

To Study Critical Factors Necessary for a Successful Construction Project

Arti J. Jari, Pankaj, P. Bhangale

Abstract: *The construction industry is dynamic in nature due to the increasing uncertainties in technology, budgets, and development processes. Nowadays, building projects are becoming much more complex and difficult. The project team is facing unprecedented changes. The study of project success and the critical success factors (CSFs) are considered to be a means to improve the effectiveness of project. The purpose of this study is to systematically investigate the causes of project failure and how these can be prevented, managed, or controlled. Construction projects are frequently influenced by success factors' which can help project parties reach their intended goals with greater efficiency. The aim of this study was to investigate the critical factors leading to construction company success. Many critical success factors such as factors related to project manager's performance, factors related to organization, factors related to project, factors related to external environment became apparent from this study. This study will be helpful to identify which factors influence the project success.*

Keywords: *project success; project success factors; critical success factors (CSF); project success criteria*

I. INTRODUCTION

Project is a complex, non routine, one-time effort limited by time, budget and resource and performance specifications designed to meet customer needs. Attempts to understand the causes of project failure or success have proven problematic, despite attempt by many practitioners and academics over the years. Project demands have constantly increased over the last decade and have driven our society into a constantly changing environment. Project management is a task derived from an organization that enables professional project managers to use their skills, tools and knowledge to plan, execute and control a unique project within a limited lifespan by meeting the specification requirements of the organization. Since the outcomes of the capital projects have strategic implications on the success and profitability of the business, the ability to deliver based on pre-determined objectives should be critical to the company's success. Project success can be defined as meeting the required expectation of the stakeholders and achieving its intended purpose. This can be attained by understanding what the end result would be, and then stating the deliverables of the project.

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Success criteria or a person's definition of success as it relates to a building often changes from project to project depending on participants, scope of services, project size, sophistication of the owner related to the design of facilities, technological implications, and a variety of other factors. On the other hand, common threads relating to success criteria often develop not only with an individual project but across the industry as we relate success to the perceptions and expectations of the owner, designer, or contractor.

A building project is completed through 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. Certain factors are more critical to a project's success than others. These factors are called critical project success factors. The term Critical Success Factors in the context of the management of projects was first used by Rockart in 1982 and is defined as those factors predicting success on projects. Differences in a person's definition of success are often very evident. Various project success factors have been identified by different researchers in different projects around the world. Community involvement, project objectives, technical innovation, uncertainty, politics, schedule duration urgency, financial contract, and implementation process were established as the critical success factors in projects. Success has been the ultimate goal of every business activity. It is highly important for the organizations to be successful in their businesses in order to survive in competitive business environments such as construction. The construction industry is changing constantly with the developments of new business methods and technologies. Thus, construction companies have to adopt and develop appropriate strategies to be more competitive in this industry and get success in their businesses. For a project to be successful, it is essential to understand the project requirements right from the start and go for project planning which provides the right direction to project managers and their teams and execute the project accordingly. A successful project is one that is delivered on time and managed within the budget, Time, cost and quality have been recognized as "triple constraint" or important elements of project success.

II. PROJECT SUCCESS CLASSIFICATIONS

Recently project success factors get categorizations in different terminologies as follows:

2.1. Project success criteria versus project success factors

Project success-related factors into two groups: "Project Success Criteria" (PSCs) and "Project Success Factors" (PSFs).



It is of importance to differentiate between these two groups. Success criteria are used to measure success whilst success factors facilitate the achievement of success.

2.2. Project management success versus product success

Project success criteria consist of Project management success and Product success. Project management success covers meeting time, cost and quality objectives. On the other hand, product success deals with the ability of the project's final product to meet the project owner's strategic organizational objectives; satisfaction of users' needs and satisfaction of stakeholders' needs where they relate to the product.

2.3. Project success versus project management success

Project success is measured against the overall objectives of the project while project management success is measured mostly against cost, time and quality (so called performance). Delivering project success is necessarily more difficult than delivering project management success since it involves second order control.

III. PROJECT SUCCESS CRITERIA

Success criteria or a person's definition of success as it relates to a building often changes from project to project depending on participants, scope of services, project size, sophistication of the owner related to the design of facilities, technological implications, and a variety of other factors. On the other hand, common threads relating to success criteria often develop not only with an individual project but across the industry as we relate success to the perceptions and expectations of the owner, designer, or contractor.

These success criteria according to owners, designers and contractors are as follows:

1.1. Owner's criteria

Owner's criteria for measuring success are: on schedule; on budget; function for intended use (satisfy users and customers); end result as envisioned; quality (workmanship, products); aesthetically pleasing; return on investment (responsiveness to audiences); building must be marketable (image and financial); and minimize aggravation in producing a building.

