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Applications and Performance Evaluation of Renewable Energy Technology Development in Nigeria using PESTEL Evaluation

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Abstract
Global warming and the depletion of fossil fuels have led advanced countries to develop renewable energy technologies. Very far from this trend are developing countries like Nigeria. The research examined the impact of Renewable Energy Technology (RET) development, taking to account the major barriers that influence the promotion of RET in the developing countries and the major issues with the usage. In achieving this, a two way analysis was done, firstly, using Political, Economic, Social, Technological, Environmental and Legal (PESTEL) frame work analysis, taking into account the macro factors considered in RET development in the developing country. Secondly, through data obtained directly from target audience divided in themes using statistical inference. The results indicates that there are strong barrier linking energy and development that obstructs implementation of RET and some of the major factors involved at the local level. Imperative and substantial suggestions that can be utilized, even by other local regions in the developing world that wish to make a shift towards greater use of RET was made.
Keywords: Application, Performance, Renewable Energy, Technology, Development, "PESTEL" Nigeria.

1.0: Introduction

Since the dawn of developed age the capability to harness and utilize different forms of energy has affected the social and economic way of living conditions for so many countries enabling them to enjoy a level of comfort and mobility that is unique in human history. It is common knowledge that the main and primary source of energy production and major source of revenue and the mainstay of the economy in Nigeria is the oil. The growing demand in energy which arises from the economic activities and also growing rate of the country population has not been in line by investment in the provision of infrastructure necessary to meet the energy needs in the country.

Although the country is endowed with vast renewable energy sources such as hydro, biomass, solar and wind which are still very much unused source of energy. Renewable energy technology development can be described as that technological and expertise know-how effort to provide a sufficient primary energy sources and secondary forms for supply cost, impact on the environment and water pollution, mitigation of climate change and sustainable development with Renewable Energy Systems forms of energy production (Sorensen, 2000). But development of a renewable energy system in the developing countries thus bring different kind of challenges that faces this development process and implementation, therefore this research focuses on the major issues that arises during implementation of renewable energy technology in Nigeria and aims to identify the issues that comes up and major impact RET in the society

One of the key factors of economic growth in Africa depends on the regular, reliable, abundant and also affordable source of energy sources to the population. But the overwhelming dependence on fossil fuels has been a threat to change the environmental climate to the extent that might have a negative impact on both the natural environment and the human population in general (Campen etal, 2000).

In addition, persistence of energy crisis has also weakened the industrialization process and significantly undermined efforts to achieve sustained growth, increased competitiveness of indigenous industries in domestic, regional and global markets as well as employment generation (Iwayemi, 2008). The objective of an energy system is to provide energy service in the industrial, transport, household and services sectors of the economy. Now confronted with the exhaustion of fossil fuels in the developing countries and also faced with the immense challenges from the climate change, Developing countries needs more than any region to rely on renewable energy so as to ensure a long lasting sustainable development.

Renewable energy is defined as any form of useful energy from a renewable source, whose current valuation does not limit the future availability. There are various sectors of renewable energy, which allow the production of mechanical energy, thermal energy or electricity. Renewable energies can contribute significantly to the future security of energy supply, economic growth, the job creation and the reduction of CO2 emissions (Barnes, 2006).

According to Oseni (2012) Studies have shown a strong connection between energy use and economic development; access to modern energy (electricity) services directly contributes to economic development and

decrease in poverty through the creation of wealth. China for example has moved 350 millions of her populace out of poverty since 1990 in the course of better access to energy.

1.2: Research Objectives

Not only that RET development in Nigeria will provide a friendly atmosphere by reducing the amount of carbon emissions and environmental pollution which can directly reduce the climate change to be more friendly and also improve the social activities. Regular Supply of energy can be a major and primary solution to poverty alleviation and a definite contribution to the socio-economic and environmental development in developing country. The research objective therefore includes:

- Examine the major barriers in implementing renewable energy technology.
- To access the role of Nigerian government in the development of Renewable energy technology.
- Examining the current and future perspectives of energy utilization in Nigeria and also the renewable energy options that are available.
- To evalute the level of awareness of the public with usage of renewable energy technology

2.0: Literature Review

According to Onyegegbu (2003) considerable growth in quantity, quality, and access to energy infrastructure services are necessary to fast and sustained economic growth, employment generation, poverty reduction and overall wellbeing of a country. But over dependence of fossil fuel as main source of producing energy has put the country at a risk of environmental issues and also bringing a fast reduction of oil reserves in the country. Depletion of fossil fuel sources, in the longer term and soaring oil prices, the fight against emissions of greenhouse gases makes for an urgent consumption management and diversification of energy sources to influence the use and development of renewable energy in the present world today both in developed and developing countries.

Making energy supply secure and curbing energy's contribution to climate change are often referred as the two over-riding challenges faced by the energy sector on the road to a sustainable future. Interest in the use of renewable energy source has risen dramatically during the past years and this drastic growth is directed towards the reaction of the effect of the non renewable energy source such as the fossil fuels which has contributed to the environmental impacts (Boyle, 1996). In addition to the energetic and environmental benefit provided the development of renewable can stimulate the employment and socio-economic growth.

