

Proceeding Paper

Assessment of Critical Success Factors for Building Projects through the Literature [†]

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Abstract: A construction project's failure encompasses a spectrum of disappointments, which may manifest individually or in combination, spanning the domains of cost, time, quality, and effective project management. This study discerns the Critical Success Factors (CSFs) that underpin the triumph or failure of construction projects, while also scrutinizing the interplay between various attributes that contribute to project success, through a comprehensive and thorough examination of prior research endeavors. This extensive review of the literature serves to guide the identification of CSFs that will serve as predictive indicators for assessing the likelihood of a project's success. This study endeavors to quantify the individual contributions of these Critical Success Factors to the ultimate outcome of a building project. The overarching aim of this current literature research is to offer a meticulous and exhaustive exploration of Critical Success Factors within the context of building projects. This focused and precise undertaking spans articles published in reputable journals over the past decade. From these, we shed new light on the dynamics of construction project success, enriching our understanding of the specific factors that shape the outcomes of these endeavors.

Keywords: success factors; building projects; critical factors; construction management; sustainability



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1. Introduction

A preliminary exploration into Critical Success Factors (CSFs) and the relationships between them holds utmost significance for pinpointing the determinants of project success. These CSFs directly influence the outcomes of a construction project. In today's fast-evolving landscape, dynamism is the norm across all industries, and the construction sector is no exception. In fact, construction projects are among the most dynamic and multifaceted environments imaginable. The construction industry, by its very nature, is complex and in constant flux [1]. Today's uncertainties pertaining to technology, budget considerations, and developmental processes only serve to amplify its dynamism [2,3]. This ever-shifting terrain necessitates a keen understanding of the factors that drive success. By delving into these dynamics and embracing the evolving nature of the construction industry, we may unravel what defines project success [4].

From 2020 to 2022, emphasis was placed on fostering substantial advancements in major construction projects in Pakistan, spanning from civil engineering works to residential and non-residential projects, all of which were deemed critical for the nation's development and progress [5]. Extensive participation from various stakeholders was not only encouraged but also expected. The collective efforts of contractors, developers, and other key players were considered essential in realizing the ambitious goals set forth during this period. The success or failure of these projects bore significant implications, not only for the clients and contractors directly involved but also for many other stakeholders in the construction ecosystem [3,6]. Projects falling short of their intended aims carried

the potential for adverse consequences, such as financial losses, delays in infrastructure development, and missed opportunities for economic growth [7]. A concerted effort and commitment were imperative to ensure that these major construction projects aligned with their objectives and contributed positively to the broader socio-economic landscape.

In developing nations like Pakistan, the construction industry is key to the economy. It exerts both direct and indirect influences on many economic activities, has wide-ranging impacts, and assumes a pivotal role within the economic landscape, contributing substantially to the Gross Domestic Product (GDP) and fostering connections with other sectors [8]. The performance of construction projects has major implications for the overall success and vitality of the industry. When a project is brought to fruition within the stipulated timeframe, adhering to budgetary constraints, and attaining its predefined performance benchmarks, it is regarded as a success [3,8]. However, not all construction projects achieve this success, with some experiencing delays and setbacks. Hence, it is imperative for organizations engaged in construction to formulate strategic approaches that can steer projects towards success [9]. These strategies must support firms to navigate challenges, mitigate risks, and adapt to the dynamic nature of construction projects, ensuring that they not only meet their objectives but also contribute positively to the growth and stability of the broader economy.

In the construction industry, the established benchmarks of time, cost, and quality have long served as the key metrics for gauging project success, as shown in Figure 1. However, alongside these conventional criteria, fresh perspectives and concepts have arisen through various researchers' contributions. This has notably led to the emergence of the concept of Critical Success Factors (CSFs) in the context of construction projects. Accordingly, this article summarizes the related insights from previous research. It seems there is limited literature available on Critical Success Factors in building projects, but the few contributions published in reputable journals over the past decade have been thoroughly examined. The article commences with an initial exploration of conventional success factors, followed by a broader, comprehensive examination of Critical Success Factors in construction projects.

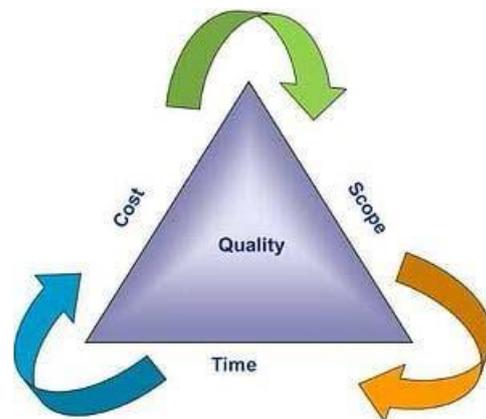


Figure 1. Importance of the Iron Triangle [3].

