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Policies Enhancing Renewable Energy Development and Implications for Nigeria

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Abstract The main objective of this study was to review the various policies and strategies promoting renewable energy development around the world. The success and failures of each country and regions were examined through a case study so as to learn some valuable lessons and derive useful implications for the development of renewable energy in Nigeria. The study initially reviewed the current renewable energy policies and identified the barriers to the development of renewable energy technology in Nigeria. The lessons from the case study were classified into support mechanisms which include; capital, fiscal, tax incentives, legislative, political, technological and environmental support. The lessons from case study were used to develop implications in addressing the development of renewable energy technologies through effective policies and strategies in Nigeria. Furthermore, some future perspectives of renewable energy development in Nigeria were discussed. This study intends to support the Nigerian government and policymakers in decisions making and policy formulation on the short-, medium- and long-term.

Keywords: *renewable energy policies, nigeria, projects, case study, tax incentives, barriers*

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1. Introduction

Access to clean modern energy services is an enormous challenge facing the African continent because energy is fundamental for socioeconomic development and poverty eradication. Today, 60% to 70% of the Nigerian population does not have access to electricity [1]. There is no doubt that the present power crisis afflicting Nigeria will persist unless the government diversifies the energy sources in domestic, commercial, and industrial sectors and adopts new available technologies to reduce energy wastages and to save cost [2].

In diversifying energy sources that is sustainable, renewable energy (RE) becomes the best option. A lot of attention have recently been focused on RE and energy efficiency (EE) measures as the only way to address the problem of clean energy provision [3]. The development of RE projects is considered as a huge opportunity from a strategic and financial point of view, as well as from a technological and environmental aspect [4]. In the development of RE projects, the government is a major player in ensuring the success of RE development and deployment [5].

This is achieved through the establishment of strategic policies, plans and the adoption of proper mechanisms. These have the capacity to alter the price of RE technologies through subsidies, taxes, funds power production and grid access for RE electricity generators. In order to develop an effective strategy to promote RE development in Nigeria, it is essential to examine the situation of other countries in terms of RE technology development so as to learn from their success and failures. This will help present some important implications for the Nigeria government to learn from the international experiences.

This study aims to answer the following research questions;

- What are the success and failures of renewable energy development from international experiences?
- What lessons can be derived from the experience so as to provide implications for Nigeria?

In order to address the research questions, this study first examine the current RE policies in Nigeria and the barriers to its development. A literature review is then used to identify the success and failures of renewable energy policies and strategies employed in various countries and regions of the world. This study presents the following research objectives which are;

- To identify the reasons for the success and failures of various RE policies and strategies from international experiences.
- To derive lessons and implications for Nigeria in the development of RE policies and strategies.

The rest of this study is organized as follows. Section 2 presents an overview on the Nigerian energy policies and strategies. The barriers to Re development in Nigeria are identified in Section 3. Section 4 presents the literature review summary of lessons from international experiences

on RE development. Section 5 provides some policy implications for Nigeria based on the lessons from international experiences. Section 6 discuss some future perspectives of renewable energy development in Nigeria. Section 7 concludes the study.

2. The Nigerian Energy Policies and Strategies

The Nigerian energy policies and strategies are summarized to provide an insight on the status quo of renewable energy policies, and they are listed from the earliest to the latest.

2.1. National Electric Power Policy (NEPP), 2001

The National Electric Power Policy (NEPP) was the first of its kind in the wake of reform in the Nigerian power sector. Its development was due to the recommendations of the Electrical power implementation Committee (EPIC), which was the body in charge of reforms and transformation of the power sector in 1999. The NEPP was created in March 2001, and presented three bold steps in achieving the goal of reforming the power sector. The first step was to privatize NEPA which was state owned and introduce Integrated Power Producers (IPPs) of electricity. The next step was to increase competition between participants in the market, gradually remove subsidies and sale excess power to the DISCOs. In the last step, it was expected that the market and competition would have been more intense and allow for full cost pricing of supply, and liberalization of the electricity market would have been complete [6].

2.2. National Energy Policy (NEP), 2003, 2006, 2013

Before the Federal Government of Nigeria approved the energy policy in the year 2003, there was no comprehensive energy policy. The established energy policy was called the National Energy Policy (NEP) which was developed by the Energy Commission of Nigeria (ECN). The National Energy Policy (NEP) sets out government policy on the production, supply and consumption of energy reflecting the perspective of its overall needs and options. The main goal of the policy is to create energy security through a robust energy supply mix by diversifying the energy supply and energy carriers based on the principle of "an energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy throughout Nigeria, thus contributing to sustainable development and environmental conservation" [7,8,9].

