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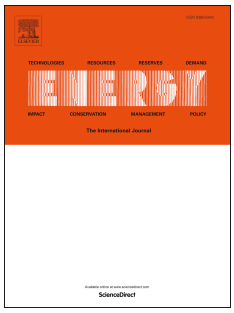

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The influence of government support, organizational innovativeness and community participation in renewable energy project success: A case of Pakistan

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Abstract

With increasing worldwide energy demand, many energy-related issues are growing, including global warming, energy sustainability, and environmental pollution. These challenges force nations to actively endorse renewable energy development policies. As a result, numerous renewable energy projects are executed around the globe, which are confronting various hurdles, causing failure for many of current projects. This study, therefore, aims to suggest that community participation in planning and decision-making is an imperative mediator through which government support (GS) and organizational innovativeness (OI) can positively affect renewable project success. Data was collected through a survey from 650 respondents of the renewable energy projects in Pakistan, and hypotheses were proved by employing structural equation modeling (SEM). The findings show that GS and OI have a significant positive impact on the CP and project success. Moreover, CP was realized to partially mediates these relationships. It is expected that the findings present guidelines for the government authorities so that they endeavor and make better policies for involving the community as a mediator in project planning and decision making for renewable energy projects.

Keywords: Renewable energy projects; Government support; Organizational innovativeness; Community participation; Project success

1. Introduction

Energy projects are considered the main pillar for development of the society, associated with the success of these projects. Renewable energy projects are one of the most favorable agenda points of governments to meet the needs of society. Renewable energy projects have experienced incredible growth globally in the previous few periods and provide a potential solution to various social and economic problems in various territories. Specifically, renewable energy projects provide various ecofriendly welfares and also providing electricity, etc. Moreover, renewable energy projects are considered as a vehicle for development, employment creation, improving the standard of living, and quality of life e [1], [2]. However, achieving these outcomes and project success is not an easy task, which needs high ambitions and long-term policies [3]. Consequently, project success is a significant concern to most policy-makers, project planners and executors, users, and communities through which specific goals like renewable energy and other main goals can be achieved [4]. Government support and organizational innovativeness are the key drivers of any project and there is a need to have greater government support and innovativeness with the uniqueness in the renewable energy frim to obtain competitiveness.

Several predictions signify that renewable energy projects are presently the immediate base of energy in the globe, and these are supposed to have a vast impact in the future [5]. The majority of the countries in the world are presently agreeing with energy investment strategies and incentive improvement for renewable energy projects [6][7]. Such strategies usually depend on the scrutiny of the linking between energy utilization and economic growth. Likewise, in Pakistan, which is the study area, the shortfall of energy sources can be beaten with renewable energy sources such as biomass energy, solar energy, wind energy, and geothermal energy can be used to beat the energy shortfall in Pakistan. Pakistan is one of the countries that face energy crises, which is endeavoring to raise its local energy necessities to cope with critical energy disasters contemporary.

Though there are many enablers to meet the renewable energy project success but here in this study, three main key enablers are focused. A major part of the study discussed the role of government support, organizational innovativeness and community participation toward the success of renewable energy projects. With community satisfaction expanding importance at present, numerous organizations believe community participation to be a strategic imperative in contemporary's competitiveness environment, and they are evolving to more successful completion of projects via various government plans and innovative policies. Considering the significance of community participation, clients' expectation, and government support as drivers of project successful project completion. The construction organizations involved in renewable energy projects are increasingly incorporating community participation into project execution to enhance the projects' overall performance.

Nevertheless, in the process of integrating the community participation concept in energy projects, the emphasis on organizational innovativeness has also been underlined in order to reach community needs and project success. Organizational innovativeness is a key prerequisite of the organization in the energy projects to acquire and apply novel ideas that have equally applied and business assistance [8]. An organization's

innovativeness is considered an important initiation of innovative processes, management tactics, which is expected to successful completion of energy projects.

For decades, practitioners and researchers have endeavored to increase project efficiency and project performance. For instance, public-private partnership (PPP) approaches [9], community empowerment and involvement [3], social partnership and social impact bond [10], project atmosphere and project cooperation, coordination, monitoring, and organizational atmosphere, team working, technical and organizational factor factors; are main key ingredients for a successful projects competition. It is evident that public-private partnerships and partnering with private sector organizations promote and enhance the project performance in the region [11]. Therefore, an increasing number of power plants will be built with the purpose to meet the increasing electricity demand and community needs are considered hope to fulfill the energy needs. Nevertheless, the success rate of renewable energy projects remained not high as verified by many analyses and studies.

Projects comprise many stakeholders, either internal or external, and their satisfaction could directly impact the implementation of projects [12]. A project is considered to have completed perfectly if it has fulfilled its scope in accordance with the plans and specifications, within the time and cost originally anticipated, and maintaining in defined quality as well as stakeholders' satisfaction [13]. It is well-defined that project success should also be assessed from the context of different stakeholders [14] and logically the most imperative of these stakeholders is the external stakeholder (local community).

However, several previous researches are available on the features of key success attributes for project managing, few of these research highlights carefully this perspective for renewable energy projects, purposely in Pakistani renewable energy projects. The primary concentration of the current study is regarding government support and organizational innovativeness while the community participation as a mediator for the judgment of meaningful success and execution of renewable energy projects. In Pakistan, various studies have evaluated the expansion of renewable energy resources. However, their judgments were narrow to abilities and forecasts around the energy originating from renewable sources and its consumption. Only some studies concentrated on the confronts, obstacles, and problems to the successful accomplishment of renewable energy projects in Pakistan. A study conducted by Sahir and Qureshi [15], found the hurdles and difficulties in the real utilization of renewable energy potentials in the state. Mirza et al. [16] researched the key matters for the development of renewable projects. The study performed by Chaudhry et al. [17], concentrated on the imperative outlook of sustainable growth of renewable energy projects in Pakistan, however, these outlooks were only limited to theoretical suggestions. None of these studies have found the meaningful success of renewable energy projects with the participation of the local community. Therefore, this study is an attempt by the authors to find the success of renewable energy projects with the participation of the beneficiary community. Community participation permits the circumstances for interactive communication, where the policy and decision makers (government departments), organizations (Construction departments) and the

community can convey and converse views easily, thus promote organizational innovativeness and accountability in project delivery, the project success rate, and the advantages to the local community [18].

