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Community Participation in the Renewable Energy Sector in Tanzania

Obadia Kyetuza Bishoge[a,b,*], Godlisten Gladstone Kombe[c] & Benatus Norbert Mvile[d,e]

[a] *Department of Environmental Management, Pan African University Life and Earth Sciences Institute, University of Ibadan, Nigeria*
[b] *Department of Environment, Masasi District Council, Postal Office Box 60, Masasi-Mtwara, Tanzania*
[c] *Department of Petroleum and Energy Engineering, College of Earth Science, the University of Dodoma, Postal Office Box 259, Dodoma, Tanzania*
[d] *Department of Geology, Pan African University Life and Earth Sciences Institute, University of Ibadan, Nigeria*
[e] *Department of Physics, College of Natural and Mathematical Sciences, University of Dodoma, Postal Office Box 259, Dodoma, Tanzania*

ABSTRACT

Community participation (CP) is emphasized in the planning and implementation of various projects and sectors. The Renewable energy (RE) sector just like other sector requires community participation for its effectiveness and efficiency. This review aims at exploring the community participation in the renewable sector in Tanzania. A seven-step model was used to review various kinds of literature and five identified themes were analyzed: (i) access to information on RE resources; (ii) Community awareness of RE technologies and related regulatory and institutional framework; (iii) Employment opportunities in RE sector; and (iv) Contribution of RE in quality of life improvements. The study revealed that despite different efforts taken by the government and other energy stakeholders, the community still lacks awareness about RE technologies, institutional and regulatory framework. However, the RE sector plays an important role in providing employment opportunities to the local communities and in alleviating poverty. For instance, hydropower has increased electricity supply, solar energy has improved the local households' standard of living, education and health services. It is recommended that the government and other energy stakeholders cooperate in providing more information and awareness of RE technologies to the community. This should be accompanied by the introduction of a national policy and law which is specifically for renewable energy to enable its development.

Keywords:

Access to information;
Community awareness;
Community participation;
Renewable energy;
The Seven-Step model;

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1. Introduction

The economic development of any society has been linked with energy utilization [1]. Traditionally, fossil fuels have been the main driving force in providing energy which drives different economic activities. Unfortunately, the world's heavy reliance on fossil fuels utilization has raised several challenges including: global warming which leads to climate change, price fluctuations, environmental pollutions and insecure supply [2], [3]. Besides, it is predicted that the global oil and gas reserves will be depleted by 2060 with coal lasting just sixty years later [4]. These challenges have influenced the increase in efforts of promoting sustainable energy planning and management into the public agenda [5]. In lieu of this, Renewable Energy (RE) have been accepted widely as a possible solution to tackle the aforementioned challenges [6], [7]. RE can provide clean and sustainable energy, it offers countries around the world an opportunity to improve their energy security and accelerate economic development. Furthermore, RE is now becoming more popular for small scale utilization due to their scalability and applicability to serve the

*Corresponding author - e-mail: obishoge@yahoo.co.uk

raising energy demands and provide critical services such as lighting, water pumping/purification [8], [9].

To successfully manage the adoption and development of RE technologies, community participation (CP) is required [6]. The community can be involved in the sector with consideration of various aspects. These aspects include community knowledge, awareness, acceptance, involvement in the investment, securing employment opportunities, accessing timely and true information on RE technology developments [10]. CP addresses sustainable development of RE through collaborative management in energy production and supply.

Tanzania has an approximate total power capacity of 1,450 MW of electricity by which natural gas, hydropower and liquid fuel accounts for 652.5 MW, 609 MW, and 188.5 MW, respectively [11]. Hydropower is one of the RE which encourages the national electricity contribution compared to other RE sources such as solar (26 MW), wind (77 MW), and geothermal (expecting to generate 200 MW by 2025) and biofuels [12].