2. Success/Failure of Construction Projects

The success of construction projects has historically been of key importance for governments, users, and communities alike. In the context of modern construction, formidable challenges confront both clients and contractors, making the successful delivery of projects a complex endeavor. These challenges stem from the increasing intricacies in project design and the expanding role of stakeholders [10]. In a study, unearthing a range of critical factors that contribute to schedule delays and cost overruns in construction projects worldwide [11]. These factors encompass issues such as frequent design changes, last-minute owner requests, design flaws, inadequate planning, price fluctuations, shifts in the owner's scope of work, incomplete or inadequately detailed designs, and a shortage of expert

site staff, among others [12]. The significance of the project planning process, coupled with the challenges posed by executing complex tasks without sufficient experience, poor design capabilities, and frequent design alterations, played pivotal roles in cost overruns during construction projects [13]. These overruns have also been linked to factors such as insufficient site management, sluggish decision-making processes, and variations initiated by the client. It is crucial that estimators and all other parties involved in construction projects can identify and address these elements contributing to cost overruns.

Upon completion, a project must meet technical performance specifications and accomplish its mission (overarching project goals); beyond this, project success has traditionally revolved around surpassing the anticipated or standard outcomes in terms of on-time completion, adherence to budget constraints, maintenance of quality and safety standards, and achievement of high levels of satisfaction among the organization, project team, and end-users. In brief, success has hinged on the cost, schedule, quality, safety, and reception, as shown in Figure 1. However, the evolving landscape of complex projects, involving numerous stakeholders, has introduced new layers to the definition of “success”. This complexity and found that the concept of project success has evolved to incorporate criteria and standards designed to guide project participants towards achieving optimal results [13]. A quantitative questionnaire survey to identify factors contributing to project failure, revealing poor risk management, budget overruns, inadequate communication management, schedule delays, and inaccurate estimation practices as the top five culprits behind project failures [10]. Cost overrun-related factors and deficiencies in contractors’ site management were identified as critical elements affecting cost performance [9]. Critical Success Factors (CSFs) for construction projects were proposed to encompass various aspects, including the establishment of clear and realistic project goals, effective project planning, the competence and relevant experience of the project manager, the client’s ability to make timely decisions, and the project’s value, complexity, and uniqueness. These CSFs have been widely utilized in literature studies to assess project performance.

3. Critical Success Factors for a Construction Project

Various lists and models of Critical Success Factors (CSFs) have been used in the literature [14]. The examination of these reveals four distinct dimensions. The first dimension centers on achieving the project’s design goals, aligning with contractual agreements made with the client. The second dimension evaluates the advantages realized by end-users, reflecting the benefits they derive from the final project deliverables. The third dimension assesses the advantages that the organization overseeing the project accrues due to its successful execution. The fourth and final dimension delves into the benefits to the national and firm-level technological infrastructure as a result of the project’s development process. These dimensions collectively contribute to an all-encompassing evaluation of project success within the realm of construction projects. However, over the years, project management efforts have predominantly concentrated on project scheduling challenges, with the belief that improvements in scheduling techniques would lead to enhanced management and, consequently, the successful completion of projects [15].

With a focus on time, in other studies the concept of project success was explored across again four distinct dimensions, but this time they are each associated with specific timeframes [16,17]. The first dimension, spanning from project execution to immediate post-completion and thus characterized by short-term goals, emphasizes project efficiency and the successful meeting of cost and time targets. The second dimension extends shortly after project delivery and thus shifts to a medium-term horizon, focusing on customer satisfaction, the resolution of customer-triggered project issues, and compliance with technical specifications. Moving towards a long-term perspective, the third dimension, assessed after achieving a significant level of sales within one to two years, centers on business success, encompassing factors like commercial achievements, market share expansion, and how trust, satisfaction, and influence have been fostered, which provide insights into organizational performance and sustainability. Finally, the fourth dimension extends into

very long-term objectives, appraised three to five years after project completion, encompassing future readiness through the development of new tools, techniques, products, and market exploration.

A review of the pertinent literature reveals that various criteria have been proposed by different researchers, as are synthesized and presented in Table 1, offering a comprehensive overview of the project success factors. These extend beyond cost, time, and quality considerations; they also encompass project management effectiveness, organizational achievements, and customer satisfaction [18]. The paper titled ‘Criteria of Project Success: an exploratory re-examination’, an alternative approach may also be taken to ascertaining success criteria [19]. The proposal is that project success should be assessed from various parties’ angles, taking into account the perspectives of individual stakeholders such as the owner, developer, contractor, end-user, and the broader public. The criteria for evaluating project success are then categorized into two dimensions: the micro-level and the macro-level perspectives. The assessment of project success from both these micro and macro perspectives [20]. The micro viewpoint focuses on parameters like time, cost, quality, performance, and safety, while the macro perspective considers dimensions such as time, satisfaction, utility, and operational effectiveness as key factors for evaluation as shown in Figure 1.

Table 1. Critical Success Factors identified in construction projects by previous researchers.

