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Community-Based Renewable Energy Projects for Sustainable Development in Nigeria

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Abstract
The study aimed to examine the current state of community-based renewable energy projects in Nigeria, assess their impact on sustainable development goals. A mixed-methods approach was employed, including surveys, interviews, and case studies of existing community-based renewable energy initiatives. The research findings indicate that while community-based renewable energy projects are still in their early stages in Nigeria, they hold significant potential for sustainable development. The findings of this research contribute to the understanding of community-based renewable energy projects for sustainable development in Nigeria. They provide valuable insights for policymakers, energy practitioners, community leaders, and other stakeholders in developing strategies and frameworks to scale up community-based renewable energy initiatives. By promoting community ownership, local participation, and sustainable energy practices, these projects can play a crucial role in Nigeria's transition to a more sustainable and resilient energy future, ultimately driving inclusive and sustainable development across the country.

Introduction
In recent times, there has been a notable increase in global awareness and concern regarding the matter of sustainable

development. Renewable energy has gained significant attention as a potential solution due to several factors: the escalating energy demand, the adverse environmental consequences associated with fossil fuels, and the imperative to combat energy poverty. Nigeria, being classified as a developing nation, encounters a multitude of obstacles in its pursuit of sustainable development. These challenges encompass restricted availability of electricity, excessive reliance on fossil fuels, and degradation of the environment. Community-based renewable energy projects have been identified as a prospective approach to tackle these challenges by granting local communities with agency, advancing social inclusivity, and cultivating sustainable development (Vincent & Yusuf, 2014).

The role of energy in socioeconomic and sustainable development is of significant importance in numerous nations across the globe in the present era. Sustainable and cost-effective energy sources that are readily available and environmentally friendly are crucial for ensuring the long-term economic development of a nation. The fields of security, climate change, and public health are intricately interconnected with the domain of energy (Ramchandra and Boucar, 2011). Nonetheless, there exists a direct correlation between the per capita energy consumption of nations and their respective standards of living. The current global energy crisis can be attributed to two main factors: the exponential growth of population and the corresponding rise in living standards within various societies (Rai, 2004 as cited in Emodi, 2015). The attainment of the Millennium Development Goals, encompassing the eradication of extreme poverty, the achievement of universal primary education, the assurance of environmental stability, and the enhancement of agricultural productivity, is contingent upon the enhancement of both the quality and quantity of energy services in developing nations (MDGB, 2015). The term "Sustainable Development" was popularized by the World Commission on Environment and Development (WCED) through its seminal report titled "Our Common Future" in 1987. The commission provided a definition of sustainable development as "the development that satisfies the requirements of the current generation without jeopardizing the capacity of future generations to fulfill their own requirements" (WCED, 1987 in Emodi, 2015).

The contemporary era has witnessed a significant surge in the worldwide pursuit of sustainable development, thereby highlighting the imperative of sustainable economic development and growth. Hence, sustainable energy has emerged as a highly promising solution for addressing the energy demand challenges faced by numerous consumers on a global scale (Hvelplund, 2006). Strategies employed in sustainable energy development encompass significant technological advancements, such as enhancing energy production efficiency, implementing energy-saving measures on the demand side, and substituting fossil fuels with diverse forms of renewable energy (RE).

Statement of the Problem

The implementation and effectiveness of community-based renewable energy projects in Nigeria encounter numerous barriers and limitations, despite their significant potential. The successful implementation and long-term viability of such projects are frequently impeded by factors such as restricted financial access, insufficient policy frameworks, technological limitations, and a lack of community involvement (Oyedepo, 2012). Furthermore, there exists a knowledge deficit regarding the precise determinants that influence the outcomes, whether positive or negative, of community-based renewable energy initiatives within the Nigerian setting. Hence, the primary objective of this study is to investigate and assess the primary obstacles and prospects linked to community-based renewable energy initiatives in Nigeria, while also offering valuable insights into the successful execution of these projects to foster sustainable development. This study aims to examine the effects of community-based renewable energy projects on sustainable development in Nigeria.

Research Objectives

The main objectives of this research are as follows:

1. To assess the socio-economic and environmental impacts of community-based renewable energy projects on local communities.
2. To explore the enabling factors and best practices that contributes to the success of community-based renewable energy projects.

Research Questions

The study sought to provide answers to the following research questions:

1. What are the socio-economic and environmental impacts of community-based renewable energy projects on local communities?
2. What are the enabling factors and best practices that contributes to the success of community-based renewable energy projects?