Tanzania has abundant and high-quality RE resources which are unexploited due to some reasons such as:- poor mobilization, lack of political will, and shortage of RE policy and law. Other challenges include poor participation of local governments, limited coordination and connectivity between sectors and energy stakeholders and lack of long-term policymaking [13]. Despite these challenges, Tanzania has made progress in electricity production and supply in urban and rural areas. The government facilitates an enabling environment for solar systems in households and institutions such as schools and health centres. Different households and institutions in rural and urban areas use solar panels to generate electricity for lighting, phone charging and watching television. Societies favour using solar panels to improve life rather than using diesel generators which are noisy, dirty and intrusive [14].

Furthermore, the government and other energy stakeholders in Tanzania collaborate to encourage and invest in the use of the RE. For instance, under the Tanzania Development Vision 2025, hydropower projects with a capacity of approximately 4,765 GW have been identified and proposed to meet the demand for reliable and affordable energy in Tanzania [15]. This initiative has started by constructing the Nyerere Hydropower Project which will be able to generate 2,115 MW of electricity soon after its completion [16]. Moreover, the country has a plan to generate 650 MW from geothermal potential, 100 MW from wind, 60 MW from solar, and 11 MW from small hydropower plants by the end of 2020 [17]. In addition, it is projected that 53%, 75% and 100% of the Tanzanian total electricity will be generated from RE sources by 2020, 2030 and 2050, respectively. The total installed capacity of RE will reach over 20 GW and 60 GW by 2030 and 2050, respectively [18].

Over the decades, there has been much debate development and debate on ways to conceptualize meaningful CP in the energy sector [19]. The use of community participatory approaches promotes the effectiveness of implemented projects or programs. Effective involvement of the communities has positive impacts on social and economic capital, leading to enhanced community empowerment and ultimately improved energy production and consumption. This facilitates the capacity of the community to meet its energy demand [20], [21]. Tanzania practices CP in the development of various sectors and projects [22]. Local communities are considered in the projects which are implemented and beneficial to local areas. RE projects require the full participation of the communities. Despite the efforts done to ensure that CP is realized in the development of the RE sector, there are still some cases in which the local communities are not fully involved from designing to the implementation of the projects [23], [24]. The community needs to have enough information regarding RE especially on technologies and sources; knowledge and awareness on the RE related technologies, policies, laws and regulations. Moreover, there is a need to discuss how the RE sector benefits local communities in terms of employment opportunities and poverty alleviation. However, despite the wide acceptance of CP in theory and practices, there are still many challenges on how CP is implemented in the energy sector and projects in developing countries such as Tanzania [25].

Previous systematic reviews and studies of CP outcomes on energy sector have focused on hydrocarbon extractions such as natural gas and petroleum in Tanzania [11], [26]. Thus, to our knowledge, there is no review of existing systematic approaches that examine the

outcomes of community involvement in RE sector planning, implementation, monitoring and evaluation in Tanzania. Hence, the objective of this paper is to address the shortcoming in literature and provide a better understanding of how communities participate in the development of the RE sector in Tanzania.

2. The concept of CP and its relation to the renewable energy sector

CP globally refers to the involvement of local people in decision-making processes and developmental projects' implementation [27]. It is closely related to the concepts of empowerment, local knowledge and awareness. CP offers local people with the opportunities, experience and insights to projects' designing, implementation, monitoring and evaluation [24]. CP in the management of sector or project has a long-standing and constructive tradition. The lack of work at the grassroots level and investment in the capacity building are system barriers towards full CP [28]. In a real sense, achieving full representation of a community can be difficult in practice.

CP can be considered into two approaches which are either top-down or bottom-up [29]. The top-down approach involves the use of experts at the top to plan development initiatives and lead the process [30]while in the bottom-up approach the local community is the one that pledges the development initiatives to allow them to select their own goals and means of achieving them [31].

Full CP provides the active, efficient and effective involvement of the community in all stages and aspects of the project or sector, as shown in Figure 1.

The involvement of the community in all levels of the project increases the legitimacy of the decisions made and minimizes the level of conflicts which are likely to occur during the implementation of the project [32]. Through CP, communities learn how to solve environmental, socioeconomic, technical and political problems which are likely to affect the sector or project or the society and hence change their behaviour. Moreover, during the monitoring of the RE policies, local communities must be involved to identify the new needs and opportunities related to the RE sector in their areas [33]. RE policies' monitoring helps to identify changes which are associated with the RE sector during its development or implementation [34].

