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Attaining Strands for a Functional Project Controls Mechanism of a Design-and-Build Project Based on the Perspectives of Construction Professionals

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Abstract

Design-and-build projects demand robust project controls due to their complexity and overlapping responsibilities. This study investigates the functional strands, which are monitoring, evaluation, and corrective action, that underpin effective project control mechanisms from the perspective of construction companies. A purposive sample of ten experienced construction professionals, including managers, engineers, and consultants from firms with varied turnover levels, participated in a structured questionnaire. The instrument captured organizational arrangements, tools, reporting practices, and corrective action processes. Data were analyzed using descriptive statistics and thematic grouping to identify prevalent practices, efficiency levels, and challenges. Findings reveal that project monitoring is predominantly team-based (80%) and initiated as early as the design stage. Tools such as Primavera and MS Project are widely used, supplemented by progress and materials reports. Evaluation is conducted regularly, often weekly, with 80% of organizations integrating it into control team structures. Corrective action is largely management-led, with project managers responsible in 70% of cases, and is implemented collaboratively across departments. Efficiency analysis highlights significant time demands for data collection (30–50% of effort), excessive documentation burdens (80% reporting overproduction), and reliance on personnel with high technical expertise. The study confirms that monitoring, evaluation, and corrective action are interdependent strands essential to functional project controls. Challenges include documentation overload, variable reporting cadences, and limited use of specialized decision-support tools. A strategic framework emphasizing streamlined data collection, balanced reporting, and managerial responsiveness is proposed to enhance project control effectiveness in design-and-build projects.

Keywords: project controls, design-and-build projects, construction industry, monitoring and evaluation, corrective action, process quality

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INTRODUCTION

Project controls are indispensable in design-and-build projects, where the contractor assumes expanded responsibility for planning, technical integration, and cost discipline. In this delivery system, the term "strands" refers to three interrelated dimensions: monitoring (data collection), evaluation (performance analysis), and corrective action (managerial response). These strands are intrinsically linked: monitoring provides the evidence base, evaluation converts information into judgment, and corrective action converts judgment into action. When aligned, these elements improve schedule visibility and decision responsiveness; however, weak strands result in fragmented reporting and ineffective interventions.

Prior literature, including Kerzner's three-step process, the PMBOK framework, and Jackson's control cycle, frames project control as a cyclical process of measuring progress, comparing actuals against benchmarks, and taking documented action. Despite this, many organizations struggle with documentation overload and inconsistent reporting, particularly in complex design-and-build environments. While existing research discusses project success factors generally, fewer studies examine the specific internal strands that make controls functional for construction companies. This gap justifies the present study, which reinforces the view that project controls rely not just on tools, but on coordinated information, analysis, and skill-based intervention.

LITERATURE REVIEW

Project controls in design-and-build projects. The construction industry is defined by extreme complexity, uncertainty, and risk, necessitating robust project control to align activities with cost, time, and quality objectives (Ebekozien et al., 2021; Barrane et al., 2020). Historically, the sector has evolved from ancient engineering feats to a modern economic powerhouse contributing significantly to global GDP and employment (Ngowi et al., 2005; Kenny, 2007; CICA, 2002). Within this framework, the contractor's role is pivotal, especially in design-and-build projects where responsibility expands to include technical integration and performance monitoring (Gyula, 1998; Murdoch, 2000). While large firms utilize advanced systems like Primavera to enhance predictability, many projects still face adverse consequences when they fail to meet technical and stakeholder standards (Sambasivan & Soon, 2007; Lewis, 1998). Consequently, effective control must be viewed as a systematic, cyclical process of measurement and corrective action rather than a mere documentation function (Kerzner. 1995).

This research specifically examines the functionality of internal project controls through three operational strands: turn-around time, quality of work/process, and corrective action implementation. Unlike prior studies that emphasize broad stakeholder engagement or external coordination (Bal et al., 2013; Talapatra et al., 2018; Haywood et al., 2019; Aghimien et al., 2019), this study isolates the internal mechanisms of contracting organizations that enable timely information flow and effective managerial response. The persistence of delays and cost overruns in the industry suggests that the mere presence of management tools does not guarantee functional oversight. By focusing on how efficiently these internal strands operate within design-and-build settings, this study addresses a critical gap in the literature regarding the practical coherence of control systems from the perspective of the construction companies directly responsible for project execution.