2.3. National Economic Empowerment and Development Strategy (NEEDS), 2004

The National Economic Empowerment and Development Strategy (NEEDS) was developed by the National Planning Commission (NPA) in 2004 and was intended to develop and alleviate poverty in the country. This involves the action of human resources on the natural resources to produce goods necessary to satisfy the economic needs of the community. On infrastructure, NEEDS promotes the privatization of government infrastructure and was one of the key instrument in achieving a revamped service delivery. The Nigerian government will however, fund projects that have very low attractiveness and high investment cost to investors such as those in rural areas. Furthermore, the increased share of renewables in the national energy mix was further encouraged in the NEEDS. This involves the suggestion for the creation of renewable energy agency and technologies which will be funded under the National Power Sector Reform Act. This was the milestone towards the adoption of renewables in the power sector and its utilization for rural electrification [10,11].

2.4. National Power Sector Reform Act (EPSRA), 2005

The National Power Sector Reform Act established in 2005 ensured the liberalization of the Nigerian power sector. The Act was due to the NEPP developed in 2001 and made provision for new legal and regulatory framework for the power sector. The Act gave way to unbundling and privatization of the power sector, which intends to introduce competition in the electricity market, enhance rural electrification, while protecting consumer rights and developing performance standards in the power sector [12].

2.5. Renewable Electricity Policy Guidelines (REPG), 2006

Developed by the federal Ministry of Power and Steel in December, 2006, the Renewable Electricity Policy Guidelines (REPG) mandated the Nigerian government on the expansion of electricity generation from renewables to at least 5% of the total electricity generated and a minimum of 5 TWh of electricity generation in the country (REPG, 2006). This policy document presents the Nigerian government's plans, policies, strategies and objectives for the promotion of renewables in the power sector [13].

2.6. Renewable Electricity Action Programme (REAP), 2006

Developed in relation to the REPG by the Federal Ministry of Power and Steel in 2006, the Renewable Electricity Action Programme (REAP) set out a roadmap for the implementation of the REPG. The document presents an overview of the Nigerian electricity sector and relates it to renewable energy development. The documents also reviews government targets and provides strategies for renewable energy development such as; leveling the playing field for renewable electricity producers, multi-sector partnerships, demonstration projects, supply chain initiatives, etc. The study also made provision for financing renewable programs and explored the roles of government ministries and agencies, then concludes with a risk assessment, monitoring and evaluation [14].

2.7. Nigerian Biofuel Policy and Incentives (NBPI), 2007

The aim of this policy was to develop and promote the domestic fuel ethanol industry through the utilization of agricultural products. This was in line with the government's directive on an Automotive Biomass Programme for Nigeria in August 2005. The NNPC was mandated to create an environment for the take-off of the ethanol industry. The policy further aimed at the gradual reduction of the nation's dependence on imported gasoline, reduction in environmental pollution, while at the same time creating a commercially viable industry that can precipitate sustainable domestic jobs. The benefits of this policy was to create additional tax revenue, provision of jobs to reduce poverty, boost economic development and empower those in the rural areas, improve agricultural activities, energy and environmental benefits through the reduction of fossil fuel related GHGs in the transport sector [15].

2.8. Renewable Energy Master Plan (REMP) 2005 and 2012

The Renewable Energy Master Plan (REMP) was developed by the Energy Commission of Nigeria (ECN), in collaboration with the United Nations Development Programme (UNDP) in 2005 and was later reviewed in 2012. The REMP expresses Nigeria's vision and sets out a road map for increasing the role of renewable energy in achieving sustainable development. The REMP is anchored on the mounting convergence of values, principles and targets as embedded in the National Economic Empowerment and Development Strategy (NEEDS), National Energy Policy, National Policy on Integrated Rural Development, the Millennium Development Goals (MDGs) and international conventions to reduce poverty and reverse global environmental change [16,17].

The REMP stress the need for the integration of renewables in buildings, electricity grids and for off-grid electrical systems. Further, the importance of solar power in the country's energy mix was also highlighted in the policy document. According to the REMP, Nigeria intends to increase the supply of renewable electricity from 13% of total electricity generation in 2015 to 23% in 2025 and 36% by 2030. Renewable electricity would then account for 10% of Nigeria's total energy consumption by 2025. However, the REMP have not been approved by the National Assembly to be passed into law.

2.9. National Renewable Energy and Energy Efficiency Policy (NREEEP), 2014

The National Renewable Energy and Energy Efficiency Policy (NREEEP) outlines the global thrust of the policies and measures for the promotion of renewable energy and energy efficiency. The FMP developed the NREEEP in 2014 and is awaiting the approval of the Federal Executive Council [18].