2.1. CP in Sustainable RE Development

As explained earlier, CP is a necessary strategy for the sustainable sector or project development including the RE sector in any country. Community-based RE has been growing as a global movement [35]. The community especially local societies need to be involved fully in the planning, implementing, monitoring and evaluating of RE projects [36], as indicated in Table 1.

Through CP, RE sector development incorporates the opinions of the local community which assist to fulfil their expectations and benefits of the project [27]. The local community will be more supportive of RE sector development if they have a chance to participate in all

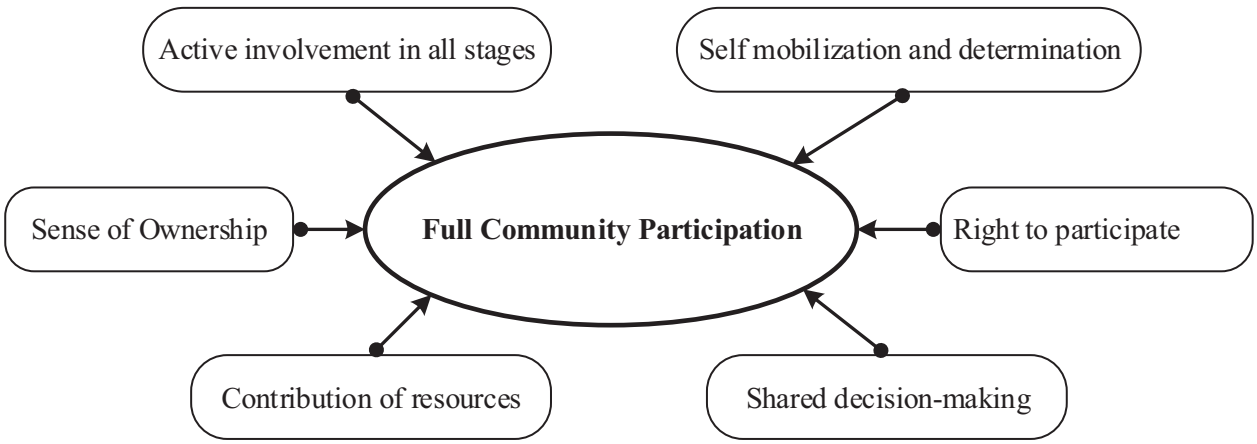

Figure 1: Aspects of full CP

Table 1: Role of the community at various stages of RE project management

No.	Stage	Role
1.	Planning and designing	The proposition of particular sites and resources for feasibility studies
2.	Financing	Provision of cheap labour and land
3.	Operation and maintenance	Line maintenance and distribution of connections
4.	Administration	Tariff collection, account maintenance, and ensuring security and handling of the project

aspects of the project. However, in some cases, local communities are only involved in the implementation process of the project, and the planning stage remains a responsibility of the proponent. This may be a hindrance to the development of the project. In other cases, according to Oji and Weber [37], the structure and design of the numerous RE programs can influence the rational participation in the program and capacity of RE programs' developers to raise finance through community involvement and to fund capital costs of RE programs. For example, in Canada, local citizens were involved in the RE programs whose overall designs had a section to address greenhouse gas emissions at household levels. Citizen participation helps to accelerate the transition towards low-carbon energy systems. Moreover, Romano et al. [38] demonstrated that different energy models are designed to allow the users' sharing of data and information within and outside their areas and to increase residents' sense of ownership through community involvement. This provides them with new forms of interaction.

The successful implementation of RE projects through CP has also been well demonstrated by a local community in Sagar and Mousuni Islands in India, whereby, the community contributed half of the total cost of the renewable power project [18]. They provided their land, labour at reduced cost and assisted government officials by arranging food and shelter during the power construction period. Also, it is interesting that the local community was trained for routine maintenance of the project [18]. The provision of the land and cheap labour had a positive impact on the speed of the project implementation and it also increased the share of the community in the project. The increased share enhanced a sense of ownership among the community members. Moreover, the provision of training in routine maintenance increased the effectiveness and efficiency in operations and line maintenance, distribution of connections and security of the project.