1.2. Designer's criteria

Designer's criteria for measuring success: satisfied client (obtain or develop the potential to obtain repeat work); quality architectural product; met design fee and profit goal; professional staff fulfillment (gain experience, learn new skills); met project budget and schedule; marketable product/ process (selling tool, reputation with peers and clients); minimal construction problems (easy to operate, constructible design); no "ghosts," liability, claims (building functions as intended); socially accepted (community response); client pays (reliability); and well defined scope of work (contract and scope and compensation match).

1.3. Contractor's criteria

Contractor's criteria for measuring success: meet schedule (preconstruction, construction, design); profit; under budget (savings obtained for owner and/or contractor); quality specification met or exceeded; no claims (owners, subcontractors); safety; client satisfaction (personal relationships); good subcontractor buy out; good direct communication (expectations of all parties clearly defined); and minimal or no surprises during the project.

3.4. Common Criteria

While many criteria items or viewpoints are similar, there are several distinctions that relate directly to the parties involved and the type of business services they provide. For example, a priority item and one that appears in all three lists (designer, owner, and contractor) in some form is the financial reality of doing business. The owner wants the project completed on time and on budget, and the designer and contractor both expect to meet certain profit or fee goals. All three viewpoints also recognize the absence of any legal claims or proceedings on a project as a desirable outcome. In other words, this is a major criteria for measuring success. Another common thread among the three groups involves meeting an appropriate schedule as a way of measuring or determining if a project was successful.

3.5. Unique criteria

It is also evident that there are some unique factors associated with each of the three groups. The designer for instance is looking for a project that will increase the level of professional development and professional satisfaction among his employees. Safety is a high-priority issue for the contractor that would not normally be an issue with the other two groups, because their employees are at much less risk during the design or operation of a building than the contractor's workers is during the construction of a building. An owner is extremely interested in knowing that the building project functions properly for the intended use and is free from long-term defects or lingering maintenance problems. As one would suspect, there is some variability even within the same firm on the same project. The factors of importance range from meeting internal budgets to professional satisfaction and on to producing a job that will help the firm obtain repeat business or serve as a marketing tool for similar projects with different clients. For example, two designers working on the same project may view success differently. An experienced designer serving as a project engineer may be concerned about meeting internal budget criteria as well as meeting the client's needs. A less-experienced designer working at a lower level of responsibility may consider the opportunity to gain valuable design experience as success criteria and be less concerned about meeting the internal budget.

IV. PROJECT SUCCESS CRITERIA AND PROJECT SUCCESS FACTORS

Project success factors are the elements of a project that can be influenced to increase the likelihood of success; these are independent variable that makes success more likely. Project success criteria are the measures by which judge the successful outcome of a project; these are dependent variable which measure project success. Primal success criteria have been an integrated part of project management theory given that early definitions of project management included the so called 'Iron Triangle' success criteria - cost, time and quality. success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business. Project success factors are not universal for all projects since different projects and different people prioritize different sets of success factors.

Project success criteria also vary from project to project and what is acceptable in one project without impact on perceived success is deemed an abject failure in another project. For instance, taking a week delay in an IT project to ensure the objectives are achieved may have a minor impact for this project in terms of success. However, this delay might be a disaster in building a function centre, which is supposed to be undertaken before its opening day.

4.1. Generic PSCs and PSFs

Some PSFs seem to be more significant than others. These criteria and factors are generic and can influence most types of construction projects which are given below:

1.3.1. Time

"Time" or "Schedule" as one of the most important project success criteria for any project. Time has been addressed as a criterion by which to evaluate a project's degree of success. It has also been mentioned as a factor, which can help the other factors/criteria be met. It is found that the definition of "Time" is of great importance. "Time" as the date when a project is most likely to end can be a criteria, but "Time" as a manageable component might be considered as a factor.

1.3.2. Cost

Without a doubt, every project is dependent on its cost or budget. Cost has been addressed as a very important success criterion, where as having an intellectual budget plan and proper cost estimation have been mentioned as prominent success factors in some studies.

1.3.3. Quality

Quality, whether it concerns the product or process, has been considered as both a project success criterion and factors. Some researchers named it quality performance and considered it as a major project success criterion. In addition, some other researchers addressed quality as a criterion under the name of product's quality. On the other hand, some researchers considered quality management process as a project success factor, which facilitates the success of other criteria and factors.

1.3.4. Project Control

Time, cost and quality are usually grouped together and known as the "Project Control Mechanism."

This is because they allow a project manager or project team to monitor and control the project, leading it to success. In fact, "Project control", which is introduced by some researchers as a project Success factor, directly controls and monitors some key project success criteria such as the Project's Time, Cost, Quality, Change and especially Scope.