Monitoring, process quality, and corrective action in project controls. The evolution of project success literature has transitioned from traditional cost-time metrics toward integrated frameworks emphasizing stakeholder satisfaction and manager competence (Jugdev & Muller, 2005). In construction, project monitoring, feedback, and coordination account for a significant 15.24% of project outcomes, alongside manager competence and organizational support (Jha & Iyer, 2006). However, complexity, governance failures, and exclusionary processes often hinder the communication and coordination necessary for delivery (Nguyen & Mohamed, 2021; Figueiredo-Filho et al., 2021; Gupta et al., 2019; Nambuta et al., 2015; Talapatra & Uddin, 2019; Mysore et al., 2021). While systematic participant classification and stakeholder registration can mitigate these risks, success remains dependent on organized information pathways and timely escalation of concerns (PMI, 2017; Huma et al., 2020; Sperry & Jetter, 2019).

This study refines these broad factors by focusing on the internal dimensions that make project controls functional within design-and-build projects: monitoring, process quality, and corrective action. Monitoring ensures the timely collection of data, which is vital in overlapping workflows were slow information turnover compromises performance. Process quality determines the reliability and consistency of this data, ensuring that management decisions are based on dependable outputs rather than fragmented reporting. Finally, corrective action represents the essential managerial response to identified deviations; without it, monitoring remains a passive activity. These three dimensions are deeply interrelated, as weak monitoring prevents early detection, poor quality leads to inaccurate decision-making, and delayed action fails to restore project alignment. By shifting from general stakeholder themes to these specific internal mechanisms, this research justifies a direct examination of functional control during project execution.

Project controls. Project controls ensure objective alignment through a systematic cycle of monitoring, assessment, and corrective action (PMBOK, 2000). Experts such as Kerzner (1995) and IPMA (1999, as cited in Gardiner, 2005) describe control as a multi-step process that compares actual performance against baseline plans to determine necessary responses, including potential replanning. Successful coordination in complex environments, like the Three Gorges Project, relies on seamless information flow between operations and decision-makers (Dai et al., 2006; Fortune & White, 2006). PMBOK (2000) further identifies that these activities span various knowledge areas, including scope, time, cost, and quality management, utilizing performance reports as inputs and updated plans as key outputs, demonstrating that control is a coordinated set of processes rather than a single activity.

Construction requires an iterative, seven-step cycle involving planning, benchmarking, monitoring, identifying deviations, evaluating options, making adjustments, and documenting results (Falco & Macchiaroli, 1998; Jackson, 2004). Disciplined implementation and data-gathering expertise are vital for specialized design-and-build systems, where the overlapping of design and construction creates greater demands for integrated coordination (Gardiner, 2005; Reschke & Schelle, 1990). In the context of the present study, these literary foundations justify examining the project controls mechanism through the specific strands of monitoring, process quality, and corrective action. Together, these strands determine whether controls function effectively by ensuring that regular data collection leads to reliable information and prompt managerial adjustments in response to identified deviations.

Conceptual Framework. The study is anchored on the view that a functional project controls mechanism in design-and-build projects is shaped by three core strands: monitoring, evaluation, and corrective action. These strands are influenced by organizational arrangements, tools and techniques, information flow, and the competencies of personnel. Their combined performance affects the overall functionality of project controls as experienced by construction companies.

Table 1
Conceptual Framework of the Study

Independent Strands	Operational Enablers	Expected Functional Outcome
Project Monitoring	Data collection, reporting lines, software tools, document control	Timely visibility of actual performance
Project Evaluation	Analysis routines, meetings, interpretation capability, risk assessment	Reliable identification of deviations and options
Corrective Action	Decision authority, coordination, leadership, escalation and follow-through	Timely intervention and improved project response

The goal of the study is to identify the variables that, from the standpoint of construction contracting organizations, affect or predispose the achievement of a functional project control system for a design and build project.

1. What project control dimensions are commonly applied in construction design-and-build projects in terms of turn-around time, quality of work/process, and corrective action implementation?

2. What is the level of efficiency of these project control dimensions in construction design-and-build projects?

3. What challenges are encountered by construction companies in implementing these project control dimensions?

4. Based on the findings of the study, what strategic plan may be proposed to improve the effectiveness of project control systems in construction design-and-build projects?