2.1 Energy Transition in Developing Countries

Energy is the mainstay of Nigeria's economic growth and development. It plays a significant role in the nation's international diplomacy and it serves as a tradable commodity for earning the national income, which is used to support government development programmes. It also serves as an input into the production of goods and services in the nation's industry, transport, agriculture, health and education sectors (Oyedapo, 2003). Energy consumption will continue to increase, as a result of economic growth on one hand, and the increase in electricity consumption per capita other, whatever the scenarios considered. Development is almost always accompanied by an increase in energy consumption. In the West, the development in economy has led to a sharp increase in emissions of greenhouse gases and with the main impact on global warming seen over the last decades. The technologies used in industrialized countries are often heavily emitting greenhouse gas emissions. It is now very difficult to make a rapid transition to clean energy in these countries. The challenge is therefore to ensure the transition energy of less industrialized countries without necessarily causing a dramatic increase in air pollution. Geller (2003) studied in detail the consequences of the energy transition under way in China and India and it shows that energy development has greatly contributed to the degradation of the environment. The use of renewable energy remains more expensive than fuel. Traditional in both countries, suggesting that international financial support is a necessary condition for an energy transition.

One of the major challenges of the energy transition will be to improve access to rural electricity and fuels other than biomass. These fuels traditional are in fact one of the major causes of illness and mortality, mainly in developing country. The low-income households rely on wood, cow manure, or agricultural waste, while middle income households rely on kerosene and those at high incomes mostly use electricity, this hypothesis is verified by Reddy (1994) for Bangalore region in India. It is generally observed that the most effective technologies have usually cost more, while their operating cost is lower because consumption is lower. The adoption of the technology depends on the willingness or ability of the household to sacrifice some of its present consumption for future profits. This explains why the poorest households are moving more towards fuels that do not involve high initial cost and then to less efficient technologies (IEA, 2002).

2.2: Energy Consumption in Nigeria

Energy is very important to the provision of the necessary and basic need of a country such as education, jobs

creation, food, health services , education, housing, clean water. The Uses of Primary Energy meets the needs of four major categories of consumption: electricity generation, domestic use, industry and transport in Nigeria, natural gas and fossil fuel remains well ahead as a primary source of energy production. Nigerian economy depends heavily on oil which accounts for more than 95 percent of export income and also accounts for almost 85 percent of the nation revenues (Oseni, 2010). Nigeria has an estimation of 37.07 billion barrels of oil reserves as at 2015, ranking the country as the largest oil producer in Africa and the 10th largest country in the world (www.worldatlas.com). In addition to oil, Nigeria had proven gas reserves of more than 5000 billion cubic meters, with current gas production at 4 billion cubic feet per day, which is likely to increase to 11 billion cubic feet by 2020; it is the 9th largest gas reserve country in the world.

However preserving the environment is a key challenge facing the energy industry. Energy consumption is growing steadily and is causing a considerable environmental pollution. The challenge is to balance the energy needs with respect for the environment. If consciousness seems now be a reality, the actions are very long to manifest. Especially as responsibility is collective, because the rational use of energy also concerns many governments, producers and consumers (Rogner, 2000).

According to report by Sambo (2007), the energy demand projection which was based on four different scenarios has shown a steady and geometric increase in the total energy demand of the country by the year 2030. Having this at mind explains the very need for promoting the use of renewable energy in the country a more efficient and also sustainable means of energy production in achieving a sustainable energy development in the country.

Table 1: Total Energy demand by sector based on 10% GDP growth rate (Mtoe)

Sector	2005	2010	2015	2020	2025	2030	Average growth rate (%)
Industry	8.08	12.59	26.03	39.47	92.34	145.21	16.2
Transport	11.70	13.48	16.59	19.70	26.53	33.36	4.7
Household	18.82	22.42	28.01	33.60	33.94	34.27	2.6
Services	6.43	8.38	12.14	15.89	26.95	38.00	8.7
Total	45.01	56.87	82.77	108.66	179.75	250.84	8.3

Energy Commission of Nigeria (2008)

The total energy demand based on 10% GDP growth rate trends shows that in the year 2015 the house hold sector of the segments has the highest demand of energy with 28.01% of the energy total energy demand followed by the industry sector which is 26.03 of the total energy demand. The third segment is the transport sector of the economy which holds 16.59% of the total energy demand and last segment is the general service which holds 12.14 % total energy demand. From all this scenarios respectively, it has been indicated that a high economic growth generally results in increase in energy demand or consumed. In the year 2015 on the above table the household has the highest segment while the general service is low; this is because of the developing stage and state of the country economic state. Comparing this predicted values with the year 2030 shows a massive concentration of energy to the industries which shows a more developed country within this years but this also proves to us that the need to adopt other source of renewable energy so as to be able meet this demands in the nearest future. This is been shown in the figures below for further details.