1.3.5. Project scope

"The preparation of a detailed project scope statement is critical to project success". Scope, as a measurable concept, has been considered as either a criterion or factor. In fact, a project scope with clearly defined goals and objectives has been verified as a dimension for project success by some researchers considered it to be the most important criterion in a software project's success. On the other hand it considered a rigorous scope to be a factor which is necessary for meeting the owner's needs and thus achieving success.

1.3.6. Project change

Change, which directly influences project scope, goals and consequently project planning, has been highlighted by researchers as they have called it "Everything" for a project. Scope change through a mature scope change control process is also considered as a project success factor.

1.3.7. Stakeholders' satisfaction

Stakeholders, whether they are directly or indirectly involved in projects and have different views about success, play crucial roles in every project. Stakeholders' satisfaction, both internally and externally (including clients, customers, contractors, managers, etc), with the final product as a project success criterion is given special importance. It is worthwhile to note that stakeholders' satisfaction is sometimes paraphrased as satisfying stakeholders' needs or meeting stakeholders' expectations. Stakeholder satisfaction is the most important success criterion in IT projects. There is a controversy over the measurability of stakeholders' satisfaction. Nevertheless, most of the researchers consider this term as a measurable project success criteria.

1.3.8. Project team

In all projects almost all activities are dependent on human resources. In other words, it is fast becoming accepted wisdom that it is people who deliver projects and indeed people, who are directly involved in a project, facilitate achieving project goals and consequently "Project Success". A project team and its members are a key part of the human resource list of a project. Different researchers have introduced some project success factors, which are all related to having a competent project team.

1.3.9. Top management support

Project management is deemed of high importance in project success. However, the most important factor for successful completion of a construction project was introduced as "Top management support".

V. CRITICAL SUCCESS FACTORS OVER THE STAGES IN THE PROJECT LIFE CYCLE

The project implementation process is complex. It usually involves attention to a broad Variety of human, budgetary, and technical variables.

The most important CSFs within the Project life cycle are as follows:

- i. **Project mission**-The initial clarity of goals and the general direction
- ii. **Top management support**-Willingness of top management to provide the necessary resources and authority/power for project success.
- iii. **Project Schedule/Plan**- A detailed specification of the individual action steps required for project implementation.
- iv. **Client consultation**-Communication, consultation, and action on behalf of all impacted parties.
- v. **Personnel**- Recruitment, selection, and training of the necessary personnel for the project team.
- vi. **Technical tasks**-Availability of the required technology and expertise to accomplish the specific technical steps.
- vii. **Client acceptance**-The act of "selling" the final project to its ultimate intended users.
- viii. **Monitoring and Feedback**-Timely provision of comprehensive control information at each stage in the implementation process.
- ix. **Communication**-The provision of an appropriate network and necessary data to all key actors in the project implementation.

- x. **Trouble-Shooting**-Ability to handle unexpected crises and deviations from plan.

VLSUCCESS FACTORS IN A CONSTRUCTION PROJECTS

Increasing uncertainties in technology, budgets and development processes create a dynamic construction industry. Building projects are now much more complex and difficult and the building project team faces unprecedented changes. The study of project success/failure and critical success factors (CSFs) is a means of understanding and thereby improving the effectiveness of construction projects. Several success factors for the construction process are as follows:

1.4. Clarity/ Definition of project objective

- To state clearly the expected end result, with consultation with the related parties. Although each party might have different specific goals in mind for the project, they must spell out their goals.
- To state the communicated and defined goal to all parties.
- To state the clarified time and cost objectives.

1.5. Scope of project

- To state the general direction and define the client's requirement.
- To present a clear design brief with minimal subsequent changes. A brief must be exact and owned by the client at the highest (strategic) level within the client and project organisations.

1.6. Project manager

- The Project Manager is the key person in the project. They must demonstrate multi-dimensional abilities including interpersonal, technical and administrative skills.
- The most important element is that the project manager must clearly understand their role as project leader, clearly defining their extent of involvement, and the authority and control they exercise over personnel.
- Personality – the project manager must have a personality which encourages respect from team players, associates and peers.
- Leadership – the project manager should have leadership skills and be able to apply competent managerial skills. The project manager should have the ability to persuade other members of the group to their view, and be able to resolve conflict between parties.
- Organizing – the project manager should be responsible for organizing, selecting and defining the responsibilities of the project team.
- Coordinating – the project manager should identify interfaces between the activities of the functional departments, subcontractors, and other project contributors.
- Controlling – the project manager should be responsible for monitoring progress, identifying problems, communicating the status of interfaces to contributors, and initiating and co-coordinating corrective action.
- Motivating – the project manager should motivate the project team to perform their duties, and also convince the project team to co-operate with each other.

- Technical knowledge and experience – the project manager must possess good technical knowledge and experience, since most of the project is highly technical.

