

CRITICAL SUCCESS FACTORS IN BUILDING PROJECTS: ASSESSING THEIR STRENGTHENING MECHANISM AND POTENCY

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Abstract

This study examined the critical success factors in building projects, assessing their strengthening mechanism and potency. The study noted that the success of building projects depends on multiple interrelated factors that influence efficiency, cost-effectiveness, and overall project outcomes. In the context of carrying out this research, the following subheads among others were explored: concept of critical success, types of critical factors in building project and potency of critical success factor in building progress. The study mentioned the following as types of critical factors in building projects: project management/planning, financial/budgetary factors, human resource/leadership factors and technology/innovation. Furthermore, the study mentioned that the potency of critical success factor in building progress is in how it significantly impact the success of building projects. Some of the barriers to critical success factors in building projects as mentioned in the study included: lack of proper project planning, poor communication and inadequate risk management. It also mentioned how to mitigate the barriers to critical success factors in building projects to include: improve project planning/scheduling and effective communication systems. The study concluded that the success of building projects relies on critical success factors (CSFs) such as project planning, risk management, stakeholder engagement, and technological integration. One of the recommendations made was that building projects should integrate modern construction technologies such as Building Information Modeling (BIM), digital project management tools, and automated quality control systems.

Keywords: Critical Success Factors, Building Projects and Strengthening Mechanism

Introduction

The success of building projects depends on multiple interrelated factors that influence efficiency, cost-effectiveness, and overall project outcomes. Critical Success Factors (CSFs) are essential elements that contribute to the achievement of project objectives, ensuring timely delivery, quality performance, and adherence to budget constraints (Lamproua and Vagiona 2018). These factors include project planning, risk management, stakeholder engagement, and technological integration, among others. However, while these CSFs are widely recognized, their strengthening mechanisms and potency in enhancing project success remain a subject of ongoing research and debate (Kumar, Pandey and Singh, 2023). Understanding how to reinforce these

factors and maximize their impact is crucial for the sustainability and effectiveness of building projects, especially in developing economies like Nigeria.

FIG 1: BUILDING



Source: <https://www.builderspace.com/how-long-do-modern-buildings-last>

The construction industry is one of the most dynamic and complex sectors, facing numerous challenges such as cost overruns, project delays, and quality deficiencies (Daoud, Hefnawy and Wefki, 2023). As noted by Usanga (2024) building wall fissures can lead to a variety of detrimental outcomes, such as diminished structural integrity, moisture and water damage, energy loss, poor interior air quality, less curb appeal, and a decline in property value. These challenges necessitate a strategic approach to identifying and reinforcing CSFs to mitigate project risks and enhance productivity. Strengthening mechanisms such as the adoption of modern construction technologies, effective project monitoring, and workforce capacity development have been proposed to optimize project outcomes (Yahya, Abba, Yassin, Omar, Sarpin and Orbintang, 2024). Nevertheless, the potency of these mechanisms in different contexts varies, highlighting the need for empirical assessment and industry-specific adaptations.

A key concern in the assessment of CSFs is the evolving nature of building project requirements due to technological advancements and regulatory changes. The adoption of Building Information Modeling (BIM), digital project management tools, and sustainable construction practices has transformed the industry, necessitating a reassessment of traditional CSFs (Umar, Waziri, Samuel and Yahaya, 2022). Moreover, globalization and urbanization have intensified the demand for efficient infrastructure, making it imperative to evaluate how strengthening mechanisms can enhance the relevance and effectiveness of CSFs in contemporary building projects.

Furthermore, the human factor remains a critical determinant of project success, with leadership, team collaboration, and stakeholder involvement playing significant roles (Maqbool, Deng & Rashid, 2020). The efficiency of construction professionals, including project managers, architects, and engineers, directly influences the realization of project goals. Strengthening CSFs through leadership training, continuous professional development, and effective communication frameworks enhances team synergy and ensures alignment with project objectives. However, without a comprehensive strategy for evaluating the potency of these interventions, their impact remains uncertain.