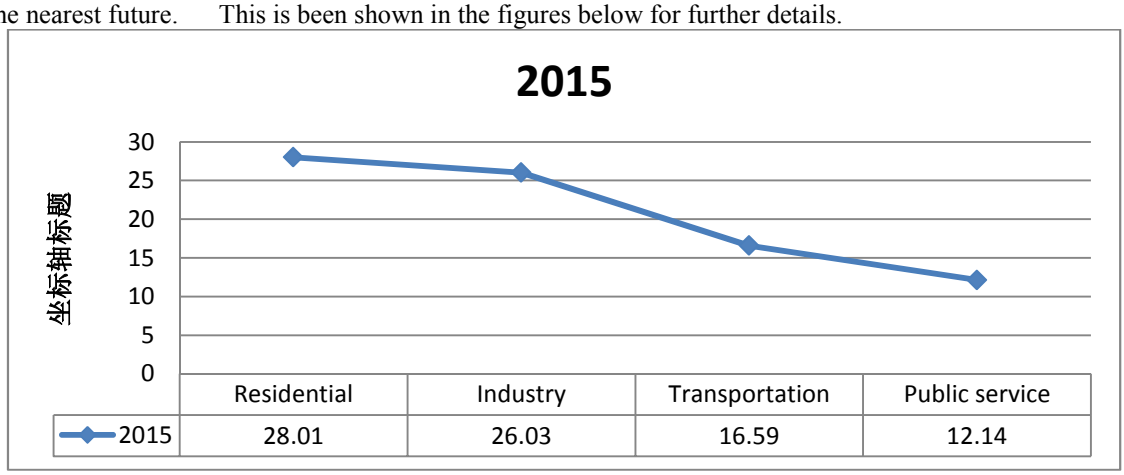


Figure 1: shows the distribution of energy demand by sector in year 2010

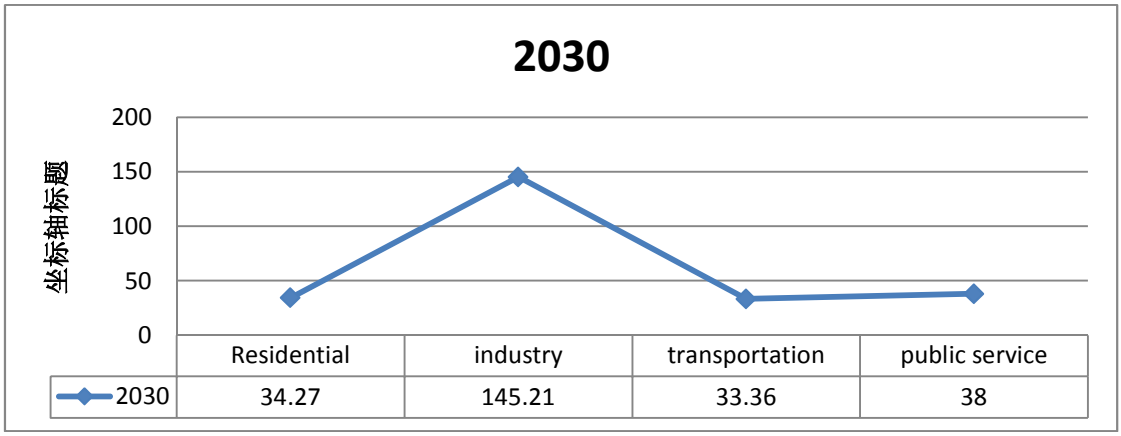


Figure 2: shows the distribution of energy demand by sector in year 2030

The sectoral energy demands in the 2030 plan period however, showed the highest growth rates for the industrial, followed by the services, residential and transport sectors in that order. This increase in demand for energy is due to the high level of economic activities expected in Nigeria as measured by the total GDP (Olayinka, 2003)

2.3: Potentials for Improving Energy Consumption through RET

Facing energy resources shortages around the world, there is an urgent need to develop a more sustainable energy system to cater for growth. The use of renewable energy (RE) sources is one of the feasible options. Nigeria is endowed with RE sources and is environment-friendly in nature, but the RE capacities are grossly under-utilized, particularly from biomass to wind energy and solar energy (Mallon, 2006). To Achieve sustainable development through energy security while at the same time fight the issues of global warming, is a target that is now widely familiar as vital to global popular opinion. Meanwhile, inexpensively-feasible renewable energy potential in Nigeria is projected to contribute 2036 MW, 6915 MW and 68,335 MW to electricity consumption data in the country in the short, medium and long run respectively (Mons, 2005).

- **2.3.1 Wind Energy**

Nigeria globally, is located within low moderate wind energy zone. A research was conducted about the wind energy potentials for a number of Nigerian cities which shows that an annual wind speed ranges from 3.89 m/s for Sokoto in far north to a figure of 2.32 m/s for Port Harcourt in the south (Sambo, 1996). Wind energy resources are virtually unlimited. Recent developments technology in the areas of variable speed wind turbines in power electronics and control of electrical machines tend to make wind energy as competitive as the fossil energy in the nearest future (Mathew, 2006). With country's location at 10^0 N of the equator, Nigeria's location is favourable for wind power generation. Wind is available at annual average speeds of about 2.0 m/s at the coast latitudes and 3.9 m/s at the far northern part of the country. At air density of 1.2 kg/m3, wind energy intensity, perpendicular to the wind direction, ranges from 4.4 W/m2 at the coasts to 35.2 W/m2 at the northern extreme. The principle of the turbine is very simple: the wind drives a propeller and a generator converts this movement into electricity, the energy is converted and stored in a battery. Applications of wind energy are multiple wind farms central / isolated network, telecommunications, home lighting, and battery charging applications off-grid: pumping water for agricultural purposes or for electricity supply later use marine systems. However, wind energy can only be complementary (Mirecki, 2005). The strength of the wind differs due to locations which intends determines the total amount of energy that can be produced through a wind turbine. To know the rate of speed of wind at a particular location a probability distribution functions is used (pdf). By using this method it helps in verifying the amount of wind produced by each area.

In contrast to the wood and biomass that can be stored and are fairly reliable sources terms of security of supply, wind energy is a good example of technical barriers related to the use of a renewable energy source because it is difficult to control. The risk of intermittent on the grid limits the development of wind energy, as in Nigeria where government objectives are satisfied to ensure balance between supply and demand, the transmission system of electricity transmission in Nigeria limit the injection of wind power to a low level of energy demand to protect the network of production falls if the wind dies down. Advances in modelling and weather forecasting can anticipate hazards and to adjust supply of electricity through wind energy technology.

