

Enhancing Project Management Effectiveness in Civil Construction: Best Practices, Challenges, and the Case for Integrated Financial and Planning Control

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Abstract: *Project management in civil construction continues to face persistent challenges, including inefficiencies that result in cost overruns and schedule delays. This study identifies best practices and examines key managerial obstacles, with the aim of enhancing project execution effectiveness and efficiency. A comprehensive literature review was conducted, focusing on financial control, planning, and scheduling techniques. The findings underscore the critical need for improved integration across administrative, financial, and planning functions, and highlight systemic gaps that impede performance. This study contributes to the discourse on construction project management by offering actionable insights and a synthesis of current best practices for practical implementation.*

Keywords: Project management, Civil construction, Financial control, Planning, Scheduling, Best management practices.

1. Introduction

Playing an essential role in the global economy, civil construction represents approximately 2.5% of Brazil's Gross Domestic Product (GDP) in 2024, according to economic analyses by the Brazilian Institute of Geography and Statistics (IBGE). However, the execution of civil construction projects is complex, facing challenges such as tight deadlines, limited budgets, and the need to adapt to unforeseen events. These factors require meticulous and integrated management of the different areas involved, including administration, finance, and planning.



Figure 1: Project planning.

Efficiency in construction management has become a competitive differentiator for companies in the sector, whose goal is to ensure project completion within the established schedule and budget, while maintaining the expected quality. Furthermore, problems such as lack of planning and inadequate resource management can compromise the success of a project, leading to delays, increased costs, and even suspension of activities. In this scenario, the question arises: what practices can be implemented to improve construction management in civil construction?

This study is justified by the need to explore best practices for construction management, offering a comprehensive view of

the stages that make up this process. Current practices and their implications for project success will be analyzed, providing a significant contribution to the literature and to professionals in the field.

2. Theoretical Framework

Project management in civil construction requires combining administration, finance, and planning. The effective allocation of human and material resources, combined with risk anticipation and rigorous control of costs and schedules, is essential for the success of complex projects, minimizing failures and optimizing results.

In project administration, strategically coordinating these resources ensures risk management and reduction. Sabbagh (2016) states that effectiveness in management depends on predicting and addressing obstacles during execution. Complementing this view, PMI, "Project Management Institute", (2021) highlights that robust resource control practices can reduce failures by up to 30%, reinforcing the importance of a proactive approach.

Furthermore, considering that a well-structured budget plan covering all phases is essential, financial management must play an essential role in maintaining the project budget and ensuring a balanced cash flow. Silva (2019) emphasizes that cash flow control is vital, and CMAA, "Construction Management Association of America", (2020) points out that 55% of projects that adopt this control finish within the planned budget.

Planning, in turn, establishes the basis for the organized and efficient execution of the project. Campos (2018) highlights the importance of a detailed schedule that takes into account the interdependencies between tasks. CIRIA, "Construction Industry Research and Information Association", (2019) emphasizes that frequent quality audits help identify flaws before they become critical, ensuring higher project quality.

It is important to recognize that despite the advantages of management practices, there are limitations in their application. EVM, “Earned Value Management”, is an example of this, as it may not be equally effective in all types of projects, especially in scenarios with variable and unpredictable dynamics. Reflecting on these limitations provides a more critical and in-depth view of management methodologies in civil construction.

3. Methodology

To carry out this research, a literature review was conducted on management practices in civil construction projects, with an emphasis on aspects involving administration, finance, and planning. Additionally, quantitative data from real projects were analyzed, enabling comparison between different management aspects.

3.1 Administration of Civil Construction Projects

The administration of civil construction projects involves the coordination of human, material, and financial resources, as well as the supervision of the various project stages. Success in this management is directly related to the ability to organize these resources efficiently and anticipate risks that may arise during execution.

One of the foundations of project administration is the effective control of resources, such as available equipment, materials, and labor. The lack of adequate planning can result in additional costs, either due to excessive material purchases, which generate waste, or delays caused by the lack of essential resources. A study conducted by PMI in 2021 revealed that a percentage equivalent to of civil construction projects face problems due to poor resource coordination, highlighting the importance of proactive management.

In addition to resource control, the identification and mitigation of financial, operational, and environmental risks are crucial for the smooth progress of a construction project. The adoption of a robust risk management plan, such as the use of budget contingencies and safety measures, helps minimize losses and increase the likelihood of on-time delivery. According to CII, “Construction Industry Institute”, 40% of projects that implement good risk management practices have superior performance results, which consequently avoids delays and unexpected costs.

Furthermore, decision-making in the project must be based on updated data on the progress of the work. With this in mind, tools such as “Earned Value Management”, which assess performance in terms of costs and schedules, are essential to ensure that the project remains aligned with the parameters established by management.

3.2 Financial Management in Civil Construction Projects

Financial management of civil construction projects involves fundamental stages such as planning, control, and monitoring of financial resources. The main objective is to ensure that the project remains within the stipulated budget, in addition to guaranteeing a balanced cash flow throughout the entire

execution.

