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A Systematic Review of the Effects of Time, Cost and Quality Management Practices on Construction Project Success.

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***Abstract*-- The success of construction projects depends on time, cost, and quality (TCQ) management practices. However, there is still scattered empirical evidence on their effectiveness depending on geography, types of projects, and the research design. This paper performs a PRISMA-based systematic literature review to summarize the results of 25 empirical and conceptual studies, all peer-reviewed and published between 2000 and 2025. The systematic search of Scopus, Web of Science, and Google Scholar identified the relevant studies, which were analyzed with the help of thematic synthesis.**

The research shows that Critical Chain Project Management and takt-time planning and the Last Planner System provide advanced time management methods that boost schedule dependability and reduce project delays. Practices in cost management, especially the practice of earned value management and risk-based cost estimation, improve the predictability of costs and financial control. Quality management systems that follow ISO 9001 and Total Quality Management systems decrease the requirement for rework while enhancing the satisfaction of stakeholders. Notably, the results show that combined TCQ management practices result in more consistent and sustainable project outcomes when compared to separate practices.

This research paper contributes to the body of construction project management literature by bringing scattered evidence together and enhancing the significance of coordinated TCQ strategies to enhance project success.

***Keywords*-- Time management; cost management; quality management; project success; construction projects; systematic review.**

I. Introduction

Construction projects are complex in nature and they are prone to delays, cost increases, and quality deficiencies. These have remained issues both in developed and developing economies and they have continued to hinder the success of projects. The empirical literature in Asia, Europe, Africa, and Australia can testify to the fact that it is not exceptional but common in the construction industry to fail to achieve time, cost, and quality goals[1], [2], [3].

The traditional method of measuring the performance of any project has been through the iron triangle, where the key criteria of measuring performance are time, cost, and quality. Even though this framework is still relevant, recent studies doubt its suitability in the context of independent treatment of these dimensions. It has been indicated that the success of projects can be better explained by the level of managing time, cost, and quality as an interdependent set of performance indicators instead of focusing on them separately[4], [5].

Although the literature relating to the management of construction projects is increasing, the studies on the time, cost and quality management practices are dispersed. Numerous empirical analyses revolve around single aspects, i.e. scheduling tools, cost control methods, or quality assurance systems. This compartmentalized model restricts the knowledge of how TCQ practices interact with each other and their overall effect on project performance. Thus, the level of theoretical development as well as its practical utility is limited [6], [7]The research data from the present study shows that project success depends on three critical factors which include geographical location and project type and institutional framework. Inequality in regulatory environment, organizational capacity, adoption of technology and managerial skill influences the implementation and effectiveness of TCQ management practices. The study results cannot be applied to other settings because of existing contextual differences which prevent evidence-based management strategies from being used.

Considering these shortcomings, there is a need to synthesize the empirical evidence in a systematic manner. The combination of the scattered findings can assist in the identification of the prevailing trends and the explanation of the personal and combined impacts of the time, cost, and quality management practices on the success of the construction projects. This kind of synthesis is necessary to support the development of integrated methods of management of TCQ and enhance the performance of projects in various construction settings[8].

The research paper uses PRISMA to conduct a systematic literature review which identifies the specific time and cost and quality management practices that result in construction project success.

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The review will establish a better theoretical foundation of evidence synthesis by using peer-reviewed studies and demonstrate why TCQ needs integrated management and develop better construction project management approaches.

II. Objectives

1. To examine the effect of time management practices on construction project success.
2. To analyze the impact of cost management practices on construction project success.
3. To examine the contribution of quality management practices to construction project success.
4. To evaluate the combined impact of integrated TCQ management practices on construction project success.

III. Methodology

3.1 Review Design

The study adopts the systematic literature review design to investigate the time, cost and quality (TCQ) management practice in construction projects. The research follows the PRISMA 2020 checklist to achieve methodological transparency through its research methods. The review process achieved transparency and rigor and replicability through the implementation of these established guidelines. It adopted a systematic review methodology and adopted secondary data as a source only due to the peer-reviewed publications.

3.2 Information Sources

The studies were located through a comprehensive search strategy. A systematic search was carried out in large scholarly databanks, including Scopus, Web of Science, and Google Scholar. Keywords for search included 'time management', 'cost control', 'quality management', and 'construction project success'. The search scope was restricted to the literature published since the year 2000 up to the year 2025 to be in a position to identify the background literature together with recent developments in the area of TCQ management within the construction industry.

