



Research Article

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Why Do Large Projects in Sustainable Energy Projects Fail?

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Abstract: *The complicated and demanding effort to complete huge renewable energy projects requiring the necessity of applying appropriate project knowledge and management models. The extent of project success drivers requires optimal handling of resources. From the onset of 19th century, academics have been developing significant methods, processes, inclusive decision making to make projects successful. In fact, many scholars have developed multidimensional frameworks that remove flawed focus on simple measurement of time, cost and performance to define project success. These factors have proved to be insufficient to precisely determine any project success. Project management scholars through period of time have managed to identify several other relevant and critical factors that are ultimately responsible for project success. The authors in this paper aim to develop a framework define project success and investigates the critical project success factors applied to renewable energy projects.*

Keywords: Renewable energy, Projects, Critical factors, optimization.

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INTRODUCTION

A recent assessment of the pertinent recent literature reveals that renewable energy projects are customarily finalized with substantial cost overruns, an extended timetable, and intermittently, inadequate technical performance. These projects usually have a high level of uncertainty in all three dimensions (cost, time, and technical performance) due to their complexity and recentness (Nicholas & Steyn, 2008).

In this particular context, plethora of studies have agreed that any renewable project success is empathically linked to satisfying all three dimensions, namely Schedule, budget and technical performance, thereby satisfying the requirements of the customers (Nicholas & Steyn, 2008; & Kerzner, 2009). However, Cooke-Davies (2002); & Shenhar & Wideman (2000) believe that due to the complex nature of the project and different assessment criteria, one cannot fully agree or come to a mutual consensus pertaining the concept of project success, as it is assessed differently based on different distinct contexts and expectations. Therefore, vital project success factors are defined as the finite number of aspects that ensure competitive advantage through satisfying the different project success dimensions (Rockart, 1982).

With this in mind, the rapid evolution of renewable energy markets and policy frameworks globally will necessitate the application of appropriate and adequate project management model, as well as full knowledge of project success drivers. In fact, Mengesha (2004) stated that investigations into pertinent and

important success factors that have ensured successful projects completion have been undertaken since 1967, Studies have revealed and highlighted the evolution of critical information on crucial success factors is contingent on both theoretical and empirical research.

PROBLEM STATEMENT

The renewable energy sector has encountered massive failures in the last five years. Reports indicate that 35 US green-energy companies have gone bankrupt, and more than \$150 billion has been spent on renewable energy since 1973 in the United States alone, yet the country still shows insignificant electricity generation from renewables (Morris & Nava, 2013). The reason behind these failures is the vigorous focus on renewable energy technologies; rather than appropriate policies and adequate project management pattern that facilitate the introduction and promotion of renewables. This negligence of project management methodologies resulted in a humble rate of growth.

Elliot & Dweck (2013) confirmed that many nations still do not have a renewable energy policy, or a proper comprehensive evaluation of success drivers of these projects. Therefore, most challenges that renewable energy projects face are results of lack of empirical studies on success factors of renewable energy projects, and the influence of these critical factors on the quality and accomplishment of such projects. Indeed, the Union of Concerned Scientists (2015) mentioned that the Department of Energy's National Renewable Energy Laboratory (NREL) stated

that the renewable energy sector needs a long-term clean energy policy and appropriate project management methodologies to ensure that project are implemented in accordance to the plan.

Research Significance

This research will be a significant endeavor in exploring project management success drivers for renewable energy projects. The results from this research shall allow the reappraisal of the current project management paradigms used for renewable energy projects, which would generate an immense deal of interest, not only among renewable energy project managers, but also among the general public.

Moreover, this study will be helpful to project management students and instructors, as well as to the renewable management industry, as it will provide elements of a management pattern favorable to increase the success and sustainability on renewable energy projects. It shall also contribute to the project management literature and will serve as a future reference for other researchers on the subject of project success and management of renewable energy projects.