Research Hypotheses

The following hypotheses were raised for this research;

1. There are no significant impacts of socio-economic and environmental that enhances community-based renewable energy projects on local communities.
2. There are no significant factors and best practices that contribute to the success of community-based renewable energy projects.

REVIEW OF LITERATURE

Concept of Renewable Energy

Renewable energy pertains to energy sources that possess the inherent ability to be replenished naturally and can be utilised repeatedly without exhausting their respective

resources. The sources mentioned in the text are obtained through natural phenomena that take place on our planet, encompassing sunlight, wind, water (specifically hydroelectric power), geothermal heat, and biomass (Awwad and Mohammed, 2007). According to the 2006 World Energy Outlook published by the International Energy Agency (IEA), there exist several fundamental principles associated with renewable energy. (i) Sustainability: Renewable energy sources are deemed sustainable due to their reliance on naturally occurring processes that undergo continuous replenishment. In contrast to fossil fuels, which possess a limited supply and are subject to eventual depletion, renewable energy sources offer the capacity for perpetual utilisation, rendering them a feasible and sustainable long-term remedy. (ii) Solar Energy; Solar power is acquired through the utilisation of solar panels or solar thermal collectors to capture and convert sunlight. Photovoltaic (PV) cells incorporated in solar panels facilitate the direct conversion of sunlight into electrical energy, whereas solar thermal collectors harness the sun's thermal energy to generate steam, which subsequently powers turbines for the purpose of electricity generation.

According to Stevens (2012), in alignment with the International Energy Agency (IEA), it is posited that wind turbines have the capability to harness the kinetic energy present in the wind and subsequently transform it into electrical energy. The rotation of turbine blades, induced by the movement of wind, facilitates the generation of electricity through the operation of a connected generator. Wind power exhibits a high degree of scalability, encompassing a wide range of installations, from small-scale individual turbines to expansive wind farms. Additionally, the speaker asserted that hydropower has the capacity to produce electricity through the utilisation of the kinetic energy present in the movement of water. The process generally entails the construction of dams in order to create reservoirs for water storage. Upon the release of water, it proceeds to pass through turbines, thereby facilitating the generation of electrical energy. Hydropower is an established and dependable form of renewable energy, constituting a substantial proportion of worldwide electricity generation.

Field and Field (2014) conducted a separate investigation wherein geothermal power harnesses the Earth's thermal energy originating from its subsurface. Geothermal reservoirs are tapped to extract either hot water or steam, which is subsequently utilised to propel turbines, thereby facilitating the generation of electricity. The accessibility of this energy source is primarily observed in areas characterised by active volcanic or tectonic phenomena. Biomass is commonly defined as organic material that originates from plants, including agricultural crops, forestry residues, and specifically cultivated energy crops. Biomass possesses the potential to be utilised for the generation of heat or alternatively transformed into biofuels, such as ethanol and biodiesel, which can be employed for transportation purposes and the production of electricity.

Renewable energy sources possess numerous environmental benefits in comparison to fossil fuels. These systems exhibit minimal to negligible levels of greenhouse gas emissions during their operational phase, thereby contributing to the mitigation of climate change. Additionally, it should be noted that these technologies exhibit minimal air pollution effects, contribute to a decreased reliance on finite resources, and possess a comparatively reduced environmental footprint (IEA, 2006). The progression of renewable energy technologies, including the enhancement of solar panels, the optimisation of wind turbines, and the refinement of energy storage systems, has resulted in heightened levels of efficiency and cost-effectiveness. The aforementioned advancements have significantly enhanced the accessibility and competitiveness of renewable energy in comparison to conventional energy sources. The global endeavour to transition towards renewable energy sources is driven by the objective of diminishing reliance on fossil fuels and establishing a more sustainable energy framework. The transition in question encompasses various elements such as policy backing, economic inducements, technological advancements, and public consciousness, all aimed at expediting the uptake of renewable energy sources and reducing carbon emissions within the worldwide energy industry (IEA, 2006). The promotion of the development and utilisation of renewable energy sources is of paramount importance in the pursuit of a sustainable and low-carbon future, as well as in effectively addressing the challenges presented by climate change.

Community-Based Renewable Energy Projects

Community-based renewable energy projects encompass initiatives that engage local communities in the advancement, possession, and functioning of renewable energy systems. The primary objectives of these projects are to facilitate the advancement of sustainable energy generation, bolster energy security, and empower communities by fostering their active engagement in the transition towards clean and renewable energy sources. This document presents a comprehensive overview of community-based renewable energy projects.