A well-structured budget is the foundation for the financial success of any construction project. It should cover all phases, from land purchase to the delivery of the completed project, detailing the estimated costs. Cash flow, on the other hand, requires continuous monitoring to ensure payments are made on time and to avoid disruptions in financing. According to a CMAA survey, 55% of projects that implement strict cash flow control are completed within budget. Conversely, among those that neglect this monitoring, only 20% achieve the same result.

Keeping costs under control is another essential aspect. Data from the CII shows that projects using advanced cost control techniques can reduce unforeseen financial issues by up to 30%. Moreover, tracking actual expenses against the initial plan requires the use of effective tools, such as EVM, for example, which measures financial and schedule performance.

In addition, good financial conditions make a significant difference. High interest rates or poorly planned financing can compromise a project’s economic viability. On the other hand, ensuring timely payments avoids problems with suppliers and maintains the smooth progress of the construction. Well-executed financial management not only minimizes risks but also contributes to the project’s success and sustainability.

3.3 Project Planning in Civil Engineering

Planning is the fundamental stage that establishes the basis for project execution in a more organized and effective manner. A well-crafted plan involves defining schedules, carefully allocating resources, and constantly monitoring quality, ensuring all aspects of the construction are properly managed.

According to PMI, companies that strictly control their schedules are 40% more likely to complete the project on time compared to those that do not. Thus, developing a detailed schedule is crucial to ensuring all activities are completed by the stipulated deadline; interdependencies between tasks and external variables that may impact construction progress, such as weather changes or material delivery delays, must be considered.

Another essential aspect for successful planning is the efficient allocation of labor and materials, as proper management of these resources avoids waste and rework, directly contributing to budget compliance. A CMAA study revealed that 70% of projects with strategic resource allocation complete construction on time and with fewer budget adjustments.

To ensure project execution is delivered on time and with the expected quality, it is essential to conduct periodic audits and closely monitor project milestones. CIRIA data indicates that 75% of projects performing quality audits during construction progress have lower rework rates and higher client satisfaction. Therefore, regular inspections are necessary to identify flaws early and correct issues before they become critical.

3.4 Integration Between Administration, Finance, and Planning

Proper integration between the administration, finance, and planning departments is crucial for the success of a civil engineering project. When these functions work in a coordinated manner, decisions are made with a comprehensive view of the project, helping to avoid communication failures and unexpected adjustments during execution.

It is the project manager's responsibility to ensure that these three areas are perfectly aligned. According to PMI, 68% of projects that maintain good coordination between these sectors are more likely to be delivered on time and within budget. With this in mind, any changes to the schedule must be immediately reflected in the budget and cash flow to avoid surprises and ensure the project proceeds without setbacks.

To maintain control and identify any deviations as early as possible, continuous monitoring and constant collection of feedback on project progress must be maintained. According to a Gartner survey, the implementation of integrated management systems can reduce communication failures and rework risks by up to 50%. Tools that allow real-time monitoring and facilitate communication and data-driven decision-making among teams, such as ERP ("Enterprise Resource Planning"), can be used to reduce the mentioned rate and increase the chance that companies using these solutions have of completing their projects within budget by 40% more compared to others, according to another Gartner study.

4. Results and Discussions

The research results indicate that to achieve successful projects, efficient construction site management in civil engineering is essential. Through a literature review and analysis of quantitative data from real projects, good practices and challenges faced by managers were identified. The data reveal that the implementation of financial control techniques, such as EVM, contributes significantly to the completion of projects within the established budget and schedule.

The following table presents a summary of the main results obtained regarding financial control and efficiency in meeting deadlines:

Table 1: Results.

Financial Control and Project Efficiency	
Success Percentage Management Technique	Success Percentage (%)
Cash Flow Control	55
Use of EVM	40
Controlled Schedules	70

The results achieved are aligned with the data present in the current literature, which emphasizes the importance of proactive and integrated management. According to PMI (2021), effective resource coordination is crucial for project success. Furthermore, the adoption of robust risk management is supported by the findings of CII (2020), which state that 40% of projects implementing good risk management practices have superior performance. However, the limitations of this study include the lack of specific field data, which could provide an even broader perspective on management practices

in civil construction. Directions for future research may include exploring the social and environmental impacts of project management, as well as the development of new technologies to enhance these processes.

5. Conclusion

The study on construction management emphasized that efficient administration is essential for the success of civil construction projects. The results showed that proactive management must integrate the areas of administration, finance, and planning, ensuring clear communication and minimizing errors throughout the process.

The results confirm the relevance of strict cash flow control and the application of cost control techniques such as EVM, "Earned Value Management" ("Gestão de Valor Agregado"), which proved essential to ensuring that projects are completed within budget. Additionally, the implementation of strictly controlled schedules and strategic resource allocation are crucial for completing construction on time.

The contributions of this study to the field of civil construction are significant. The proposed management practices, combined with integrated management systems such as ERP, "Enterprise Resource Planning" ("Planejamento de Recursos Empresariais"), not only promote a more efficient and competitive sector but also enable the search for innovative solutions that support sustainability. The results obtained support the specialized literature, highlighting the need for effective resource coordination and robust risk management, aspects that should be further explored in future research.

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