METHODS

Population and Sampling. The study employed ten (10) purposively sampled construction professionals with direct experience in project monitoring, evaluation, and corrective action within construction-related organizations. The participants' profile were diverse and highly experienced, with 50% possessing over 10 years of work experience and roles ranging from managers (40%) and engineers (30%) to heads or supervisors (20%) and consultants (10%).

Furthermore, 40% represented organizations with an annual turnover of USD 1–100 million, while another 40% came from large-scale firms earning USD 301 million and above. Primarily involved in residential and commercial building projects, these individuals were deemed suitable due to their professional capacity to provide informed, practical insights into the actual implementation of project control systems.

Instrumentation. The research utilized a structured questionnaire as the primary instrument, organized into four sections covering general organizational information, project monitoring, project evaluation, and corrective action. Designed to capture both quantitative and qualitative data, the instrument assessed key areas such as responsibility assignment, organizational setup, tools and systems, time allocation, and skill priorities. To ensure academic rigor and reliability, the questionnaire underwent formal review and validation by the research adviser, as confirmed by the appended instrument validation certification.

Data Gathering Procedure. Following the selection of qualified participants, the questionnaires were distributed with clear instructions for respondents to provide insights based on their actual organizational practices and professional expertise. Upon retrieval, the data was systematically organized, verified, and encoded for analysis. To strengthen the interpretation of findings, open-ended responses concerning input sources, reporting channels, and functional participation were grouped thematically, ensuring a robust qualitative discussion of the results.

Data Analysis. The study employed descriptive statistics and thematic analysis to address the research objectives, using frequency counts, percentage distributions, and thematic grouping to identify prevalent project control strands for Research Question 1. For Research Question 2, percentage distributions and rank aggregation were utilized to analyze the efficiency of organizational arrangements, reporting cadences, and expertise requirements, while Research Question 3 applied descriptive statistics and thematic analysis to isolate recurring implementation challenges. Finally, for Research Question 4, an analytical synthesis of these empirical findings and existing literature served as the foundation for developing a strategic plan anchored in high-priority strands and actual industry difficulties.

RESULTS

Project control dimensions that are commonly applied in construction design-and-build projects in terms of turn-around time, quality of work/process, and corrective action implementation. Table 2 shows that the project control dimensions commonly applied in construction design-and-build projects may be grouped into three major strands: project monitoring, project evaluation, and corrective action.

Table 2
Project Control Dimensions Commonly Applied in Construction Design-and-Build Projects

Dimension / Strand	Key Evidence from the Results	Frequency / Percentage	Interpretation
Project monitoring / turn-around time	Monitoring is handled by a project control team; the setup is both centralized and project-based.	8 / 80% for each item	Monitoring is institutionalized and combines head-office visibility with project-level information.
Project monitoring / turn-around time	Monitoring most commonly begins at the design stage; Primavera and MS Project are the main tools.	5 / 50%; 4 / 40% each tool	Monitoring starts early and is supported by planning/scheduling tools.
Project monitoring / turn-around time	Inputs include progress reports, materials and accomplishments, actual site conditions, percentage completion, manpower productivity, and quantitative data.	Thematic responses	Monitoring relies on both documentary records and actual site performance information.
Project evaluation / quality of work-process	Project evaluation is handled by a control team.	8 / 80%	Evaluation is generally treated as a team-based project controls function.
Project evaluation / quality of work-process	Evaluation setup is the same as monitoring for half of the respondents, while half reported a different setup.	5 yes / 50%; 5 no / 50%	Evaluation structures vary across organizations.
Project evaluation / quality of work-process	Most respondents reported no distinct tools for evaluation apart from monitoring; reports are commonly generated weekly.	7 / 70%; 8 / 80%	Evaluation is active but often relies on the same systems used for monitoring.
Corrective action implementation	Corrective action is mainly the responsibility of the project manager after conferring with department heads.	7 / 70%	Corrective action is primarily management-led and consultative.
Corrective action implementation	People are highly involved in practically every corrective-action decision.	8 / 80%	Corrective action requires cross-functional participation.
Corrective action implementation	No specialized tools such as decision trees or mind mapping are commonly used; corrective measures occur weekly or monthly.	7 / 70%; 5 / 50% each cadence	Corrective action is recurring but often depends on coordination and managerial judgment.
Corrective action implementation	Engineering specialists are engaged for process-control advice.	9 / 90%	Organizations recognize the value of technical support in corrective decisions.

