, healthcare, and economic opportunities. Solar and wind energy help reduce carbon footprint and build resilience against climate change, which disproportionately affects the LDCs. Renewable energy offers a transformative opportunity for LDCs and the continent to achieve sustainable development, energy security, and economic growth. While fossil fuels may still play a role in the short term, investing in renewable energy is a more sustainable and cost-effective pathway for long-term prosperity.

2.2.4 What Does The Energy Transition Mean For Nigeria?

For climate commitment and global standing, Nigeria has committed to achieving net-zero emissions by 2060. The energy transition aligns with its climate commitments under the Paris Agreement and enhances its global reputation in sustainable and green finance.

The National Renewable Energy and Energy Efficiency Policy (NREEP) is a pivotal framework established by the Nigerian government in May 2015 to advance the adoption of renewable energy and enhance energy efficiency across the nation. The policy aligns with regional commitments notably the ECOWAS Renewable Energy Policy (EREP) and the ECOWAS Energy Efficiency Policy (EEEP).

Energy Market and Rates Consultants (EMRC) 2024, stated in its report that Nigeria's energy transition represents the country's effort to shift towards more sustainable and cleaner energy sources, to become carbon neutral by 2060. Following the Paris Agreement, Nigeria submitted its first Nationally Determined Contribution (NDC) in 2015 and a revised version in 2021. An NDC is a country's target to help reduce emissions and adapt to climate change. Each country is required to submit its NDC and update it every five years. According to the World Economic Forum, Nigeria ranks 108th out of 120 nations on the Energy Transition Index (ETI). The ETI is a tool for the global energy community to monitor the performance of energy systems at the national level over the last decades, Nigeria's overall ETI score has increased by three percent, but system performance scores have decreased by one percent. In August 2022, the Federal Government of Nigeria released its Energy Transition Plan (ETP) based on the Paris Agreement. The plan aims to address both energy poverty and climate change problems. According to (the EMRC report, 2024) the ETP outlines the energy transition pathways in major sectors of the country's economy which account for 65 percent of total emissions. The ETP is primarily placed on the following key objectives;

- To eradicate poverty for over 100 million people through an increase in the standard of living.
- To drive sustainable economic growth in the key domestic commercial sectors.
- To provide universal electricity access to the entire population.
- To mobilize investments and private sector participation by creating significant market opportunities in the energy transition process.

Nigeria can significantly reduce its greenhouse gas emissions and accelerate the transition towards a low-carbon economy by strengthening climate governance and policy framework. Integrating sustainable practices into industries such as agriculture and transportation, can further contribute to Nigeria's transition to climate goals. Investing in clean energy technologies will attract foreign investments and promote sustainable economic growth, positioning Nigeria as a global leader in the green energy market. Looking at the policy framework and climate governance channeled by the Nigerian government in the transition to a low-carbon economy, it shows the progress towards the proposed Zero Net by 2060, several factors influence the scenario in accelerating towards the proposed Zero Net by 2060. The availability of funding and investments in renewable energy projects, and effective education and training programs for skilled workforce in the green sector plays a crucial role in expediting Nigeria's transition towards achieving its net zero goals (Nwokolo, Singh, Khan, Kumar & Luthra, 2023).

2.2.5 Lessons for Nigeria in Navigating Energy Transition and Natural Resource Governance

a. Strengthening Governance, Environmental Regulations and Climate Commitments
Building strong governance structures: by enhancing governance structures, such as establishing clear roles, and responsibilities among relevant stakeholders, Nigeria can ensure effective and well-coordinated climate policies and implementation processes. Nigeria should prioritize the development and implementation of policies and strategies that promote renewable energy sources, to reduce greenhouse gas emissions and enhance resilience to environmental sustainability (Nwokolo, Meyer, Ahia, 2023).

In strengthening environmental regulations and climate commitment, there should be a proper waste management system in Nigeria. The Nigerian government has been implementing various strategies to enhance waste management systems. One such initiative is the

establishment of waste-to-energy plants, which convert organic waste into electricity. For instance, the Odogbolu integrated waste management facility in Ogun state utilizes anaerobic digestion technology to generate biogas, which is then used to produce electricity, (Nwokolo Meyer, Ahia, 2023). This helps in reducing the amount of waste that ends up in landfills and also provides a sustainable source of energy. Through proper waste management, the government can minimize the release of methane from landfills by promoting recycling and composting which enhances an eco-friendly environment. By doing these, a circular economy is created, which focuses on reducing, reusing, and recycling waste materials which is also a way of creating job opportunities.