1.7. Project Team Commitment

- All participants must understand and be dedicated and strongly committed to achieve, maintain and fulfill project goals.
- All participants must be committed to the concept of project planning and control and must be able to put the concept into practice. They must understand the project management process, its purpose and values, and be committed to following the steps and necessary procedures.

1.8. Capability and cooperation

- All participants must possess adequate capabilities, including skills and experience.
- All participants must retain appropriate interpersonal skills.
- All participants must maintain a good working relationship between the client, the project team members and stakeholders.
- All participants must sustain a healthy work attitude.

1.9. Planning

- The plan, or schedule, should be prepared as early as possible.
- The plan should be prepared with as much detail as possible, including during the design process and throughout its phases. The detail required includes individual actions for project implementation, the party responsible for each action (if known), and the technical standard required.
- The plan should be realistic; it should identify the appropriate workload for the project team.
- The plan must be updated regularly in order to keep pace with the project's development.
- The team should be prepared to re-plan the job schedule to accommodate frequent changes on dynamic projects.
- The team should incorporate detailed planning guidelines for termination.

1.10. Control

- Schedule control – the project's managers and supervisors should jointly agree on intermediate milestones and build the detailed schedule around these. Successful project teams mark the achievement of milestones formally (for example by celebrating) in order to break the monotony of a long schedule into easily managed portions.
- Costs control – focus on tracking the money spent. This requires detailed actual costs, and one of the best monitoring aids is a plot of plan versus actual costs on a cash-flow curve, for example, an earned – value analysis system.
- Quality control – focus on ensuring the project reaches the agreed and designed level of quality. It must be closely scrutinised during the entire process.
- Methods of control include regular meetings and day-to-day reports etc.

1.11. Appropriate size of work package and environment

- Divide the project tasks into appropriate sizes and identify the relevant parties responsible for each task.
- Maintain the appropriate level of staff for the amount of work that needs to be done.
- Consider the natural environment e.g. weather.
- Consider sustainability, e.g. supply of materials.
- Consider the political environment, e.g. the legal requirements of the regulatory authorities.

1.12. Communication and information management

- Instigate and maintain adequate communication channels among the project team.
- Ensure there is some way to manage the flow of information. The suggested methods of transferring information should include drawings, manuals, meetings and letters.

1.13. Top management support and Health and safety

- Provide the necessary resources, authority and power for performing the project.
- Ensure legislative health and safety requirements are considered.

2. General Advantages of a critical success factors

Approach

- Critical success factors (CSFs) can reduce organizational ambiguity. Developing and communicating a set of CSFs can reduce the dependence on the perceived aims of the organization. CSFs reflect the implicit, collective drivers of key managers and as a result are a more dependable and independent articulation of the organization's key performance areas.
- CSFs are more dependable than goals as a guiding force for the organization. An organization can set good goals that, in theory, will move the organization toward its mission. However, if the goals are poorly articulated or developed, this is not guaranteed. CSFs are reflective of what good managers do well to move the organization toward its mission, regardless of the quality of the goals that have been set.
- CSFs are more likely to reflect the current operating environment of the organization. Goal setting tends to be a yearly activity that is seldom revisited until performance measurement. Used properly, CSFs are likely to be more dynamic and to reflect current operating conditions because of the many sources of CSFs.
- CSFs provide a key risk-management perspective for the organization to consider. The risk perspective of executive-level managers is built into CSFs, so their "radar screen" is exposed to the organization as a whole.
- CSFs can be valuable for course correction. When CSFs are made explicit, managers often realize that their perception of what is important to the organization may not match reality or they may realize that they don't fully understand the current operational climate. Thus, they can use CSFs to realign their operating activities.
- A unique strength of the CSF method is that it takes into account the changing environment with which organizations and managers must deal. Also, CSF is

especially suitable for top management and for the development of organisation, the method produces a consensus among top managers about what is important to measure in order to gauge the organizations success.

VII.CONCLUSION

- Success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business.
- The purpose of this study is to define project success criteria, clarify their difference with success factors and analyse their importance in project management methodology
- Findings in this study asserted that the critical success factors perceived as most influential in avoiding or preventing critical delay factors can lead to better performance within construction industries and they are likely to improve success in building construction projects.
- This study provides a forecasting tool to enable parties to rapidly assess the possibility of a successful project from their point of view.
- Time, cost, quality, risk and finally scope control should be centralized under a general definition of "Project control", which was considered as a very important success criterion.
- Identifying CSF's is important as it allows firms to focus their efforts on building their capabilities to meet the CSF's, or even allow firms to decide if they have the capability to build the requirements necessary to meet CSFs.
- Identifying critical success factors would assist in taking proactive measures for successful project management of construction project. This study will benefit academicians and professionals involved with building projects.
- The finding will also be useful for effective management for all type of construction projects , thus helping to raise the overall level of productivity in construction industry

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