The Relationship between Ownership and Participation in Academic Contexts Community-based projects place a strong emphasis on the ownership and active participation of the community throughout all phases of the project, encompassing planning, financing, implementation, and management. In many instances, individuals residing within a specific locality, as well as commercial entities or associations, frequently establish cooperative ventures or collaborative partnerships with the aim of collectively possessing and deriving advantages from renewable energy infrastructure. Community-based projects often prioritise a diverse range of renewable energy sources, including solar, wind, hydro, biomass, and geothermal energy. The selection of an energy source is contingent upon factors such as the accessibility of local

resources, the economic viability of the chosen option, and the preferences of the community.

Scale and Scope: Community-based initiatives encompass a spectrum of projects, varying in size and magnitude. These initiatives can span from modest installations, like the placement of rooftop solar panels on community structures or individual residences, to more extensive endeavours, such as the establishment of community wind farms or mini-hydropower plants. The magnitude and extent of the projects are contingent upon the energy demands, available resources, and capability of the community.

Community-based renewable energy projects provide economic advantages to local communities. The development, construction, and maintenance of renewable energy systems have the potential to generate income and employment opportunities. Additionally, the income generated from the sale of energy can be allocated towards community development initiatives or distributed among the participants involved in the project.

Energy Independence and Security: Through the generation of self-sustained clean energy, communities are able to diminish their reliance on imported fossil fuels and conventional centralised energy systems. This initiative fosters the achievement of energy independence, strengthens energy security, and mitigates vulnerability to volatile fuel prices and disruptions in supply.

Community-based renewable energy projects play a significant role in fostering environmental sustainability through the reduction of greenhouse gas emissions, the mitigation of climate change impacts, and the promotion of local biodiversity conservation. Furthermore, these initiatives have the potential to yield social advantages, including enhanced air quality, diminished health hazards, and heightened community resilience in the face of energy disruptions and natural calamities.

The concept of community empowerment and education revolves around the implementation of community-based projects that aim to empower local residents. This is achieved by actively involving them in decision-making processes, offering educational opportunities related to renewable energy, and cultivating a sense of ownership and pride within the community. Additionally, they have the capacity to encourage the implementation of energy efficiency measures and the adoption of energy conservation practises among community members.

Community-based renewable energy projects have garnered international traction as a strategy to attain climate objectives, decentralise energy frameworks, and foster comprehensive and sustainable advancement. This study showcases the capacity of communities to actively engage in the process of transitioning towards clean and renewable energy sources, thereby promoting a more equitable and resilient energy landscape for the future.

Energy Crises in Nigeria

Electricity is a globally prevalent and highly sought-after form of energy. The attainment of economic development and the maintenance of an acceptable standard of living are fundamental prerequisites. As the population of a nation increases and its economy experiences growth, there is a corresponding increase in the demand for electrical energy. Insufficient fulfilment of this requirement leads to a deficit in the availability of goods or services. The current shortage has the potential to escalate into a crisis of significant magnitude. According to Chigbue (2006) as cited in Oyedepo (2012), the insufficiency of electric power in Nigeria severely hampers the country's ability to achieve effective industrialization and development. Nigeria has been grappling with a severe electricity deficit for an extended period of time. The deficiency in question exhibits multiple facets, encompassing financial, structural, and socio-political causes, all of which are interconnected and not mutually exclusive (Julia, et al., 2008). Currently, the power sector in Nigeria is facing significant challenges in its key operational domains, namely generation, transmission, distribution, and marketing (Idigbe, 2009).

Despite Nigeria's abundant energy resources and significant investments in energy infrastructure, the power sector's performance has consistently lagged behind that of other developing economies. The veracity of this claim was substantiated by a study conducted by the World Bank in 1993, as cited in Oyedepo's (2012) assessment of energy development in Nigeria. This study involved a comparative analysis of Nigeria's power sector performance in relation to that of 20 other developing nations. The findings of the study indicate that the sector exhibited the highest proportion of system losses, ranging from 33% to 41%. Additionally, it had the lowest generating capacity factor, standing at 20%. Furthermore, the sector demonstrated the lowest average revenue, amounting to US$ 1.56 per kilowatt-hour. Moreover, it displayed the lowest rate of return, measuring 8%. Lastly, the sector had the longest average period for accounts receivable, spanning 15 months.