The Nigerian construction sector, like many others in developing countries, faces unique challenges such as inadequate funding, weak regulatory enforcement, and material shortages (Unegbu, Yawas and Dan-asabe, 2023). These limitations emphasize the need for robust mechanisms that can strengthen CSFs to improve project performance. Identifying the most

potent strategies for mitigating these challenges requires a thorough analysis of industry trends, case studies, and empirical data. By assessing these factors in real-world project environments, policymakers and industry practitioners can develop more effective strategies for ensuring project success.

This study seeks to critically examine the strengthening mechanisms and potency of CSFs in building projects. By exploring various dimensions of CSFs, this research will provide valuable insights into best practices for improving construction project performance. It will also highlight the contextual factors that influence the effectiveness of CSFs, offering recommendations for industry stakeholders on how to enhance project delivery through strategic interventions.

Concept of Critical Success

Critical success can be defined as the accomplishment of specific, high-priority goals or objectives that have a significant impact on the overall success and sustainability of an organization, project, or endeavor. Amuzat and Eno (2024) mentioned that critical success factors are things which need to go well to ensure success for an organization and, therefore, may represent those managerial or enterprise areas that must be given continual attention. Yarbrough (2021), explained that critical factors help a team or organization decide what they should focus on and compare progress to the goal that is set. These goals or objectives are typically aligned with the organization's mission, vision, and strategic objectives. Critical success is a concept that has gained significant attention in the construction industry, particularly in building projects. It refers to the achievement of specific goals, objectives, or outcomes that are crucial to the overall success and sustainability of a building project. These goals or objectives are typically aligned with the project's mission, vision, and strategic objectives, and may include factors such as: Project timelines and schedules, Budgets and cost management, Quality standards and specifications, Safety and risk management and Stakeholder satisfaction and engagement.

Furthermore, Olawale, Ndifreke and E.N.O. (2024) mentioned that to minimize risk in selecting the best vendor, then the right dimensions of critical success factors need to be employed by businesses at all levels. Critical success in building projects is characterized by several key attributes, including: Well-defined project goals and objectives that are aligned with the project's mission and vision, detailed project schedules, budgets, and resource allocation that ensure the project is delivered on time, within budget, and to the required quality standards, experienced project managers with excellent leadership and communication skills who can motivate and direct the project team, identification and mitigation of potential risks that could impact the project, including safety risks, environmental risks, and financial risks, and effective communication and engagement with stakeholders, including project team members, clients, contractors, and suppliers.

However, Critical success ensures that the project is delivered on time, within budget, and to the required quality standards, ensures that stakeholders are satisfied with the project outcome, which can lead to increased loyalty and repeat business, minimizes the risks associated with building projects, including safety risks, environmental risks, and financial risks, improves project efficiency by optimizing resource allocation, reducing waste, and improving productivity and supports sustainable development by ensuring that building projects are designed and constructed with sustainability in mind.

The Types of Critical Factors in Building Project

Critical Success Factors (CSFs) are essential elements that significantly impact the success of building projects. According to Usanga and Usanga (2024) a building is an enclosed space, such a house or factory, that has walls and a roof and is typically stationary. These factors can be categorized into several types, each playing a crucial role in ensuring project success. Below are the various types of critical success factors highlighting their importance:

1. Project Management and Planning: Construction project success is largely dependent on careful planning and efficient project management. Setting precise goals, outlining the project's parameters, and creating reasonable deadlines are all part of this. Planning thoroughly enables the identification of possible risks and the creation of mitigation plans, which helps to avoid delays and overspending. All project activities are guaranteed to be in line with the overarching objectives when structured project management frameworks are used, which makes resource allocation and task coordination more effective. A study by Wuni and Shen (2023) emphasizes the importance of these factors in modular integrated construction projects.

2. Financial and Budgetary Factors: A construction project's financial stability depends on sound financial management. This comprises careful cash flow management, efficient budgeting, and precise cost estimation to guarantee that funds are accessible for the duration of the project. Project delays, a lack of resources, or quality compromises as a result of cost-cutting initiatives can all result from poor financial planning. Using cost management software and conducting routine financial audits are two examples of financial control measures that may be used to monitor spending and maintain project budget. According to research, one of the most important factors influencing a project's success is its financial stability.

