

Important Factors for Success of Public Construction Projects

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Abstract. Modern public construction projects involve multiple stakeholders, such as designers, contractors, subcontractors, construction managers, consultants, and specialists from different disciplines. In a multi-agency work environment, it is natural to have clash of objectives and interests among the different stakeholders. The objective of public project management is to ensure the success of a project which not only involves managing the schedule, cost, and quality, generally known as 'the iron triangle', but also satisfying a number of other performance criteria, such as avoiding disputes, and complying with safety norms. Identification of the success factors is considered the key to achieving success in these projects. Through an extensive literature review, 36 success factors were identified and a questionnaire-based survey was undertaken to elicit views of construction professionals on the criticality of these factors for the success of public construction projects. The responses from 105 professionals with an average of 22 years of experience in public construction projects in India were collected and analyzed using ANOVA and most important factors for success for various success criteria are presented. The success factors of generic nature are: owners need thoroughly understood and defined, a high degree of trust shared by project participants, timely and valuable decision from top management, availability of resources as planned throughout the project, top management's support, and regular monitoring and feedback by top management, whereas success factors of specific nature are: thorough understanding of scope on the part of project manager and contractor, comprehensive pretender site investigation, regular monitoring and feedback by owner, no bureaucratic interference, no social and political interference, clearly articulated scope of work, quality control and quality assurance activities, and adequate communication among all project participants. The results would be helpful to public construction project professionals in taking proactive measures for successful completion of public projects.

Keywords: Success factors; India; Public projects.

1. Introduction

Growing economy is an indicator of a country's development. Development of physical infrastructure is most critical issue for sustained future growth (Construction Industry Development Council, 2005). Global construction market is worth around US \$3,200 billion per year (Sohail and Cavill, 2008). The Government of India has committed an outlay of INR 20,562 Billion (US \$ 514 billion at an exchange rate of Rs 40 for \$1) to infrastructural development in its Eleventh Five Year Plan (2007-2011). Large investments in infrastructure, have almost assured the growth prospects of the businesses.

The performance of the Indian Construction Projects has not been very encouraging owing to time and cost overruns. As per the report of the Ministry of Statistics and Programme Implementation (Infrastructure and project monitoring division), Government of India, time and cost overruns have been a major problem affecting the public sector projects (<http://www.mospi.gov.in>).

Studies conducted for improving the performance have revealed a number of factors called success factors. It is well acknowledged that there is a significant difference between public sector and private sector organization, in terms of funding, serving public and accountability constraints. Public projects demand a high level of transparency and accountability and are therefore accountable to external financial audit and

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vigilance agencies. Tabish and Jha (2011) developed a frame work based on transparency, professional standards, fairness, contract monitoring and regulation, and procedure for corruption-free performance in public projects. The literature on the success factors for public construction project reveals that very few studies have been taken up and that too they are not focused on individual performance criterion. For example, Jacobson and Choi (2008) and Toor and Ogunlana (2009) identified success factors for overall performance such as: specific plan/vision, open communication and trust, political support, expert advice and review, high degree of commitment, clear role and responsibility, willingness to compromise/collaborate, respect, risk awareness and community outreach and shared vision between the client, architect and contractor, project planning and control, project personnel and involvement of client. Hence more awareness of success factors of public projects with specific reference to different performance criteria needs to be created among the construction professionals.

In addition to success factors, the term ‘success’ itself has undergone a sea change in the complex project environment with so many stakeholders involved. The objective of public project management is to ensure the success of the project, and this involves not only managing the schedule, cost, and quality, generally known as ‘the iron triangle’, but also satisfying a number of criteria for performance measurement, such as no-disputes and complying with safety norms.

The earlier research on the project success factors includes perception of respondents and data gathered from either private sector or both private and public sector uniformly. Since public sector projects are different from private sector ones, the success factors shall also be different. Existence of differences in the perceptions about the relative importance of success factors between private and the public sectors has been reported (Yang *et al.* 2009; Divakar and Subramanian 2009). Hence, uniformity of respondents (employees of public sector) is also very important. So, only public sector construction projects and perception of their engineers are used in this study. Thus the objective of the study is to determine the important factors for success of public construction projects addressing the limitations of the past studies as pointed out.

2. Research Method

Through literature review 36 success factors were identified. Then, a questionnaire-based survey was conducted to draw the views of experienced public sector professionals on these success factors. A list of all on-going major and medium public work monitored by Government of India was developed. One hundred and five responses were received against all 813 major and medium projects.