Although several previous studies have attempted to determine the criteria for evaluating project success [19]–[22] e.g. community empowerment [23], and community participation [24]–[26] but these studies limit their findings to some specific subjects. Nevertheless, the effect and integrated approach of government support (GS), organization innovativeness (OI), and community participation (CP) on the success of renewable energy projects have not been thoroughly considered in the previous studies. To fill the above-mentioned research gap, this study strives to provide a better understanding of the mechanisms through which government support and organizational innovativeness influences project success. Following up on these calls, the current study aims that community participation plays a considerable role in mediating the relationship between government support and organizational innovativeness and project success. The study simulates that government support and organizational innovativeness help community participation, which in turn are reflected in project success. Understanding the ways that cause the effect of government support and innovativeness on project success facilitates us to coherent a better theoretical understanding of this relationship. Furthermore, understanding how the effect takes place can provide practical support for project-based firms that intend to gain the effects of government support and innovativeness to the greatest degree. This study proposes a model for identifying the mediating role of CP between GS, OI and its impact on the success of renewable energy projects so that the success process can be more improved, as a legitimate stakeholder beneficiary community play a key role in project success. Furthermore, this study aims to fill the knowledge gap by addressing the subsequent research questions:

RQ1 – What is the role of the local community in influencing renewable energy project success?
and RQ2 – How could community participation enhance the chance of the renewable energy project success?

2. Literature review

At the strategic level, policies should be aligned for the successful completion of renewable energy projects, and the policies mix to determine the failure or success of a renewable energy project with respect to its key objectives such as time, cost, scope, and satisfaction. The success of renewable energy projects can be ascertained based either on project practitioner views and sentiments or quantitative approaches [27]. This section of the study elaborates on the nature of renewable energy and the key factors essential toward successful project management in renewable projects.

2.1 Renewable energy projects

Renewable energy is considered a global agenda points to fulfill the energy shortfalls. Every year the global energy shortfall reports are published and countries are trying to meet the energy requirements for their

people. Although there are many sources of energy like coal, wind energy, hydro power, solar energy, etc.; but all these resources are very limited and the required energy shortfalls cannot be fulfilled. Many of the countries are facing financial budgetary issues to launch such types of energy projects [28].

Renewable energy is one of the solutions to cover the energy needs of the industry and dogmatic consumptions. In renewable energy, the resources through which energy is produced can be used again to further the production of more energy powers. In its nature renewable energy is not only a good way to meet the requirements of the energy shortfall but also is an environment friendly agenda that keeps the human society clean and safe [28]. Due to the importance of renewable energy, the United Nations kept it in its list of sustainable development goals.

Table 1

Identification of success factors influencing the renewable energy projects (REPs)

Reference	**Government Factor**	**Organizational innovativeness**	**Community participation**
Standish [29]	***		***
Zhao et al. [30]	***	***	
Xu et al. [31]	***		
Maqbool and Sudong [32]		***	
Chua et al. [27]	***	***	
Arnaiz et al. [129]	***		
Booth and Richardson [128]	***		***
Ul Musawir et al. [119]	***	***	
Unegbu et al. [120]	***		
Chou and Yang [121]	***		***
Zhimin et al. [122]	***	***	
Shao [123]	***	***	
Yalegama et al. [124]	***		***
Ahmadabadi and Heravi [125]	***		
Dvir et al. [126]	***	***	
Koops et al. [127]	***	***	***

There are many enablers that make it possible to launch a renewable energy project. The key elements which play a significant role in the success of renewable energy propjets are; government support, community participation, and organizational innovativeness (see Table 1). These three factors may increase the feasibility

of renewable energy projects. Renewable energy projects are spread down in all regions of the world, in this study the focus is given to know the renewable energy project success factors in Pakistan.

2.2 Community participation

In this study, "community participation" means, a process where individuals, groups, and organizations are given the opportunity to take an effective role in planning and decision-making with the purpose of influencing the choices being made [33], [34]. CP in project activities can build a sense of ownership, belief, and trustworthiness among civic members [35]. The participation of communities in renewable energy projects has been a substantial measure of the government tactic [36] and successful community participation in energy projects will provide a sense of satisfaction. Community energy projects which purpose to generate more viable energy approaches, which indicate a kind of bottom-up innovation carried out by communities in lieu of the government or traders. Studies remain to suggest the participation of local communities in energy projects. Khwaja [26] argues that CP can be an essential means to encourage decision-makers to take CP seriously and incorporate the community's decisions according to their needs. Involving the public, society, and civics' (as these terms are closely related to each other and used interchangeably in this study) in resources management can support better service delivery and accountability in projects [37]. Rogers [38] conducted a survey and semi-structured interviews on public perceptions of opportunities for community-based renewable energy projects in the UK. The authors found that the active involvement of local residents was widespread support for renewable energy generation and use of renewable energy, with respondents expecting benefits from a project in terms of increased community spirit. Moreover, the authors suggested that community renewable energy projects are likely to gain public acceptance when they participate in decision making process.

Walker et al. [39] observed that the participation of the resident community in responsibilities–for instance attend key meetings or execution work—planned by a small community group was a significant success factor in a renewable energy project. Walker and Cass [40] have investigated the advancement of community energy projects. The authors expected that the local community is keen to take part as a member in local renewable energy projects and that the local members' experience could enhance individuals' understanding of sustainable energy matters. They are also likely to face reduced local opposition to new energy project developments. Likewise, Walker et al. [41] found that though community participation in energy projects can promote trust and support performing the project task, whether they do trust greatly on established community dynamics. Healey [42] stressed the importance of a collaborative approach to CP and to enhance the acceptability of plans and policies. The collaborative gets different stakeholders organized for a common cause. Hence, it can support and facilities to shape agreements to resolve complex problems.

In the contemporary era, the concept of community participation has been implemented by many business segments such as in renewable energy projects. As a result of participation, the community engaged can keep a component of directly or indirectly control over the renewable energy project decisions to be made. Project

decision- and policy-makers, in contrast, can assist from broader stakeholder contribution when considering, choosing, and acting and thus ensure successful project completion [43].

2.3 Government Support

Government support (GS) in the current study indicates the assistance given by the authority to intensify the successful completion of renewable energy projects. It is acceptable that the government and its agencies are major performers in the planning and successful completion of projects. Government is the core financier and the only entity responsible for maintaining all the renewable energy sectors [44]. This support from the government generally takes the form of financial, institutional, or educational aid. The IEA [45] ascertain the long-term stability of policy support from the government as the most vital factor in succeeding policy goals on renewable energy projects.

The government is a major player in helping and making reliable strategic plans for the success of renewable energy projects. A survey was conducted by Adighibe et al. [46], and the result shows that government policies and guidelines are imperative for projects. Moreover, it is likely that projects would enhance through GS of a general project management criterion and rationalize some of the regulatory policies employed in project assessment. The government is a key player in making suitable policies, either it is a developed or developing country, governments have made and constituted various regulatory policies to realize community opinions and sentiments by way of mandatory compliance. Mitchell and Connor [47] argued that unless the government 'learns' from its previous consequences, errors and mistakes, explains the causes for supporting renewable energy and then sees through with a concentrating policy intended at delivery, diversity and the creation of mentors.

