

Project management, process control and organizational coordination of construction projects: Basis for construction project performance framework

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Abstract

Construction projects are complex projects that require effective management, control, and coordination to achieve desired results. This study examines the relationship between project management, process control, and organizational coordination and their impact on construction project performance. By examining these factors, the study aims to provide insights into best practices for managing construction projects and improving their overall performance. Descriptive design was utilized in the study as it describes the relationships and patterns between these variables. This involves examining how effective project management practices, rigorous process control, and effective organizational coordination contribute to overall project performance. A self-designed questionnaire was used as it allowed the researcher to tailor questions to the specific research objectives and the unique characteristics of the respondents. This ensures that the data collected is directly relevant to the research objectives. A total of 400 managerial and non-managerial employees from 50 construction companies in Hubei, Henan and Shandong province were used as respondents of the study. Based on the results, the respondents have moderate agreement on project management as to contract management, information management, and security management and these are all essential for the successful completion of construction projects. The process control of the construction companies in terms of quality control, progress control and cost control were found essential tools to improve the construction project outcomes. Results demonstrated that organizational coordination, which encompasses personnel coordination, material coordination, and fund coordination, are indispensable for the achievement of successful construction projects. There are significant relationships between project management, process control and organizational coordination. Finally, a construction project performance framework was developed for construction companies.

Keywords: project management, process control, organizational coordination, construction performance framework

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1. Introduction

The construction industry is a complex and dynamic industry, characterized by large-scale projects, complex processes, and the need for effective collaboration between various stakeholders. Successful project management in this field requires a delicate balance between project planning, resource allocation, and coordination of various activities.

Construction project management involves planning, organizing, directing, and controlling project activities to achieve defined objectives within specified time, cost, and quality. Effective project management requires a comprehensive understanding of project scope, resources, and risks, as well as the ability to adapt to changing circumstances. Construction projects, as an important part of modern social development, play an important role in promoting economic growth and upgrading of urban infrastructure. However, the complexity and diversity of construction projects also pose challenges in project management, process control and organizational coordination. Kerzner (2019) argues that in construction companies, effective project management, process optimization and resource coordination to ensure that project quality, progress and costs are effectively controlled have become key factors in improving enterprise competitiveness and project success. Studies have consistently shown that effective project management is crucial for the success of construction projects. This includes proper planning, resource allocation, risk management, and communication. Technological advancements have significantly influenced the way construction projects are managed. Tools such as Building Information Modeling (BIM) and project management software have improved project efficiency and coordination.

Process control plays an important role in ensuring the smooth and efficient execution of construction projects. By monitoring and controlling project processes, managers can identify potential problems early and take corrective action to avoid delays and an increase in costs. Process control involves setting clear performance standards, measuring progress against those standards, and adjusting, when necessary (Construction Industry Institute (CII), 2020). Interestingly, Chen et al. (2021) disclosed that process control is essential for ensuring that construction projects are executed efficiently and effectively. This involves setting clear performance standards, monitoring progress, and making necessary adjustments.

Organizational coordination is another essential aspect of successfully managing a construction project. In complex projects involving multiple stakeholders, effective coordination is essential to ensure that all parties are working towards the same goals and that resources are allocated efficiently. Organizational coordination includes establishing clear communication channels, resolving conflicts, and promoting cooperation among team members (International Project Management Association (IPMA), 2021). As revealed by El-Gohary et al. (2020), effective organizational coordination is vital for successful construction projects, especially in complex projects involving multiple stakeholders. This includes establishing clear communication channels, resolving conflicts, and fostering collaboration.

The present study found it difficult to engage stakeholders from different organizations and levels within the construction industry because different parties may have conflicting interests and priorities. Generalizing the results of a particular study to the entire construction industry can be difficult due to differences in project characteristics, cultural contexts, and regulatory environments. Collecting accurate and complete data on construction projects can be difficult due to privacy concerns, data security concerns, and the complexity of project management systems. Through in-depth research on project management, process control and organizational coordination in construction companies, problems and gaps can be identified, effective solutions

can be determined, and a scientific management foundation can be provided for construction companies. In addition, building a reasonable framework for construction companies will help improve overall business efficiency, minimize risks, and achieve sustainable development.