These strands correspond with the study variables of turn-around time, quality of work/process, and corrective action implementation. The first strand, project monitoring, is strongly evident because 80% of respondents reported that monitoring is handled by a project control team and 80% also indicated that the monitoring setup is both centralized and project-based. This means that the participating organizations commonly maintain a project controls structure that links project-site information with centralized management oversight.

The results further show that monitoring begins relatively early in many organizations. Half of the respondents indicated that monitoring starts during the design stage, while 30% identified the conception stage and 20% identified the execution stage. In a design-and-build project, this is significant because design, procurement, and construction activities may overlap. Early monitoring therefore supports faster turn-around of information and helps the organization detect issues before they become site-level delays. The use of Primavera and MS Project, each cited by 40% of respondents, also confirms that project monitoring is normally supported by planning and scheduling tools.

The second strand, project evaluation, is also commonly applied. Eighty percent of respondents stated that project evaluation is handled by a control team. However, the results show that the structure of evaluation is not uniform. Half of the respondents reported that evaluation uses the same setup as monitoring, while the other half reported a different setup. Furthermore, 70% indicated that there are no distinct tools or methods for evaluating project performance apart from those used for monitoring. This suggests that evaluation is recognized as a project controls activity, but many organizations still rely on the same systems used for monitoring rather than using separate analytical or decision-support tools.

The third strand, corrective action, is likewise a common project control dimension. The findings show that corrective action is primarily led by the project manager, as reported by 70% of respondents, usually after conferring with department heads. This indicates that corrective action is not merely a clerical or reporting function; it is a management-led response to identified issues. The high level of organizational involvement reported by 80% of respondents further implies that corrective action often requires coordination among several functions. At the same time, 70% reported that no specialized corrective-action tools are used, suggesting that corrective action is commonly implemented through managerial judgment, consultation, and cross-functional coordination rather than through formal decision-support techniques.

Overall, the results for Research Question 1 indicate that the participating construction companies commonly apply the three core dimensions of project controls: monitoring, evaluation, and corrective action. Monitoring provides visibility of progress and actual conditions, evaluation interprets the information and supports performance review, while corrective action translates the findings into managerial intervention. These results support the view that a functional project controls mechanism is not a single activity but an interrelated process.

Level of efficiency of the project control dimensions in construction design-and-build projects. Table 3 presents the assessed efficiency of the project control dimensions. For project monitoring, efficiency appears functional but constrained. The largest group of respondents reported spending 30% of their time on data gathering. In addition, 80% stated that the organization produces more production documentation than required. This indicates that while monitoring is already embedded in organizational practice, it may be slowed by documentation volume, repeated reporting, and administrative requirements. In terms of expertise, all respondents indicated that monitoring requires either high or very high expertise, which means that monitoring efficiency depends heavily on the availability of competent project controls personnel.

Table 3

Level of Efficiency of the Project Control Dimensions

Dimension / Strand	Efficiency Evidence	Frequency / Percentage	Interpretation
Project monitoring	Most common time spent gathering data was 30%; more production documentation than required was also reported.	4 / 40%; 8 / 80%	Monitoring is active but affected by time demand and documentation burden.
Project monitoring	Monitoring requires high or very high expertise.	6 / 60% high; 4 / 40% very high	All respondents viewed monitoring as requiring strong capability.
Project evaluation	Evaluation-related data collection most commonly required 30% of time; evaluation alternatives are commonly reviewed weekly.	3 / 30%; 5 / 50%	Evaluation is regular but time-consuming.
Project evaluation	Project control reports are commonly generated weekly; distinct evaluation tools are generally absent.	8 / 80%; 7 / 70%	Evaluation outputs are frequent, but analytical support may be limited.
Corrective action	Corrective action is led by the project manager and supported by high involvement in decisions.	7 / 70%; 8 / 80%	Corrective action has clear leadership and strong participation.
Corrective action	Specialized corrective-action tools are generally absent; engineering specialists are commonly engaged.	7 / 70%; 9 / 90%	Corrective action may be technically supported but less standardized.
Corrective action	Corrective action generally requires high or very high expertise.	8 / 80%	Effective response depends on experienced and technically competent personnel.