Government support for renewable energy is comprised in different segments like; financing, communication, team building, auditing, community compensation, technological support, legal support, technical support, human resource availability, owning the projects as state property, maintenance and upgradations, etc. [48]. Maqbool [13] revealed that the initial plan to launch renewable energy is initiated by the government and legislation bodies formulate such policies which could help the project investors till the completion of the projects. Government policies are being worked to support the commercialization of new startup technologies and to increase the competitiveness of renewable energy in the market to lessen the traditional dependence on fuel-based energy creation [49]. Renewable energy projects in its nature needs latest technology, durable policy, technical skilled labor, long term policy, consistent innovation and financial support; all these are only possible with the support of the government.

2.4 Organizational Innovativeness

Organizational Innovativeness (OI) conveys to the organization's competence to participate in innovation; such as the initiation of novel processes, products, or ideas in the organization [50]. OI is an organizational capacity to engage in creative processes, experiment, apply new approaches and techniques, generate new

knowledge and products [51]. Organizational innovativeness can reveal something that is novel to the industry and/or the stakeholders and is an imperative dynamic ability itself [52]. Some researchers like [58] described the OI as one part of the business model to achieve the renewable energy goals, while some other researchers [59] claimed that the plans and concepts for renewable projects take OI as part of inter-organizational knowledge transfer management.

Researcher such as Subramanian and Nilakanta [53] and Wolfe [54] reveals two main important findings on innovation, the first one stress on organization's external and/or internal processes of innovation, whereas the second emphasizes elements of innovation and/or its influence on organizational performance.

There is no doubt that knowledge is a key concept for energy strategy and promotion of innovation in the energy industry [130]. As for as knowledge and innovations are concerned, the energy industry is mostly considered by a wide-ranging technological knowledge origin. Therefore, the energy industry greatly relies on potentials that exist in the production and supply of electric power. Cordero [55] formed a model employing productivity and resource indicators to measure a general innovative performance of an industry by determining the innovation process at all phases, such as the planning phase, control phase, technical phase and commercialization phase. Ogbonna & Harris [56] uncovered a combined joining participative leadership and innovative organizational culture as a predictor of organizational performance. To be effective and successful, organizations should continually generate novel concepts on how to advance their operations towards innovativeness to keep competitiveness [57]. In a study conducted by Cho et al. [58], organization and manager attributes elucidate a large share of the change in an organization's innovation output. Matja et al. [59] have studied that corporate efficiency in innovativeness will acquire performance advantages for organizations.

In particular, renewable energy project management is a unique, dynamic, and complex sector and innovations are necessary to respond to adjusting stakeholder requirements. Hence, it is imperative for energy providing organizations to continuously observe new products, services, strategic innovativeness, and processes [60], which is considered to escalate organizational efficiency. Additionally, it is not only business but also renewable energy industries that are more necessary to turn into innovative in meeting stakeholder interest [49] and if renewable energy industries are endeavoring to be innovative it craves innovation and novel strategies, policies and approaches.

2.5 Project Success

Success has usually been the fundamental goal of every endeavor of a project including renewable energy projects buildings. Amongst the most general ways of assessing a project, success has been described in the literature as triple constraints, i.e., time, cost, and quality objectives, which is also known as the iron triangle that involves many additional success measures such as, primary stakeholder's requirement and satisfaction, and satisfies the needs of stakeholder [19], [61]. A study was done by Cooke-Davies [62] on the difference between "project success" and "project management success." Project success is primarily evaluated against the complete purposes of the project and achieved through the utilization of the project's outcome whereas

project management success primarily the successful accomplishment of the project in relation to reaching time, cost, and quality parameters. We cannot judge the project's success according to the acceptance criteria of project organization concepts only. On the other hand, we can merely realize whether the initial project idea is accomplished or not in the implementation phase of the project. This attainment is determined by the end-users [63].

A study in the area of renewable energy projects for finding the success factors was conducted by Zhao et al. [30] in China. The authors evaluate the key success elements for thermal and wind power projects. On the basis of the survey findings, the authors grouped the success elements into five categories comprising; project feasibility, project environment, project company, project contractor, and project suppliers. In another study, Maqbool and Sudong [32] systematically analyze and identified 41 critical success factors affecting renewable energy projects and which further extracted into five critical success factors. Ika et al. [64] conducted a study on the critical success factors for world bank projects, which comprise 2.7% of energy projects. The authors found that monitoring, coordination, design, training and institutional environment were the key success factors of the project in an organization.

Moreover, previous researchers have developed and identified numerous models to measure project success, such as Turner and Müller [65], Shenhar et al. [66], or Pinto and Prescott [67], which were all proposed with unique fundamental ideas. In the renewable energy industry, cooperation, collaboration, consultation, and communication can jointly be considered a factor for successful project delivery [68].

3. Research framework and model hypothesis

The suggested framework in this study should be more beneficial for the sound understanding of renewable energy project success. Based on the earlier literature, this study's variables are interrelated through different hypotheses; which further leads to the development of a framework. This section presents the different project success factors measured in the study and the proposed research model.

3.1 Government support and project success

GS in this study indicates that government authorities' support to accelerate the renewable energy production process and performance within the renewable energy projects. The planning, scheduling, and success of any project depend greatly on government policies and regulations [69]. Qiang et al. [70] suggested that the project execution could be enhanced with GS. The Governments in many developing countries have made policies, rules, and regulations, and GS which is the best way to accelerate the successful accomplishment of renewable energy projects and also support to achieve the desired result as compared to other practices. Government regulatory policies and support potentially establish a major benefit to renewable

energy projects' success. Management support and accountability, realistic strategic goals, success to select an appropriate contractors, proper monitoring and management of the socio-economic environment, professional and motivated personnel and proper recognition of cross-cultural influences lead to renewable energy project success [71].

Thus, GS is an important factor in regulating renewable energy projects' success. It is expected that compliance with government rules and strategic plans are likely attributes to achieve organizational goals successfully and project performance. Therefore, in line with the above, the first hypothesis suggests:

H1:* There is a positive relationship between *government support and project success

3.2 Organizational innovativeness and project success

Previously, the studies claim a significant positive relationship existed between OI and project success [72], [73]. It had been a key focus in innovating measures to ensure competitiveness and renewable energy project success. A vital part of the success of an organization is the degree of its innovativeness [74]. Innovative, effective, and efficient management methods promote and established appropriate planning, design, execution, and proper monitoring system to accomplish the project. The ability to innovate is amongst the important strategy that influences business performance [75]. Gemu¨nden et al. [76] found that there is a positive relationship between OI and project success, particularly with the market and technological innovativeness. OI is accepted as one of the driving forces for pushing the success of renewable projects.

Through an in-depth understanding of the discussion above, it has been claimed that OI and project success are distinct but consistent ideas and have a significant relationship between the two constructs. So, it is hypothesized that:

H2: Organizational innovativeness significantly affects project success.