According to Plummer and Taylor [39], China has been successful in the development of RE projects because it has increased the trends which create the possibilities for increased participation by Chinese people in making decisions affecting their daily lives, especially in rural areas. The new reforms in some areas, appear to change how power is exercised at local levels. The energy efficiency is currently high in rural areas of China. In addition, the poverty rate has gradually decreased [40]. Besides China, many other countries with RE constructions have experienced an improvement in livelihood. For instance, the construction of mini-power plants in Zambia, have created jobs and economic opportunities to local people [41]. Most of the local people's homes are powered with solar PV systems by which the residents benefit in different ways such as relieving women and children of the time spent in completing household activities manually without the aid of electricity [42]. Solar powering the health centres especially the maternity rooms and laboratories have improved health services in rural areas by ensuring effective and safe healthcare [43]. Moreover, solar-powered lightening in schools and other learning places in rural areas has enhanced the children to study for a longer time in safely-lit classrooms and teachers have a longer time to plan, mark and assist students with their home works, raising education standards [44].

Besides, Furuya [45] reports that in Japan, after the Great East Japan Earthquake and the Fukushima nuclear disaster in 2011, Tama Empower (a Tokyo based community solar startup) initiated a new participatory installation model for rooftop solar, named "Do it Ourselves" in 2016. This model offers customers with power from photovoltaic (PV) and enhances the community to have a deep understanding and feeling on the PV systems installed in their places. This creates a sense of ownership of the solar PV systems among the customers or local communities. This model insisted on the participation of building owners and

tenants in the installation; breaking down cost and role sharing; carefully solar PV selection; and support for institutional operations and maintenance. This project achieved the installation over a total of 610 kW distributed solar PV in 13 places around the city. The beneficiaries were mainly university building, schools, a house for elderly people, a community centre, a private company's building and a museum.

Likewise, according to the Institute for Sustainable Energy Policies [35], Samsø Island in Denmark, realized 100% community-based RE in 10 years since the 1990s. This was achieved through holding the series of workshop named "Next Practice". In this workshop people shared the island's life experiences and knowledge on energy sector development and challenges with communities and experts around the world, enriched mutual inspiration and sightsaw next practice. Next Practice is among the initiatives which have made Denmark being the pioneer of clean energy in the world. Currently, over 30% of all energy is from RE sources. The interesting issue about Denmark is that half of its electricity was from wind and solar power in 2019 [46]. That's the highest number ever. This practice was later adopted by Japan to achieve the CP in RE sector development in local communities [35].

On the other hand, in Kenya, as reported by Comer [47] the Baharini Electra Wind Farm, a 90 MW wind project in Lamu faced the opposition from residents throughout its development process because over 80,000 residents were not prior informed of the project's intention to acquire their land. Also, in the same country, a proposed Kinangop Wind Park with 60.8 MW was cancelled before it could go online as scheduled in 2015 because the community landowners were not involved during the planning process. The community willingness is a key element by which the community is to be imparted to assist the full CP in the RE sector management. The study conducted by Nakano et al. [48] revealed that social acceptance of the RE projects and willingness to pay for RE services in East Japan is influenced by the communities' strong concerns about the global change and willingness to participate in policy-making. This has enhanced the achievement of effective and efficient RE development in Japan. Alternatively, Akinwale et al. [49] pinpoint that less than 6% of the respondents who were involved in a study about public understanding and attitudes of RE resources towards energy development in Nigeria argued for the use of biomass and wind energy due to poor knowledge and awareness of the efficient utilization of their technologies. Moreover, the study conducted by Karatepe et al. [50] on the levels of awareness about the RE sources of university students in Turkey revealed that there are poor awareness levels on the RE among the communities especially students and no enough information about policies and laws on RE. It is evidenced, therefore, CP is a crucial element in the development and sustainability of any RE project.