3.3 Eligibility Criteria

It had definite inclusion and exclusion criteria that were used to find out the relevance and quality of the selected studies. The inclusion of studies was based on the presence of a certain focus on the time, cost, and quality practices in construction projects. Only the studies that put into consideration the project performance or project success in relation to TCQ were considered. Articles were selected out because they did not pertain to the construction industry, did not dwell on TCQ management or project success and because they were in other languages other than English. Grey literature, conference abstracts and non-peer-reviewed sources were also excluded.

3.4 Study Selection

The initial search of the database showed 112 records. After the processing of duplicates (N = 17) 95 records were to be filtered. The first level of filtering of these records was based on the titles and abstracts. At this stage, 48 articles were filtered as they were not related to the topic of the study. The remaining 47 articles were then undergone the full-text review so as to establish their eligibility. Based on preset criteria 25 studies were selected and incorporated in the final synthesis because they met all the criteria of inclusion. Study selection was conducted independently and resolved through discussion[9]

3.5 Data Extraction

The process of data extraction was standardized so as to increase consistency among the selected studies. The essential information was received like the study area, research methodology, TCQ management practices under study, project type, project management standards used, and the results.

3.6 Synthesis Method

The analysis of the selected studies was conducted with the help of thematic synthesis. This methodology helped to search and identify patterns and themes that were prevalent in literature systematically. The synthesized findings were systematized and aligned with four research objectives of the study and consistency of the review findings were made with the overall research framework.

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PRISMA Flow Diagram

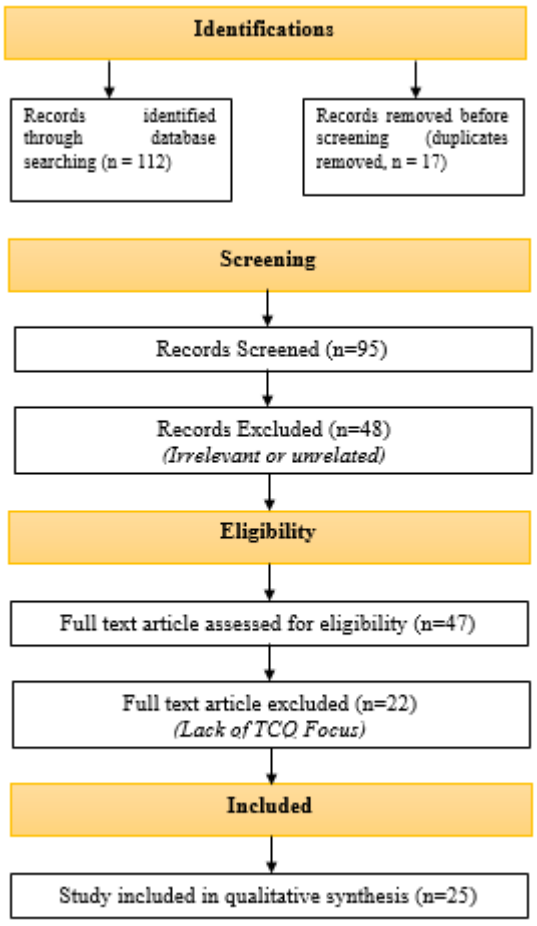

Figure 3.1. PRISMA 2020 flow diagram

IV. FINDINGS AND EVIDENCE SYNTHESIS

Table 4.1 Evidence Synthesis and Thematic Coding of TCQ Management Practices.

Theme	Codes	Observed Patterns	Key Evidence	Alignment with Objectives
Advanced Scheduling Practices	CCPM, Takt-time, Last Planner System	Projects executed with the help of modern scheduling tools demonstrate better schedule observance and lesser delays.	(Bharambe, 2023; Frandson et al., 2014; Solís-Carcaño et al., 2015)	Objective 1: Time Management
Causes of Time Overruns	Poor planning, resource shortages, weak site coordination	Time wastage has been constantly associated with management and operational inefficiency.	(Whitman et al., 2023)	
Cost Control Techniques	Earned value management, risk-based estimation	Active cost reduction enhances financial forecasting.	(Ayu et al., 2024; Jaroslaw, 2022)	Objective 2: Cost Management
Drivers of Cost Overruns	Inflation, material price fluctuation, scope change	Cost overruns are augmented by external economic factors and the scope instability.	(Lo-honi et al., 2008; Tabish & Jha, 2011)	
Formal Quality Systems	ISO 9001, TQM	Formal quality systems minimize recidivism and enhance customer satisfaction.	(Chen, 2018; Love et al., 2018; Wickramarachchi et al., 2018)	Objective 3: Quality Management
Quality Failures	Weak supervision, poor workmanship	Poor site management contributes to poor performance of the project.	(Amoah, 2025; Gamil, 2023)	
Integrated Management Approaches	CCPM + EVM, logistics optimization	TCQ integrated practices yield better project results.	(Bharambe, 2023; Jaroslaw, 2022; Nolz, 2021)	Objective 4: Integrated TCQ
Fragmented TCQ Management	Isolated planning, lack of coordination	TCQ separation functions restrict the overall project success.	(Ahmed, 2023; Parmar & Rajgor, 2024)	