Importance of Project Management in Renewable energy:

Efficient project management is vital for achieving success in any project undertaken by the organization to achieve competitive advantage. Renewable energy project managers face specific challenges in addition to those of “normal” projects, namely those of cost, schedule and quality. Project managers require significant technological know-how in order to anticipate and mitigate the unique risks and challenges in this realm. For instance, the uncertainty of governmental support and whether there will be sales opportunities for renewable energy projects etc. implies great amount of risk involving dynamic and challenging change management

RESEARCH OBJECTIVES

The main objective of this research is to design elements of a management pattern favorable/conducive to increase success and sustainable development rates of renewable energy projects. Related objectives include:

- To identify critical project success drivers for renewable energy projects.
- To critically discuss and suggest of relevant project management instruments for a sustainable development and promotion of renewable energy.

RESEARCH METHODOLOGY

Literature on project success and projects success factors shows that these two concepts have not been explored in the renewable energy sector. Thus, this paper will be a significant and unique endeavor, and will form the basis for future research in the field of

renewables. The research will adopt a deductive approach, which involves developing a hypothesis (or more) based on contemporary theory, and then formulating a research design to assess the hypothesis. The deductive approach will ensure a high level of certitude and reliability, unlike inductive research. In this context, Rusnell (2015) stated “the very reason a deductive conclusion is guaranteed is precisely because it doesn't add any new information not already contained in the premises”. In fact, the deductive approach was proven to be successful by Slevin & Pinto (1987) as they identified the critical success factors in effective project implementation. Additionally, several other scholars (Belassi & Tukel, 1996; Nwakanma *et al.*, 2013; & Turton, 2010) used deductive reasoning to assess project success and explore different success factors from a project management perspective.

The research uses qualitative approach in order to answer research questions and achieve the assigned objectives. It utilizes surveys and empirical data about project success and success drivers. In order to ensure reliability and validity of the research, the conducted survey targeted a stratified random sampling of sixty seven key renewable energy practitioners, decision makers, professionals, and stakeholders across Karnataka. The study also investigated methodologies relating to project management and the success criteria applied to renewable energy projects.

REVIEW OF LIERATURE

The growth in the use of renewable energy has been growing steadily over a decade or so. Several factors have contributed to this scenario like increasing energy costs, climate change, growing environmental concern, resource depletion et al. The stock of Fossil fuel is fast depleting. While the global coal reserve is expected to last for another 120 years, the available oil reserves is expected to meet 55 years of world production. This contributed to sharp rise in energy costs, which ultimately culminated to endeavors seeking independence from fossil fuels. This lead to higher investment in renewable energy projects and making them succeed.

Energy generated from non-fossil fuels are called Renewable energy or just simply, “renewables”. Examples include solar, wind and geothermal energy. According to Statistical Review of World Energy 2017, the consumption of renewable energy grew by 23.3% globally in 2016 and is now providing 7.3% of the world's electricity. In comparison with 3.7% in 2010, the share has almost doubled.

Project Success

The idea of project success is often debated and discussed subject in the area project management. Greer *et al.* (1999) opined that the cost, time and performance are of prime importance for successful completion of project. This basic definition is still being

followed by a lot managers and practitioners. However, cost, time and performance are not only the parameters to be used in measuring project success; there is an important need to include satisfaction of all stakeholders and most importantly the quality of the project management process. (Baccarini, 1999; & Schwalbe, 2015).

Thus, by changing the traditional triangle (Figure 1) by including the pertinent stakeholder's overall satisfaction and optimal quality of management process that gives more room to a extensive representation of project success. In a intensive analysis of almost 20 project that have failed, Thomsett (2002) broadens this definition by adding that the project should meet the functional requirements and the lessons learnt by the team delivering the project.