3.3 Government support and community participation

As documented in the previous literature, the local level government approach contrary to top-down processes, claiming that the 'government nearest to the civil society'–is believed to be better positioned to promote benefits amongst inhabitants and public policy objectives [77], [78]. Governments have considerably better and acceptable policies to participate in the community in the project initiation and planning stage. As the government play a significant role in establishing logical policies and have the power to implement an ineffective way that can help the local community to take part in decision making and the government will better be informed about the issues and problem of the community. Ahmad & Abu Talib [79] explored that community development initiatives in Pakistan need regular support from the government to enhance the economy of regions. Moreover, community-local government participatory development policies can realize robust local ownership and empowerment in rural communities. Community participation would lead to a

fundamental collaboration with major stakeholders and initiate enhanced service delivery and development in the region [80]. It is supposed that government support for a community-based participatory approach will help locals to better their capabilities for a shared interest, which can lead to meaningful development consequences for successful competition of a project [81], and therefore, the following hypothesis is proposed on the relationship between government support and community participation:

H3: Government support for inhabitants will encourage community participation

3.4 Organizational innovativeness and community participation

Community participation refers to common community perception concerning the expectations of dwells about their priorities and preferences, on which these are regularly comprehended through formal and informal organizational processes, policies, and practices. In a study, Pagell and Wu [82] found that innovative organizations successfully develop new strategies by utilizing their capability to meet suitable and appropriate information about stakeholders' needs. Innovation is fundamental to the productivity, profitability and competitiveness, and sustainability of an organization [83]. Furthermore, to fulfill the rising stakeholder's requirement for societal welfare, renewable energy providing organizations' innovative technologies and products are indispensable [84]. Furthermore, von Hippel [85] recommends that innovation initiates from external sources, particularly end-users, as a successful product needs a thorough examination of end-user requirements and needs as well as technical specifications. In addition, end-users are the source of 87% of all significant innovations [86].

Widén et al. [87] addressed that the key stakeholders should be recognized at the initial stage in the innovation process since they will have the most opportunity to help the suggestions through the numerous decision doors.

Therefore, the aforesaid relationship is established based on the subsequent hypothesis:

H4: There is a positive relationship between organizational innovativeness and community participation

3.5 Community participation and project success

To understand the possible advantages that can be derived from the development of renewable energy projects for the community, it is vital to encourage community participation in the pre-launching renewable energy planning process. Since any renewable energy project development should be targeted at enhancing the socio-economic and cultural conditions of a community as well as satisfy the stakeholder requirements. For project success, it needs the contribution and participation of the community in identifying the better strategies they desire to use to improves their quality of life [88]. CP in project development is worthwhile and more

sustainable [23]. Wati and Rosaira [89] conducted a study and found that the success of energy project greatly depends on CP and local government and other stakeholders support. By actively engaging the stakeholders in decision-making may positively or negatively influence the planned project, but the probability of project success be supposed to increase [90]. An empirical study done by Khwaja [26], concluded that CP enhances project outcomes and also an essential element to project success. Therefore, this leads us to propose:

H5: There is a positive relationship between community participation and project success.

3.6 The mediating role of community participation

While making Governmental and organizational policies, involving the community in identifying and addressing public problems. The empirical evidence shows that participation sometimes improves project performance [91]. According to an instrumental perspective, stakeholder participation in organizational or project management examines how stakeholder participation can be expanded to accomplish the project performance objectives [92], [93]. This perspective seeks out to reveal ways to know; how stakeholders can be involved in the mechanism for planning and decision-making to accomplish preset project goals and objectives [94]. Mostly, project success also comprises some other facets, for instance, stakeholder satisfaction, which is primarily achieved by the key outcome performance (time, cost, and quality) are met [95]. Subsequently, it is claimed that the government's support and OI may not directly influence project success rather CP plays a mediating role between GS and OI which possibly enhances the probability of renewable energy project success. Moreover, for improved policy-making and strategic plans, this study will allow different project stakeholders to work collectively to execute and accomplish the project goals and objectives successfully. Furthermore, the government and managers of renewable energy projects need to distinguish their major stakeholders and encourage their participation in decision-making, listen, and feedback to their attention and concerns [96]. This participatory management process is essential to regulate how the stakeholders are expected to respond to project decisions accordingly. Their response will be taken into account providing them with a method wherein stakeholders might cooperate with each other, which enhances the likelihood of successful delivery of a project [97], [98]. Given that, it was proposed as:

H6: Community participation mediates the influence of government support and organizational innovativeness on renewable energy project success.

Based on the aforementioned literature and proposed hypothesis, the research framework for this study is presented in Fig. 1.

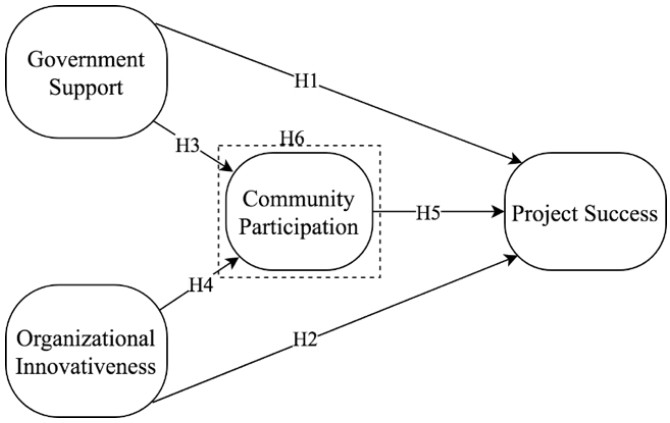


Fig. 1. Research framework and a summary of the research hypothesis

4. Research Methodology

4.1 Measures and scale development

This study is based on post-positivist philosophy, to analyze the conceptual model. A deductive approach was used to test the proposed hypothesis. A survey design was chosen to collect quantitative data in a cross-sectional approach from a wide variety of respondents. This study's structured questionnaire was designed from earlier studies. Therefore, the existing scales were adopted, modified, and extended. To ascertain content validity, items for the various constructs were reviewed by executives from the renewable energy projects department, and professors/assistant professors in universities. Based on the respondents' feedback, ambiguous items were either modified or eliminated. It is suggested that in construction and project management studies, a draft of questionnaire should be tested to confirm that all questions are understandable, logical and reasonable [99].

The data collection was managed using personally-administered and mail survey methods. The questionnaire was used to measure the GS, OI, CP, and project success on a five-point Likert scale between 'strongly agree' to "strongly disagree.' The 5-point Likert scale is advantageous because of some important reasons e.g. to increase the response rate, increase response quality with fewer respondents, and decrease the respondents' frustration level, and also to compare the reliability of instruments with earlier studies [100].

The questionnaire is divided into two parts. Part one consists of the demographic information of the respondents, such as age, education, experience, position, industry type, etc. While, part two consists of the main body of the questionnaire, comprises of two independent latent variables such as GS consists of six observed variables and OI consists of seven observed variables, one mediator such as CP contains four observed variables and one latent dependent variable (project success) which includes six observed variables. In total, there were 23 main questions are shown in Table 2.

