Stakeholder management in sustainable rural electrification program: A review

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Abstract. Renewable energy utilization is recognized as a way to increase energy access for rural and remote areas. However, such efforts depend not only on the economic and technological aspects but also the support of society and respective stakeholders. Some studies have focused on managing stakeholders in wide scope energy projects but studies in relation to rural electrification program (REP) schemes seem to be lacking. To help understand the wider scope of rural electrification, this paper analyses a range of past and current research development on this domain and places the literature on the framework of stakeholder management (SM). The review indicates that SM in relation to REP is identified under three major themes namely stakeholder influence, stakeholder identification and classification, and stakeholder involvement.

1. Introduction
The growing concern of environmental problems and depletion of fossil fuels results in an increasing demand to integrate renewable energy into the power system [1]. Renewable energy is seen as an effective way to increase energy access in remote areas, especially in developing countries [2]. In spite of the development of renewable energy for rural electrification, there are still barriers and problems to overcome. Efforts to reduce greenhouse gas emission and increase the share of renewable energy in the future demand social acceptance for their success [3]. Therefore, the effective development of such projects depends not only on the economic and technological aspects but also on the support of the society and respective stakeholders [4]. It is worth pointing out that stakeholder involvement and participation is seen as one way to reduce conflict and foster acceptance of said energy projects [5].

Stakeholder participation is the highest form of stakeholder involvement [6]. The process of managing stakeholder to ensure their participation is stressed firstly on stakeholder identification and later on determining the plan to involve them in each project phase. Some studies in the field of stakeholder management (SM) focused on mega construction projects [7,8] and road transportation projects [9]. Although recent studies have addressed SM in energy projects such as stakeholder involvement in energy transition [3], stakeholder participation in municipal energy planning [10], engagement in large-scale energy infrastructure project [11] and carbon capture storage projects [4], the literature on SM in relation to rural electrification program (REP) seems to be lacking. Therefore, this paper reviews systematically the latest research development of SM studies in REP. This study begins with the background of SM and REP followed by research methodology. The authors then review the selected publications in the finding section.
2. Background of stakeholder management and rural electrification program

2.1. Stakeholder Management (SM)

The term stakeholder was originally defined by Freeman [12] as individuals or groups that can influence and be influenced by the achievement of organization’s objectives [7, 13]. According to Freeman [12], knowledge and understanding of the involvement and interests of stakeholders in an organization are necessary [14]. With the emergence of the stakeholder theory, [15] began to develop stakeholder concepts in the field of project management while proposing a stakeholder model for the project [16]. After [15], various SM concepts emerged, such as stakeholder engagement [17], and stakeholder involvement [18].

According to Mathur et. al, stakeholder involvement has been emphasized greatly in the context of project development specifically in identifying who will have an impact on the project and actively including them in the project design and delivery process so that the project is responsive to the needs and local conditions [19]. Another study pointed out that stakeholders need to be involved in the planning, design and construction phases to draw their inputs to achieve effective collaboration [18].

The process of implementing stakeholder participation was divided into six main steps [20], which are practically the same as PMBOK Guide [21], namely stakeholder identification, characterization of stakeholders, mapping of stakeholders and their level of involvement, selection of participatory methods or techniques, implementation of participatory techniques, and evaluation of stakeholder participation. Stakeholder identification and analysis is an early process of involving stakeholders by identifying the ones that can directly and indirectly influence and be influenced by the project, whose interests are then reviewed [17]. Stakeholder participation is the highest level of stakeholder involvement [22]. This is also supported by Degan and Parkin who divided the process into two levels, namely participation as a form of providing information and consultation in order to increase stakeholder knowledge of the project and participation as the highest level of involvement to reduce stakeholder resistance to the project [23].

2.2. Rural Electrification Program (REP)

In rural areas, lack of road access and considerable distance from urban settlements means poor accessibility and limited connection to the national or regional grid [24]. According to Urmee and Nd a renewable energy-based REP is an effective way to increase energy access in remote areas, especially in developing countries [2]. This is also supported by another study which found that the off-grid decentralized system is suitable for rural and remote areas, especially in mountainous areas and small islands [25]. Decentralized systems are usually based on local needs that are tailored to specific energy needs and often rely on local energy sources namely renewable energy [24]. Rural energy is utilized for basic household needs and community service needs such as education and health, as well as for productive use such as agricultural and other rural industries activities [24].

There are several choices of technology for off-grid rural electrification such as micro-hydro power, biomass gasification, biomethanation, solar photovoltaics, small wind turbines, and biodiesel [26]. It is worth noting that the choice of technology for rural electrification effort depends on the target groups and the countries. The factors that influence the technology mix selection are landscape, availability of natural resources, economic and financial aspects, concerns of customer and load density, distance to the national or regional grid, and the availability of the chosen technology [27].

3. Research methodology

This literature review was undertaken by paper retrieval from academic journals as well as conference proceedings, books, and publication from certain institutions, such as International Energy Agency (IEA) and International Finance Corporation (IFC). Some keywords were used and compiled in the literature search including stakeholder management, stakeholder involvement, stakeholder participation, rural electrification, renewable energy, and renewable energy project. In the beginning, the publications which do not contain the aforementioned keywords in their abstract were filtered out. This was later followed by a brief content review on the remaining papers to eliminate irrelevant ones.
The final selected publications covered various perspectives of managing stakeholders especially in rural electrification efforts which were from the timeframe of 2003 until 2019. In addition, this review was not restricted to any specific geographical regions.

4. Results

The SM procedures involved in the process of rural electrification efforts have been discussed in existing literature. This finding reveals that SM in relation to REP is categorized under three major themes such as stakeholder influence, stakeholder identification and classification, and stakeholder involvement. However, the authors would like to point out that the literature may not cover all the relevant studies, but it can indicate the overall advancement of its research trend.