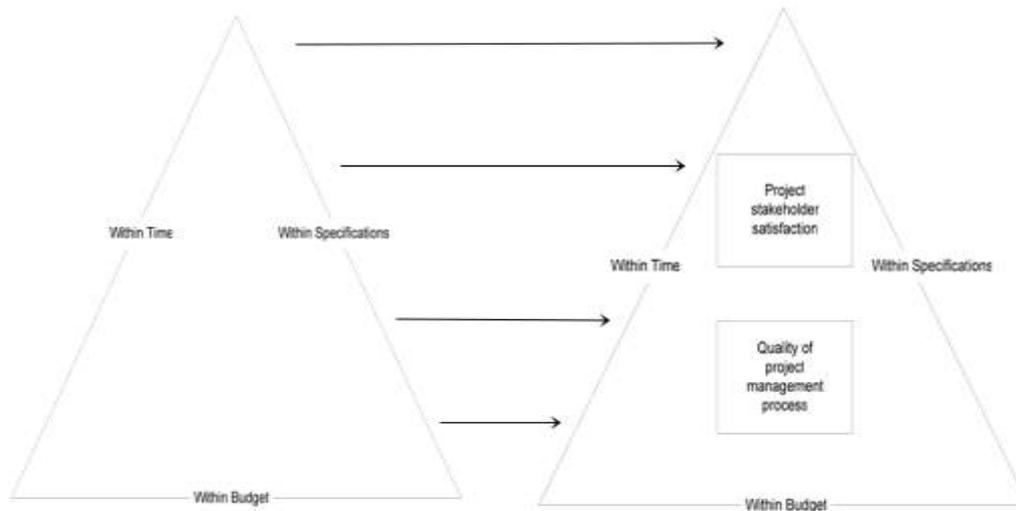


Figure 1. Project success: extending the traditional view(Westhuizen & Fitzgerald, 2005)

Likewise, Raz *et al.* (2002) opined that by also argued that associating fruition of project with pre determined schedule, budget, and performance, is a misleading measure. The authors indicated that the whole concept of any project success or failure varies in accordance to the assessor; “an architect may consider success in terms of aesthetic appearance, an engineer in terms of technical competence, an accountant in terms of expenditure under budget, and a human resources manager in terms of employee satisfaction “(Raz *et al.*, 2002). They further argued that there is a comprehensive need to understand varied interests, opinions and views. In another study, Shenhar & Bonen (1997) recommended a multifaceted extensive framework that can be used to appropriately assess success of any project. They proposed four dimensions namely: efficiency of the proposed project, its impact on the stakeholders and customers success, and a blueprint for the future. It must be noted that that the first dimension efficiency of the proposed project is usually a short time measure that illustrates whether the processes involved in the project have been properly managed. This dimension is an indication as to whether the project is successfully completed as per the schedule and the budget allocated. The second dimension measures the impact that the completed projected has on the customer by meeting the appropriate functional requirements, specification, both technical and performance. Most importantly the third dimension provides an indicator of business and direct success, it

also addresses the overall impact that the project has had on the organization, in particular by improving the total performance of an organization and by ameliorating performance time, yield, quality of the process, and cycle time (Hammer & Champy, 1993). Last but not the least, the fourth dimension involves preparing for the future, is the longest-term dimension and answers the following questions:

- How does the organization prepare for future opportunities?
- Does it explore new opportunities for further markets, ideas, innovations and products?
- Does it build new skills that may be needed in the future, or develop new technologies and core competencies?
- Is it prepared to make a change and create the future in its industry or to adapt quickly and meet additional challenges, unexpected moves of competitors, and market and technology surprise?

Based on Shenhar & Bonen (1997) findings, the assessment of project success needs to be undertaken in an integrative manner, in which all four dimensions are considered. This is due to the fact that the importance of these dimensions is time-dependent (Figure 2). “The first dimension is assessed in the very short term, during project execution and completion. The second dimension is assessed after delivering the project to the customer. The third dimension can only be assessed after several years of delivering the project

(depending on the project type). The fourth dimension can only be assessed after a longer period of time

(usually more than five years)".