Table 2
Variables and survey questionnaire.

Code	Latent constructs and related observed variables
GS	Government support [101][46]
GS_1	Better regulations for project success
GS_2	Government support to capacity building
GS_3	Government support to engage with civil society to achieve project goals
GS_4	Government support regarding principles and standards are important for improving project performance
GS_5	Government support can favorably influence project performance
GS_6	Better policies and regulations enhance the project execution
OI	Organizational innovativeness [102][74]
OI_1	Our organization implement innovative and new ideas
OI_2	Our organization tends to be an early adopter of innovative construction
OI_3	Our organization creating new construction practices as critical to project success
OI_4	Our organization looking for innovative methods or techniques that benefit the construction
OI_5	Our organization engage the stakeholder in innovativeness that helps new processes, products, or ideas in the organization
OI_6	Organizational innovativeness is the medium for project success
OI_7	Organizational innovativeness is promptly influencing organizational productivity, profitability, and competitiveness
CP	Community participation [26][79]
CP_1	The local community should involve in the monitoring process
CP_2	The community should involve in the decision-making process
CP_3	The community should involve in the execution process
CP_4	The local community should involve in the planning process
PS	Project success [103]
PS_1	Met internal stakeholder's requirement
PS_2	Project efficiency (time, cost, and quality standard)
PS_3	Prepare for the Future (Sustainability)
PS_4	Met overall customer benefit
PS_5	The project satisfies the needs of external stakeholder (users)
PS_6	The project achieved its purpose

4.2 Sample and data collection

The primary data was collected through a well-structured questionnaire from the Pakistani construction industries related to renewable energy projects. Respondents were government officials, chief engineers, chief architects, executive engineers, project managers, assistant project managers, sub-engineers, and surveyors. The questionnaires were circulated to 900 renewable energy project professionals at all levels in organizations within the construction industry in Pakistan to get their responses. A cover letter was also attached, that certified the privacy of responses and also included a concise description of the study.

5. Data analysis

5.1 Data analysis techniques

Data was analyzed employing Smart-PLS version 3.2.7 and SPSS version 24. SEM can be used by applying partial least squares SEM (PLS-SEM) and covariance-based SEM (CB-SEM). In this study, we

adopted the variance based PLS-SEM method, because the variance based PLS approach is preferable to the covariance-based for exploratory or early-stage theory testing models. SEM is a multivariate analysis technique based on different statistical tools such as casual analysis, factor analysis, causal modeling, correlation, multiple regression, covariance structures, or path analysis [104]. However, covariance-based structural equation modeling (CB-SEM) is in reliance on the common factor model that considers evaluating only the common variables of indicators [105]. Moreover, CB-SEM has rigorous conditions for data distribution and sample size when it is applied whereas, PLS-SEM is related to small sample size with a non-normal distribution of data.

This study used PLS-SEM due to different reasons: 1. Identification of key constructs (e.g. identification of main constructs influencing renewable energy project success); 2. Exploratory nature of the study; 3. Low requirements for sample size; 4. Easy handling of large models; 5. No requirement of data normality; 6. Software availability; 7. Large community forum. The study model is illustrated in Fig. 1, which was observed through the PLS-SEM using smart-PLS software v3.2.7. Considering the advantages of PLS-SEM, this study used a two-step methodology in which at first, the measurement model was evaluated, and later structural model was analyzed in accordance with guidelines of Henseler et al. [106].

In total, 675 questionnaires were returned, of which the final 650 were found to be usable, representing a 72.22% response rate. The response rate is consistent with the earlier construction studies and well above the threshold to apply different statistical techniques e.g. SEM [107]. The demographic information is shown in Table 3 and a graphical representation of demographic information is shown in Fig 2-4, which participated in this study. Table 3 shows that 14.6% were government officials, 48.8 % of the participants had above 15 years of construction experience. Furthermore, 57% of the respondents were executives in their industry and therefore made high-level inputs to the study.

Table 3

Demographic information of the survey participants.

	Frequency	**Percentage**
Age		
25-34	208	32.0%
35-44	265	40.8%
45-54	129	19.8%
55 and older	48	7.4%
Education		
Diploma in Engineering	150	23.7%
Bachelors	268	41.2%
Masters	187	28.8%
MPhil	45	6.9%
Experience Years		
5-9	130	23.4%
10-14	154	27.7%
15-19	180	32.4%
More than 19 years	91	16.4%
	95 are government officials	14..6%
Designation		

Government Officials	95	14.6%
Chief Engineers	82	12.6%
Chief Architects	49	7.5%
Executive Engineers	103	15.8%
Project Managers	137	21.1%
Assistant Project Managers	119	18.3%
Sub-Engineers	57	8.8%
Surveyors	8	1.2%

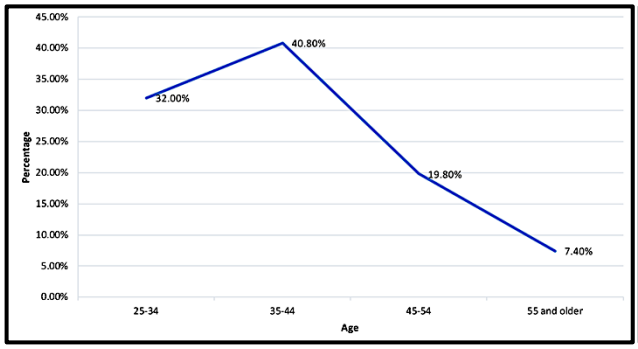


Fig. 2. Respondents' age.

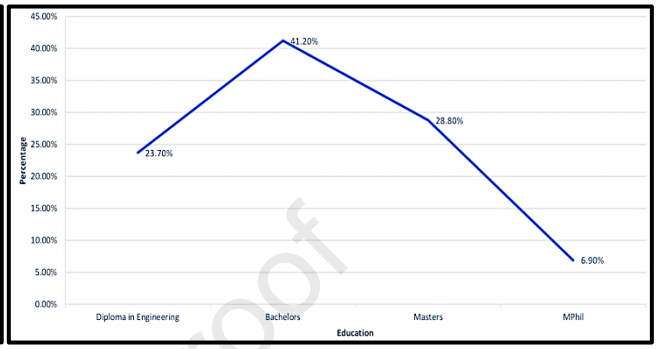


Fig. 3. Respondents' education.