Undoubtedly, the issue of costly and unreliable electricity continues to be a significant concern across various sectors of the Nigerian economy, including industrial, commercial, and domestic domains. Frequent and unpredictable power outages, which have become a routine phenomenon in Nigeria, frequently lead to equipment malfunctions, thereby impeding the efficient production of goods and provision of services. Due to this inherent issue, industrial enterprises have been obligated to incorporate their own equipment for the generation and transmission of electricity, resulting in a significant increase in both their operational and capital expenses (Uduma, 2010). A significant number of businesses in Nigeria, irrespective of their size, heavily depend on generators to meet their electricity needs for operational purposes. MTN, a prominent South African telecommunications company and the

leading mobile phone provider in Nigeria, reportedly employs approximately 6000 generators to power its base stations for a duration of up to 19 hours per day. According to Uduma (2010), the organisation allocates a budget of $5.5 million towards the procurement of diesel fuel for the operation of its generators.

Roles of Community-Based Renewable Energy Projects and Economy Development of Nigeria

Energy plays a pivotal role in driving Nigeria's economic growth and development. The nation's international diplomacy is greatly influenced by its role, while also serving as a tradable commodity that contributes to the national income. This income is subsequently utilised to support government development programmes. Furthermore, it functions as a crucial factor in the generation of goods and services within the industrial, transportation, agricultural, health, and education sectors of a nation. Additionally, it serves as a tool for political, security, and diplomatic purposes (Sambo, 2009). Energy, specifically oil and gas, has consistently played a significant role in Nigeria's Federal revenue generation for national development initiatives and security, as these earnings form a substantial portion of the country's financial resources. Over the previous five-year period, energy, particularly crude oil, has consistently accounted for approximately 25% of Nigeria's Gross Domestic Product (GDP), making it the primary contributor after crop production. According to the National Planning Commission (1997), as cited in Oyedepo (2012), the incorporation of renewable energy utilisation, which accounts for approximately 90% of energy consumption in rural areas, is anticipated to result in a greater contribution of energy to the Gross Domestic Product (GDP).

Despite the existence of substantial reserves of coal, oil, and natural gas, current extraction rates indicate that these reserves are projected to be depleted within the next four decades, reaching a point where further exploration would no longer be economically viable. It is imperative that we commence the implementation of energy conservation and efficiency measures in conversion systems, while simultaneously seeking alternative sources of energy (ECN, 2005).

According to Idigbe (2009), the utilisation of renewable energy sources is crucial in addressing the forthcoming energy demands in both rural and urban regions. The prioritisation of the development and utilisation of renewable energy is crucial, particularly in response to the growing recognition of the detrimental environmental consequences associated with fossil fuel-based power generation. The global demand for sustainable energy development has been experiencing a significant surge. The utilisation of renewable energy on a large scale is of utmost significance in attaining sustainability within the energy domains of both developing and industrialised nations. Renewable energy resources play a crucial role in facilitating sustainable development

due to several primary factors: (i) In comparison to alternative energy sources, they typically result in a lower degree of environmental impact. The incorporation of renewable energy technologies can effectively mitigate the environmental issues arising from the release of greenhouse gases, including carbon dioxide (CO2), nitrogen oxides (NOx), sulphur oxides (SOx), and particulate matter, which are byproducts of power generation from fossil fuels such as oil, natural gas, and coal. The diverse range of renewable energy resources offers a versatile selection of options for their utilisation. (ii) It is not possible to exhaust their supply. When employed judiciously in suitable contexts, renewable energy resources have the potential to offer a dependable and enduring source of energy. On the other hand, the extraction and consumption of fossil fuel resources result in their depletion. (iii) The proponents of system decentralisation and local solutions prioritise a level of independence from the national network, thereby increasing the adaptability of the system and yielding economic advantages for small, isolated populations.

Material and Methods

The current investigation utilises the ex post facto survey methodology, which combines qualitative and quantitative approaches to gather data. The literature review was undertaken by taking into account the variables linked to the research objectives. The attainment of this goal was facilitated by incorporating prior research studies, scholarly articles, and educational resources, in addition to analysing specific renewable energy companies operating within the Nigerian context. A subset of 379 individuals was selected from a larger population of 15,321 participants, utilising a methodology that closely aligns with the approach proposed by Krecie and Morgan in 1970. The researchers utilised a snowball sampling methodology in order to ascertain the participants. The questionnaires were distributed using Google Forms and subsequently administered to a specific cohort of participants through WhatsApp groups and email. The data collected from these participants was subsequently integrated into the research. The implementation of the snowball sampling technique hindered researchers from conducting face-to-face visits in order to collect data from participants. The utilisation of the snowball method was found to be effective in identifying and locating participants due to the pre-existing connections among them. The study comprised a sample size of 379 participants who satisfactorily completed and submitted the electronic questionnaire. The collected data underwent analysis utilising appropriate statistical techniques, such as regression analysis, to assess the null hypothesis.