Through environmental regulations, deforestation will be mitigated, which is a negative impact of climate change. Nigeria can safeguard the well-being of its citizens and contribute to a healthier and more sustainable environment through proper sanitation, a study conducted by Umegbolu and Offor (2017) found that in rural communities in Nigeria, water sources such as wells and boreholes get contaminated with fecal coliforms, leading to outbreaks of waterborne diseases, therefore there is a need for an improved waste management practice for positive climate change.

b. Diversifying the Economy

Reduce Oil Dependency: Nigeria's economy is heavily reliant on oil exports, making it vulnerable to price shocks. Diversification into sectors such as agriculture, manufacturing, and services, as well as investment in renewable energy, is crucial.

Promote Renewable Energy: Encourage investment in renewable energy sources like solar, wind, and hydro to diversify the energy mix and reduce reliance on fossil fuels. This also opens up new economic opportunities and job creation in the green energy sector.

c. Ensuring Inclusive Governance

Community Involvement: Ensure that local communities, particularly those in oil-producing regions, are involved in decision-making processes regarding resource extraction and energy projects. This can help reduce conflicts and ensure that benefits are shared equitably.

Equitable Distribution of Resources: Implement policies that ensure that revenues from natural resources are used to benefit the entire population, particularly in regions that have historically been marginalized (Udodiugwu, Nwosu, Obiakor & Nwumeh, 2024).

d. Leveraging International Support and Partnerships

Seek International Partnerships: Nigeria should leverage international partnerships and financial mechanisms, such as the Green Climate Fund, to support its energy transition efforts. Collaborations with international organizations can provide the necessary technical expertise and funding. International collaboration is a crucial aspect of Nigeria's foreign policy. It allows the country to actively participate in global initiatives and address various challenges that require collective action. For instance, Nigeria has been actively involved in international agreements such as the Paris Agreement on climate change, where it has committed to reducing greenhouse gas emissions by 20% by 2030 (Nwokolo, Ogbulezie & Ushie, 2023).

By working together with other international partners on a global scale, countries can share knowledge, resources, and technologies to accelerate the transition towards a low-carbon economy. International agreements play a vital role in ensuring a framework for commitment, transparency and responsibility from all nations towards militating against climate change.

The Paris Agreement also establishes a robust transparency framework that helps to hold countries accountable in ensuring they have taken meaningful steps towards climate change. Additionally, the Paris Agreement provides financial support to developing countries like Nigeria to help them transition to a low-carbon economy and build resilience against climate impacts. The collaborative efforts foster innovation and knowledge sharing, as nations can learn from each other's successes and failures in tackling issues in the transition to renewable energy, also through collaborations Nigeria can leverage its resources and expertise to implement large-scale initiatives that have a greater chance of success in the transition to renewable energy, increasing their chances of achieving long-term sustainability goals and protecting future generations from the detrimental effects of greenhouse gases.

Engaging in South-South Cooperation (SSC), Nigeria can also engage in South-South cooperation to learn from other developing countries that have successfully implemented energy transition reforms. The South-South collaboration is a framework for development collaboration among developing countries, which focuses on the exchange of knowledge, experiences, and resources to address common challenges in the promotion of sustainable development. One of the key benefits of SSC is its potential to enhance Nigeria's economic growth through self-reliance and increased trade with other southern countries. By engaging in SSC, Nigeria can strengthen its economy on larger economies and connect more deeply with regional and global markets; this opens new avenues for technology exchange and innovation, especially in the transition to low-carbon energy. Nigeria can learn from these developing nations, thereby helping her facilitate quicker and in making a more equitable distribution of resources in the transition to renewable energy.

Environmental protection is another critical area where SSC plays a significant role, especially for Nigeria, which grapples with deforestation, pollution, and climate change, by sharing eco-friendly strategies and green technologies with other nations, Nigeria can better address their pressing environmental challenges. Established in 1974, the United Nations Office for South-South Cooperation (UNOSSC) supports collaboration among developing countries and within the UN system. It fosters a strong relationship with developing nations, enhancing political partnerships among developing nations, which Nigeria and its Southern counterparts can utilize through attaining a fairer international policy and driving changes in global governance and eco-friendly environment that impact sustainable development.

e. Supporting Research and Development of Renewable Energy Technologies in Nigeria

According to a report by the International Renewable Energy Agency (IRENA), Nigeria has made significant progress in supporting Research and Development (R&D) of renewable energy technologies. Nigeria has witnessed a steady increase in investments in renewable energy, with 5% growth recorded in 2019 alone. Furthermore, the Nigerian government has established various initiatives and policies to promote clean energy innovation, such as the Renewable Energy Master Plan and the Nigerian Electricity Regulatory Commission's feed-in Tariff program (Ijiwole, 2019). This initiative is aimed at attracting both domestic and international investments in the clean energy sector and also creating a conducive environment for research and development in Nigeria. Research and Development can help in addressing issues faced by Nigeria in transitioning to a low-carbon economy by leveraging its abundant renewable resources like hydropower, solar, and wind. According to a study conducted by the Nigerian Electricity Regulatory Commission (NERC), solar, wind and hydropower have shown significant potential in Nigeria. A report by IRENA states that