- **2.3.2: Solar Energy**

Nigeria is endowed with an annual daily sunshine that is averagely 6.25 hours, which is ranging between about 3.5 hours at the coastal areas of the northern boundary of the nations. The radiation of energy directly from the sun is estimated to be about 3.8 × 10^23KW per second. The power or energy conversion directly from the sun can be produced using the photovoltaic cells (PV). The annual average of total solar radiation varies from about

3.5 kWh m−2day−1 in the coast to about 7 kWh m−2 day−1 along the semi-arid areas in the far North. Photovoltaic energy is obtained directly from solar radiation. The photovoltaic modules are generally positioned in an angular form in order to enhance the amount of directed sun ray on the plate according to (Foley, 1990). The PV panels consist of photovoltaic cells based on silicon; have the ability to transform the photon energy into electrical energy. The current continuously produced is used directly. The manufacture of solar panels is although currently expensive raw material (silica) is abundant and expensive. This is due to a significant energy required for production of cells. Real progress has been made, however. Their integration into a building can also add an aesthetic touch.

Firstly is the high reliability of the system. The installation has no moving parts and that made it particularly suitable for remote areas (Bala etal 2001). In addition the modular nature of photovoltaic panels allows installation simple and adaptable to various energy needs. Systems can be sized to power applications ranging from milli-Watt to Mega-Watt. Another argument is that the PV system operating cost is very low given the reduced maintenance and requires no fuel or transportation, or highly specialized personnel to put it into operations. The PV technology has qualities ecologically because the finished product is non-polluting, silent and causes no disturbance of the environment, this system should be highly considered in a developing country such as Nigeria.

- **2.3.3: Biomass**

Biomass is a widespread resource as it includes, in addition to woody biomass and residues from the wood processing industry, energy crops, agricultural residues and food waste, manure and the organic fraction of municipal solid waste, sorted household waste and sludge purification. Biomass is a versatile energy source to the extent that it can produce, as required, electricity, heat or fuel. It can be stored, unlike electricity, so cheap, usually simple. Over the years, fuel wood and charcoal have constitute between 33% and 41% of total primary energy consumption largely dominated by households. As at 2015, about 84% of Nigerian houses rely on wood as cooking fuel. About 350,000 hectare of forest and natural plants are lost annually due to a variety of factors while the national demand is proposed to increase to 91 million tonnes by 2030.

The state of biomass resources in Nigeria has been estimated to be enormous in the country. The wood, apart from being a main resource of energy in form of fuel wood it is also use for business purposes in different forms as saw wood, plywood, electric poles and paper products. For energy purposes, the country is using 80 million cubic meters (4719.7 kg) of fuel wood every year for cooking and other domestic purposes (Sambo, 2007). The energy content that is being used from fuel wood is 6.0x109MJ which only between 5-12% is the fraction that is utilized gainfully for cooking and domestic purposes. The abundant energy available from biomass can be meaningfully introduced into the nation's energy mix through the development of a comprehensive programme.

Table 3: State of biomass resources in Nigeria

Resources	Quantity (million tonnes	Energy value
Fuel wood	39.1000	5310000
Agro-Waste	11.2444	147,7000
Saw dust	1.8000	31.4333
Municipal solid waste	4.0750	

Source: IEA, (2008)

From the above table it can be observed that the total energy that can be produced using biomass is estimated to be 14750MW. Wood is the material most commonly used for the category of biomass. Nigeria is one of the largest producers of wood energy in Africa, though this resource represents only 8% of primary energy production. However, the potential is enormous: indeed, in fifty years the forest area. It is estimated that today the wood energy sector occupies 50,000 direct jobs and indirect.

- **2.3.4: Hydro Power**

Hydro power system has a very high potential because of the numerous and large rivers, dams and waterfalls which are present in the country. Nigeria is ranked ninth in hydropower potential in Africa with technically and economically feasible hydro power energy at 32450 GWh/yr and 29,800 GWh respectively (Oseni, 2012). There are 3 types of hydro-electric: power dams or high head the average fall plants found in regions mountainous and those present average falls on watercourses. The flow of water causes a turbine that drives the electric generator. The water is either used directly is stored in batteries. Individuals, communities, organizations and businesses are all affected by the electrical potential of hydropower. Despite of this hydropower capacity in Nigeria some still remains underexploited. It must be observed here that Small Hydro energy (SHP) has gained fast reflection in both the developed and developing economies of the world.

The total exploitable hydro power potential in Nigeria is estimated to be 14,750mw with the large hydro power to be 11,250MW resource reserve unit and 3,500MW for the small hydro power. But despite this large amount of hydro resources only 1930 MW which represents only 14% of the total which is been generated by

kanji, Jebba and Shiroro which constitutes to about 30 percent of the total electricity generation capacity of the country (ECN, 2005). A cost contrast among small-scale hydro power and diesel generators for rural electrification clearly indicates the cost effectiveness of the former. It will therefore be useful for the country if more attention is paid to the use of small scale hydro resources for power generation. Contrasting in developed countries where SHP plants have been widely adopted in electricity generation and other applications, little attention is paid to its significant in spite of the vast potential, and high and increasing energy needs in Nigeria (Oseni, 2012).

2.4. Constraints to RET development in Nigeria

Robert etal, (2009) has argued that the success of renewable energy has been limited by a combination of factors including: an institutional framework and energy poor infrastructure, inadequate planning, high initial investment costs, dissemination strategies inefficient, lack of skilled labour; reference information of poor quality, low maintenance capacity etc.