Data Presentation, Analysis and Findings

Answering of Research Questions

Research Question One: What are the socio-economic and environmental impacts of community-based renewable energy projects on local communities?

Table 1: analysis of respondent's responses on the socio-economic and environmental impacts of community-based renewable energy projects on local communities

SN	socio-economic and environmental impacts of renewable energy projects	SA(%)	A(%)	U(%)	D(%)	SD(%)	Total
1	The intermittency of sunshine and wind cannot provide an on-demand power source 24 hours a week.	106 (27.96)	96 (25.32)	78 (20.58)	55 (14.51)	44 (11.60)	379
2	Energy generation by the burning of fossil fuels is more consistent.	103 (27.17)	97 (25.59)	73 (19.26)	61 (16.09)	46 (12.13)	379
3	There is volatility in generation and volatility in loads.	109 (28.75)	95 (25.06)	80 (21.10)	50 (13.19)	45 (11.87)	379
4	energy and wind are unpredictable.	105 (27.70)	90 (23.74)	72 (18.99)	60 (15.83)	52 (13.72)	379
5	Focusing on renewable energy sources other than fossil fuels and coals might help in avoiding environmental impacts.	108 (28.49)	96 (25.32)	80 (21.10)	50 (13.19)	45 (11.87)	379
	Aggregate	**531 (27.72)**	**474 (25.39)**	**383 (20.29)**	**276 (14.36)**	**231 (12.24)**	**1895 (100)**
	Proportional Ratio	**105.1**	**94.9**	**76.9**	**55.8**	**46.3**	**379**

Source: Researcher's Computation (2023).

Analysis of response of respondents on the socio-economic and environmental impacts of community-based renewable energy projects on local communities reveals that the respondents Strongly Agreed (SA) responses had an aggregate of 531 representing 27.72% and a proportional ratio of 105.1. This was followed by aggregate of 474 representing 25.39 and a proportional ration of 94.9 who opted for agreed option, Undecided had an aggregate of 383 representing 20.29 and a proportional ratio of 76.9, Disagree option had an aggregate of 276 representing 14.36 and a proportional ratio of 55.8, Strongly Disagree option had an aggregate of 231 representing 12.24 and a proportional ratio of 46.3.

Therefore, based on the above data analysis, there are socio-economic and environmental impacts of community-based renewable energy projects on local communities**.**

Research Question Two: What are the enabling factors and best practices that contributes to the success of community-based renewable energy projects?

Table 2: analysis of respondent's responses on the enabling factors and best practices that contributes to the success of community-based renewable energy projects

S/N	practices that contributes to the success of community-based renewable energy	SA(%)	A(%)	U(%)	D(%)	SD(%)	Total
1	It is essential for local communities to be included in the decision-making process.	104 (27.44)	90 (23.74)	81 (21.37)	71 (18.7)	33 (8.70)	379
2	Organization and management of environmental factors enhance the success of renewable energy projects.	108 (28.49)	88 (23.21)	74 (19.52)	51 (13.45)	58 (15.30)	379
3	Technology contributes to the success of community-based renewable energy.	102 (26.91)	93 (24.53)	86 (22.69)	50 (13.19)	48 (12.66)	379
4	Wind power and solar energy contribute to renewable energy.	102 (26.91)	91 (24.01)	82 (21.63)	59 (15.56)	45 (11.87)	379
5	Renewable energy sources are the opposite of fossil fuels, like coal and gas, which are a finite energy source.	109 (28.75)	90 (23.74)	83 (21.89)	50 (13.19)	47 (12.40)	379
	Aggregate	**525 (27.90)**	**452 (23.85)**	**406 (21.42)**	**281 (14.43)**	**231 (12.40)**	**1895 (100)**
	Proportional Ratio	**105**	**90.4**	**81.20**	**56.2**	**46.3**	**379**

Source: Researcher's Computation (2023).

Analysis of responses respondents on the enabling factors and best practices that contributes to the success of community-based renewable energy projects reveals that

the respondents Strongly Agreed (SA) responses had an aggregate of 525 representing 27.90% and a proportional ratio of 105 This was followed by aggregate of 452 representing 23.85 and a proportional ration of 90.4 who opted for agreed option, Undecided had an aggregate of 406 representing 21.42 and a proportional ratio of 81.20, Disagree option had an aggregate of 281 representing 14.43 and a proportional ratio of 52.6, Strongly Disagree option had an aggregate of 231 representing 12.40 and a proportional ratio of 46.2. Therefore, based on the analysis of study, the enabling factors and best practices is effectively contributes to the success of community-based renewable energy projects.