Sr. No.	Critical Success Factor	Researchers							
		Mashali et al. [3]	Buniya et al. [6]	Ali et al. [7]	Iqbal et al. [10]	Wuni et al. [14]	Lee et al. [15]	Ramlee et al. [16]	Rasool et al. [17]
1	Cost	✓	✓	✓	✓	✓	✓	✓	✓
2	Time	✓	✓	✓	✓	✓	✓	✓	✓
3	Quality	✓	✓	✓	✓	✓	✓	✓	✓
4	Satisfaction	✓	✓				✓		✓
5	Management	✓	✓	✓			✓	✓	✓
6	Safety			✓				✓	
7	Technology	✓	✓		✓	✓		✓	
8	Organization		✓	✓	✓			✓	✓
9	Environment			✓				✓	
10	Resources			✓					

4. Critical Success Factors in Building Projects

Critical Success Factors (CSFs) in building projects are key to their success. These factors encapsulate a range of considerations, extending beyond the technical aspects of the project. While cost, time, and quality remain paramount, other dimensions such as effective project management, organizational efficiency, and customer satisfaction carry equal weight in determining the project’s success. The CSFs identified across extensive literature and underscored the consensus among researchers on the pivotal roles of cost, time, quality, and management [21]. These four pillars serve as the cornerstones of project success. Additionally, factors such as technology, safety, organizational prowess, and environmental considerations have emerged as influential contributors [7]. While such CSFs in building projects are each integral to achieving project objectives, the literature stresses that they represent a holistic blend of elements. Success in this context means meeting not only the budget and timeline constraints but also ensuring the highest quality standards, effective teamwork, and a satisfied clientele. As such, they must harmonize to define the success of building projects.

As highlighted in Table 1, an array of project evaluation criteria have been compiled by previous researchers. Figure 2 provides valuable insights into the representation per-

centages of these Critical Success Factors (CSFs) identified through an extensive literature review. Resounding consensus emerges among researchers, with cost, time, quality, and management consistently recognized as the foremost CSFs [12]. Often, these are translated into completing the project within the predefined cost parameters, adhering to the stipulated timeline, meticulously following the project schedule, meeting the required quality standards, and benefiting from effective management by a proficient team. Additionally, technology emerges as another influential CSF contributing significantly to the success of construction projects today [3]. Figure 2 supports the notion that there is a consensus, with cost, time, and quality each garnering a substantial 16.3% of the total CSF mentions. Satisfaction, management, technology, and organizational factors also hold significant weight.

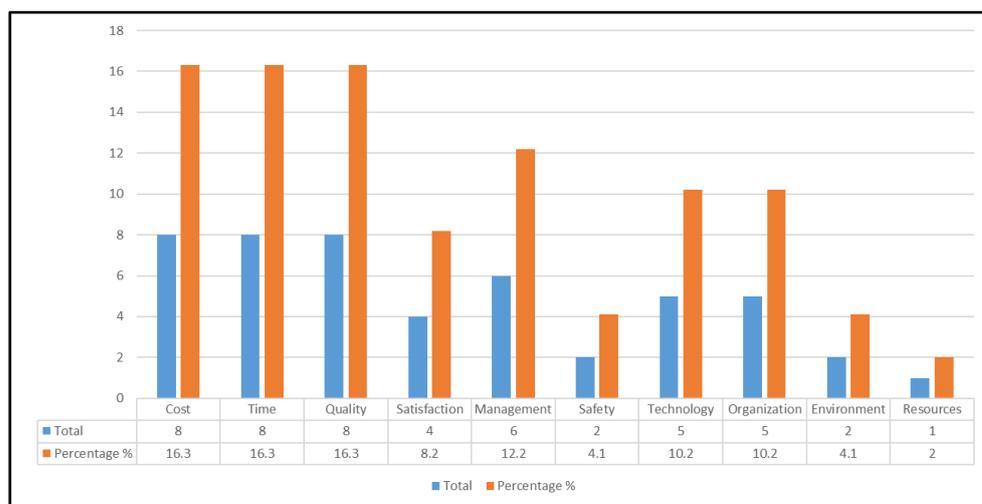


Figure 2. The percentage representation of Critical Success Factors in building projects through previous research.

5. Conclusions

This review paper has examined the most Critical Success Factors in building projects, drawing upon articles published in reputable journals over the past two decades. The objective of this study was to compile all the published information pertaining to factors, success rates, and Critical Success Factors within the domain of construction and building projects. Based on the extensive literature research conducted, the following conclusions can be drawn:

- Project success and the critical factors contributing to it have been a subject of discussion for a considerable time. However, there is no widely agreed-upon or standardized definition of project success, nor a single comprehensive list of Critical Success Factors. This paper suggests the importance of compiling a prioritized list of Critical Success Factors that must be taken into account to ensure the successful performance of construction projects.
- In the context of project success, scholars have consistently emphasized that the foundational elements contributing to success in construction projects encompass cost (budget), time, quality, and proficient management. It is essential to recognize, though, that there is a growing recognition of the significance of additional facets, such as safety, technology, and satisfaction, among others, in this ongoing discourse.
- When a construction project is concluded within the predetermined time and budget and meets the quality criteria, it inherently is deemed a success; consequently, these conventional Critical Success Factors (CSFs) will continue to play a crucial role as indispensable metrics for assessing the probability of future project success.

Chiefly, this study has delved into the Critical Success Factors that impact the success rate of building projects, aiming to support work to establish a ranking of these influential factors, which can serve as a valuable guide for achieving success in building projects.

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