Analysing the political factors affecting the RET development in Nigeria, there is need to give a definition on the political factors. Firstly considering political stability of Nigeria is basically essential in the development of RET in the country and general stability in a country can be considered as a stable period of a country been rule in a democratic way (Jacobsson and Johnson 2000). One major benefit of the stability for RET development is that this create a perfect and favourable conditions for the promotion of RET.

- **2.4.1: Financial barriers**

Financing plays an essential role in the successful development of renewable probably anywhere in the world. Studies have shown that the main obstacle to the implementation of projects is not usually their technical feasibility, but the lack of long-term financing. This problem is compounded by the competition between projects for access to limited financial resources and adverse macroeconomic conditions. Governments and private companies must find innovative ways to finance renewable energy projects. The challenge for the financing of renewable projects is to develop models that can bring these technologies to consumers (including the poorest) at affordable prices, while ensuring that the African sector of emerging renewable energy continues to grow and stay viable.

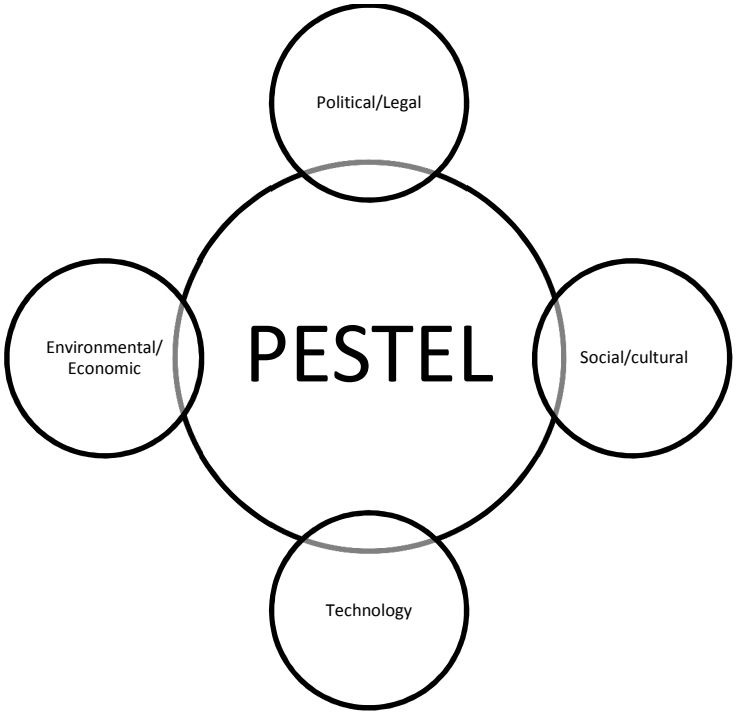
Under the current macroeconomic conditions in Nigeria and Africa at large, the investment costs for renewable sophisticated manufacturing equipment can be prohibitive. Planners in the energy sector, investors and policy makers must develop innovative ways to attract capital or minimize the total cost per unit produced.

- **2.4.2: Barriers in human resources**

The introduction of previously unknown technologies such as renewable energy technology to a developing country as Nigeria requires the development of technical skills in the energy sector. The importance of technical expertise has been recognized in the region, but there continues to be a shortage of qualified personnel in this area of development (Olayinka 2006). Technical knowledge is necessary to constitute a critical mass of policy analysts, economic officials and engineers who will be able to manage all aspects of the development of renewable energy technology (Geller, 2003). Training a workforce that can develop and manufacture equipment for renewable energy is a prerequisite for successful dissemination in the country (Rao, 2000). The Nigerian governments and departments suffer from a shortage of qualified staff in renewable energy sector. This deficit is largely responsible for the state of general underdevelopment of research and technological resources, as well as deficiencies in the management of renewable energy programs. Given the limitations of technical expertise in the formal sector, the situation in the informal sector requires an even greater challenge. Technical competence in the field of mechanics and electricity are more difficult to control for artisans in the informal sector. This may explain the low adoption of renewable power such as photovoltaic or wind turbines. Users of these technologies rely on expatriates or technicians installed in urban areas. The departure of these experts can lead to the end of these renewable projects.

3.0: PESTEL EVALUATION ON RET DEVELOPMENT IN NIGERIA

Promotion of RET development is very essential to the success of renewable energy source in the developing country. But considering the nature and present situation of Nigerian economy some factors are needed to be considered when implementing the RET technology. These are major factors that can affect the growth or the promotion of RET development in Nigeria and are classified into two categories; the micro environment factors and macro environment factors. Listing all the all barriers facing the development of RET in Nigeria is not really feasible but this paper will analyse this barriers using the PESTLE analysis which will help in identifying some of the major barriers extensively.



- **3.0.1** *Political/ Legal factors***.**

The introduction and success of renewable energy depends largely on the existing policy framework in the country (Oseni, 2012). Government policies are important for their ability to create an enabling environment to mobilize resources and encourage private sector investment. Most of the early policy initiatives on renewable energy in the region were driven by the oil crises of the 1970s. In response, governments have set up an independent Department of Energy or a department specializing in the promotion of rational energy policies, including the development of renewable energy. Unfortunately, as soon as the oil crisis abated, government support for renewable decreased. Much of the current support comes down to great speeches.

Most African governments have no clear policy on renewable energy. The shortcomings of supporting renewable are also illustrated by the low budgetary allocations that can be seen in most countries. Emphasis is placed on the oil and electricity, which serve only a small portion of the population at the expense of renewable energy that can help achieve a greater number of people. In contrast, spending on traditional and alternative energy has steadily declined from about 1% of total investments in 1990 to 0.1% in 2000. It is highly unlikely that renewable programs in Africa may experience a significant development and dissemination measures without supportive government policies accompanied by sufficient budgetary resources.