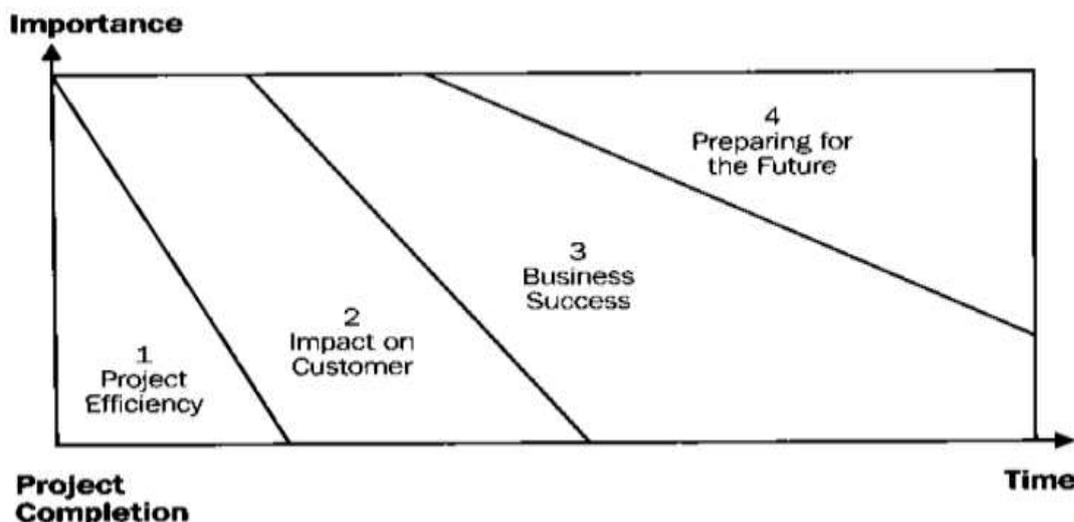


Figure 2. Time-dependency of the importance of the four project’s success dimensions (Shenhar *et al.*, 1997)

Project Success Factors

Since the 60’s researchers have been constantly striving to pinpoint factors that contribute to the success of any project. Have attained several conclusions that have been largely disclosed in project management literature.

However, in spite of all the effort to determine projects’ success factors, despite all the acquired individual and collective experience in project management, and despite the continuous growth in project management professional bodies’ membership, project results are still disappointing to the different stakeholders.

Scholars have agreed that the concept of success factors is critical for management of projects; they however, have differed in their viewpoints and definitions. Prabhakar (2008) mentioned in this context “the only agreement is the disagreement on the issue of what is project success.” Kerzner (1987) in his definition indicates that success factors for a project should include all elements that form an environment and projects can be managed in accordance to excellence.

Simultaneously, Schultz *et al.* (1987) presented the first methodical apportionment of success factors for project management. According to them, factors can be classified into two groups, strategic and tactical. The strategic success factors are related but are not limited to, Management support, Mission of the project and Scheduling of the project. Client consulting, recruitment and selection of best available human resources and Staff training.

Pinto & Slevin (1988) indicated that the above mentioned categorization is incomplete and insufficient, because managers have to take into account different stages of project life cycle.

Kerzner (2003) acknowledged with Pinto & Slevin (1998) findings, where he stated that the idea of project success is conclusively linked to the “completion of project activities in the specified term, within the budget, and expected quality”. In addition, he was in the opinion that this has been changed to include “limitation of minimum changes in the scope of activities without interruptions in the workflow, without shifts in the corporate culture, and with full acceptance of results by the project client” (Kerzner, 2003). In addition to Kerzner, Khang and Moe (2009) also subscribed with the findings of Pinto and Selvin, and further expanded by recommending new sets of critical project success factors positioned on the various phases of the project’s life cycle.