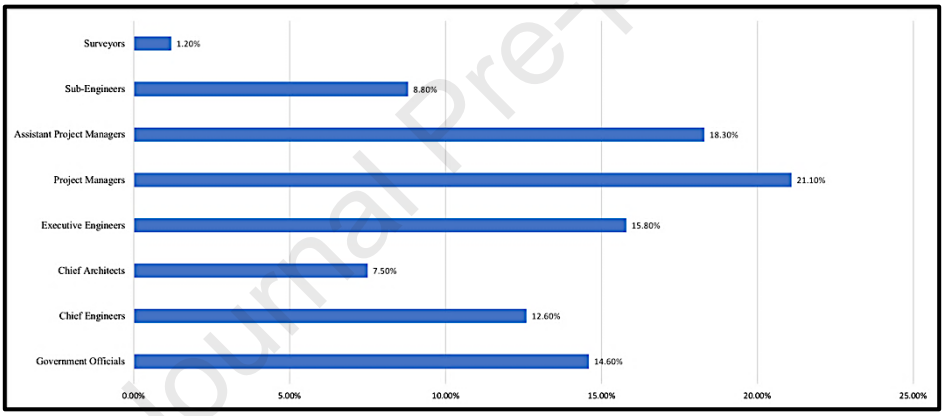


Fig. 4. Respondents' designation.

5.2 Measurement model and structural model assessment

In order to evaluate the measurement model, we followed the Hair et al. [131] suggestions, we performed reliability and validity analysis. To measure the reliability of all constructs, Cronbach α, and composite reliability (CR) was employed and the values should be greater than 0.70 as recommended by Cohen [108]. As exhibited in Table 5, Cronbach's α and CR values for the constructs range from 0.848 to 0.929 and 0.885 to 0.943, respectively, which were all greater than the 0.7 threshold level which provides robust evidence for reliability and validity. The results of convergent validity shown that standardized factor loading values of all items were greater than 0.70. The "Average Variance Extracted (AVE)" calculates the variance captured by indicators regarding measurement error, which must be greater than the threshold value 0.5 [109] to validate the use of a construct. Results are shown in Table 4 that, AVE value of all constructs was greater than the threshold value of 0.5, which also provides support for the convergent validity of the model.

Further, discriminant validity was ascertained using the Fornell-Larcker criterion test and Heterotrait-Monotrait Ratio (HTMT) of correlations. As depicted in Table 5 (as Fornell-Larcker Criterion Test), bold

values indicate the square root of AVE, which is more than the threshold value of 0.5 [109] and higher as compared to the crosswise correlations. Moreover, another test for discriminant validity for the measurement model was done by measuring HTMT, as a current technique recommended by Henseler et al. [110] for the evaluating discriminant validity of constructs contained in measurement models. If the HTMT values higher than 0.85, there must be a problem of discriminant validity [110]. All HTMT values as shown in Table 6 for this study were below the criterion level of 0.85, which implies there is no problem of discriminant validity in this study model.

On the basis of the above findings and analysis, we can conclude that both measurement and structural models are validated.

Table 4

Latent Construct Reliability and Validity.

	Cronbach's Alpha	**CR**	**AVE**
Community Participation	0.890	0.925	0.755
Government Support	0.922	0.939	0.72
Organizational Innovativeness	0.929	0.943	0.701
Project Success	0.848	0.885	0.561

Table 5

Fornell-Larcker Criterion Test.

	CP	**GS**	**OI**	**PS**
Community Participation	**0.869**			
Government Support	0.493	**0.848**		
Organizational Innovativeness	0.486	0.528	**0.838**	
Project Success	0.709	0.552	0.555	**0.749**

Table 6

Heterotrait-Monotrait Ratio (HTMT).

	CP	**GS**	**OI**
Community Participation			
Government Support	0.542		
Organizational Innovativeness	0.533	0.57	
Project Success	0.77	0.624	0.625

In general, the results mentioned above provide robust support and fulfill all conditions for determining the validity and reliability of the measurement model.

5.2. Hypothesis testing

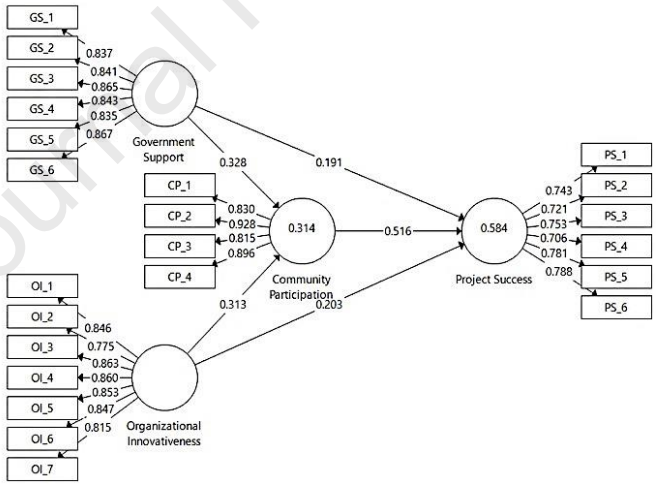
We validated the convergent validity and discriminant validity (measurement model). Further is to evaluate the structural model assessment. This includes measuring the model's predictive relevancy and the relationships between the constructs.

Table 7 and Figure 5 show the beta coefficient of the model as well as Figure 6 shows the path coefficient histogram of the study. Path coefficients (β) were employed to test the results of the hypothesis using the PLS-SEM method. The path between GS and project success [H1] holds a statistically significant relationship, and this provides support to confirm H1 (beta =0.191, T= 6.305, p =0.000). The path coefficient showed that OI had a significant positive influence on project success (beta =0.203, T= 6.408, p = 0.000), denoting that the H2 was verified. The effect of GS on CP is positive and statistically significant (beta =0.328, T= 8.198, p = 0.000), conforming H3. The influence of OI on CP was statistically significant (beta =0.313, T= 7.98, p = 0.000), supporting H4. The result indicated that CP positively influenced project success (beta =0.516, T= 17.763, p = 0.000), supporting H5.

Table 7

Hypothesis assessment and results.

	***β*-value**	**T Stat.**	***p*-value**	f^2	***Decision***
Community Participation -> Project Success	0.516	17.763	0.000	0.440	Supported
Government Support -> Community Participation	0.328	8.198	0.000	0.113	Supported
Government Support -> Project Success	0.191	6.305	0.000	0.057	Supported
Organizational Innovativeness -> Community Participation	0.313	7.980	0.000	0.103	Supported



Organizational Innovativeness -> Project Success	0.203	6.408	0.000	0.065	Supported

Fig. 5. Complete path coefficient of the model

The mediation analysis was carried out by measuring the model without the mediator (community participation) as exhibited in Table 8, the direct effect of both GS (beta=0.362, t=10.614, p=0.000) and OI (beta=0.364, t=10.145, p=0.000) has a significant positive impact on project success.