Hypotheses Testing

Hypothesis One

There is no significant impacts of socio-economic and environmental that enhances community-based renewable energy projects on local communities. In order to test the hypothesis, Pearson Product Moment Correlation analysis was then used to analyze the data in order to determine the relationship between the two variables

TABLE 3

Pearson Product Moment Correlation Analysis of the impacts of socio-economic and environmental that enhances community-based renewable energy projects on local communities

Variable	$\sum x$	$\sum x^2$	$\sum xy$	r
		$\sum y$	$\sum y^2$	
Community-based renewable energy projects (x)	9011	270655	140162	0.83*
socio-economic and environmental impact(y)	9113	58989		

***Significant at 0.025 level; df =375; N =379; critical r–value = 0.086**

Table 3 presents the obtained r-value as (0.83). This value was tested for significance by comparing it with the critical r-value (0.086) at 0.025 levels with 375 degree of freedom. The obtained r-value (0.82) was greater than the critical r-value (0.086). Hence, the result was significant. The result therefore means that there are significant impacts of socio-economic and environmental that enhances community-based renewable energy projects on local communities.

Hypothesis Two

There is no significant factors and best practices that contribute to the success of community-based renewable energy projects. In order to test the hypothesis, Pearson

Product Moment Correlation analysis was then used to analyze the data in order to determine the relationship between the two variables

TABLE 4

Pearson Product Moment Correlation Analysis of the factors and best practices that contribute to the success of community-based renewable energy projects

Variable	$\sum x$	$\sum x^2$	$\sum xy$	r
		$\sum y$	$\sum y^2$	
community-based renewable energy projects (x)	9011	270655	140162	0.83*
factors and best practices that contribute (y)	9113	58989		

***Significant at 0.025 level; df =375; N =379; critical r–value = 0.086**

Table 4 presents the obtained r-value as (0.83). This value was tested for significance by comparing it with the critical r-value (0.086) at 0.025 levels with 375 degree of freedom. The obtained r-value (0.82) was greater than the critical r-value (0.086). Hence, the result was significant. The result therefore means that there are significant factors and best practices that contribute to the success of community-based renewable energy projects.

Discussion of Findings

The result of the data analysis in table 3 was significant due to the fact that the obtained r-value (0.83) was greater than the critical r-value (0.086) at 0.025 level with 311 degree of freedom. This implies that there are significant impacts of socio-economic and environmental that enhances community-based renewable energy projects on local communities. The significance of the result caused the null hypothesis to be rejected while the alternative one was accepted.

The result of the data analysis in table 4 was significant due to the fact that the obtained r-value (0.91) was greater than the critical r-value (0.086) at 0.025 level with 311 degree of freedom. This implies that there is significant factors and best practices that contribute to the success of community-based renewable energy projects. The significance of the result caused the null hypothesis to be rejected while the alternative one was accepted.

Conclusion

For a sustainable development to be achieved there needs to be an efficient, reliable and decentralized energy system in the economy which is based on a clean energy

source. the conservation and sustainable use of biodiversity and the equitable sharing of the benefits arising from its use are germane for socio-economic development and poverty alleviation. Also, science and technology in an integrated fashion is also central to any sustainable development path because it enhances understanding of how human activities affect the environment and the imperative of a balanced and responsible natural resource management. Although development can assist the process of alleviating environmental problems, it is not automatic. This is because there is the appropriate public policy nexus which should be systematic, integrated and inter-disciplinary in approach so as to efficaciously provide the premise for the analysis of the benefits and costs of the different courses of action.

Recommendation

Since policy outcomes are affected by the vagaries of the political struggle, the product of this process must advance the welfare of society in the light of sustainability by ensuring that environmental policies posses well stated objectives, well designed means and transparent ways of assessing results. Fundamental changes in attitude by all stakeholders in Nigeria that will engender a paradigm shift from activities and processes that abuse the environment to alternatives that respect its limitation and facilitate innovation and best practices which are environmentally beneficial is equally exigent. Thus sustainable development as a practical guide and road map to the survival of humanity must encapsulate all the dimensions in an inter-dependent reality so as to bring man, nature and development for both now and the future.

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