For project evaluation, the findings also show a functional but mixed level of efficiency. Evaluation activities are recurring, with 50% of respondents reporting weekly review of control alternatives and 80% reporting weekly generation of project control reports. These results suggest that evaluation is not occasional or incidental; rather, it forms part of the regular control cycle. However, the efficiency of evaluation is limited by the fact that 70% of respondents reported no distinct tools or methods for evaluating project performance apart from monitoring tools. This may result in evaluation practices that are less analytical, less standardized, or too dependent on the interpretation of individual team members.

For corrective action, the results show strong management ownership and participation. The project manager is the principal responsible party, as indicated by 70% of respondents, and 80% reported high involvement in practically every corrective-action decision. This suggests that corrective action has organizational attention and decision authority. However, the absence of specialized tools reported by 70% of respondents may reduce the consistency and traceability of corrective responses. Corrective action also requires a high level of expertise. The engagement of engineering specialists by 90% of respondents suggests that organizations attempt to strengthen corrective-action efficiency through technical support.

Taken as a whole, the efficiency of the project control dimensions may be described as functional but not fully optimized. Monitoring, evaluation, and corrective action are all present and active; however, their efficiency is affected by heavy documentation, time-consuming data collection, limited use of specialized evaluation and corrective-action tools, and high dependence on competent personnel. Therefore, the prevailing strands operate as a functioning project controls mechanism, but they require process streamlining, clearer analytical methods, and stronger capability development to become more efficient.

Challenges encountered by construction companies in implementing the project control dimensions. Table 4 identifies the main challenges encountered by construction companies in implementing the project control dimensions. The most direct challenge is the documentation burden. Since 80% of respondents stated that their organizations produce more production documentation than required, the results suggest that monitoring and reporting may be affected by over-documentation. Although documentation is essential in construction projects, excessive documentation can weaken efficiency if project controls personnel spend more time preparing records than interpreting project performance and initiating action.

A second challenge is the time required for data collection and evaluation. Monitoring and evaluation both consume a meaningful portion of staff effort. The most common monitoring response was 30% of time spent on data gathering, while evaluation-related data collection also showed considerable variation. This indicates that project controls can become resource-intensive, particularly when data are manually collected, duplicated, or sourced from several departments without a consolidated system.

Table 4
Challenges Encountered in Implementing Project Control Dimensions

Challenge	Supporting Result	Affected Dimension	Implication
Excessive documentation	80% reported more production documentation than required	Monitoring and evaluation	Excessive reports may delay information flow and reduce time available for analysis.
Time-intensive data collection	Data gathering and evaluation consumed a notable portion of staff effort	Monitoring and evaluation	Project controls may become resource-intensive when data collection is not streamlined.
Limited distinct evaluation tools	70% reported no separate tools for evaluation	Evaluation / quality of work-process	Evaluation may lack depth, consistency, and standardized analytical support.
Limited corrective-action tools	70% reported no specific tools such as decision trees or mind mapping	Corrective action	Corrective action may depend heavily on experience and informal judgment.
Concentration of responsibility	70% identified the project manager as responsible for corrective action	Corrective action	Clear accountability is helpful, but overreliance on key roles may slow decisions when issues increase.
High competency requirements	Monitoring and corrective action require high or very high expertise for most responses	All dimensions	Implementation may be weak if organizations lack trained project controls personnel.
Variation in setup	Evaluation setup was split equally between same and different from monitoring	Evaluation and corrective action	Inconsistent structures may affect coordination, accountability, and response authority.

A third challenge concerns the limited use of specialized tools beyond monitoring. While Primavera and MS Project are commonly used, these are primarily planning and monitoring tools. The finding that 70% of respondents do not use distinct tools for evaluation and 70% do not use specific tools for corrective action indicates a gap in the analytical and decision-support side of project controls. Without structured evaluation templates, variance analysis formats, issue logs, action trackers, or decision-support methods, organizations may rely heavily on experience, informal discussions, or ad hoc coordination.