3. Methodological Framework

This study is the systematic review (SR) which overviews the existing evidence pertinent to CP in the RE sector in Tanzania. SR refers to the strict approach used to pinpoint relevant studies which address the study topic with an established inclusion or exclusion criteria and a well-defined methodological analysis and dissemination of the themes from the selected studies [51]. SR is précised and standardized methods to identify and critically appraise the previous relevant studies relating to CP and RE sector by focusing on very specific questions or themes. In general, SR aims to deliberately document, critically evaluate and summarize scientifically all of the previous studies about a clearly defined research problem [52].

The Seven-Step Model was used to conduct a comprehensive literature review [53] as summarized in Figure 2. In which, the researchers initiated the identification of the problem, beliefs and interests of the study by selecting major themes such as CP, RE, RE sector management, community knowledge, awareness, willingness, and information flow. An extensive literature search for information from different bibliographic sources such as Google Scholar, Web of Science, and Scopus, and government and non-government reports was conducted from 2010 to 2020. The obtained studies were then filtered to allow detailed study which provides main concerns relevant to the study topic. The list of selected studies was filtered down to 42 out of 54 studies. The selection process revealed further, the unsuitability of some studies which lacks a clear information on CP in the RE sector. Thus, out of 42 studies, 35 studies were finally selected, as indicated in Table 2.

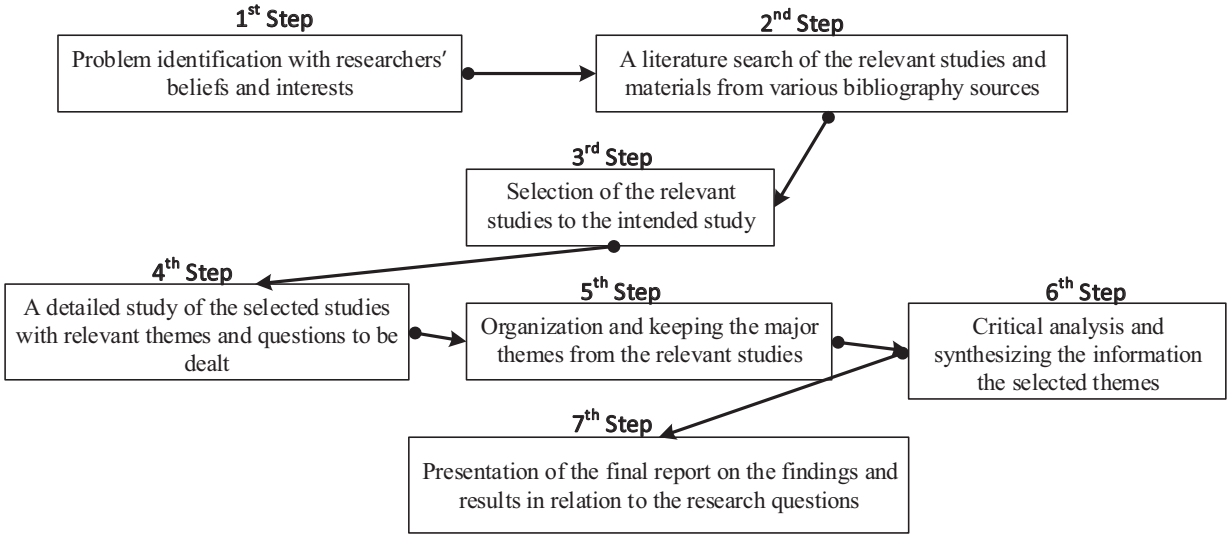

Figure 2: The Seven-Step Model used in the study

Table 2: Potential studies used for themes analysis

No.	Variable	No. of relevant studies	Percentage
1.	Access to information on RE resources and technologies	14	40
2.	Community awareness of the RE technologies and related regulatory and institutional framework	11	31.4
3.	Employment opportunities in the RE sector	5	14.3
4.	Contribution of RE in quality of life improvements	5	14.3
	Total	**35**	**100**

Then, data were organized, analyzed, synthesized and finally reported according to the research questions.