- **3.0.2:** Energy Policies in Nigeria

Since the democratic dispensation rule started in the year 1999, the economy has become largely private sector oriented with different policies being provided to encourage infrastructure for energy production and supply in the country. The adjustment in the policy has become an imperative due to the growing rate of the country's population and its direct effect on the consumption of energy pattern leading to socio-economic development of the country. One of the major policies that were approved during this era of the country is the energy policy which was the National Energy policy (NEP). This approved agency was designed so as improve and encourage the security of energy of the country by developing a more sustainable and efficient, adequate and reliable energy at reasonable costs.

The agency was aimed at the providing a cost effective energy and promoting the sustainable energy sources. Some other major policy reform that was designed is the Electric power sector Reform Act (EPSR) which was a liberalization of the power sector in 2005. This move reduce the control, distribution of the power sector by the government making way for the introduction of Nigerian Electricity Regulatory Commission (NERC) (Olayinka, 2010). Main while, the European energy policy on renewable energy development and climate is based on contributions to the growth of renewable energy technology because the policies main objectives for renewable energy production is to encourage producers of electricity to abandon some production-based fossil fuels, thereby facilitating their compliance under the European market for CO_2 allowances thereby this was one of the major reason for the growth of RET in the European countries. Many Member States have implemented policies and incentives to help power producers from renewable sources such as tendering, purchase tariffs or green certificates.

- **3.0.3** Technology: Lack of inadequate expertise & capacity

One of the major barriers that was identified by (Sambo, 2007) was the inadequate of standard quality control and inadequate expert to monitor and utilize the RES. Nigeria solely depends on acquiring the services of expertise in management of RET from foreign countries which doesn't really promote the growth of RET in the country. Also mention is the inadequate and scarcity of the necessary components in the development and utilization of RET which makes the country depends of importation of these parts which is quite expensive for replacement of wearing components. In addition to the barriers of RET development is the lack of good quality management of locally manufactured components and imported components technologies. Most customers will prefer product with proper quality assurance which assured the customer of the quality. Quality refers to any measurable characteristics such as correctness, maintainability, portability, testability, usability, reliability, efficiency, integrity, reusability and interoperability. Quality Control is the series of inspections, reviews and tests used throughout the development cycle to ensure that each work product meets the requirements placed upon it.

- **3.0.4** Economical factors

The Nigerian energy policies on financial incentives focus mainly on centralized and conventional sources of electric power generation in the country. The subsidy placed by the government on the grid electric power system in Nigeria discourages investors in RET development in the country. In addition to this, the financial status of the country is not that sound, thus no financial support for investors in RET in Nigeria which will motivate investors in the renewable energy sector. Lack of plain level field in the energy industry for the survival of RET in the country is notable and major barrier in the development of RET in Nigeria.

- **3.0.5** Social / Cultural

McCormick (2007) explains socio-cultural issue, which involves the process of how actors
(Individuals and organization) take decisions, resolve issues, form partnerships, react to government policies and engage with public issues. Such issues correspond to a combined connection between the nature of related policies, power and the public. Political issues concerning the interests of powerful actors in the form of coalitions amongst strong interest actors contribute extensively to the implementation and approval of policies related to Renewable energy technology (Geller, 2003). This dimension of social acceptance can explain the differences between countries with high and low RET implementations**.** Within this element, acceptance of technologies and policies, the public level of acceptance of key actors, and policy-makers are components boosting efficient RET policy development**.**

- **3.0.6:Community Acceptance**

Community and local residents are two main players to consider whether to accept a framework that can benefit or slows RET development primarily. As stated by Wustenhagen et al, (2007), that debate on ''not in my back yard' syndrome is still very much a problem in adopting this technologies in regards with the wind turbines and also the related factors that include the visual impact, and noise. As enumerated earlier, some of the major the barriers to this effects are insufficient information and lack of training which is as a result of lack of interest and unawareness of RET options or direct benefit and financing opportunities. For Nigeria to achieve a sound strategy and overcome the hindrances that is faced during implementation of RET overcoming the barriers should be addressed. A good example can be made from the projects of wind mills in Germany and England (Wustenhagen et al 2007). Jacobsson and Johnson (2000) stated that accepting RET innovations in the market depends much on the strategies, institution and firms.

3.1: Data Analysis and Discussion

Theme I: Awareness:

Have you heard of renewable energy technology?

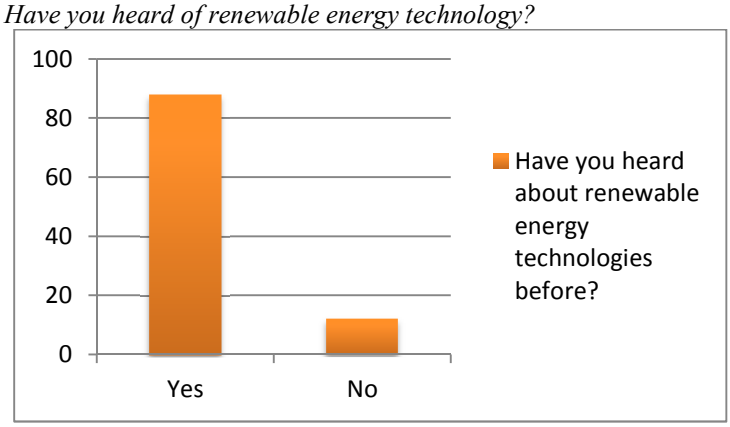


Figure 4: awareness.