Nigeria has the potential to generate over 3000 megawatts of electricity from solar power. World Bank highlighted in a report that Nigeria has biomass resources, including agricultural waste and forestry residues, which can be converted into bioenergy, which could provide a sustainable and reliable source of energy for rural communities and contribute greatly to the reduction of greenhouse gas emissions.

2.3 Theoretical Framework

This study adopts Sustainable Development Theory as its theoretical framework because it provides a framework for understanding how Least Developed Countries (LDCs) can balance economic growth, environmental protection, and social well-being while managing natural resources and transitioning to renewable energy.

Application: This theory can be used in curbing environmental degradation, for instance in Nigeria, the reliance on fossil fuels has led to pollution, deforestation and loss of biodiversity. Applying this theory helps pave way for a shift towards an eco-friendly environment.

The theory has strong indices for strong governance, effective policies, international collaborations, and institutional accountability in achieving sustainability. The energy transition efforts in LDCs have been hindered by weak institutions and policy inconsistencies. The theory emphasizes the need for the government to have strong reforms and policy coherence in driving efficient natural resource management and successful energy transition strategies.

Relevance to Nigeria: This model provides a holistic approach to analyzing the governance of natural resources and energy transition, by highlighting on the need for a balanced strategy that ensures economic development, environmental protection, and social equity, which makes a strong foundation for assessing policy effectiveness and governance challenges in Nigeria.

3. Methodology

The research design used was qualitative. The data were collected using secondary data collection, in which a thorough review of academic articles, books, and reports related to natural resource governance and renewable energy were consulted. This study applied a thematic approach for clarity in understanding the concepts and approaches related to the frameworks and adaptation of an eco-friendly system which imbibes a green finance approach aimed at promoting positive environmental outcomes and a low-carbon economy. The study adopted Sustainable Development Theory as its theoretical framework. The theory provides a holistic approach to analyzing the governance of natural resource and energy transition, and for assessing policy effectiveness and challenges common in energy transition in developing countries like Nigeria and the LDCs.

4. Discussion of Findings

Findings reveal that while LDCs have made progress in managing natural resources and adopting renewable energy technologies, significant challenges persist. Some LDCs have begun to take policy measures to enable them to transition to clean energy by utilizing their considerable resource endowments to generate renewable energy like hydroelectricity, solar energy, and biomass energy (de Klerk, Balchin, Zhuawu, 2024), but the issues affecting

access to green technology in LDCs are complex, though the LDCs need to access the necessary technology to harness their renewable energy potential, there is no simple answer to how this should be realized in practice. There is a need for LDCs to consider every option that can drive international partners and other developing or developed countries to partner with them in pursuing an environmental policy that encourages the transfer of technology from their developed counterparts to them, this will help them achieve environmental policy objectives. This will also help ease the financial burden involved in purchasing green technologies.

From the findings, there is also a need for effective reforms that will drive institutional frameworks, diversifying energy sources, improving access to finance and promoting decentralized energy solutions. The LDCs should consider ways to encourage the movement of scientists, technologists, and technicians under the WTO's general Agreement on Trade in services to facilitate their access to technology (WTO, 2005).

The findings reveal that governance failures, financial barriers, and policy inconsistencies are major obstacles to the LDCs, however, there is need to demonstrate strong institutions, clear policies, and investment-friendly regulations in order to accelerate the shift to renewable energy.

The study went further to identify opportunities for Nigeria's energy transition, which includes: abundant renewable resources (solar, wind, and hydro) that remains underutilized, growing international interest in Africa's renewable energy sector which presents opportunities for investments and potential for job creation in the renewable energy industry, contributing to economic growth and sustainability.

5. Conclusion

The governance of natural resources and the transition to sustainable energy systems are pressing challenges for many developing countries, including Nigeria. The pursuit of energy transition is a crucial issue for LDCs. From the findings strong institutions, clear policies and investment-friendly regulations can help battle governance failures, financial barriers and policy inconsistencies experienced by the LDCs in transitioning to renewable energy. Nigeria however, stands at a pivotal moment in its history, where the need to transition from a fossil fuel-dependent economy to a sustainable energy future is more urgent than ever. As global pressures mount to address climate change, the ability of LDCs to adapt and innovate will determine their future economic resilience and development trajectory.

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