The next step was to add the mediator to the model. For the mediation effect, we adopted the method suggested by Baron and Kenny [111] and tested the hypothesis [H6]. In order to determine the mediating effect, the indirect effect must be significant [112]. After analyzing the model, we found that GS and OI have a

high and significant effect on CP, which in line has a robust and significant positive relation with project success. The indirect effects of GS (i.e., 0.169, p=0.000) and OI (i.e., 0.162, p=0.000) through the mediator CP were both significant (see Table 8). To evaluate the magnitude of the indirect effect, we have determined the Variance Accounted For (VAF), which ascertains the size of the indirect effect in relation to the total effect (VAF=Indirect effect/Total effect), getting a value of 0.32 (32%) (GS) and 0.31 (31%) (OI). This concludes that partial mediation exists. The criterion is if the VAF is greater than 80 implies a full mediation; when the VAF is greater than 20% and below 80% indicates partial mediation, and VAF values zero means no mediation exists [113].

Table 8

Mediation effect of the model.

	Direct effect	**Indirect effect**	**Total effect**	**VAF**
Government Support -> Project Success	β =0.362 SD=0.034 t=10.614, p=0.000	–	0.531	31.8% Partial Mediation
Government Support -> Community Participation-> Project Success	–	β =0.169, SD=0.023 t=7.335, p=0.000		
Organizational Innovativeness -> Project Success	β =0.364, SD=0.036 t=10.145, p=0.000	–	0.526	30.8% Partial Mediation
Organizational Innovativeness -> Community Participation-> Project Success	–	β =0.162, SD=0.022 t=7.241, p=0.000		

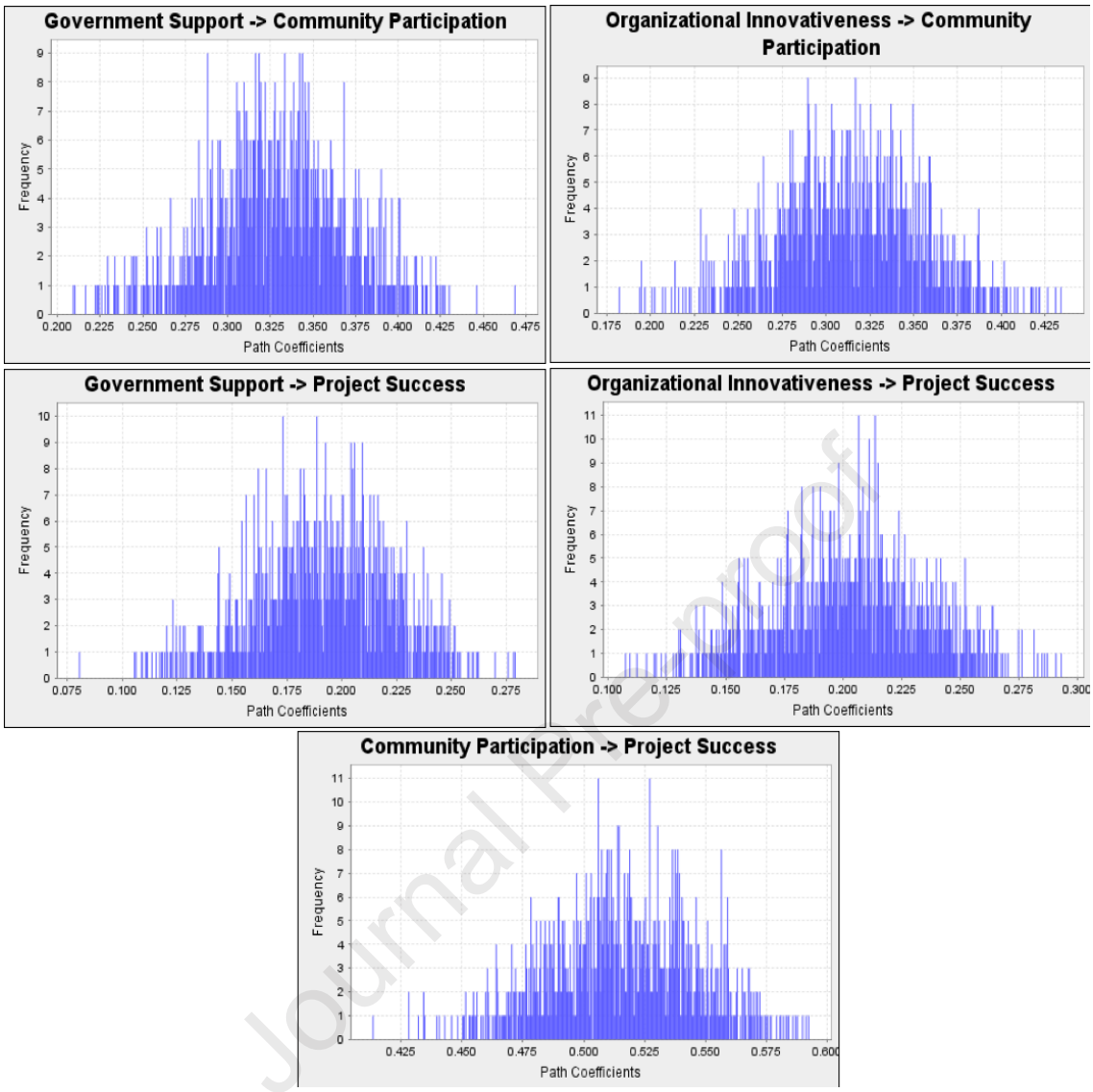


Fig. 6. Path coefficient histogram

The R^2 determines the total effect size for the structural model and is thus a degree of the model's predictive accuracy. R^2 scores of 0.75 (substantial), 0.50 (moderate), and 0.25 (weak) in path models [114]. As presented in Fig 5, 58.4% of project success was together explained by all three exogenous latent variables (GS, OI, and CP), whereas GS and OI also explained 31.4% of the variance in CP. The R^2 values in this study's endogenous latent variables were moderate. The R^2 value implies that the proposed conceptual model has sufficient explanatory significance.

Further, following Stone–Geisser's Q^2 [115] is often used to evaluate the predictive relevance and can be computed employing the blindfolding procedure in smart-PLS. If Q^2 is greater than zero, then the model is considered as having predictive relevance [113]. The Q^2 values of this study endogenous latent constructs were

0.221 and 0.297; which helps the fundamental idea of this study that the endogenous latent construct (i.e., CP and project success) have a great predictive relevance of the model.

Moreover, as mentioned above, the R^2 value measures the strength of the model. Nevertheless, a single independent unobserved variable's involvement to the R^2 value can also be ascertained by deleting the independent unobserved variable from the model [113], which is called effect size f^2. A threshold value recommended by Cohen [108] for f^2 were such as 0.02 (small effect), 0.15 (medium effect), and 0.35 (large effect). The relative f^2 of the exogenous latent variables are shown in Table 7. The effect size f^2 of GS was 0.057, which were considered small effect sizes, OI 0.065 small, and CP 0.440 was considered a large effect.

6. Discussion of results

Project success is one of the most challenging factors in the construction industry, particularly in renewable energy projects in developing countries such as Pakistan. This study intended to measure the mediating role of CP in the relationship between the government's support, OI and project success of renewable energy projects. Furthermore, the government's better policies and support and organization implementation of strategic plans are imperative to increase renewable energy projects' success within the construction industry.

