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Energy security, the Imperative to National Development

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Abstract
Energy plays a paradoxical role in the development of any nation-state. Access to abundant, affordable, secure, safe, and clean energy benefits nation-states. Most importantly, energy is a vital driver of development, as it is required for agriculture, transportation, information and communication technologies, power generation, and, ultimately, industry. Nonetheless, the increased use of energy has resulted in global warming, and hence climate change, which is the primary cause of flooding, draughts, unexpected rains, and wildfires, among other things. Energy extraction, transportation, and consumption or utilization is detrimental to most countries' security, economy, and ecology. Worse, the detrimental effects of the energy that impoverished and marginalized countries either create or use have had disastrous consequences. This is due to their inability or limited capacity to implement mitigation and adaptation strategies to address the growing energy-related dangers to their development. Despite its energy crises, Nigeria, a developing country, has its share of energy consequences. Also, despite its enormous energy reserves, the country is yet to produce enough clean energy for national development, hence the need for energy security while dealing with significant energy-related negative repercussions. To explicate the relationships between energy and development in Nigeria, this article used content analysis. The paper illustrated that Nigeria is vulnerable to the harmful effects of energy, and stated that energy is an unavoidable evil that can be condoned, where its benefit can be utilized than its drawbacks.

Keywords: Energy security, Industrialization, National Development, Agriculture, Global Warming

Introduction

Energy (fossil fuel) is a major driver to national development in most countries in the contemporary international system, particularly developed world. This is because it plays the most vital role in the economic growth, progress, and development, as well as poverty eradication and security of any nation. Uninterrupted energy supply is a vital issue for all countries today (Khatib, 2000; Cherp and Jewell 2014). However, rising energy usage - energy extraction, transportation and consumption are threat to economics, and environment of most countries. The result of abusive usage of the energy include among others flooding, draughts, unexpected showers, and wildfires, also affecting development of countries (Shahzada, Nawaz, and Alvi, 2018; McDowell, 2020).

Nigeria as an independent state is faced with the ineffectiveness of the energy operations and non-capabilities to provide and sustain the country's energy need remain a nightmare for national development. For several decades, energy crisis has contributed to the incidence of poverty by paralyzing industrial and commercial activities (Akubo and Maduagwu 2021; Ajao, *et al* 2021). The continuous loss and underutilization of energy has cost the country more than 126 billion naira on one hand, on the other hand has also resulted in health hazards due to the exposure to carbon emissions caused by constant use of 'backyard generators' in different households and business enterprises, unemployment, and high cost of living leading to a deterioration of living conditions (Dike, 2020; McDowell, 2020).

More so, the production, transportation, and utilization of energy within and outside the country may impede Nigeria's growth and development, as it is clear that energy extraction, particularly non-renewable energy, contributes to the annual incidence of climate change that the country faces. These occurrences include drought and famine in the country's northern parts, as well as floods and heavy rains in the south (Nwozor, Oshewolo, and Ogundele, 2019; Abdallah and Odeleke 2023). The impact of climate change is devastating and recorded more humanitarian crisis in recent years in the country.

These pose a significant threat to Nigeria's development, despite its energy reserves. The country is yet to fully benefit from its energy to drive development, with energy production and distribution adversely harming the country's development. As a result, energy security is critical, as are the best techniques for adapting to and mitigating the effects of climate change. The security of energy is premised on the availability of the amount of energy required to sustain people's lives and daily activities while also ensuring its affordability and avoiding its consequence (Isah Dahiru, and Aminu, 2018; Nwokike 2022). The security provides and sustains the basics of human needs, helping a country's economic growth, political stability, and the overall development and security of other industries like agriculture and manufacturing (Shahzada Nawaz and Alvi 2018; Magazzino, Drago and Schneider 2023). It against this background, this study explicated the relation between energy security and national development in Nigeria.

Conceptual Clarification

Energy Security

The International Energy Agency (2015) defined energy security as the uninterrupted

availability of energy sources at an affordable price. Cherp and Jewell (2014) considered the security of energy to as “low vulnerability of vital energy systems”, while Winzer (2012) averred that energy security is the continuity of energy supplies relative to energy demand. More so, Andrews (2005) maintained that energy security is assuring adequate, reliable supplies of energy at reasonable prices and in ways that do not jeopardize major national values and objectives.

In addition, Intharak et al. (2007), argued that energy security as the ability of an economy to guarantee the availability of energy supply in a sustainable and timely manner with the energy price being at a level that will not adversely affect economic performance. The argument incorporates three fundamental aspects - physical energy security, which is the availability and accessibility of energy supply sources; economic energy security, which is the affordability of resource acquisition and energy infrastructure development; and environmental sustainability, which entails using energy resources in ways that meet current needs without jeopardizing future generations' ability to meet their own needs (Intharak et al; 2007).

Moreover, energy can be renewable or non-renewable (Khatib, 2000; Festus and Ogoegbunam, 2015). Once used, a renewable natural resource can be renewed or replenished in a reasonable amount of time (in years or a human life span). Renewable energy is generated from natural sources (such as the sun, wind, rain, tides, and vegetation) and can be generated repeatedly as needed. It is replenished naturally in most cases. However, a non-renewable energy is one that was created under specific conditions (for example, fossilized plant matter converting into coal) and takes many generations to reproduce. Because the conditions are not likely to reoccur, they are limited in supply and, once used, cannot be regenerated in a short period of time. Non-renewable sources exist in the form of natural gas, oil, and coal (Khatib, 2000; Festus and Ogoegbunam, 2015).

National Development

Sen (1999) define development as a process of increasing people's freedoms from hunger, including freedom from poverty and ignorance. Furthermore, according to Gboyega (2003) development is defined as sincere efforts to enhance the conditions of human existence in all of its forms. The dynamic changes of some key aspects, such as economic, administrative, political, social, cultural, religious, and living standards of individuals in a given society, are referred to as development (Olalere, 2021). These criteria imply that for development to take place, there must be a thorough improvement in material wellbeing of human conditions, whether social, political, or economic, as well as good health, education, and other societal sectors.

National development can thus be defined as a nation's overall development or collective socioeconomic, political, and religious advancement. This is best accomplished through development planning, which can be defined as the government's collection of strategies (Lawal and Oluwatoyin, 2011). According to Idike (2014), national development refers to nationwide development within a nation-state. It implies the material well-being of a hidden majority of citizens, as well as a reduction in inequality levels. National development can be

described as a nation's overall development or collective socioeconomic, political, and religious advancement. This is best accomplished through development planning, which can be defined as the country's collection of government-mapped out strategies (Nwapi, 2018).

Energy, Energy Security in Nigeria

Nigeria is blessed with enough energy resources to meet its current and future developmental needs. The country is among the world largest crude oil reserve, with an estimated 35 billion barrels of recoverable oil. It also has a significant amount of coal and natural gas, estimated at 2.7 billion tonnes of coal and 187 trillion cubic meters of natural gas, respectively (National Energy Master Plan, 2007; Chukwuemeka et al (2023).

The country's hydroelectric potential must not be overlooked. Small-scale hydropower potentials in Nigeria have been estimated to be around 734.2MW across seven river basins (Sokoto, River Niger, Hadejia-Jama're, Chad, Upper Benue, Lower Benue, and Cross River). The country's exceptional exploitable hydro potential is 12,220MW (Manoha and Adeyanju, 2009). The total exploitable wind energy reserve is located at a height of 10 meters and ranges from 8MWh/yr in Yola to 51MWh/yr in the Jos plateau areas and 97MWh/yr in Sokoto (Sambo, 2005). These figures are strong indicators for wind energy potential. Biomass resource in Nigeria is approximately 144 million tonnes per year with a consumption rate of about 43.4×10^9 Kg of fuel-wood annually and average daily consumption of about 0.5 to 1.0 kg of dry fuel-wood per person. It makes up 37 percent of total energy demand and it is popular in the rural communities (Akin, 2008; Ajao et al., 2009). Nevertheless, the country is struggling to meet its energy needs for developmental goals.

Furthermore, the extraction, distribution, and consumption of especially non-renewable energy are among the key sources of environmental pollution, globally. Extant literature has proved that non-renewable energy coal, fossil fuel-based energy are the primary sources of carbon dioxide and other greenhouse gas emissions, causing global warming and changing the climate condition (Festus and Ogoegbunam, 2015; Chukwuemeka, Ogbonna and Nwachi 2023). Climate change is directly link weather event such as floods, droughts, and heat waves, among others, that are destructive to countries' development.

Developing countries such as Nigeria are important climate change hotspots. Their rapidly rising population, poor agricultural methods, skyrocketing energy consumption, and disregard for the environment are to blame for the unusual scenario. There are definitely ramifications for energy generating and exporting countries like Nigeria, where there are various sources of greenhouse gas emissions. Furthermore, Poor domestic policies that favour poorly targeted subsidies, and limited transportation connectivity across the country all limit the extent and speed with which energy trade can take place between energy-surplus and energy-deficient regions of the country.

Extraction of crude oil, natural gas, and coal has been higher than their respective use, whereas the overall total primary energy supply is more than twice the amount of primary energy used. As Dike (2020) argues that the state of energy mix in Nigeria is heavily dependent on crude oil for energy generation and this has slowed down the development of other alternative forms

of energy. Several efforts made by successful government to bail Nigeria out of energy crisis has not yielded the desire results as more inhabitants mostly the rural dwellers have little or no access to electricity and many interior villages are yet to be connected to the national grid. Amiesa *et al*. (2019) assert that energy insecurity has a direct and negative impact on all sectors of the economy. Presently, there is a sharp decline in economic activities trends in some states of the country with high energy insecurity. Another implication of energy insecurity is that Nigeria might become an importer of crude oil between 2030 and 2035 as the country economy, industrial activities and population grows (Amiesa *et al*. 2019).