The responses were analyzed using analysis of variance (ANOVA) which compares mean values of sample and population distributions and thus useful for hypotheses testing. The following hypotheses were examined to explore the relationship between success factors for various criteria for highly successful projects.

H₀: There is no significant difference in identified success factors for ‘successful’ and ‘not successful’ projects

H₁: There is a significant difference in identified success factors for ‘successful’ and ‘not successful’ projects

The significance level was set to 0.05. The respondents were asked to rate the performance on various criteria on a nine-point scale, in which ‘1’ represented ‘very low performance’ and ‘9’ represented ‘very high performance’. Projects rated more than ‘6’ on scale were considered ‘high’ performing ones. The projects which were ‘high’ and ‘very high’ performing were rated as ‘successful projects’ whereas other projects with a value/rating less than or equal to ‘6’ on scale were rated as ‘not successful’. In addition, the respondents were also asked to rate the success factors for the project in which they were involved on a nine-point scale in which ‘1’ represented ‘strong disagreement’ and ‘9’ represented ‘strong agreement’ for the success factors.

The top five significant success factors for various criteria identified using ANOVA are presented and discussed briefly in the following section.

3. Data Analysis

3.1. Most significant factors for ‘schedule’ performance criterion

From Fig 1, it is observed that most important success factors for schedule compliance are: availability of resources as planned throughout the project, timely and valuable decision from top management, a high degree of trust shared by project participants, owners need thoroughly understood and defined, and no bureaucratic interference. Timely decision from top management not only helps in making the resources available but also helps in building trust and thus avoiding delay (David, 2009). Obviously, the owner’s input in the development of a clear project brief, reflecting project requirements accurately is important (Chan *et al.*, 2001) and to a certain extent avoids bureaucratic interference during execution. Role of project participant and their timely decision is vital for schedule criteria (Divakar and Subramamian, 2009).

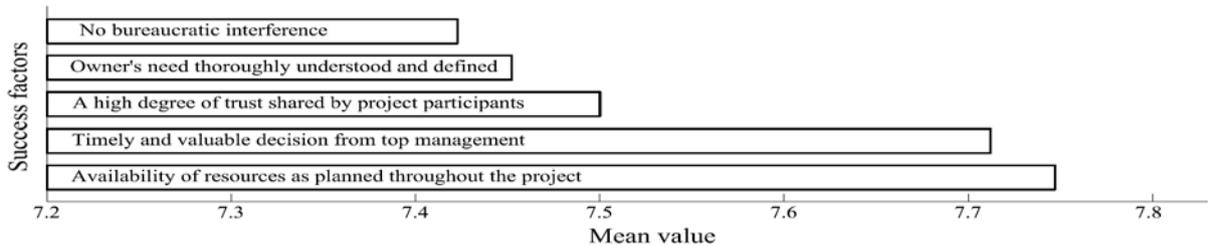


Figure 1 Success factors for schedule criteria

3.2. Most significant factors for ‘cost’ performance criterion

The most important success factors for cost compliance are: comprehensive pretender site investigation, thorough understanding of scope on the part of project manager (PM) and contractor, a high degree of trust shared by project participants and no social and political interference. Anderson *et al.*(2006) also observed that well understood project improves the managerial ability to deliver results in cost which is possible if PM and contractor understand the scope clearly. Comprehensive site investigation helps in sound planning which in-turn helps in clarifying the scope and developing a thorough understanding. Trust among the project participants helps in understanding the cost implications and delivering the project within cost. Clarity also limits the social and political interference. Hence all the four success factors are important for cost compliance. The ranking is shown in Fig. 2.

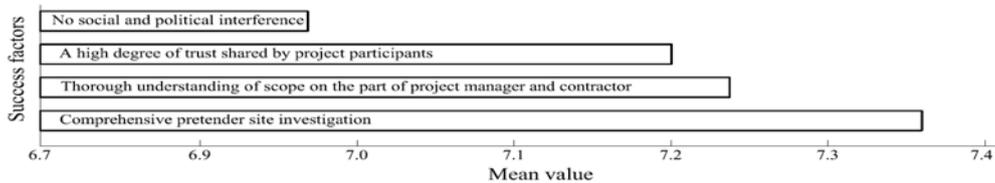


Figure 2 Success factors for cost criteria

3.3. Most significant factors for ‘quality’ performance criterion

From Fig 3, it is observed that most important success factors for quality compliance are: owners need thoroughly understood and defined, regular quality control and quality assurance activities, regular monitoring and feedback by top management, top management’s support, and availability of resources as planned throughout the project. Quality improves under watching eyes. This could be top management or quality control people and their regular monitoring and support. Availability of resources and clear scope are linked to the quality work on site (Chua *et al.*, 1999). Hence all the mentioned success factors are important for quality compliance. The ranking of top five success factors is shown in Fig. 3.