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1. Objective 1: Time Management Practices

The analyzed literature always emphasizes the significance of time management in construction projects[10]. More sophisticated scheduling methods have been reported as effective in enhancing schedule reliability, including Critical Chain Project Management (CCPM), takt-time planning and the Last Planner System. Such practices can be used to minimize uncertainty, enhance the coordination of work processes, and reduce delays [11], [12], [13].

Conversely, bad planning traditions, lack of sufficient resources, and poor management of the sites become the leading factors that cause time overruns. These problems are often associated with poor coordination between the project stakeholders and the insufficiency of control mechanisms [2], [3].

The evidence indicates that the good practice of time management promotes a high level of schedule performance and indirectly leads to the project cost control.

2. Objective 2: Cost Management Practices.

The results show that active cost management is very critical in ensuring financial stability in construction projects. Methods like earned value-based control and risk-based cost estimation improve the predictability of costs and facilitate the timely correction measures [14], [15].

Nevertheless, cost overruns are still prevalent because of the external and internal factors. Status of material prices, inflation, and repetitive scope changes are again and again cited as one of the significant causes of budget escalation [7], [16].

Collectively, Cost management practices have the greatest effectiveness when combined with the scheduling and risk management processes resulting in greater overall project success.

3. Objective 3: Quality Management Practices

Quality management functions as the main element which determines the success level of construction projects. Organizations that use ISO 9001 and Total Quality Management (TQM) formal quality systems will achieve higher work quality and reduce their need for rework while providing exceptional client satisfaction [1], [17], [18].

Weak supervision together with poor work quality stand as the main elements which cause quality failures to occur. The present system problems create negative impacts which negatively affect operational performance while simultaneously decreasing project outcome value [19], [20].

The reviewed studies converge that the Quality management practices strongly predict functional performance and stakeholder satisfaction in construction projects.

4. Objective 4: Integrated TCQ Management

The research findings show that organizations which implement integrated TCQ management practices will achieve the most stable and beneficial project results. Research indicates that using scheduling methods together with earned value management and logistics optimization produces better results in all three performance areas of time and cost and quality [11], [14], [21].

Organizations fail to achieve proper coordination because their TCQ dimensions receive separate management through fragmented systems which results in decreased overall performance[22]. The integration of different systems through system integration creates decision-making obstacles which decrease project success rates according to [4], [23].

Collectively, the results show that construction projects achieve their best results when TCQ management practices operate as an integrated system.

In general, the evidence synthesis shows a clear correspondence of the research objectives and the available literature. The time management practices always lead to a higher degree of schedule reliability[24], cost management is a predictive of financial performance, and quality management is a predictive of project success[25]. Above all, the research comes to the conclusion that combined TCQ management practices will lead to better and more consistent project results.

V. Discussion

The results of this review support the fact that the management practices of time, cost, and quality (TCQ) are core issues in construction projects success. Both dimensions have a separate contribution to the project performance and each of them solves particular managerial challenges. Nevertheless, the data continuously demonstrates that integrated TCQ interventions are more effective compared to isolated ones. The synchronization of scheduling, cost control and quality assurance of projects results in more reliable and more sustainable results. The review also shows that there are regional differences in TCQ practices effectiveness. These variations are determined by the complexity of projects, institutional capability, regulatory conditions and managerial competence.

Contextual factors such as these influence the implementation of TCQ practices as well as the effectiveness way of making them work towards project success.

VI. Conclusion

The paper finds that the effectiveness of TCQ management practices is very critical in determining the success of construction projects. The review also shows that the three dimensions are relevant in obtaining the desired project outcomes. Quality management among them has the most direct influence, especially in terms of enhancing functional performance and stakeholder satisfaction. Most significantly, integrated TCQ management offers the strongest and the most consistent outcomes in various project settings. Thus, to improve the overall project success, it is highly encouraged that coordinated strategies that integrate time, cost and quality be applied in construction projects to achieve success.

VII. Limitations And Future Research.

There are a number of limitations in this review. Published empirical studies are only analyzed and this brings in the risk of publication bias. Unpublished research and grey literature could offer further information that was not reflected in this review. Research in the future ought to be done to empirically test the integrated TCQ management frameworks in other geographical areas as well as on other project delivery systems. These studies would enhance the overall aspect of generalization of the results and aid in formulation of context-sensitive project management strategies.

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