Unhealthy political opposition, saboteurs, and activities of terrorists in several part of the country are other agents frustrating the development of energy sector in Nigeria. Also, the domination of oil and gas downstream sectors by cartels that manipulate the prices through artificial supply restriction cannot be overruled as a clog to the wheel of energy development in Nigeria. In the work of Okeke et al., (2014), the elitist dimension to energy insecurity were discussed. Based on their findings, one of the critical challenges to energy security in Nigeria is the lack of clarity in policy objectives and strategies which hardly galvanize the citizenry into actions.

Furthermore, the Russian-Ukraine war has also jeopardized the energy security in the world. Russia is one of the major suppliers of world petrol and natural gas, their crisis with Ukraine created challenges that reduced the supply of energy to the world. Countries, especially in Europe including United States that relied on natural gas and petroleum are currently facing the challenges of energy security. European Union (2022) has alleged that Europe is facing an energy crisis resulting from Russian's war on Ukraine. And that energy prices are surging in the countries of Europe as Russian curtails fossils fuel export with the aim pressing the union to reduce its support for Ukraine (European Union, 2022). In Africa, most of the countries are affected that resulted into increasing inflation. Nigeria is not insulated from the effect of the war; the increasing price of fossil fuels in the world has affected economic activities in the country (Magazzino, Drago, and Schneider, 2023).

In addition, climate change is another factor engendering energy security (Ajao *et al* 2021). The incidence of climate change such as flood, hot temperature among others is a direct consequence of continuous production fossils fuels thus, energy, especially non-renewable energy. These incidences are threatening the existence of livelihood in the world; hence the need to reduce the exploration becomes paramount.

Energy Security and National Development

The importance of energy security is rising on the global agenda as more people recognize its role in the development of every country. The United Nations adopted the new Sustainable Development Goals on September 25, 2015, with "ensuring access to affordable, reliable, sustainable, and modern energy for all" as a goal to be achieved by 2030 (UN, 2015). This goal is critical because fossil fuels (non-renewable energy) are already in the increase and resulting to global warming which threatens national development.

For a country like Nigeria's national development, which includes both socioeconomic and political development, an efficient and secure energy sector that is affordable and accessible to a larger percentage of the population is essential. For example, the renewable energy in the country is very important at this stage. The annual average daily sunshine in Nigeria is 6.25 hours, ranging from 3.5 hours along the coast to 9.0 hours in the north (Bala, Ojosu and Umar, 2000). This equates to approximately 5.08 x 1012 kWh of energy per day, and using solar energy technology with a 5% efficiency to cover 1% of the country's surface area will yield 2.54 x 106 MWh of solar-generated electricity, which is equivalent to 4.66 million barrels of oil per day (Sambo, 2005). It becomes essential for Nigeria government of Nigeria to incorporate the design and develop an integrated renewable energy planning and investment strategy that will encourage investment in renewable energy research, market development, and regulation as a path to the country's long-term growth.

Furthermore, Adeniji (2016) pointed out that all aspects of energy generation and distribution processes require adequate infrastructure in order to ensure clean energy supply which is the ultimate goal of an integrated energy security and climate change policy framework. Therefore, a move towards a collective development of clean energy and power infrastructure would better impact on the institution of the integrated energy security and climate change policy framework and consequently enhance significant clean energy generation and supply in Nigeria. One possible solution to Nigeria's power infrastructure dilemma is to incorporate opportunities to further explore and develop decentralized infrastructure into the policy framework (Adeniji, 2016).

Additionally, Elum and Mjimba (2020) stated that Nigeria should endeavour to identify its potential source of renewable energy to integrate it to its energy needs, and thence since the country is blessed with a huge amount of solar radiation and is blessed with abundant wind energy resources, large deposits of fossil fuel, as well as enormous hydro-power resources. There is a need to maintained the generated energy in the country using energy-efficient products and the appropriate practices is essential for sustainable development (Ajayi and Ajanaku ; Oyedepo (2012).

Conclusion

This study investigated the significance of energy security to Nigeria's national development. Energy is both useful and destructive to any country, according to the study. On the one hand, it benefits nations that use economic and environmental energy demands to propel their development; while on the other hand, it is disastrous to countries that ignore the aforementioned needs. According to the findings of the study, a developing nation like Nigeria is not actually benefiting from the country's abundant reservoir of energy, while facing devastating effects of energy extraction and distribution, thus the effect of climate change, which has a negative impact on the country's development, resulting in poor revenue generation, underperforming business activities, poverty, and unemployment.

This, however, implies an energy security paradigm that prioritizes both economic and environmental energy requirements. Nigeria's poor growth, which is caused, among other

things, by energy insecurity, derives from the country's inability to recognize both economic and environmental demands, as well as significant investment in energy infrastructure to boost the country's development. In order to offset the obstacles of national development, it is in the interest of this study to suggest that the government establish energy policies that would increase energy production, usage, and distribution. The research also suggests that the government use energy-efficient technologies in conformity with worldwide best practices. Other energy sources, such as more environmentally benign renewable energy, should be employed to diversify the nation's energy mix and create energy for the country's development.

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