This study aims to explore the relationship between project management, process control and organizational coordination and their impact on construction project performance. By considering these factors, the researcher may contribute to the body of knowledge by determining the best practices and strategies to improve the project outcomes in the construction business. The study will gain an in-depth understanding of the relationship between project management, process control and organizational coordination in construction projects of construction companies and their significance in the context of the development of construction companies. By systematically studying and analyzing the practices of project management, process control and organizational coordination, this aims to provide construction enterprises with scientific and reasonable management strategies and practical suggestions to further improve construction project management, optimize project performance and enhance business competitiveness.

By understanding the importance of project management, process control, and organizational coordination, construction companies can take steps to improve their project performance. This can lead to increased profits, reduced risk, and improved customer satisfaction. By examining these factors, researchers can gain a deeper understanding of the key factors that contribute to the success or failure of construction projects. This knowledge can be used to develop better project management methods and strategies. Studying these factors can help identify best practices in project management, process control, and organizational coordination. These practices can be shared throughout the construction industry to improve project outcomes.

1.1 Objectives of the Study

The study aimed to examine the project management, process control and organizational coordination among construction companies which was made the basis in developing a construction project performance framework for construction companies. Specifically, it determined project management as to contract management, information management, and security management; described the process control as to quality control, schedule control, and cost control; assessed the organizational coordination in terms of personnel coordination, material coordination, and fund coordination; tested the significant relationship among project management, process control and organizational coordination and developed a construction project performance framework for construction companies.

2. Methods

2.1 Research Design

This study mainly adopts descriptive quantitative research methods to comprehensively understand project management, process control, and organizational coordination of construction companies. Descriptive quantitative design focuses on describing and measuring the characteristics of phenomena through quantitative data. The purpose of this design is not to test hypotheses or determine causal relationships, but to provide detailed and accurate descriptions of specific groups, events, or situations. The goal of the researcher is to describe in detail the characteristics of a group or phenomenon, and this design is particularly useful for this. It can be used to determine the level characteristics of project management in construction companies or to evaluate the universality of specific variables in project management. Secondly, descriptive quantitative design helps establish baseline data, which is crucial for future comparative research. By collecting and analyzing data, benchmark information can be provided for further research and policy formulation on the performance of construction companies. Descriptive quantitative design can also aid in policy making. By providing detailed information on the current situation and scale of specific issues, research findings can guide decision-makers in formulating more targeted and effective policies. Trend analysis is also an application area of descriptive

quantitative design. By conducting research at different time points, trends can be analyzed and compared to understand the changes of a certain phenomenon over time. Finally, descriptive quantitative design can provide quick feedback. The researcher was able to collect and analyze data, providing timely information to decision-makers, which is crucial for situations that require quick response. This study collected detailed descriptions and perspectives on project management, process control, and organizational coordination of construction companies through in-depth interviews and focus group discussions. Through communication with project managers, construction personnel, quality control personnel, suppliers, and other relevant personnel, a deeper understanding of the problems and challenges in actual project execution can be gained and practical experience and effectiveness of project management and organizational coordination can be explored.

2.2 Participants of the Study

In this study, construction companies were selected as the research sample because they are the main contractors of construction projects, directly responsible for project execution and management. By studying project management, process control, and organizational coordination among different construction companies, there can be a better understanding of their performance and effectiveness in these areas, while providing reference for the development of construction company frameworks. The participants in the survey were 20 construction companies from Henan Province, China, 15 construction companies from Shandong Province, and 15 construction companies from Hubei Province. A total of 50 construction companies participated in the survey. The survey subjects all came from these 50 construction companies, who held different positions such as project manager, technical director, cost estimator, construction worker, and safety officer. A total of 400 people participated in the survey questionnaire. When choosing a construction company, a series of standards were set to ensure the relevance and representativeness of the sample. Including the size of the company, divided into small, medium-sized, and large enterprises; type, such as residential builders, commercial builders, or infrastructure builders; and geographical location, distinguishing companies from urban, suburban, or rural areas. In addition, the company's historical performance, market reputation, financial stability, management practices, market positioning, industry certification and qualifications, as well as experience and professional knowledge in specific fields or types of projects, were also important selection criteria.