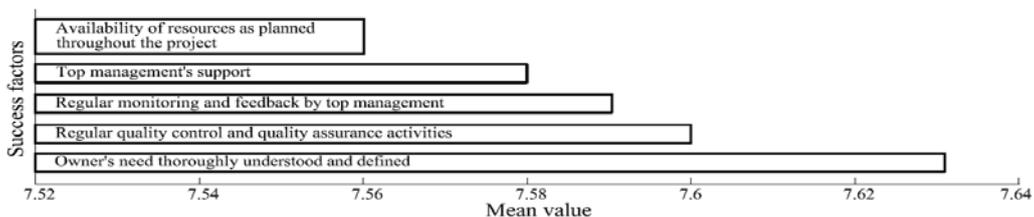


Figure 3 Success factors for quality criteria

3.4. Most significant factors for ‘safety’ performance criterion

Top five success factors for safety compliance are shown in Fig. 4, and they are: regular monitoring and feedback by owner, clearly articulated scope of work, regular monitoring and feedback by top management, availability of resources as planned throughout the project and top management’s support.

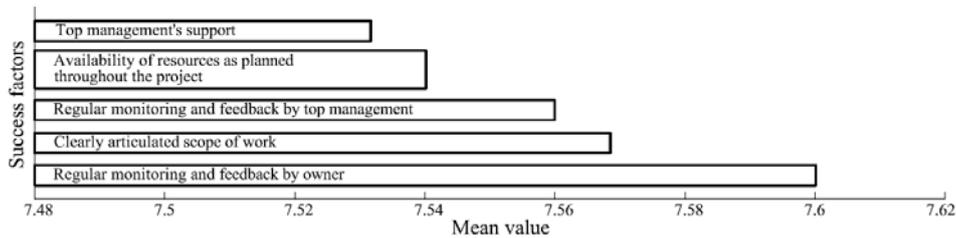


Figure 4 Success factors for safety criteria

To foster a safety culture at a construction site, top management support and commitment to safety programme is must. Commitment and support by top management and owner would significantly drive up the performance on safety. Haslam *et al.* (2005) observed that shortcomings with resources/equipment are responsible for 56 per cent of the accidents. Availability of resources must be ensured throughout project lifecycle. Construction projects requiring the presence of more than forty different specialists at the construction site are not unusual (Ortega, 2000). Lack of clarity may lead to failure. Billy *et al.* (2006) reported that effective two way flow of information is essential for safety. Major changes during construction should also be avoided as it disturbs the planning and becomes potential source for accident. Clear scope helps in sound planning resulting in minimum changes during construction.

3.5. Most significant factors for ‘no-dispute’ performance criterion

Top five most important success factors for no-dispute performance are: owners need thoroughly understood and defined, regular monitoring and feedback by top management, adequate communication among all project participants, availability of resources as planned throughout the project, and timely and valuable decision from top management. This is shown in Fig. 5.

In fact, conflicting parties should look for a mutually satisfactory solution, and this can be achieved by joint problem solving in order to seek alternatives for problematic issues. Public sector projects require management of all stakeholders, but this can also be used as an opportunity and a source of resources and support for dispute resolution (David, 2009). Valuable timely decision by top management and availability of resources can help in taking timely measures to avoid dispute. If any conflict during construction is not resolved and timely decisions are not given, dispute becomes complicated and difficult to resolve. Both contractor and project manager must have thorough understanding of the scope, to avoid dispute and conflict, which is possible if scope is clearly defined by owner. Top management and owner can also help in resolving the conflict.

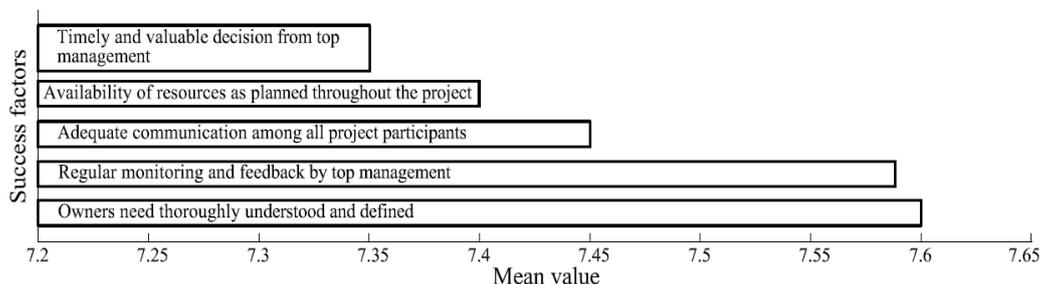


Figure 5 Success factors for no-dispute criteria

It is evident from above that the success factors identified in this study are mostly in line with previous studies on public projects.