4. The Concept of CP in Renewable Energy Sector in Tanzania

This study revealed four major evaluation themes which are related to CP in the RE sector development in Tanzania. These themes were obtained after a systematic review through Seven-Step model in section 3. The outcomes for each step of the seven-step model are presented in Table 3. Moreover, main themes are access to information on RE resources and technologies, community awareness of the RE technologies and related regulatory and institutional framework, RE as the source of employment opportunities, and RE sector and improvement of life quality.

Table 3: The outcomes of each step in the Seven-step model

Step	Outcomes
1.	Explored worldwide beliefs on the topic of interest and highlighted its contents to create the aim of the study
2.	The initial list of relevant studies from various sources such as google scholar
3.	Relevant studies after searching keywords related to the study topic were filtrated from the initial list in step 2
4.	Examined list of filtrated studies and themes
5.	Identification of major themes such as access to information, community awareness and knowledge on RE technologies and resources, employment opportunities and improvement of life quality through RE sector
6.	Comprehensive reading and evaluation of the major themes to produce a deep discussion
7.	Presentation of the results in terms of summaries

4.1. Access to information on RE resources and technologies

Tanzania has an abundance of RE resources by which largely are unexploited. The country's total energy capacity from RE resources excluding hydropower is about 5% [54]. Hydropower is the major RE resource of electricity contributing about 652.5 MW out of 1,450 MW of the total capacity [13]. The potential available RE resources in Tanzania [55], [56] are summarized in Table 4.

Table 4: Potential and development status of RE resources in Tanzania

No.	Source	Estimated Resource Potential	Status of development
1.	Hydropower	4.7 GW	12%
2.	Small hydropower	485 MW	2%
3.	Solar	>200 Wp/m^2	Average insolation 215 W/m^2. Up to 3,000 h sunshine/year
4.	Biomass	>500 MW	34 MILm^3/year
5.	Geothermal	5,000 MW	–
6.	biofuels	Presence of various crops such as Jatropha, oil palm, algae, soybean for ethanol and biodiesel production	–
7.	Wind power	Speed: > 8m/sec	–
8.	Tidal and wave	Under an assessment	–

Access to information is important for promoting and protecting resources. It is among the human rights [57]. It collects the voice of the people to participate in various activities at all levels and set priorities for action. Information can be accessed through different ways such as media, workshop, training and seminars. The government and other stakeholders are responsible for information dissemination to society. Moreover, Kichonge et al. [58] suggest that the use of RE for electricity generation requires sufficient information regarding their economic and social convenience to the government, experts, communities and other energy stakeholders.

In Tanzania, various ways such as media, and seminars, conferences or training conducted by various institutions are used to disseminate information of RE to the community [59]. One of the organizations which promote Sustainable Development of RE through information dissemination is Tanzania Renewable Energy Association (TAREA). This non-government organization is not only responsible for information dissemination but also responsible for training, policy influence, research, volunteer programs, and consultancy services [60]. Moreover, there are other private organizations like Palmetto which facilitates the access of information and finance on RE technologies such as the installation of solar panels to the rural areas especially in the Iringa region [61].

Despite the initiatives which are undertaken, there is still a shortage of some data and information on RE. For instance, the study conducted by Aly et al. [62] through stakeholders' based approach revealed that there is lack of information, data and studies on RE technologies to some communities, especially in rural areas. Similarly, Katikiro [63] while studying the prospects of RE technologies in Tanzania, a case study of Mtwara district, revealed that rural people have no appropriate information on the RE technologies. Such gap on RE information has hindered rural people from seeking for the RE alternatives to replace the use of unclean fuels like charcoal and firewood.

Based on general observation from studies, the lack of access to information on RE resources and technologies calls for more efforts to improve the accessibility of information on modern energies to rural residents. This will facilitate the achievement sets on energy targets by 2030 as stipulated in 2015 Energy Policy [64]. Thus, there is a need for establishing a designated unit which will comprise all relevant statistics and resource information on RE resources [65]. Moreover, the government and other stakeholders through various ways such as media should disseminate timely and correct information on RE to the communities to realize sustainable energy development.