The findings of the current study give empirical confirmation of a positive and significant relationship between the constructs of the model of GS, OI, CP and project success. This relationship was statistically verified in this study. As per this study findings, GS positively and significantly impact project success (beta =0.191, T= 6.305), confirming the H1. Thus, the findings also verify previous researches such as Zhang [11] and Loring [116] who found a positive relation between GS and projects. Considering the success of the renewable energy projects, this relationship has been verified in the current study, recommending that the effects of GS and better policies and regulations are favorable to a renewable energy project success, which eventually considers in the performance of project-oriented organizations. The results reveal that capacity building, better policies and regulations, and government support, significantly impact the success of renewable energy projects in developing countries.

The path between OI and project success (beta =0.203, T= 6.408) holds a statistically significant relationship, verifying hypothesis H2. This is in line with a previous publication such as Ryun and Zhao [117] found that as innovativeness upsurges the result of organizational memory and use of outer information becomes stronger. These findings verify that OI plays a vital role in creating novel ideas by the construction industries in implementing the successful completion of the projects. This study finding also provided evidence that the organizational innovativeness aid for construction industries remarkably plays a potential role in renewable energy projects' success.

This study has also provided verification for the fact that GS significantly impacts CP (beta =0.328, T= 8.198). These findings validate the results of earlier studies, such as Marinetto [118] who found that urban renewal projects centered on housing and estate projects showed imperative tools for the government support

of citizen involvement and also resident capacity-building depend greatly on government support. Moreover, Kyung [119] also discussed government support and better policies and community involvement in urban policy. Because the government, management of the construction organizations, and communities are equal beneficiaries of the project, where, the government makes rules, regulations, policies, and financing the project. The renewable energy project departments are responsible for the management and executing the projects, whereas, the community is the end-user of the project.

This study has also stipulated support for the fact that OI also had a significantly positive effect on CP (beta =0.313, T= 7.98), confirming H4. The results of the study by Yan and Benbya [120] are in line with our study, which also finds a positive relationship between OI and CP. Due to organizational innovativeness, the construction mechanism is based on a new philosophy and a new style of CP. The local community is still believed by renewable energy firms as the most vital innovation partners as the end-users of the project. Moreover, OI is a multi-dimensional thought, comprising of activities relating to new idea origination and realization or implementation with the participation of the local community. These findings are related and endorse the previous studies in the construction industry such as Enserink et al. [90], and Khwaja [26] who found that CP and empowerment have a great impact on project success. But, it is worthy of an indication that these authors' findings stated that CP in governance has a greater project success influencing capability.

Finally, the findings supported that CP mediates the effect of GS and OI on project success. The result suggests that the full participation of the community in renewable energy projects is indispensable to enhance the project performance. It also provides a valuable contribution to accomplishing organizational goals if their participation and opinions are incorporated. CP provides beneficial inputs/knowledge and better collaboration between government and construction industry management to improve renewable energy project outcomes. It is an elementary method to enhance the project performance as well as a better understanding of the local inhabitants' voice in the planning and decision-making process. The study findings further revealed that GS and OI has a significant positive impact on CP (R^2= 31.4%), showing that GS and OI is a suitable guide of how a construction industry accomplish community needs and achieve organizations' goals. Moreover, the R^2 value of project success (58.4%) implies that the government's support and OI, as well as CP, was better to define the causal relationship with project success. Hence, project performance is accomplished through the involvement CP and better regulatory plans, because the regulatory plans have a link to organizational strategy. Therefore, in order to accomplish better project outcomes, government and construction organizations should provide appropriate network and opportunities to the local community.

7. Conclusion

This study contributes to the extant literature by finding that GS, OI and CP significantly impact renewable energy project success. Moreover, this study proposed and tested a research model that examined CP as a mediator between GS, OI and project success by using the partial least squares technique. This study proved that within the context of renewable energy projects, GS and OI has both direct and indirect impacts on project

success. In addition, the findings revealed that community participation as a critical project success factor plays a significant mediating role in the relationship between GS, OI and project success. Both GS and OI are equally significant for the successful completion of renewable projects. So, certain measures should be adopted in order to provide an effective policy and decision-making where renewable energy projects could complete in due course.

The study revealed that the mediating role of CP substantially accelerates the project performance and it is recommended that the government and construction organizations encourage CP to improve project delivery through the government's support and OI. This study provides some evidence that CP creates effective and innovative renewable energy project policies and improves project outcomes. The community involvement in information sharing and communications provide the opportunity to express their views in such a way that it can be considered in the development and implementation of renewable energy projects development.

In a view of the theoretical aspect, the current study can expand the increasing body of literature on renewable energy project management and strategic management in the construction organization. Particularly, the study validates that effective CP in the regulatory framework for guiding government and construction organization is imperative and for the improvement of renewable energy projects performance. Furthermore, there is a lack of research that has been undertaken to link GS, OI, and CP with project success particularly under the frame of the renewable energy projects. According to the methodological point of view, this study presented a novel approach by using SEM framework first time to identify the relationship between GS, OI, and CP and their contribution to the renewable energy projects' success is being empirically examined in the construction industry.

The practical contribution of the current study provides policy-makers and practitioners with clear solutions for the problem confronted by renewable energy projects. Particularly, this study is worthwhile for construction renewable energy projects, to use these results by focusing more on the application CP that enhances project success. Currently, project performance is usually an important consideration for all stakeholders and to understand together how to enhance project performance. Project success is a prime objective of all stakeholders, and it is a multi-dimensional concept, and a single-dimensional measure can not measure it. CP in decision making and planning may provide an efficient solution to community needs and integrate their opinions according to their requirements in renewable energy projects. The current study findings can support the government and project organizations to make some strategic decisions in achieving project performance. Therefore, government and legislation departments must develop an effective dynamic mechanism for creating opportunities for the community to engage in decision-making practices of renewable energy projects.

The limitations of the current study lie in the nature of the research methodology. This research was developed in Pakistan, which signifies that there are certain preferences that render it problematic to generalize the research conclusions to developed nations/countries. However, the substantial sample of above 500 in several regions and countries proposes significant understanding to promote further studies and builds a

foundation for assessment with other nations/states. The analysis was based solely on renewable energy projects constructed by a government organization in Pakistan. So, we did not include private organization officials and practitioners. In the future, someone can do research and collect data from public and private organizations to more generalize the findings.

Acknowledgments

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The influence of government support, organizational innovativeness and community participation in renewable energy project success: A case of Pakistan

Highlights

The paper makes some important contributions. It:

(1) explicates the efficiency, timeliness, quality of project performance

(2) affirms local community views in the planning and decision-making process

(3) integrates government support and organizational innovativeness in renewable projects

(4) presents guidelines for the government authorities about renewable energy projects

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: