

Review

Towards developing an improved methodology for evaluating performance and achieving success in construction projects

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Success has always been the ultimate goal of every activity and a construction project is no exception. The construction industry has characteristics that sharply distinguish it from her sectors of the economy, causing the rate of failures to become very high. However, the prospect of business failure is not a topic that most businesses care acknowledges. Understanding the mechanism of failure is the key to avoid failure. Corrective action cannot be taken if trouble is not acknowledged or foreseen (Kangarl, 1988). By its very nature, the construction industry is contentious and filled with a wide variety of disputes. Even the best-managed project is likely to have one or more significant disputes which may imperil the successful completion of the project. If project participants can predict probability of success better, they can take steps to avoid unsuccessful projects; identify good projects worth pursuing; and identify problems on current projects and take corrective action. In this hostile and competitive environment it is critical to know and understand more about performance evaluation and success criteria and its impacts in construction (Halpin and Woodhead, 1980). The main objective of this paper is to define the critical factors that lead to project success and provide a forecasting framework to enable parties to rapidly assess the possibility of a successful project from their viewpoint. The previous objective was divided into the following secondary objectives: Providing background information on construction evaluation techniques. Distinguish factors influencing project success. Presenting a hierarchical model framework for construction project success. This paper provides a rational framework to further develop a conceptual framework to a substantive predictive model aiming to increase the likelihood of achieving more successful project outcomes through predicting and subsequently preventing construction failure, and analyzing the effects of various conditions and fluctuating economic environments on the construction project.

Key words: Success criteria, failure, construction projects, framework, methodology.

Paper methodology

Although most buildings today are far more complex and sometimes much larger, the time scale to build is far shorter. Whether the project is a building, bridge, dam, pipeline, sewage treatment plant, water supply system, or any one of numerous other types of projects, it seeks to satisfy the owner's particular needs in accordance with the plans, specifications, and local laws. The whole process is now greatly influenced by the desire to achieve profit on financial investments as soon as possible and the exploitation of machine technology. Project success is an abstract concept, and determining whether a project

is a success or a failure is far more complex. However, the methodology of this paper relies on defining criteria and project success factors, and then modifying the generic success criteria to develop an assessment framework for construction projects. The previous methodology was met through the accomplishment of several specific tasks:

- Define the project success criteria.
- Define the causes of failure in the construction industry.
- Develop guidelines for critical project success factors.

Synthesizing information into a particular framework to avoid failure

Defining project success

The identification of key factors for construction project success enables appropriate allocation of limited resources. It is generally accepted that the major goals in a construction project are budget, schedule and quality, although there are other more specific objectives, such as safety consideration and market entry, depending on the nature of the project. A variety of factors determine the success or failure of projects in terms of these objectives. Therefore there is a need to develop a modified and concise technique that would provide a more effective and measurable evaluation process for construction projects.

Indeed, measuring project success is a complex task since success is intangible and can hardly be agreed upon. The general concept of project success remains ambiguously defined because of varying perceptions. Such a phenomenon also exists in the construction industry where different parties are involved, including the client, the architect, the contractor, and various surveyors and engineers. Each project participant will have his or her own view of success (Sanvido et al., 1992).

On the other hand if we define failure as the act of falling short or being deficient, therefore success can be accepted to be meeting the perceptions and expectations of the owner, designer, or contractor. Previous studies showed different classifications of failure. One classification divided failure into two major categories: technical and procedural. Technical causes are actual physical proximate causes. For example, improper compaction of soil could lead to excessive settlement of a foundation. Procedural causes are related to human errors and include things such as communication problems, or shortcomings, in the design and construction process that cause physical failures to occur. One example of this would be when a contractor places the top reinforcing steel too low in a slab. Another example of a procedural error would be when a testing laboratory fails to check the compaction of the soil. Others classify failures into three categories, safety, functional, and ancillary, and causes of failures fall into five general areas: design, construction, material, administrative, and maintenance deficiencies (Yates and Edward, 2002). While success is measured in terms of goal attainment, there is ambiguity in determining whether a project is a success or failure. However, the definition of success often changes from project to project.

Traditionally, success is defined as the degree to which project goals and expectations are met. It should be viewed from different perspectives of individuals and the goals related to a variety of elements, including technical, financial, education, social, and professional issues. Project success is the goal, and the objectives of budget,

schedule, and quality are the three normally accepted criteria to achieve the goal. The criteria are the set of principles or standards by which judgment is made.