2.3 Instrument of the Study

A self-made questionnaire was tailored to their company type, personnel positions, and construction project situation. By creating their own questionnaire, supporters can ensure that it focuses on the most relevant aspects of developing an efficiency framework. This avoids including irrelevant questions in general questionnaires that may not be applicable to specific research objectives. In addition, self-made questionnaires allow researchers to easily adjust and modify questions as needed. Supporters can also have complete control over the content, wording, and format of the questionnaire, ensuring that it accurately reflects research objectives and terminology in specific industries.

The questionnaire is divided into two parts. The first part is the basic information of the participants, including age, gender, teaching experience, professional title, education level, salary, etc. The second part is an evaluation of project management, process control, and organizational coordination, evaluating three variables from nine dimensions. Project management consists of three dimensions, namely contract management (6 projects), information management (6 items), and security management (6 projects); Evaluate process control from quality control (6 projects), schedule control (6 items), and cost control (6 projects); Organizational coordination involves a total of 54 projects, including personnel coordination (6 projects), material coordination (6 projects), and fund coordination (6 projects). Researchers obtained data through online surveys. According to Likert's four-point scale design, the higher the score, the higher the degree of consistency. On the contrary, the lower the score, the lower the degree of consistency. The value "1" represents strong opposition, represented by "SD", "2" represents disagreement, represented by "D", "3" represents agreement, represented by "A", "4" represents strong agreement, represented by "SA".

To ensure the reliability and consistency of the questionnaire and scale, Cronbach alpha analysis was used to evaluate internal consistency. The range of reliability coefficient is between 0 and 1, used to represent reliability. A coefficient exceeding 0.6 is considered satisfactory, while the range of 0.7-0.8 represents considerable reliability, and the range of 0.8-0.9 represents excellent reliability. This rigorous analysis aims to establish the credibility and stability of measurement tools in the academic environment, providing a solid foundation for research design and data collection methodology. Based on result, the Project Management, Process Control, Organizational Coordination Instrument has an Excellent consistency as exhibited by the Cronbach's Alpha value of .980. This was validated by the Excellent remarks from Project Management (.976); it was confirmed by the Excellent results from Contract Management (.927), Information management (.925), and Security management (.942).

Table 1

Reliability Summary Table – Project Management, Process Control, Organizational Coordination Instrument

Indicators	Cronbach Alpha	Remarks
Project Management, Process Control, Organizational Coordination Instrument	.980	Excellent
Per variable		
Project Management	.976	Excellent
Contract management	.927	Excellent
Information management	.925	Excellent
Security management	.942	Excellent
Process Control	.953	Excellent
Quality control	.926	Excellent
Progress control	.904	Excellent
Cost control	.863	Good
Organizational Coordination	.917	Excellent
Personnel coordination	.913	Excellent
Material coordination	.952	Excellent
Funding coordination	.717	Acceptable

George and Mallery (2003) provide the following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable”

Also, it was validated by the Excellent remarks from Process Control (.953); it was confirmed by the Excellent result from Quality control (.926), Progress control (.904), and the Good result from Cost control (.863). Moreover, it was further validated by the Excellent results from Organizational Coordination (.917); it was confirmed by the Excellent results from Personnel coordination (.913), Material coordination (.952) and Acceptable result from Funding coordination (.717) which shows that the instrument at hand passed the reliability index test. Thus, the researcher proceeded to the actual survey using the instrument.

From the table, the alpha coefficients of Cronbach are all above 0.7. Among them, the coefficients of contract management, information management, security management, quality control, schedule control, personnel coordination, and material coordination are all greater than 0.9. The conclusion is "Very Good". The coefficients for cost control are all greater than 0.8, and the conclusion is "Good". The coefficient of fund coordination is only less than 0.8, with a maximum coefficient of 0.952 and a minimum coefficient of 0.717, indicating that the reliability and quality of the questionnaire are very high and suitable for data investigation and collection.