2.10. Multi-Year Tariff Order (MYTO), 2008 and 2012

In 2008, a 15-year roadmap towards cost reflective tariffs called the Multi-Year Tariff Order (MYTO 1) was developed by the Nigerian Electricity Regulatory Commission (NERC). The first two phases, 2008-200 and 2012-2017 were designed to keep consumer prices relatively low, through still affecting the price increases in a gradual manner. The final regime is intended to provide the necessary incentives for power producers and investors to operate and maintain electricity infrastructure.

The NERC has released the Multi-Year Tariff Order 2 (MYTO 2), which has similar features to MYTO 1 but includes some improvements, and will be effective from 1st June 2012 to 31st May 2017. The retail tariff in MYTO 2 will be reviewed bi-annually and changes may be made for all electricity generated at wholesale contract prices, adjusted for the Nigerian inflation rate, US$ exchange rate, daily generation capacity, and accompanying actual CapEx and OpEx requirements that will vary from those used in the tariff calculation [19].

2.11. Draft Rural Electrification Strategy and Implementation Plan (RESIP), 2014

The Power Sector Reform team initially prepared the Rural Electrification Strategy and Implementation Plan in 2006 (RESIP, 2006). However, a committee involved in the power sector reviewed and redrafted the RESIP in 2014. It was expected to establish a clear institutional step-up for the sector and set a roadmap which will result in the development of an enabling framework for rural electrification in Nigeria. The primary objective of the RESIP is to expand access to electricity as rapidly as can be afforded in a cost-effective manner. This includes the use of on-grid and off-grid means of electricity supply. The draft is ready and awaiting approval from the government [20].

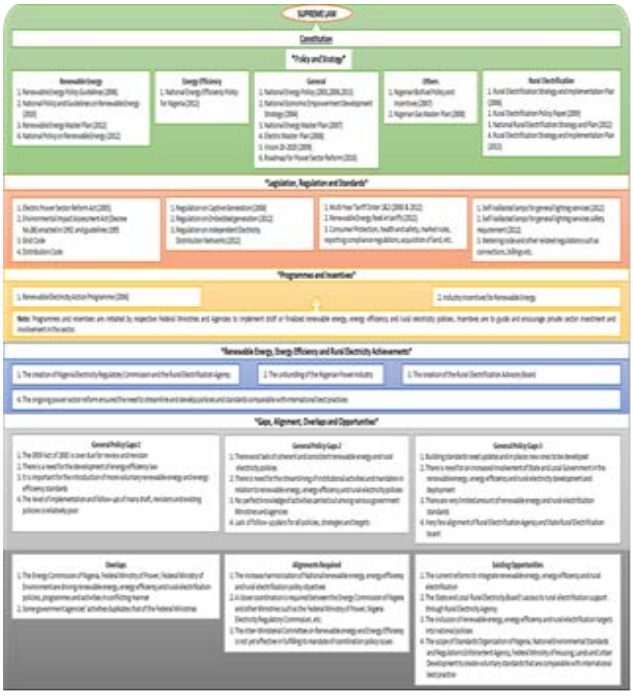

Figure 1. An Overview of the Nigerian Energy Policies, Laws, Programmes

A general overview of the various Nigerian energy policies, legislations, regulations, standards, programmes and incentives, their achievements, gaps, alignment, overlaps and opportunities are presented in Figure 1. From

Figure 1, it can be observed that various gaps exist in the Nigerian energy policies, while some policies such as the ERSP Act of 2005 is long overdue for revision. There is also no need for the development of an energy efficiency law, instead the development should be on voluntary renewable energy and energy efficiency standards. Besides this, the follow-ups of all the Nigerian energy policies, strategies and targets are lacking, as well as commitment from the state and local government in renewable energy development. Some overlaps also exist in some activities of some ministries and government agencies, while duplication of the same activities is observed in some Federal ministries in the country. Alignment required in the Nigerian energy policies include the harmonization of National renewable energy, energy efficiency and rural electrification policy objectives, coordination of government agencies and effectiveness in the fulfillment of the mandate to coordinate policy issues.

3. Barriers to the Development of Renewable Energy in Nigeria

In order to achieve success in the development of renewable energy in Nigeria, some obstacles have to be identified. It is however, not easy to identify a single factor that can have a long positive impact on the development of renewables. We should then look at the supportive measures that can lead to its full exploit or can hinder its development. The factors in the Nigerian case are summarized in this section to list out the essential components affecting renewable energy development. The factors are classified into; capital investment, fiscal incentives, legislation and regulation, politics, policy and strategy, technology and innovation, and environmental support programs.