As a result, a change has occurred in the assessment criteria of project success over the last decade. There are other more specific objectives, such as safety consideration and market entry, depending on the nature of the project and company (Chua et al., 1999).

Studies revealed that on-site construction activities for industrial projects were perceived to be the most troubling quality problems. The troublesome items were identified as concrete, piping, welding, roofing, painting, and electrical work. In addition, investigation of the frequency and severity of claims on federally funded and administered projects found that design errors were the single most common cause for contract claims, accounting for 46% of the additive claims that were reviewed. Questions regarding the causes, number, and costs of quality problems in design and construction remained unanswered (Burati et al., 1992).

Changing measures of project success

Indeed, a comprehensive review of the literature reveals that great interest in the topic of project performance has been shown over the past 10 years. Different views of previous researchers on project success and performance are:

Trend 1. Project success-meeting objectives: All projects stem from the needs or objective of a client. It is obvious that if these objectives are achieved, the project is claimed to be successful. Those objectives can be evaluated through the project performance in terms of cost, schedule, and quality.

Trend 2. Project success-global approach: Several classifications of the performance measures have evolved to achieve a global approach. One classification establishes a conceptual framework for measuring construction project success from both objective and subjective points of view. Another classification considers the "hard" and "soft" sides of project success criteria, with time and cost being "hard" and satisfaction being "soft."

Trend 3. Project success-beyond project: Apart from considering the goal attainment of project success, more emphasis is placed on the assessment of the positive effects brought about by the project to judge success. The success of a project can be assessed along by four distinct dimensions; project efficiency, impact on the customer, direct and business success, and preparing for the future. In addition, attainments of such goals as satisfaction, absence of conflicts, professional image, aesthetics, and educational, social, and professional aspects are considered indications of project success.

The integration of criteria for project success is presented in Figure 1.

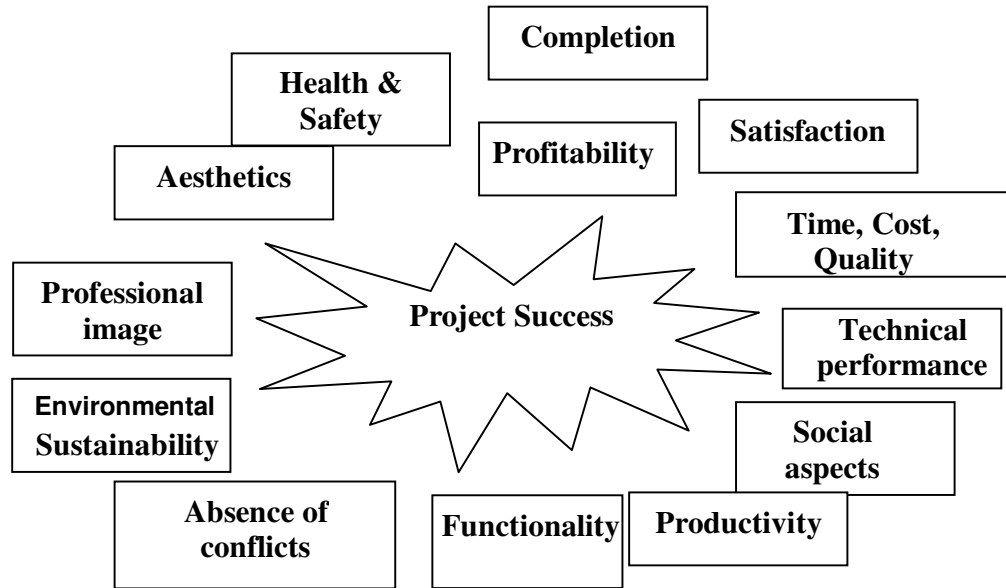


Figure 1. Criteria for project success.

Framework for construction project success

Framework objectives

A building project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment. The construction processes can be divided into phases including: pre-construction (conception and project design), and project construction, and post-construction. While project conception is the recognition of a need that can be satisfied by a physical structure, project design phase translates the primary concept into an expression of a spatial form that will satisfy the client's requirements in an optimum economic manner. Construction operations are the final phase of the three-part process. They create the physical form that satisfies the project conception and permits the realization of the design (Okpala and Anny, 1988).

The main purpose of the suggested framework is to aid in predicting and subsequently preventing construction failure. It is hoped that the framework would help to minimize delay and cost overrun problems, generate confidence within the construction industry, and therefore enhance performance as well. Using the suggested framework can probably help to prevent failure and increase the likelihood of achieving more successful project outcomes.