A fourth challenge is the concentration of responsibility in key roles. Monitoring and evaluation are generally handled by control teams, but corrective action is primarily assigned to the project manager. This arrangement provides accountability but may also create dependence on a limited number of decision-makers. In a design-and-build project where many technical, commercial, and site issues arise simultaneously, overconcentration of responsibility may slow response if escalation pathways and delegated authority are not clearly defined.

A fifth challenge is the high competency requirement across all project control dimensions. Respondents considered monitoring and corrective action to require high or very high expertise. The skill-ranking results also imply the need for analytical, technical, leadership, computer operational, presentation, communication, negotiation, and risk assessment skills. This confirms that project controls cannot be performed effectively by documentation alone; they require personnel capable of interpreting project data, coordinating with stakeholders, assessing deviations, and supporting management decisions.

Lastly, the results reveal variation in organizational setup and positioning. Half of the respondents reported that evaluation uses the same setup as monitoring, while the other half reported otherwise. The relationship among site management, corporate management, and project control also varied. This suggests that the project controls function may not be uniformly positioned across organizations. Such variation can create uncertainty in accountability, reporting lines, and response authority, especially in design-and-build projects where coordination must be rapid and integrated.

Proposed strategic plan to improve the effectiveness of project control systems in construction design-and-build projects. Table 5 presents the proposed strategic plan for improving the effectiveness of project control systems in construction design-and-build projects. The plan is anchored on the findings that monitoring, evaluation, and corrective action are already present in participating organizations but are constrained by documentation burden, time demands, limited specialized tools, high competency requirements, and variation in organizational setup.

Table 5
Proposed Strategic Plan to Improve the Effectiveness of Project Control Systems

Strategic Area	Basis from Findings	Proposed Action	Expected Improvement
Streamline monitoring and documentation	80% reported more documentation than required; data gathering consumed substantial time	Review reports, remove duplicate documentation, standardize templates, and consolidate monitoring data.	Faster turn-around time, reduced administrative burden, and clearer performance visibility.
Strengthen evaluation methods	70% reported no distinct tools for project evaluation	Introduce variance analysis, trend review sheets, dashboards, issue registers, and evaluation checklists.	Improved quality, consistency, and usefulness of evaluation outputs.
Improve corrective-action protocols	70% reported no specific corrective-action tools	Develop escalation matrices, action trackers, responsibility logs, closure verification, and lessons-learned records.	More traceable, timely, and consistent corrective action implementation.
Clarify roles and accountability	Responsibility is concentrated in project controls teams and project managers; setups vary	Define the roles of project controls teams, project managers, engineers, department heads, and corporate management.	Reduced ambiguity, better coordination, and clearer decision authority.
Build project controls capability	Monitoring and corrective action require high or very high expertise	Train personnel in planning tools, analysis, forecasting, risk assessment, communication, leadership, negotiation, and reporting.	Higher competence and stronger interpretation of project control information.
Formalize specialist support	90% reported engagement of engineering specialists	Establish a formal mechanism for involving technical, commercial, planning, and quality specialists in complex control issues.	Better technical review, stronger corrective decisions, and improved integration across disciplines.
Improve digital integration	Monitoring uses software, but evaluation and corrective action	Link planning software, cost records, document control, issue logs,	Reduced manual effort, improved data reliability, and

The first priority is to streamline monitoring and documentation. Since monitoring is the information base of project controls, it should remain systematic; however, unnecessary duplication should be reduced. Standard templates, consolidated data sources, and a clear reporting calendar can help improve turn-around time while preserving the reliability of project information.

The second priority is to strengthen evaluation methods. The finding that most organizations do not use distinct evaluation tools indicates a need for more structured analysis. Evaluation should not merely repeat monitoring outputs. Instead, it should interpret deviations, assess trends, compare actual performance against planned targets, and identify options for management decision-making. This can be supported through variance review templates, dashboard summaries, risk registers, and structured review meetings.

The third priority is to improve corrective-action protocols. Since corrective action is mainly led by the project manager and often implemented through consultation, clearer escalation and follow-through mechanisms are needed. Action trackers, responsibility assignment matrices, closure verification, and lessons-learned logs can help ensure that decisions are not only discussed but also implemented and monitored until closure.

The fourth priority is to clarify roles and accountability. Project controls should define who collects data, who verifies it, who evaluates deviations, who recommends action, who approves the response, and who monitors closure. This is especially important in design-and-build projects because design, procurement, construction, commercial, and quality issues are closely connected.