3.1. Financial Investment

Even though renewable energy sources have low operational and maintenance costs, most renewable energy technologies have high up- front capital cost compared to their conventional energy alternatives[1]. Apart from the higher capital costs most renewable energy technologies face the barrier of being perceived as untested technologies. Given these twin barriers to renewable energy technologies, investors face higher risks and uncertainties when making investment decisions. Therefore in a capital constrained economy like Nigeria, where there are many competing demands for available scarce capital resources, the promoters of Renewable energy technology face the problems of high transaction costs and restricted access to capital. On the other hand the end users of renewable energy technology, especially the poor, face problems of access to credits. Lack of access to micro financing, high interest rates, poor business development skills by renewable energy system vendors and unsupportive climate for investments are some of the primary barriers to market growth [21].

3.2. Power Purchase Agreement

Currently there is no Power Purchase Agreements plan for renewable energy generation to the national grid. A system of rational expectations between renewable electricity producers and the grid operators are imperative for the growth in grid-based renewables [22]. The Power Purchase Agreements set the terms by which power is marketed and/or exchanged. It determines the delivery location, power characteristics, price, quality, schedule, and terms of agreement and punishments for breach of contract [23]. Legally binding long-term Power Purchase Agreements are a must since they provide comfort for the developers of renewable as well as lenders, and would also encourage the expansion of renewable electricity development through investments[2].

3.3. Legislation and Regulation

Achieving adequate energy supply where renewables play a role necessitates the creation of appropriate policy framework of legal, fiscal and regulatory instruments that would attract domestic and international investments [24]. Clear rules, legislation, roles and responsibilities of various stakeholders along every stage of the energy flow from supply to end-use are key elements of the overall policy framework needed to promote renewable energy technologies [21]. Such policy, legal and institutional frameworks are at their beginning stage in Nigeria and are being developed under the reform program[3].

3.4. Politics, Policy and Strategies

Strong and long-term political support at the federal, state and local government level is a consistent component in the successful development of renewable energy [25]. The political support includes the proper implementation of policies and strategies, price support mechanisms, and provision of funds for R&D activities, as well as the deployment of renewable energy technologies [26-27]. The Nigerian energy policies and strategies discussed in the last section presented the government's plan for development of renewable energy [28]. However, the follow-up and active implementation of these policy is lacking from the Nigerian government.

3.5. Technology and Innovation

The development of renewable energy requires support in all stages of research, demonstration and deployment so as to achieve a competitive local industry [29]. Although most renewable energy technologies such as solar PV, wind power, small hydropower, etc. have become popular in developing countries, it's still a new technology in most developing countries such as Nigeria [30]. There is need for the Nigerian government to invest in R&D activities in renewable energy so as to enhance technological innovation. Sometimes, public sector funding may not be enough to increase R&D activities and as such, private sector investment is vital for the realization of technological innovation in renewable energy.

[1] http://www.ucsusa.org/clean_energy/smart-energy-solutions/increase-renewables/barriers-to-renewable-energy.html#.VjIbnSsbjMw

[2] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2006/04/27/000012009_20060427113507/Rendered/PDF/36986.pdf

[3] http://www.un.org/esa/earthsummit/nigeriac.htm.

3.6. Environmental Support Program

The increase in global climate change has had its impact in many countries of the world, and this is due to the increase in energy consumption, especially fossil fuels as about 84% of the global CO2 emissions and 64% of the world's GHG emissions are attributed to energy consumption [31]. This has drawn the attention of the international communities to see to its reduction. Countries with high carbon emission from coal, gas and oil power plants have been under intense pressure to limit emission rate [32]. This countries have been tasked to provide funds to which comes in the form of environmental support programs. This support programs has a big impact into the drivers for technological support and thus, the development of renewables. This environmental support programs have not been fully exploited as a potential in Nigeria for the increase in renewable energy development.

3.7. Public Awareness

Awareness of the opportunities offered by renewable energies and their technologies is low among public and private sectors. This lack of information and awareness creates a market gap that results in higher risk perception for potential renewable energy projects [33]. The general perception is that renewable energy technologies are not yet mature technologies, hence are only suited for niche markets and as such will require heavy subsidy to make it work [34]. There is therefore a need for dissemination of information on renewable energy resource availability, benefits and opportunity to the general public in order to raise public awareness and generate activities in the area. Such process is paramount to building public confidence and acceptance of renewable energy technology. Providing information to selected stakeholder groups like the investors can help mobilize financial resources needed to promote renewable energy technology projects [21]. The draft Renewable Energy Master Plan proposes the set-up of a National Renewable Energy Development Agency (NREDA), which can assist in increasing public awareness and providing information and assistance to interested stakeholders. This is to be done together with non-governmental organizations (NGOs) [17].

4. Lessons from International Experiences

In some countries, the method of renewable energy policies comes as a "package" and not a "stand-alone" kind of policies. The packaged policies works in an interactive mode, where the success or failure of a single policy will depend on the effectiveness of other complementary policies. These section deals with the lessons learnt from international experiences on the development of renewable energy in relation to the Nigerian case as presented in Section 3.