3. Human Resource and Leadership Factors: Project results are strongly influenced by the team's proficiency and leadership. Putting together a team with the required expertise and experience guarantees excellent performance and punctuality. A collaborative work atmosphere, team member motivation, and effective decision-making are all facilitated by effective leadership. The team's capabilities can be increased by regular training and opportunities for professional growth, which will improve performance. A thorough analysis of construction project management emphasizes how important human resource considerations are to project success.

4. Technology and Innovation: Construction projects can be made much more efficient and of higher quality by implementing cutting-edge technologies and creative methods. Building information modeling (BIM) is one example of a tool that enhances design accuracy, promotes improved stakeholder engagement, and allows for the early identification of any problems. Modular construction is one of the innovative construction techniques that can save money and time without sacrificing quality. A study by Wuni and Shen (2020) discusses the critical success factors for modular integrated construction projects, underscoring the role of technological innovation.

5. Legal and Regulatory Compliance: To prevent legal issues, penalties, or project closures, compliance with industry standards and regulatory regulations is crucial. This include securing the required permits, adhering to building codes, and making sure that all construction operations adhere to safety and environmental standards. Navigating complicated regulatory environments

might be aided by routine compliance checks and legal expert assistance. A crucial component of building projects' success is ensuring legal and regulatory compliance.

6. Supply Chain and Logistics Management: Delays can be avoided by ensuring that supplies and machinery are available when needed through effective supply chain and logistics management. Choosing trustworthy suppliers, efficiently overseeing the procurement procedure, and organizing logistics to maximize material delivery and storage are all part of this. Costs can be decreased and efficiency increased by using supply chain management software and cultivating solid connections with suppliers. The significance of efficient supply chain management is emphasized by an evaluation of essential success indicators for construction projects.

7. Communication and Coordination: A construction project's successful completion depends on all parties involved communicating clearly and effectively. This minimizes miscommunications and mistakes by making sure that everyone is aware of project developments, modifications, and expectations. A study by Anvuur & Kumaraswamy, (2007), cited in Esmaili, et.al (2016), stated that it has been proven that a clash of values and the existence of complex relationships between team members have an impact on project performance. Regular meetings, detailed reporting, and the use of communication tools facilitate better coordination and collaboration among team members. A study on critical success factors in construction projects emphasizes the role of effective communication in project success.

The Potency of Critical Success Factor in Building Progress

Critical Success Factors (CSFs) are essential elements that significantly impact the success of building projects. These factors are crucial in ensuring that projects are completed on time, within budget, and to the required quality standards. CSFs are critical because they Influence Project Outcomes as they have a direct impact on project success, affecting the timely completion, budget adherence, and quality of the project. These factors represent a set of very important issues on which organizations must focus their limited resources in pursuit of success (Rockart 1979, cited in Borges & Soares, 2024). Nonetheless, the building sector is distinguished by its intricacy, encompassing numerous parties, complex procedures, and substantial financial outlays. Critical Success Factors (CSFs), the crucial components that have a major impact on construction project success, must be identified and prioritised in order to overcome these obstacles and accomplish effective project outcomes.

By making sure that stakeholder expectations are fulfilled, they also aid in recognizing and mitigating risks related to construction projects, such as delays, cost overruns, and quality problems. These results in heightened satisfaction and fewer disagreements. Numerous CSFs relevant to construction projects have been the subject of recent investigations. A comprehensive literature review by Wuni & Shen (2023) identified key determinants for supply chain management in modular integrated construction projects, emphasizing the importance of effective stakeholder collaboration and efficient resource management. In the context of sustainable construction, Buniya et al. (2023) highlighted the contributions of safety-critical success factors and safety program elements to overall project success. Their research underscored the necessity of integrating safety management practices into the project lifecycle to enhance performance outcomes. Critical success elements also offer many advantages, including better risk management, increased efficiency, better project planning, and improved project control.