4. Concluding Remarks

Based on the responses to a questionnaire survey conducted among Indian construction professionals engaged in public projects, a set of most significant success factors have been identified for different project

performance criteria. Depending on the nature of projects, for example public or private projects, the performance criteria vary. The study has revealed that some factors such as: owners need thoroughly understood and defined, a high degree of trust shared by project participants, timely and valuable decision from top management, availability of resources as planned throughout the project, top management's support, and regular monitoring and feedback by top management, are of generic nature and would be required to be present to ensure success against two-three performance criteria while there are some specific factors such as: thorough understanding of scope on the part of project manager and contractor, comprehensive pretender site investigation, regular monitoring and feedback by owner, no bureaucratic interference, no social and political interference, clearly articulated scope of work, quality control and quality assurance activities, and adequate communication among all project participants, which are required to be present to ensure success against a certain criterion. A project manager does not aim to achieve all the performance criteria at any point of time and depending on the circumstances the relative importance of performance criteria may vary. Under such situation, the distinction of generic and specific factors would play a role and with this knowledge the project manager would be in a position to distinguish the factors which needs higher attention and thus can ensure higher gain. The identification of success factors in this paper is a part of ongoing research work to identify success factors for public projects for various performance criteria and develop a model which would ultimately result in fair and transparent procurement practices avoiding the frequently occurring irregularities. A series of in-depth case studies on various public projects should be undertaken in future in other countries as well in order to verify the applicability and reliability of the success factors identified in this study.

5. References

- [1] Andersen, E.S., Birchall, D., Jessen, S.A., and Money, A.H. Exploring project success. *Baltic Journal of Management*. 2006, **1**(2): 127-147.
- [2] Billy, H., Cameron, I., and Duff, A.R. Exploring the integration of health and safety with pre-construction planning. *Engineering, Construction and Architectural Management*. 2006, **13**(5): 438-450.
- [3] Construction Industry Development Council, News letter December, 2005.
- [4] Chan, A.P.C., Ho, D.C.K., and Tam, C.M. Design and build project success factors: Multivariate analysis, *Journal of Construction Engineering and Management*. 2001, **127**(2): 93-100.
- [5] Chua, D.K.H., Kog, Y.C., and Loh, P.K. Critical success factors for different project objectives. *Journal of Construction Engineering and Management*. 1999, **125**(3): 142-150.
- [6] David, W. *Public-Sector Project Management*. John Wiley and Sons, Inc. Hoboken, New Jersey, 2009.
- [7] Divakar, K. and Subramanian, K. Critical successfactors in the real-timemMonitoring of construction projects. *Research Journal of Applied Sciences, Engineering and Technology*. 2009, **1**(2): 35-39.
- [8] Haslam, R.A., Hide, S.A., Gibb, A.G.F., Gyi, D.E., Pavitt, T., Atkinson, S., and Duff, A.R. Contributing factors in construction accidents, *Applied Ergonomics*. 2005, **36**: 401-415.
- [9] Jacobson, C., and Choi, S.O. Success factors: public works and public-private partnership. *International Journal of Public Sector Management*. 2008, **21**(6): 637-657.
- [10] Ortega, I. Systematic prevention of construction failure. *Quality Management and Technology*. 2000, **9**:1-13.
- [11] Sohail, M., and Cavill, S. Accountability to prevent corruption in construction projects. *Journal of Construction Engineering and Management*. 2008, **134**(9): 729-738.
- [12] Tabish, S.Z.S. and Jha, K.N. Analysis of irregularities in public procurement in India, *Construction Management and Economics*. 2011, **29**(3): 261-274.
- [13] Toor, S. and Ogunlana, S.O. Construction professionals' perception of critical success factors for large-scale construction projects, *Construction Innovation: Information, Process, Management*,2009, **9**(2):149-167.
- [14] Yang, J., Shen, G.Q., Ho, M., Drew, D.S., and Chan, A.P.C. Critical success factors for stakeholders management: Construction Practitioners' Perspectives, *Journal of Construction Engineering and Management*. 2009, Doi:10.1061/(ASCE)CO.1943-7862.0000180.