4.1. Capital Support

One of the most important experiences in tackling capital investment provision is observed in Spain. The Spanish experience through its wind energy proved that the need for financial support is not permanent issue, since the cost gradually reduced as the project becomes successfully done. With the implementation of legislative support through FiTs or tendering arrangement, there is less need for investors to receive financial aid in installation. Sometimes when prices are guaranteed, the investors will have enough confidence to invest in renewable energy projects without financial support. In a situation where FiTs and tendering arrangement is absent, subsides presents itself as the main mechanism as can be observed in the Swedish wind energy schemes [35].

The provision of capital for investment goes hand-in-hand with technological support, since the establishment of the RE technology needs initial push to the market. This is the situation in Germany's Solar PV market where in the beginning of PV installations, a lot of financial support is given by means of favorable loans [36]. It is therefore important to properly identify the type of mechanism (usually legislative) works best for a particular RE technologies in order to ensure an effective, efficient and successful completion of the project. In stand-alone RE technologies used for rural electrifications off-grid areas, lessons learnt from some Asia-Pacific countries showed that financial incentives are very effective which comes in the form of subsidies achieve a high success rate [37]. A summary of some measures employed by some countries/regions to address capital investment support in RE is shown in Figure 2.

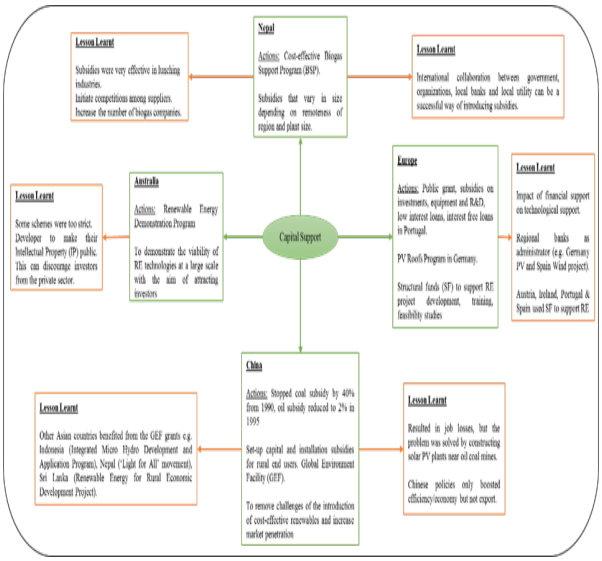

Figure 2. Capital Support

4.2. Fiscal Support

The provision of fiscal incentives can address financial barriers to the development of renewables. Fiscal support can come in various forms which may be from tax exemptions on imported RE equipment, to tax holidays on generation incomes [38]. Some tax incentive policies includes; import duty/excise duty concession, VAT concession, tax credit, production tax concession, and tax holiday on generation income. Furthermore, environmental taxes have proved to be an effective fiscal support in some countries. An example is observed in Denmark which was one of the first European Union countries to implement an environmental tax. Since 1992, Denmark energy consumers have been charged a CO2 tax and some of the revenue generated goes to generators of

electricity from renewable energy [39]. Another country is Sweden which used the same approach and this added in the expansion of biomass. This made energy from fossil fuel such as coal very expensive [40]. Other forms of fiscal incentives are presented in Figure 3.

4.3. Tax Incentives

The reduction of complete exemption on tax can stimulate investment private sector investors into investing in renewables. An example is cited in Sweden and Germany where investment in wind schemes was an offset against individual tax, while tax relieve on renewable energy investment was received by investors in Ireland, Netherlands and Spain [41]. This was the same situation in Greece where the installation of solar thermal water-heating systems was stimulated by tax exemptions for residential buildings [42]. In the Netherlands, industries received accelerated depreciation of investment in equipment if they invest in renewables and energy efficiency projects [43]. This is also shown in Figure 3 under fiscal support.