Framework methodology

No single list will ever be totally comprehensive when it comes to a definition of success for a project. The criteria

developed in Table 1 gives a general overall impression of success criteria from different participant's points of view. It determines the "envelope" of ideas that are used to evaluate success, showing lists of typical success criteria for the owner, designer, and contractor.

The framework is based on three key inputs: Owner-contractor evaluation effort; cost monitoring; and the early applying of project management. In fact these key inputs embrace the four main aspects of a construction project, namely, project characteristics, contractual arrangements, project participants, and interactive processes involving the project participants (that is, communication, project planning, control, and project organization). Therefore, these predetermined aspects of a project were not ignored in the success framework model (Russell and Edward 1992).

Suggested framework

The suggested hierarchal framework for project success was established based on the typical project environment including project characteristics such as project size, owner-contractor evaluation and monitoring efforts, contractor characteristics, and economic-related. At the top of the hierarchy are the success criteria for different project phases showing both objective and subjective measures which totally represent the goal of "construction project success" (Figure 2).

The following four main project aspects occupy the immediate lower level:

Interactive processes: Project success can be better assured if all parties in the construction field can work together as a team with established common objectives

Table 1. Success Criteria from different participant's viewpoints.

Participant	Success criteria
Owner	On schedule On budget Function for intended use (satisfy users and customers) End result as envisioned Quality (workmanship, products) Aesthetically pleasing Return on investment Building must be marketable (image and financial) Minimize aggravation in producing a building
Designer	Satisfied client Quality architectural product Met design fee and profit goal Professional staff fulfillment Met project budget and schedule Marketable product / process Minimal construction problems No liability, claims Socially accepted (community response) Client pays (reliability) Well defined scope of work (contract and scope and compensation match)
Contractor	Meet schedule Profit Under budget Quality specification met or exceeded No claims Expectations of all parties clearly defined Client satisfaction (Expectations of all parties clearly defined) Good direct communication Minimal or no surprises during the project

and defined procedures for collaborative problem solving. Interactive processes refer to the communication both formal and informal, planning, monitoring and control, and project organization to facilitate effective coordination throughout the project life and provide sufficient information on project objectives, status, changes, organizational coordination, client's needs, current problems, etc. to the appropriate project members.

Contractual arrangements: Adequacy and clarity of plans, objectives, and technical specifications contribute to the identification of risk and its equitable allocation. The aspect of contractual arrangements should also include motivation and incentives to the contracting parties.

Project participants: Project participants refer to the key players, namely, the project manager (PM), client, contractor, consultants, subcontractors, and suppliers and manufacturers. The PM's involvement and commitment is crucial for project success. Furthermore, the level of sup-

port from top management in their respective organizations is a factor that can determine the ease and the will to resolve difficulties that arise.

Project characteristics: Hierarchically, project characteristics can be further divided into external and internal characteristics. The former is associated with the surrounding environment that includes factors such as political and economical risks, impact on public, efficiency of technical approval authorities, adequacy of funding, and site limitation and location. Internal project characteristics, on the other hand, are inherent to the project, such as constructability, pioneering status, and project size. The lower level of the sub hierarchy is occupied by the success-related factors corresponding to the four previous project aspects. Those related factors are few things that must go well to ensure success for a manager or organization, and therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance. They are events or circumstances that require the special attention of management because of their significance to the corpor-