4.2. Community awareness of the RE technologies and related regulatory and institutional framework

Awareness and knowledge among the community is a key tool in achieving sustainable energy development in any country [50]. Various studies show that societies, especially in developing countries, have low-level awareness and knowledge about RE use in energy production [66], [67]. However, it is suggested that every individual needs to have knowledge and awareness about issues related to environmental conservation in energy sources, production and effective use. In Tanzania, there are various institutions and policies which are responsible for

RE sector development. The Ministry of Energy is the custodian of energy sector development in Tanzania. It oversees policies, strategies, and laws within the areas of energy resource management. It furthermore sets plans, develops capacity building and mobilizes financial resources.

The National Energy Policy of 2015 is among the regulatory documents that ensure an efficient and sustainable energy value chain which includes production, procurement, transportation, and distribution and end-use systems. It aims at ensuring the provision and development of reliable and affordable energy in Tanzania. The policy calls for a better way and scaling-up of the utilization of RE resources [68]. Also, the National Environmental Management Act of 2004 emphasizes the promotion of the use of RE sources for which more incentives, policies and measures should be taken to encourage the development of RE [69]. This Act encourages the use of RE resources to replace the utilization of non-renewable energy resources such as charcoal, firewood, and fuels which are depleted and detrimental to the environment [70]. In Tanzania, the government and other energy stakeholders have been providing awareness of the RE technologies to the community. The awareness has been provided through different ways including media, training, conference, workshops and seminars. Most efforts are directed to implementing awareness through demonstrating campaigns on the use of solar systems for domestic and industrial use as well as supporting direct installation in public and privates institutions such as health centres and schools [71].

Despite these efforts, only a few communities have benefited and reacted positively to the RE technologies, policies and regulations. The majority of the population remains with poor or lack of awareness and understanding of the RE sector development. For instance, the study by Katikiro [63], revealed that there are poor awareness and low skills on RE technologies due to lack of displays and activities relating to RE in village areas. This is justified by Aly et al. [62] while studying the barriers to solar power in Tanzania. Aly et al. [12] reported that a lack of awareness on RE technologies hinders the development of small-scale solar power in rural societies of Tanzania. Moreover, Bauner [72] reported that limited awareness of available solutions and ability to pay are the major issues which affect the small scale power development in Tanzania. This affects the organization of effective and efficient operations and maintenance of the development of small scale power especially in rural areas where electricity is a problem.

Besides, the reporter of Tanzania Daily News (Dar es Salaam) interviewed Mr Mahimbo (a young managing director of a RE company) who pinpointed out that the lack of awareness on RE potential among the communities hinders their activities of developing, procuring and constructing RE projects across Tanzania [73].

Thus, more efforts are required for the community to acquire knowledge about the energetic requirements and the potential of RE sources and previous experiences to develop the most efficient and sustainable technology system which may allow better use of RE sources available. The interest of local stakeholders should be taken care to guarantee a common acceptance and widespread of the knowledge about the benefits for the adoption of RE and fulfil the sustainable development goal number 7. Besides, the knowledge, best practices, and solutions must be transferred to various energy actors when facing common problems relating to RE sector development.

4.3. RE as the source of employment opportunities

RE sector plays a central role in assisting to offset the impact of climate change. It is at the forefront of technological development, which has opened up various career routes for graduates at down and up the supply chain. RE sector needs casual, semi-skilled and skilled labour to operate RE technologies. RE sector can provide direct job opportunities to experts such as mechanical, design and environmental engineers, policy analysts, managers, sales representative, accountants, and economists. According to the International Renewable Energy Agency [74, the RE sector employed 11 million people directly and indirectly at the end of 2018 globally. There are factors which shape how and where employees can be generated in RE production and supply chain. These factors include government policies and laws; the variation of supply chains; trade forms; industry restructuring; and consolidation leanings [74].