According to Belassi & Tukul's theory of success in construction projects, Building construction industry has many factors which affect the working process of a project, such as lack of coordination, competition, or poor management of human resources. In order to prevent such risks and improve the performance and productivity of a project it is essential to handle the human resources, organizational factors, and the environmental aspect, Belassi & Tukul's theory considers each of these criteria is imperative to the success of a project (Chetty, 2020). The critical success factor must also be identified, which includes identifying the critical factors that will affect project success, such as the project scope, budget, timeline, and quality standards; assessing each CSF's likelihood and potential impact and prioritizing those that could have the biggest impact; developing strategies to address each CSF; assigning resources and responsibilities as necessary; and routinely reviewing and evaluating CSFs.

In construction projects, critical success factors are crucial because they affect project outcomes, reduce risks, and raise stakeholder satisfaction. Project teams can enhance project planning, control, and efficiency and ultimately guarantee project success by recognizing, evaluating, and resolving CSFs. The effectiveness of CSFs will continue to be a critical component in completing building projects successfully as the construction industry develops. In addition to being relevant to particular facets of construction, the identification and control of CSFs also extend to more general organizational tactics. For instance, Wuni & Shen (2022) developed critical success factors for integrating circular economy principles into modular construction projects, highlighting the role of innovative business models and regulatory support in facilitating sustainable practices.

Barriers to Critical Success Factors in Building Projects

The success of building projects often depends on a variety of critical factors, and understanding the barriers that hinder these factors can significantly impact the outcome of a project. Below are some of the barriers to critical success factors in building projects:

- **Lack of Proper Project Planning**

Inadequate planning is one of the most frequent obstacles to building project success. This involves underestimating the resources needed, setting unreasonable deadlines, having unclear goals, and not allocating enough time. Significant delays, expense overruns, and less-than-ideal project execution can result from unclear guidance from the start. Teams may find it difficult to deal with unforeseen problems without adequate planning, which could result in chaos and inefficiency (Osei-Tutu 2020). Inadequate project planning raises the risk of missed deadlines, stakeholder conflicts, and lowered quality. Effective project milestone achievement requires realistic scheduling, well-defined objectives, and adequate resource allocation, all of which are components of proper planning.

- **Poor Communication**

A successful building project depends on effective communication because it guarantees that all parties involved (e.g., contractors, architects, engineers, and clients) are in agreement. Communication barriers can be caused by inadequate information sharing, miscommunications, language barriers, or ineffective use of communication tools. When communication fails, it can lead to mistakes, delays, and conflicts that ultimately affect the project's outcome (Xu & Liu, 2019).

- **Inadequate Risk Management**

Although risk management is an essential part of any project, it is frequently disregarded or managed insufficiently. Risks associated with building projects can include challenges related to the environment, technological malfunctions, safety concerns, budgetary constraints, or procurement delays. Inadequate risk assessment or mitigation can result in costly problems and project execution setbacks. Unexpected setbacks are common in projects lacking an appropriate risk management framework, and they frequently lead to extra expenses and delays.

- **Financial Constraints**

Adequate financial backing is crucial for the successful execution of building projects. Often, financial constraints become a barrier when there is a lack of proper budgeting, cost estimation, and resource allocation. Khan, & Shariq (2022). This may be due to unexpected cost increases, poor financial management, or lack of investor confidence. Insufficient funds can lead to cutting corners, which compromises the quality of materials or delays the procurement process. Additionally, financial mismanagement can lead to unpaid contractors, which further delays the project and escalates costs.

- **Lack of Skilled Labor**

A shortage of skilled labor is a growing challenge in the construction industry. This shortage can stem from various factors, such as low wages, poor working conditions, and the aging workforce. Moreover, the construction industry often faces challenges in attracting younger talent or providing ongoing training and development. Yusoff & Ismail, (2023) stated that when skilled labor is in short supply, the construction process becomes slower, and the quality of work is affected. Lack of skilled labor leads to high turnover rates, lower productivity, and an increased risk of accidents on-site.