The fifth priority is to build capability among project controls personnel. The results show that project controls work requires high levels of expertise. Training should therefore cover technical interpretation, planning software, cost and schedule analysis, forecasting, risk assessment, communication, leadership, and negotiation. Capability development will improve the quality of both evaluation and corrective action.

Finally, the plan recommends formalizing specialist support and improving digital integration. Most respondents recognized the engagement of engineering specialists, which should be institutionalized for complex project control issues. In addition, the use of digital systems should move beyond monitoring and support evaluation, issue tracking, action follow-up, and management reporting. This would strengthen the complete project controls cycle from data collection to decision-making and corrective action.

The overall findings indicate that construction companies apply project controls through three interrelated strands: project monitoring, project evaluation, and corrective action. These strands are consistent with the theoretical view of project control as a cyclical process involving the collection of project information, assessment of performance, and implementation of corrective response. In the participating organizations, monitoring is commonly team-based and supported by planning tools; evaluation is undertaken through review and reporting cycles; and corrective action is led by management with cross-functional participation.

However, the findings also show that the existence of project controls does not automatically mean that the system is fully efficient. Monitoring and evaluation are active, but they require significant time and documentation. Corrective action is practiced, but it often relies on managerial consultation rather than formal tools. The results therefore point to an important distinction between the presence of project controls and the functionality of project controls. A project controls mechanism becomes functional only when information is timely, evaluation is reliable, and corrective action is properly implemented.

In the context of design-and-build projects, this distinction is particularly important. Because design and construction responsibilities are more integrated, delays in information flow, weak evaluation, or slow corrective action can affect several project workstreams at the same time. The findings suggest that construction companies can improve project controls by strengthening the linkage among monitoring, evaluation, and corrective action. Monitoring must provide timely and reliable data; evaluation must convert data into useful judgment; and corrective action must convert judgment into coordinated response.

The results therefore support the central premise of the study: attaining the strands of a functional project controls mechanism requires more than the adoption of software or reporting procedures. It requires a coherent system of roles, tools, competencies, communication pathways, and follow-through mechanisms. The strategic plan proposed in this chapter is intended to address these requirements and provide a practical basis for improving project control systems in construction design-and-build projects.

DISCUSSION

This study examined project control dimensions in construction design-and-build projects, specifically focusing on turn-around time, quality of work/process, and corrective action implementation. The findings reveal that while monitoring and evaluation are embedded in the project cycle—often starting at the design stage and continuing through weekly or monthly reviews—efficiency is constrained by a 30% to 35% staff time requirement for data gathering and an 80% documentation burden. Quality is supported by structured reporting and tools like Primavera and MS Project, yet 70% of organizations lack specialized tools for evaluation and corrective action. Furthermore, while corrective action is a participative, management-led process primarily assigned to project managers, it remains vulnerable to role concentration and high competency requirements. To address these challenges, a strategic plan was proposed to streamline reporting, standardize procedures, clarify accountability, and build staff capability, ensuring that project controls function as a cohesive system rather than isolated administrative tasks.

The study concludes that project control dimensions are active but not optimal in construction design-and-build practices. While recurring review cycles and team-based monitoring are present, their effectiveness is moderated by excessive documentation, time-intensive processes, and a reliance on managerial judgment over standardized decision-support systems. The findings confirm that project control is a cyclical process of monitoring, assessment, and response, but its success depends heavily on the timely coordination of these strands rather than the mere existence of software. Ultimately, improving these systems requires more than procedural existence; it necessitates a reduction in administrative overhead, clearer accountability frameworks, and the integration of specialized analytical tools to support high-level expertise across all organizational levels.

To improve project control effectiveness, construction companies should prioritize reducing unnecessary documentation and standardizing procedures to enhance turn-around time and process quality. It is recommended that organizations adopt more structured tools specifically for evaluation and corrective action while investing in targeted capability development for personnel in analytical and forecasting skills. For project managers and control staff, strengthening the coordination between site teams and corporate functions is essential to ensure that outputs are used for active intervention rather than just reporting. Finally, future researchers should consider larger sample sizes, comparative analyses from client or consultant perspectives, and deeper case studies to further explore how these control dimensions influence long-term project outcomes across different sectors of the construction industry.

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