In view of the statistical response as indicated on figure 4 above, it goes to show that there is a high percentage of awareness among participant on renewable energy technologies indicating that there public has alternative to energy sources.

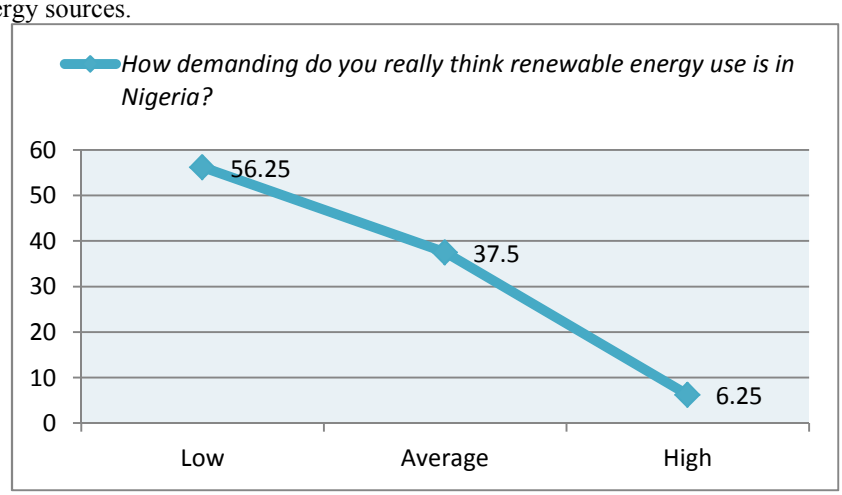


Figure 5: Usage and Demands

From the data representation in figure IV, 56 per cent argue that the demand for renewable energy use in the country is low, whereas 38 per cent feels the demand for this technology is just on the average. Only 6 per cent maintain that the demand is on the increase. However this goes to show that majority of the respondents agreed that the level of demand for this technology is not in high demand which highlight the attitude of the public acceptance which can be recognised as a major issue shaping the widespread implementation of renewable energy technology from the discussion it should be emphasised that promotion of renewable energy technology and public attitudes towards RET needs to change for better promotion of the technology.

Theme II: Perceptions and Attitudes:

Do you think renewable energy development can really have a positive impact in the economic and social development?

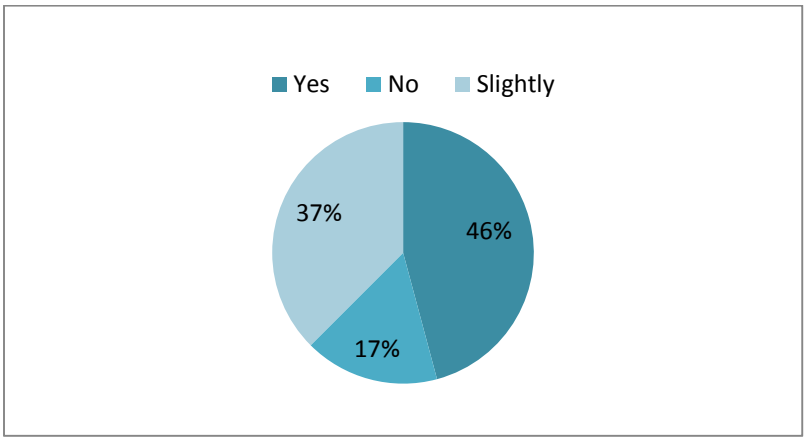


Figure 6: Economic Impact

The statistical findings related to figure vi indicates that 22 respondents answered yes for the above question which in turn translate to 46 per cent of the total respondents from the findings and only 8 respondents disagreed which in turns translate to 17 per cent of the findings and 38 per cent agreed slightly. Hence the result shows that 84 per cent of the respondents believed that development of renewable energy technology can have a positive impact within the economic and social development of the country which shows that the participant are very optimistic on the impact of RET towards the economic and social development.

Can 20% increase of renewable energy technology help improve the local environment?

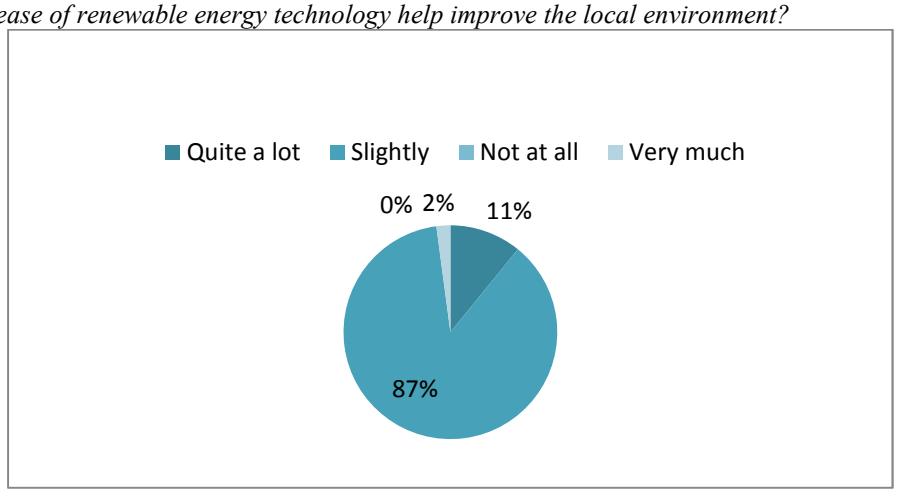


Figure 7: improvement

The statistical findings in figure vii above related to the above question is been analysed as thus; out of the total number of participant who answered the questionnaires 3 respondents which translate to 6 per cent answered that a 20% increase in renewable energy technology quite a lot in energy generation can improve the economic state of the their local government which shows an high optimism among the participants on this issue. While most of the other respondents are agreed on the statement by saying that this technology will improve the condition just slightly and 21 per cent corresponding to 44% answered very much improvement will occur if the there is at least 20% increase of the technology has a source of energy generation.