How to Mitigate the Barriers to Critical Success Factors in Building Projects

Mitigating the barriers to critical success factors (CSFs) in building projects requires strategic planning, proactive measures, and the adoption of best practices at various stages of the project lifecycle. Below are some practical approaches to mitigate the barriers that can hinder the successful completion of building projects:

- **Improve Project Planning and Scheduling**

A recent study carried out by (Karlsen, & Wangen, 2020). One of the most effective ways to mitigate planning-related issues is to adopt structured planning processes using project management tools and techniques. These tools help create detailed schedules, set realistic deadlines, and allocate appropriate resources involving all key stakeholders early on ensures that their inputs are factored into the plan, making it more comprehensive and realistic. Proper planning leads to better foresight, reduces uncertainty, and increases the chances of meeting project deadlines. Comprehensive plans also provide contingency measures, which can address unforeseen circumstances, ensuring smoother execution.

- **Effective Communication Systems**

To address communication barriers, adopting modern communication tools, such as project management software, cloud-based platforms, and real-time messaging systems, can facilitate more efficient communication. Regular updates and meetings help ensure that all stakeholders are aligned with the project's progress Zhang, & Liu, (2021). Clear protocols should also be

established to avoid miscommunication and ensure that all relevant parties are promptly informed of any changes. Improved communication reduces misunderstandings and ensures that all team members are aware of their roles, deadlines, and project status. This results in smoother workflows and better decision-making.

- **Risk Management Frameworks**

A thorough risk management plan must be put into action in order to complete a project successfully. Early risk identification, risk impact and likelihood analysis, and risk mitigation strategy development are all part of this. Risk classification and prioritization can be aided by the use of instruments such as a risk registry or a risk breakdown structure (RBS). Conducting routine audits and risk assessments is also necessary to make sure that any new hazards are dealt with early on. The probability of unforeseen circumstances impacting the project's budget, schedule, and quality is decreased by effective risk management. It enables project teams to make well-informed choices and swiftly carry out remedial measures (Mustapha and Rahman, 2022).

- **Effective Financial Control and Management**

As stated by Narasimhan & Mukherjee (2020) to avoid financial constraints, building projects should incorporate strict budget management and financial forecasting. Tools like Earned Value Management (EVM) and financial tracking software can be used to ensure that costs are kept in check. Additionally, setting aside a contingency fund can help address unforeseen financial challenges. Regular financial audits can also detect issues early before they escalate. Effective financial management helps in maintaining the project's cash flow and ensures that it stays within budget, reducing the likelihood of delays caused by financial issues. Transparency in budgeting fosters trust and accountability among stakeholders.

- **Investment in Labor Training and Development**

To address the lack of skilled labor, construction companies should invest in training and development programs that enhance the skill sets of their workforce. Collaboration with educational institutions and vocational training centers can also help bridge the skill gap. Incentives for continuous professional development, such as certifications and career growth opportunities, can also attract young professionals into the field. A well-trained workforce increases productivity, reduces the likelihood of accidents, and improves the overall quality of the work. This, in turn, ensures that projects are completed on time and to the required standards (Goh & Lee, 2021).

Conclusion

The success of building projects relies on critical success factors (CSFs) such as project planning, risk management, stakeholder engagement, and technological integration. Strengthening these factors through modern construction technologies, effective monitoring, and skilled workforce development enhances project efficiency. However, evolving industry demands and challenges in developing economies like Nigeria necessitate continuous reassessment of CSFs. By identifying and reinforcing the most potent strategies, policymakers and industry practitioners can improve project sustainability, cost-effectiveness, and overall performance, ensuring long-term success in the construction sector.

Recommendations

1. Building projects should integrate modern construction technologies such as Building Information Modeling (BIM), digital project management tools, and automated quality control systems.
2. Continuous professional development programs should be implemented for project managers, engineers, and other construction professionals. Training in leadership, risk management, and technological advancements will strengthen project execution and improve overall performance.
3. Governments and industry regulators should enforce strict compliance with building codes, safety regulations, and quality standards. Additionally, fostering strong collaboration among stakeholders—including contractors, clients, and regulatory bodies—will enhance accountability, communication, and project success.

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