4.1. Stakeholder influence

As previously mentioned, Freeman’s original definition described stakeholders as any group that can influence and be influenced by the achievement of organization’s objectives. This study takes a look at both how stakeholders influence REPs and how they are influenced by it. Some researches on REP showed that it has already been exposed to some types of stakeholder influences. The authors found that the influence firstly comes from government policies. For example, the biggest challenge in the development of renewable energy in Indonesia is the large amount of fossil fuel subsidies that leave no place for renewable energy to compete. In addition, the little recognition towards private sector’s role in the country’s policy has created an inefficient market which has not served the public’s interest [28]. Inappropriate policy framework is also acknowledged to be a barrier in increasing the use of renewable energy for REP as experienced in Sri Lanka where the national energy authorities solely focused on energy panning at national level due to their commercial orientation [29]. Another source of influence comes from the local community since their acceptance may influence the success of the project. Social acceptance is one indicator in achieving sustainability in REPs; it implies a participatory and inclusive approach in which local communities can be involved in increasing accountability [30]. The level of acceptance is low if stakeholders’ expectations are not satisfied, or the benefits of the project are not recognized by the local stakeholders [31].

The second source of influence shown by studies that focused on how REP may benefit stakeholders is the socioeconomic sustainability. An example is the micro-hydro project in Venezuela that improved conditions in primary and secondary school, as seen from the attendance rate, increased productivity, and advanced health services [32]. Furthermore, the locals’ welfare is also improved through better lighting for education and basic appliances [33] as well as significant employment increase in the case of South Africa [34].

4.2. Stakeholder identification and classification

SM processes, as identified by Cleland, comprised the following steps: stakeholder identification, classification, analysis, and strategy development [15]. The research study covered mainly stakeholder identification and classification in relation to SM process in REP domain. In general, stakeholders in infrastructure are users who will receive services, operators, investors, regulators, affected local communities and other groups [35].

Stakeholders in the off-grid solar energy system in Indonesia were classified based on a social innovation system, such as providers (differentiated into sponsors and facilitators such as government and donors), and users [36]. The process of identifying these stakeholders focus on who they are and the role they play, which is necessary since local and non-local stakeholders will influence the implementation of renewable energy projects [37]. After identification, the stakeholders, especially in community renewable energy projects, are classified into three levels based on their influence namely macro, intercommunity and intracommunity [37]. In order to ensure that the deployment of PV programmes for rural electrification continues on a sustained basis, the preparation phase in the program planning should clearly identify the beneficiaries and other stakeholders and assess how they benefit from the programmes [38].
4.3. Stakeholder involvement

Stakeholder involvement is a growing research trend in dealing with the complexity of issues such as energy transition and climate change mitigation and adaptation [2]. One of the factors that influence the development of energy planning in municipalities is the extent to which stakeholders are involved in the process [10]. In fact, stakeholder involvement and participation are seen as one way to reduce conflict and to foster acceptance towards energy projects [5]. According to Adil and Ko, stakeholder participation is seen as important in increasing social absorption in renewable energy schemes, especially in the decentralized energy system [39]. It is revealed that sustainable rural electrification requires the participation of an adequate community organization to carry out maintenance activities effectively while at the same time reducing maintenance cost [32]. Active local participation in all levels and throughout all project phases is required to ensure project sustainability [40].

A study of rural electrification in Peru was found to be unaware of the importance of local participation. Thus, most of the projects were planned without the engagement and participation of communities which resulted in frequent project failures [41]. On the other hand, multi-stakeholder involvement from the planning stage onwards in three small hydropower projects in Tanzania resulted in a sustainable operation [42]. Other studies on solar home system in Myanmar’s rural poor also revealed that clearly defined roles and responsibilities of all parties involved is required in order to achieve a better coordination among stakeholders [43].

5. Conclusion

The development of renewable energy utilization is considered as a solution to electrify rural and remote areas. Notwithstanding the struggle in dealing with respective stakeholders, studies on SM in relation to rural electrification efforts seem to be lacking. Previous studies placed their focus on SM studies in the context of large-scale energy projects while largely overlooking specific project in rural areas. This paper attempts to perform a systematic overview of SM articles in rural electrification efforts published by academic journals aiming to depict the research development of this domain.

Stakeholder itself is originally defined as an individual or a group that can influence or be influenced by the organization’s objectives [12]. Since stakeholders may have different stakes and interests, 12] believes that it is an essential knowledge that should be properly understood by the respective organizations. With the emergence of stakeholder theory, scholars began to study how to manage the stakeholders; hence the birth of SM concept to achieve stakeholder engagement [17] and stakeholder involvement [18]. Several studies emphasized on stakeholder identification [17-19] and their classification [20] as the primary step before managing stakeholders so that they can be involved and engaged. Furthermore, these studies revealed that the involvement level of stakeholders as well as selection of participatory methods are necessary [20] in order to foster stakeholder participation as the highest level of involvement [22].

The findings revealed that three associated topics have been classified as the key research themes of SM under REP domain: (1) stakeholder influence, (2) stakeholder identification and classification, and (3) stakeholder involvement. In terms of stakeholder influence, many literatures focused on how REP may be prompted by stakeholder influence especially government policies as well as how such efforts benefit the stakeholder. The second theme acknowledged the use of stakeholder identification and classification as one stage in SM processes. It was found that stakeholders can be classified differently between off-grid solar PV project and community renewable energy as a whole. In the latter theme, authors of current and past literatures highlighted the importance of stakeholder participation and involvement to sustain plant operation as the primary REP objective. In addition, it is hoped that this review would positively alter the perception of energy providers in general about the importance of managing stakeholder to sustain REP, especially by enabling rural households to benefit from the services.
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