

PROJECT MANAGEMENT ISSUES IN MEGA CONSTRUCTION PROJECTS

ABSTRACT

The success of the infrastructure projects of government organizations depends primarily on government policies, which include the rules, regulations, manuals, standard contract documents, systems, and practices that govern mutual relations between the government and private contractors to a large extent. This study aimed to critically examine this part of the project management system of government organizations and to suggest measures for its improvement. The systems of three government organizations, viz. Central Public Works Department (CPWD), Delhi Metro Rail Corporation (DMRC), and National Highway Authority of India (NHAI) were studied in detail by examining their documents and interviewing their senior officers. Their salient features were compared and best practices grouped to frame propositions and determine the opinion of experts regarding their implementation. Consensus on the suggested propositions was measured using a questionnaire survey and a Delphi analysis, and out of 11 propositions, consensus was found on nine of them; therefore, these nine propositions were suggested for adoption by the three organizations to bring about system improvements. Said improvements were expected to be the authentication of the tender process, a less time-consuming and dispute-free process, enhancement of the financial liquidity of the contractor through assurance of timely payments, compensation for losses due to idling of labor and machinery, adoption of strict measures in the contract through the introduction of a debarment clause for failure to perform, and deemed termination of the contract in case of abnormal delays in preconstruction activities. The most crucial recommendation that emerged in the study was the introduction of a “focus on delivery” clause in the work manual, which would

enhance bona fide decisions in favor of work while addressing various issues faced during work execution.

Management of delays is one of the critical issues in construction contracts. To fix the responsibility and avoid disputes in construction projects, the delays attributable to the client, contractor, and beyond the control of either party need to be appropriately identified and accounted for in the contract document. The present study critically examines construction contracts of different government organizations in India for various provisions concerning delays, delay damages, and levy of compensation and suggests improvement measures. It also proposes a mathematical framework for calculating the levy of compensation for delays attributable to the contractor incorporating various relevant factors. The findings are based on a detailed study of the project management system of the three government organizations, and subsequent interview with the senior government arbitrator and workshop with senior construction professionals working in these organizations. The study found that the existing contract provisions for calculating delay compensations sometimes can be flawed and biased. Moreover, the prevalent methods to determine the levy of compensation do not consider many relevant factors, such as delays that occurred due to the client and total delay. The proposed framework can help construction practitioners calculate the compensation levy for delay damages in a fair and balanced manner.

Megaprojects play a pivotal role in the socioeconomic development of any country and contribute significantly to employment generation and national gross domestic product. The construction industry has many beneficial roles, but it also has numerous detrimental impacts. These impacts include natural resource depletion, energy consumption, environmental pollution, harmful gas emissions, and waste generation. It is imperative to avoid such detrimental impacts and ensure sustainable development by

adopting green measures. Many studies have been conducted on sustainable construction, some of which have also focused on determining critical success factors (CSFs). However, studies on the sustainability of mega construction projects are limited. In the literature, no study was found that determined CSFs for the sustainability of mega construction projects. To fill this gap, this study aimed to determine success attributes for the sustainability of mega construction projects, to evaluate their underlying structure, and to determine CSFs and their relative importance. Attributes were prepared based on a literature survey and discussions with experts. A questionnaire survey was conducted with experts who handle megaprojects. The respondents were asked to select a megaproject with which they were associated and rate its sustainability performance. They were also asked to rate the impact of attributes on the sustainability performance of the project. Subsequently, exploratory factor analysis was conducted to group the attributes into smaller sets of factors. Using multiple regression analysis, CSFs and their relative importance were determined. This study found nine success factors and four CSFs. The CSFs were as follows: adequate budget provision and effective governance, mandatory environmental impact assessment and enforcement, sustainable design with proper site feature management, and effective construction stage monitoring and management. The study provides vital inputs for stakeholders to adopt in their projects to enhance their sustainability performance. Since the study is unique for mega projects, there is a need for similar studies in future to create pool of data for comparison and further analysis.

The safety of workers at worksites, becomes a major social responsibility and challenge. The construction industry has the highest accident rate and is considered the most dangerous industry globally. It is thus imperative to prevent such a situation and move toward safer construction. Many studies exist on safety issues in construction

projects, some of which have determined critical success factors (CSFs) for safety. However, safety studies specifically on MCPs are limited. In the literature, no study was found to have determined CSFs for the safety performance of MCPs. To fill this gap, this study aimed to determine success attributes for the safety of MCPs, evaluate their underlying structure, and determine CSFs and their relative importance. Attributes were prepared in the similar manner as sustainability attributes. Data were collected through a questionnaire survey, in which industry experts with experience of handling megaprojects were asked to rate the degree of safety arrangements in a select megaproject with which they were associated. They were also asked to rate the impact of attributes on the safety of the project. Subsequently, exploratory factor analysis was conducted to group the attributes into smaller sets of factors. Using multiple regression analysis, CSFs and their relative importance were determined. This study found five success factors and three CSFs. The CSFs were as follows: management support and commitment, adherence to safety rules and procedures, and a proactive approach of supervisory staff. The findings of this study have theoretical as well as practical application. In theory, this study adds to the body of knowledge, while in practice it provides CSFs for safety for stakeholders to adopt in their projects to enhance their safety performance. Since this study is unique to megaprojects, a need exists for similar studies to be conducted in the future to create a pool of data for comparison and further analysis.

Finally, three case studies were conducted; selecting one MCP each from the three government organizations. It is found that the system adopted in the case study projects are broadly and qualitatively similar to that adopted in the research objectives. The CSFs identified in the research for sustainability and safety are also in practice in

the case study projects. Thus, the case studies support the data inputs and results of this research.

Keywords: Mega construction, contract management, project management, comparative analysis, Delphi method, project delays, delay damages, levy of compensation, sustainable construction, green building, critical success factor (CSF), environmental performance, safety performance, construction safety, safety issues in mega construction.