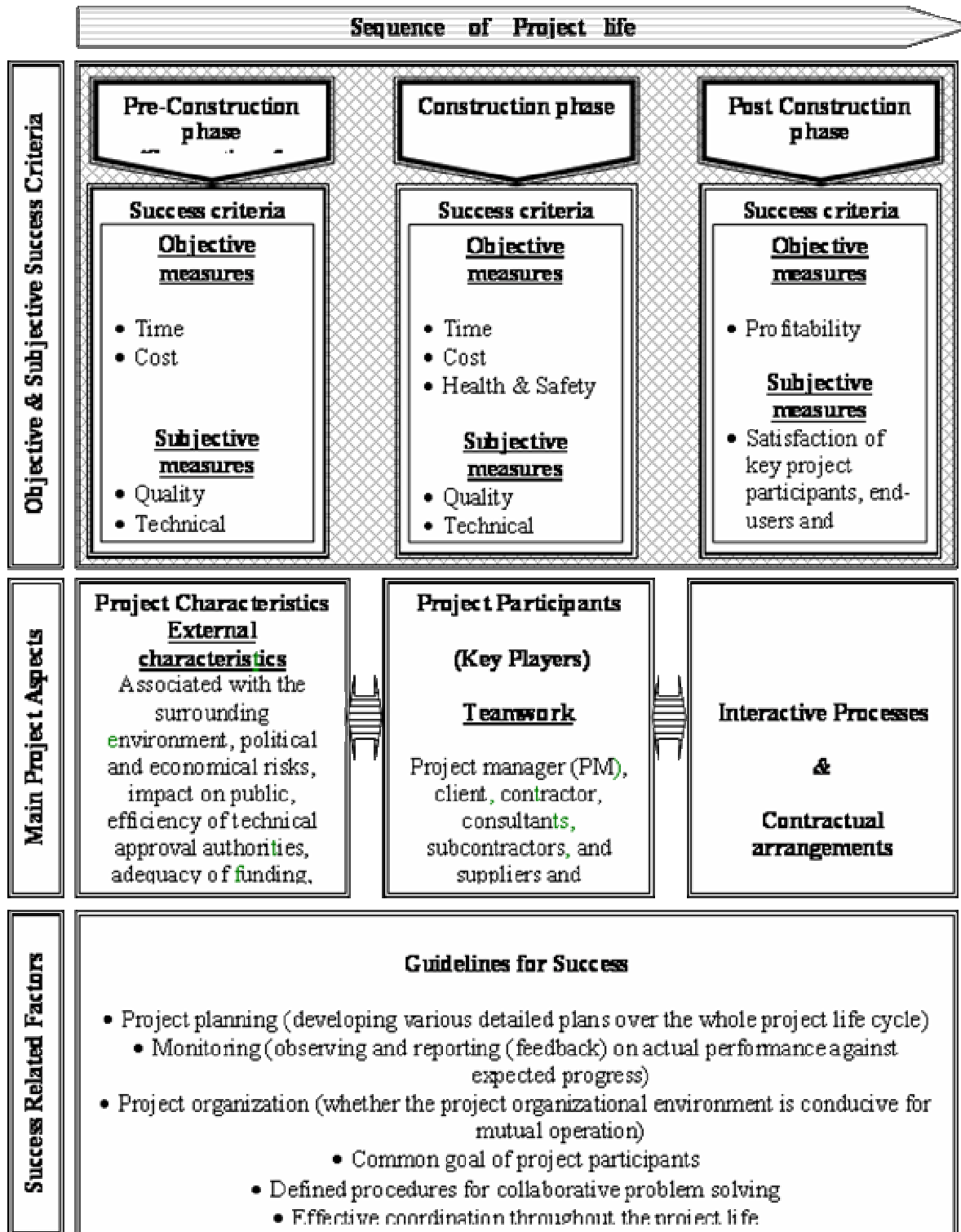


Figure 2. Hierarchical framework for project success.

tion. Their essential character is the presence of a need from special awareness or attention to avoid unpleasant surprises or missed opportunities or objectives. Therefore

they are qualitative and need to be further investigated, more rigorously defined with a standard form of measurement established.

Conclusions

The topic of project success has been discussed for a long period of time, but an agreement can hardly be reached. No single list will ever be totally comprehensive when it comes to a definition of success for a project.

Failure is an extremely disruptive force in the construction industry, as the chance of failure for a construction company has increased over the past 10 years.

While most discussion considers the project success for a construction project in general, little emphasis is placed on a particular organization structure.

The criteria for project success can be divided into objective and subjective categories, with time, cost, quality, and satisfaction the most significant measures.

Delay and cost overruns can be minimized. This is clear from the fact that shortage of materials, methods of financing and payments for completed works, and poor contract management are the three major reasons for high construction costs.

Recommendations

A new assessment framework incorporating the success criteria of a construction project in general is necessary for evaluating the project success.

Good management strategies would perhaps affect the project success situation positively and can have both short- and long-term effects.

The framework presented in this paper can be evaluated in the preconstruction, construction, and post construction phases. In order to develop a more substantive predictive model Overall construction industry indicators must be monitored and trends should be analyzed to determine swings in failure probabilities. In addition there is a need for more detailed planning to highlight problems earlier and allow for development of contingent solutions.

Areas for further research

Identifying tools for adequately screening possible contractors, and constant monitoring through the use of financial ratios.

Achieving measurable success criteria for procurement methods in order to break with the old way of doing things. Using a qualitative evaluation technique to enable construction parties to minimize their chance of failure and yield the best results.

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