Although Kerzner, Khang and Moe were in cognizance with the opinion of Slevin and Pinto on the premise that factors contributing to success vary from stage to stage of the project. Different literature reviews confirms that arriving at conclusions pertaining to the reasons of success and failure is as complex as project management by itself. Fortune and White (2006) investigated 63 publications relating to critical success factors (CSF) and concluded that there is below par unanimity between scholars in the field of project management on the factors determining project success. They identified three frequently cited factors, which are: “the importance of a project receiving support from senior management; having clear and realistic objectives; and producing an efficient plan”. Ofori (2013) presented a comprehensive review of literature

based on critical factors that enable project success gathered from several authors. They are as follows:

- Clear Project Management Objectives
- Support from higher management
- Communication flow between all stakeholders and the client in particular
- Qualified project team
- Span of authority of the project leader
- Prudent estimate of time and cost
- Adequate autonomy and control over the project
- Manager / leader problems/issues solving ability
- Optimal Project performance and quality
- Adequate resources
- Proper Planning/controlling
- Constant Monitoring of performance and feedback
- Project mission/common goals
- Project Ownership

Ofori (2013); & Shenhar & Bonen (1997) findings will serve as the basis in investigating critical success factors for renewable energy projects, and their importance in the different project life cycle phases.

DISCUSSION

Several themes emerged in our in-depth interviews with stakeholders. These are discussed below:

Efficient planning and execution: Herroelen & Leus (2005) suggest that in the real world, all major project activities are subject to considerable uncertainty; these uncertainties are gradually resolved during the execution of the project(s). In their course of research they reviewed different approaches, and in particular found that the following were commonly used for scheduling under uncertainty: reactive scheduling, stochastic project scheduling, fuzzy project scheduling, robust (proactive) scheduling and sensitivity analysis. Our interviews revealed that all successful projects involved comprehensive planning and execution. Planning was being done to the minute details. They had a very good monitoring mechanism to ensure that the work was completed within the specified time frame. Frequent meetings were held between stakeholders to build up their confidence and retain it. Quality was being ensured by checking them at periodic intervals at different stages of work

Participation of locals in the project: Studies have indicated that any major projects needs complete participative involvement of stakeholders, Projects that involve local populace in participative planning and the outcome are accepted by the public and generally more successful Getting the confidence of the local people and involving them in all stages, right from planning through execution was observed as a pivotal factor in successfully implementing and operating the projects. It

was observed that all doubts of the local people were addressed at the beginning itself and chances were also given to them to participate in different roles in executing and operating the projects.

Robust communication between stakeholders and project beneficiaries: All participants confirmed that there was a robust communication among stakeholders and between stakeholders and project beneficiaries. This was essential to ensure conformity of operations to plans without any hassles. The interplay of several factors during the operationalization stage normally raised doubts in the mind of the beneficiaries regarding the efficacy of the project. Only when these were successfully settled the managers were able to successfully execute the project. This was essentially done through active and continuous communication.

Availability of maintenance infrastructure post implementation stage: A project to become sustainable needs efficient maintenance management in the post implementation stage. This includes maintaining sufficient technicians, continuous technology up gradation, conducting workshops at periodical intervals to update the knowledge of the locals in keeping the project in robust operational condition. A good stock of spare parts in hand was considered essential in maintenance activities in the post implementation stage.

Hands-on training to beneficiaries in using the projects: Interviewers unanimously agreed that locals need to be sufficiently trained in using the project intended to benefit them. Updating their knowledge and operational training were considered as essential constituents in this factor. Lack of technical know-how in using the new project have put several of them in disuse. This has resulted in funds locked up in such projects, at times leading to financial catastrophe.

Support of the local authority: Participants in the interview acknowledged that lack of support from local authority has made several projects become unsustainable. So, all successful projects have roped in the support of the local authorities at all stages of the project, from planning to implementation and also in the post-implementation stage.

FINDINGS AND CONCLUSION

The research has thrown light on the fact that apart from the normal competencies and requirements for a project like clear cut objectives, support of top management, efficient management team, tactful decision making capabilities, uninterrupted fund flow at appropriate times, problem solving abilities, monitoring performance and feedback and taking actions as required, the following six additional factors of (i) Efficient planning and execution (ii) Participation of locals in the project (iii) Robust communication between stakeholders and project beneficiaries (iv) Availability of maintenance infrastructure post

implementation stage (v) Hands-on training to beneficiaries in using the projects (vi) Support of the local authority, are very essential to put things in place and ensure successful implementation of renewable energy projects.

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