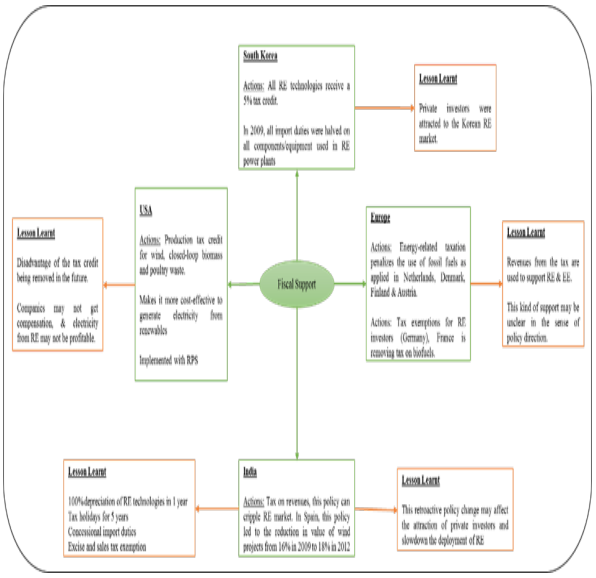

Figure 3. Fiscal Support

4.4. Legislative Support

In ensuring the accessibility of renewable energy market, some legislative support which comes in form of different strategies have been used by some countries. The main objective of these strategies is to let the market decide the tariff structure and the tariff to be paid to the renewable electricity generators based on a bidding system or in some cases, certificate markets [44]. Some legislative strategies are feed-in-tariff (FiT) and tendering arrangements, net-metering programs, and green certificates. FiT system have been proved to be a more cost effective than a quota system in some countries, while the reverse is the case as was experienced in the South Korean case [45]. Generally, FiT resulted in the reduction in electricity prices. Most countries that were successful in the FiT system include countries in the EU such as Denmark, Germany and Spain [46]. These countries recorded high percentage share of electricity from renewables through the FiT system. On the other hand, the quota system employed by the United Kingdom and Italy have not been too successful. In the United States (USA), the net-metering programs were employed and the rules varies from a program to another. However, in the USA case, household participants are credited according to the offset in energy consumption, which is at an essential subsidized tariff rate [47]. Usually in a net metering program, a maximum offset of zero dollar monthly electricity bill is allowed, but in some cases, the credit of excess feed-in is allowed to roll over the next month [48]. The net metering programs also limit the amount of electricity from renewables. Countries such as Belgium, Italy, Poland, Romania, Sweden and the UK have applied for green certificates [49]. In the case of Belgium, a minimum price (s) was set and this varies across regions, while a price was imposed in the case of Poland which is the average price of the year before the current one. The UK and Sweden did not guarantee prices unlike their counterpart countries. Other legislative mechanisms are shown in Figure 4.

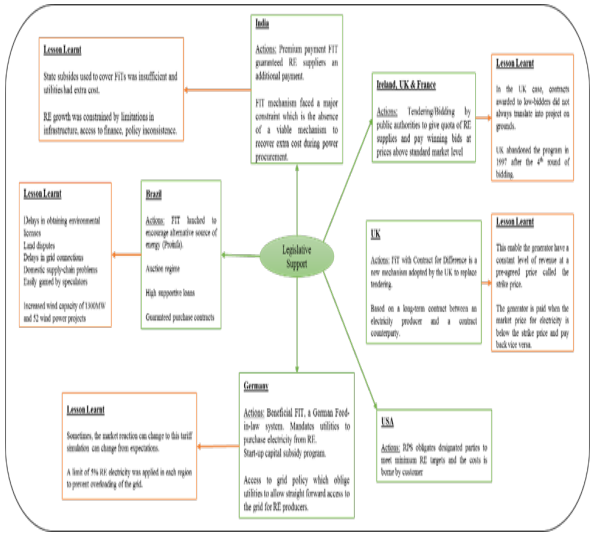

Figure 4. Legislative Support

4.5. Political Support

In order to achieve an expanded RE market, the creation of a favorable legal and regulatory framework is essential. Thus, the development of RE technologies requires a strong political support through an easy bureaucratic procedure (some cases are shown in Figure 5).

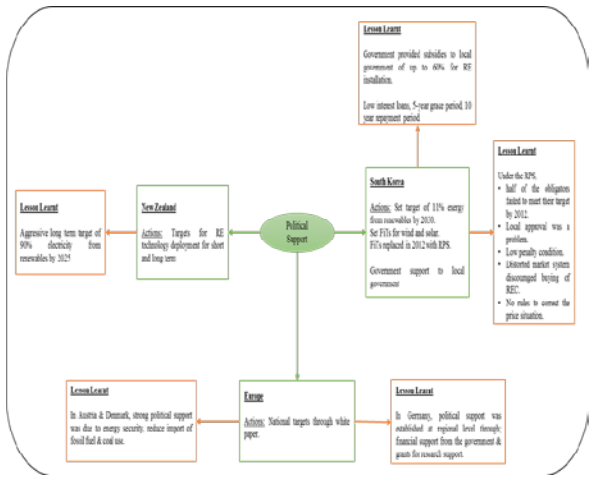

Figure 5. Political Support

Clear and simple regulations about the required license for the construction and operation of RE power plants is very important. Another means of political support is through the setting of national target as was carried out in the case of New Zealand, Austria and Denmark with strong support from the government. In Germany, the government provided financial support through research grants at the regional level [50-51]. Similar situation was observed in South Korea where the government provided subsidies to local government of up to 60% of RE installation. The South Korean government also offered low interest loans, 5 year grace period and a 10 year repayment period for all RE technologies [52].