In Tanzania, the RE sector is among the sectors which provide employment opportunities. For instance, during the site visit of the Parliamentary Committee on Energy and Minerals in 2019, the Minister for Energy told the committee members that over 5,400 people would be employed at Nyerere Hydropower Project (biggest

hydropower plant in East Africa) which will be able to generate 2,100 MW. Out of 5,400 people, 5,000 and 400 will be employed under temporal and permanent contracts, respectively [75]. Moreover, other RE related projects such as solar power projects provide opportunities such as technicians, contractors and drivers [76]. Currently, there are a lot of companies (about 40) which deal with solar power production especially in selling, installing, and maintaining solar PV systems in urban and rural areas. All of these companies offer various job opportunities among the communities.

Despite this RE benefit to the community, the society still lacks the awareness on the use and development of RE technologies in Tanzania [13]. The local communities tend to look for technicians from the other areas far from their areas. However, the government and other stakeholders have been providing various training and education programs for RE technologies to help the local communities build their skills.

4.4. RE sector and improvement of life quality

Energy access is among the driving forces for poverty alleviation for sustainable development in any country. The promotion and supply of modern energy encourage the improvement of human living conditions and the sector's productivity [77]. Extremely poor people cannot lift themselves out of poverty without access to reliable and modern energy.

In Tanzania, the use of RE improves the living standards of the people in rural and urban areas. This facilitates the running of the business, provision of good health and education services as well as lighting homes and enhancing cooking meals. For instance, the World Future Council [78] pinpoints that health centres, especially in maternity wards, microscopes and vaccine storage, are now powered with solar PV systems. This helps to improve the quality of health services especially the labour and delivery process. Solar PVs are installed in various schools, classrooms, and laboratories, something which promotes long hours for the students to study, and for teachers to prepare and plan for teaching. Moreover, most of the individual households, businesses and hostels install solar PVs which are used for lightening, water heating, cellphones charging, and televisions running. Malaki [79] revealed that local communities use existing solar driers to increase productivity and improve their livelihoods through using solar power in food drying, heating homes, eggs incubation and powering electrical appliances.

RE and farming are a winning combination. For example, wind, solar, and biomass energy can be harvested forever, providing farmers with a long-term source of income [80]. RE improves the value chain of agricultural products. For instance, the study conducted by EfD Tanzania [81] in 2015 on the management of hydropower plants in the Southern Highland region indicates that the hydropower projects have provided more energy which has increased and improved the processing and value addition of agricultural products.

5. Conclusion and Policy Recommendations

Increased access to energy in developing countries including Tanzania needs systematic planning based on comprehensive stakeholders' cooperation on all aspects of the energy sector. It furthermore brings a huge difference in the people's quality of life and enhances the development targets of the country. There are scenarios which are important to explain possible future development paths, and giving the planners, decision-makers and implementers a broad overview of various options toward energy sector development. Changes to energy markets need long term planning which should be specific and focus towards better decision making incorporating CP at all levels of the development.

This review provides an overview of community-related issues on the RE sector development. These issues include access to information; community awareness and knowledge on RE technologies and resources; employment opportunities and poverty alleviation through RE sector development. It is therefore important for experts such as economists, electrical and environmental engineers and journalists to theoretically and practically test these issues to realize the achievement of RE sector development through CP. Various studies, policies and laws insist on the CP in the project or sector development in Tanzania. Experts can be on the front line to discuss and provide more clarification on the theories, policies and regulations on this aspect to appreciate the development of the RE sector.

This review concluded with the following recommendations:-

- RE related policies and regulations have to be amended at both national and regional levels. Setting clear policy priorities across policy areas is essential to provide investment security, mobilize stakeholders as well as improve the allocation of RE resources. There should be the policy and law which is specifically for RE in Tanzania since RE issues are discussed in the general policy *"National Energy Policy of 2015"*.
- More efforts are required to provide timely information on the RE resources and technologies available in Tanzania. This information should be provided to all communities and other stakeholders who are and interested in investing in the RE sector. The dissemination of these will increase the capacity of the community on how to manage and utilize these resources and technologies.
- The government and other energy stakeholders should cooperate to offer awareness on the RE technologies to the community through various ways including training at primary to university levels, media, workshops, seminars and conferences.

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