What really do you think is the main reason why promoting renewable energy development in Nigeria is difficult?

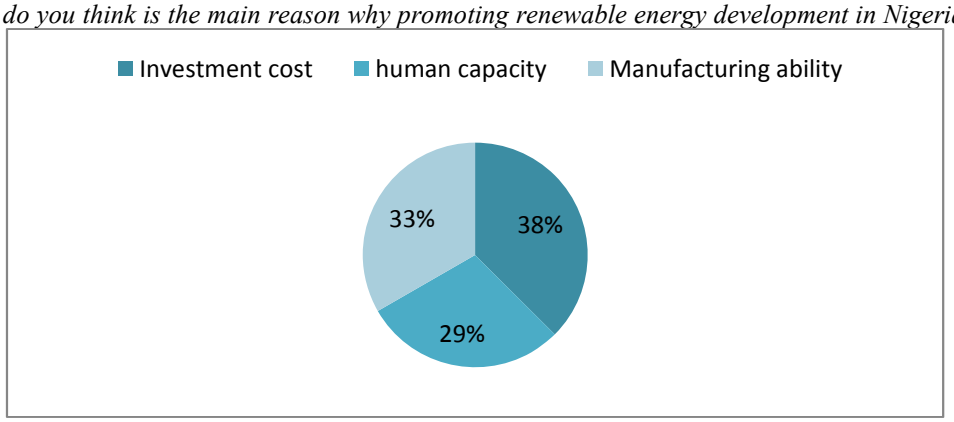


Figure 8: Difficulty in promoting RET

The statistical findings shows in figure 8, indicates that 18 respondents which translates to 38% of the findings agreed with the statement that high cost of high investment is a major reason why promoting development of renewable energy technology in the country is difficult and 29% which correspond to 14 respondents claimed that a low human capacity in this field is another major reason for this difficulty and 33% claimed that a low manufacturing ability is a major cause for the slow development of energy technologies. Well generally all the three factors are main reasons but high cost of investment is a major barrier during this development.

In the coming years can renewable energy surpass the present percentage of fossil fuel in the country?

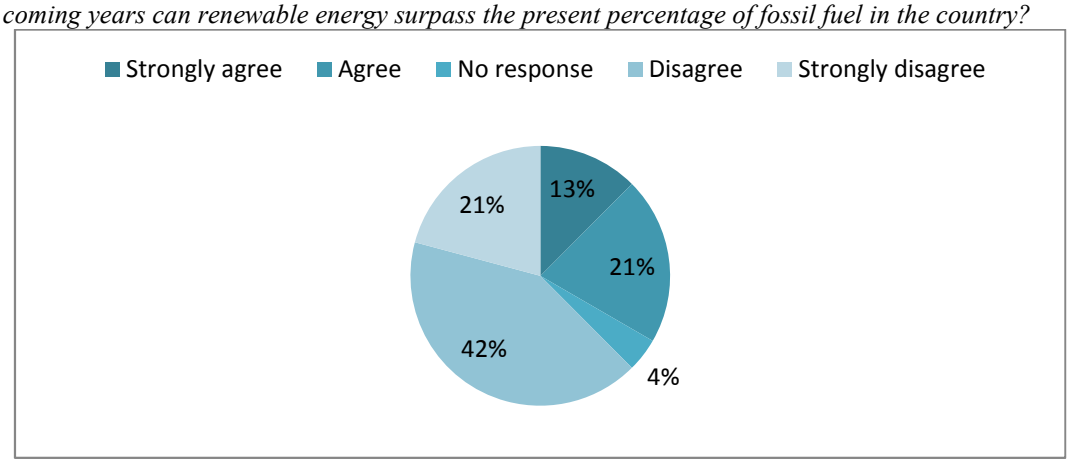


Figure 9: future emphasis on RET

From the data findings 16 respondents translating to 34% of the finding disagreed with this statement while 63% translating to 30 respondents agreed with it; however 4% of the participants didn't respond to this question. This result shows that recent encounter has shown hike in petroleum products and there is news everywhere about depletion of fossil fuel in future and there is been a slow shift to renewable energy technology to meet the demands and needs. The respondents who disagreed with their statement might be concerned with the reliability and also considering the high cost of these technologies for meeting future needs

However it can be deduced from the majority of the opinion that there is definitely emphasis on renewable energy in the present day.

4.0: Conclusion

It is now crystal clear that energy demand is on the rise and is increasing geometrically while the supply remains insufficient and unstable and is falling with the years thereby reinforcing the need for adopting renewable energy technologies.

The major problem in the rapid development and distribution of technologies for the exploitation and utilisation of these vast resources in the country include lack of market and the lack of proper policy, rigid and institutional framework to encourage demand and attract investors.

Finally, for the sustainability of energy system, government at all levels must be strongly dedicated to the development of renewable energy utilisation and the improvement has to be constantly reviewed to know how well it performs. Accurate monitoring of the system has to be put in position for proper policy formulation at all time.

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