4.6. Technological and Environmental Support

In order to support the development of RE, the technological and environmental support needs to be explored. For technological aspect, R&D support comes in mind. Most R&D programs are typically in the form of grants or loans and sometimes provided with no expectations of financial gains. However, it is very important that the particular R&D program receiving the funds for the R&D develops patentable technologies. In Australia, the government competitive grant scheme called the Renewable Energy demonstration Programs (REDP) was used to support the development of commercial RE projects and mini-grid project [53]. The German Federal Ministry of Economic Cooperation and Development (BMZ) commissioned the Renewable Energy Support Programme for ASEAN (RESP-ASEAN) to enable the sharing of expertise and policies in order to improve framework conditions for RE in ASEAN countries. This produced corresponding guidelines for bioenergy projects in Indonesia bioenergy project and Philippines solar project [54].

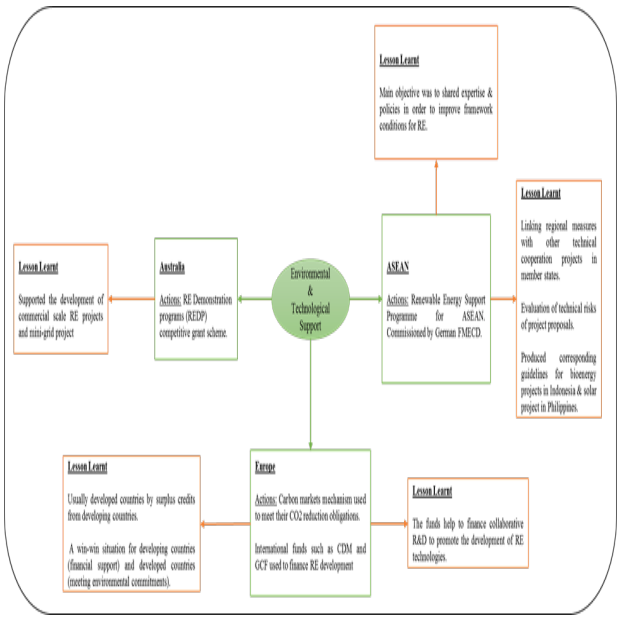

Figure 6. Environmental and Technological Support

On environmental support, crediting mechanisms such as the Clean Development Mechanism (CDM) and Global Climate Fund (GCF) can provide financial and technological incentives to aid in the reduction of greenhouse gas emission levels in energy intensive sectors [55]. Another support is through environmental audits which is generally used to access the current environmental performance of an industry and to identify measures to improve energy efficiency [56]. However, the provision of funds is usually the problem of the organization carrying out the audit. This has been observed in Canada, Denmark, Netherland and Sweden, but their own form of assistance is usually through other voluntary schemes [57]. Other countries that applied this scheme are Costa Rica, Israel, Portugal, Taiwan, Thailand and Tunisia, while low success rate was observed in Egypt [58]. Other experiences are presented in Figure 6.

5. Implications for Nigeria

The review of the various country case and the lessons presented some important implications for Nigeria and this can be used to address the barriers to RE development and they are as follows.

5.1. Subsidies and Grants

In order to achieve a successful subsidies and grant mechanism for RE development in Nigeria, a strong commitment is required from the government in not only the provision of funds, but also making them efficient enough through a cost recovery mechanism so as to ensure sustainability. The absence of a cost recovery system make the receiving entity vulnerable to financial critical situation and they may fail to maintain their operational efficiency.

5.2. Loans

On the issue of loans, the role of the Nigerian government is vital for a successful financial support on RE technologies. The first step for the government in recovering loans like revolving funds may help encourage banks to finance RE projects and hence overcome the barrier of RE investment. The government can further support micro-finance banks by financing loans, providing soft loans and long loans for RE projects.

5.3. Feed-in-Tariff

Although FiT proved successful in some countries and unsuccessful in others, some measures that could be employed by policy makers in Nigeria include; provision of higher price to generators to stimulate increased supplies of RE electricity, ensure a shorter payback period on investments, avoid market monopoly by removing market entry barriers of small investors. Others are; the provision of a flexible FiT system based on technology type, market structure, and location. The government should ensure a secured return over years for investors so as to reduce the risk in RE projects. Finally and most importantly, the government should ensure that the FiT system is sustainable on the long run through an incremental cost recovery system.

5.4. Renewable Portfolio Standards

Considered as the least-cost option for RE development in many countries, RPS has a reputation for bringing

down the cost of RE technologies and it creates a competitive market. The RPS system has shown in many countries to be a sustainable policy to RE generators since the government will compensate them for their extra costs through subsidies. This option if considered by the Nigerian government has the potential to create a RE market in Nigeria that will be very competitive since Nigeria have the market and large RE resource potential. However, the Nigerian government should ensure the flexibility of targets and adjust it on the short-term bases. The government should also take note of regional imbalance in pricing as some locations may have higher RE resource potential than others, while some may have the problems of electricity transmission and distribution.

5.5. Competitive Bidding

This mechanism is considered to be the most favorable policy for end users of electricity and the government in most countries, since it reduces the price of RE technologies through market-based pricing. The down-side of competitive bidding is that it may face the risk of price bids that are unsustainable on the long-run. Also extreme low price of energy/electricity may prevent investors and this should be taken into account by the Nigerian government if bidding system should be implemented.

5.6. Fiscal Support

It should be noted that tax incentives on investments can led to reduction in operational efficiency. This sometimes occur when the owners of the RE project receive the benefit of investment tax credit, after which the owner lose interest in maintenance and operation of the RE power plants. A more feasible approach will be production tax credit which motivates the RE owners to ensure an effective operation of the power plant. Another effective fiscal support is the structural tax policy with strict enforcement mechanism followed by a good administrative system. In the Nigerian case, this will ensure that the incentives are efficiently utilized and the problems of tax payment and bad practices are avoided.

6. Future Perspectives of Renewable Energy Development in Nigeria

There is the need for the Nigerian government to develop the renewable energy industry within the country boarders. It is important to harmonize the Nigerian energy sector rather than fragmentize it. Mutual cooperation between government agencies and ministries is the first step in a successful renewable energy development. The government and policymakers need to explore renewable energy options such as small hydropower plants across the country, especially in the rural areas. If this is done in the rural areas with flowing small rivers, the communities could be transformed into semi-urban centers. Thus, enhancing various economic activities that will improve the socio-economic wellbeing of those in the rural areas. On solar energy awareness, the rate has increased in recent times and the acceptance is expected to increase in the future [59]. Some successful research such as the implementation of solar PV water pump and electrification, solar cooking stoves, crop drying facilities, etc. have been undertaken out in the Sokoto Energy Research Center and the national Center for Energy Research and Development under the supervision of the Energy Commission of Nigeria. On wind development, the government have completed the installation of the 20 MW wind farm in Katsina state. However, the progress of wind development in Nigeria is still relatively low as compared to other developing countries in Africa. Since the northern part of Nigeria have high potential for wind energy and the communities have low access to energy, the government most do more regarding the exploitation of wind energy to meet the needs to the populace.

Biomass have been an important renewable energy source in Nigeria, but its sustainability is still a big issue in Nigeria. The government should continuously use municipal waste, oil palm product, sugar can and rice husk for the sustainability of biomass energy production. Also the government incorporation with the private sector should establish some biogas plants to help the country's energy sector through energy production [60]. On policy aspect for renewable energy development, effective policy options that can attract foreign direct investment into the country should be a top priority for the Nigerian government. This will not only aid in the production of energy from renewable energy source, but also create jobs and enhance the transfer of technology and knowledge to the local partners. This should be done with some fiscal incentives to encourage indigenous and foreign investors in the renewable energy industry [61]. Furthermore, the development of a ten-year energy plan that will be review in a short time frame. Other policy options to enhance renewable energy development in the future include the introduction of a National innovation System with a special focus on renewable energy development, and the development of a renewable portfolio standards to increase electricity generation from renewable energy sources. The Net Metering Policy and Biofuels Obligation Policy that have proved successful in other countries should be adopted in the Nigerian context to see if effectiveness, efficiency and successful integration. All these present a successful prospect for renewable energy development in Nigeria. It is important to state that Nigeria's long decades of dependence on conventional energy resources may create a "lock-in" for the transition to renewable energy economy. Also, this transition will be expensive in the short term due to the huge investments in renewable energy investment, and the transfer of technology and knowledge. However, the long-term benefit of this move to an economy focused on renewable energy development will outweigh the short-term disadvantages.

7. Conclusion

This study reviewed the current RE and energy efficiency policies in Nigeria and also interrelate them in order to identify the gaps, overlaps and barriers that exist. Then a case study on various country cases which were both successful and unsuccessful were reviewed with the aim of deriving some lessons from the international experiences. This provided useful implication for Nigeria on how to address subsidies and grants, loans, FiT, RPS,

competitive bidding and fiscal support for renewable energy development. RE development have been successful in most countries through government interventions in form of fiscal incentives and political will of the government. However in other countries, the same policy and strategies have proved unsuccessful or a failure. The lessons from the success and failure cases are vital in the attainment of suitable renewable energy policy development for Nigeria. Hence, the Nigerian government and policy makers alike should look into these lessons in order to improve RE development in Nigeria. The information provided in this study is intended to support the Nigerian policymakers in making proper decisions that are based on international best practice, while taking caution from past mistakes of other countries.

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