2.4 Data Gathering Procedure

The literature used in this study were published papers, monographs, and books, which provided support for the reliability of the dissertation; the use of the platform provided by the Questionnaire Star website, which distributes and recovers the questionnaire online, saved costs and allowed for relevant analysis of the data collected by the questionnaire. Experts in the domains of construction validated the content to see whether the questionnaire is suitable and sufficient for assessing the research variables. Furthermore, content validation

verified if the questionnaire assessed the variables and ideas needed for the study effectively. A valid questionnaire ensures that the study's results are legitimate and accurate. Cronbach's alpha was employed in reliability testing to determine the questionnaire's internal consistency. Cronbach's alpha coefficient helped reliability analysis using SPSS to evaluate the internal consistency of the different questionnaire parts. In this study, four hundred construction company employees from twenty-five cities in Henan Province, Shandong Province, and Hubei Province participated in the survey. Further, ethical considerations and authorization prior to data collection were done. The researcher requested necessary authorizations from the human resources heads of the selected construction companies. The study respects ethical principles, ensuring data and participant confidentiality. Informed consent was obtained from all respondents prior to data collection. Through the Questionnaire Star platform, the questionnaire was administered, and data was gathered online. To increase efficiency and reach a larger number of respondents, the questionnaire was distributed online. There was an explicit instruction on the questionnaire to guarantee data completeness and accuracy. The gathered information was periodically retrieved and safely kept for examination later. The gathered data went through a rigorous cleaning procedure to find and fix any inconsistencies or errors throughout the data retrieval process.

2.5 Data Analysis

Weighted average and rank were used to determine project management in terms of contract management, information management, and security management; to describe process control from three aspects: schedule control, quality control, and cost control; and to determine organizational coordination from the aspects of personnel coordination, material coordination, and fund coordination. Therefore, Spearman rho was one of the non-parametric tests to determine significant relationships. SPSS version 28 helped in analyses.

2.6 Ethical Considerations

Before proceeding with data collection, the researcher considered ethical considerations such as informed consent, information disclosure and over-collection. Firstly, the purpose of the study was clearly explained to the participants in a prominent place in the questionnaire and that the survey was for academic research only, at the same time, they had the full right to refuse to participate or not to answer the questions that are difficult for them to answer to ensure the quality and completeness of the questionnaire recovery. Secondly, questionnaire fillers filled out the questionnaire online in an anonymous way without writing down their names or personal identification in the questionnaire, which guaranteed their anonymity and confidentiality. Thirdly, all information of the questionnaire fillers is kept strictly confidential, no video or audio recording were made, and the findings of the questionnaire were exclusively used for the study of the problem without excessive data collection and analysis.

3. Results and discussion

Table 2

Summary Table on Project Management

Key Result Areas	Composite Mean	VI	Rank
Contract Management	3.17	Agree	1
Information Management	3.12	Agree	2
Security Management	3.06	Agree	3
Grand Composite Mean	3.12	Agree	

Legend: 3.50-4.00 = Strongly Agree; 2.50-3.49 = Agree; 1.50-2.49 = Disagree; 1.00-1.49=Strongly Disagree

This table provides a comprehensive average of the key outcome areas of project management with average of 3.12. This value indicates that respondents generally believe that all aspects of project management have been recognized and implemented to a certain extent. The indicator that obtained the highest comprehensive average is "Contract Management", with a value of 3.17 and an agreed verbal interpretation. The highest score in

contract management may indicate that in project management, the clarity of contract terms and the strictness of contract execution are considered crucial for project success. This may be related to the core role of contract management in ensuring project goals are achieved, risk allocation, and stakeholder expectation management. The literature supports this point, emphasizing that good contract management is the cornerstone of project success, helping to avoid disputes, control costs, and ensure timely delivery. Wang et al. (2023) proved that to ensure that agreements are carried out properly and efficiently, contract management is a crucial component of business operations. It entails tasks, such as contract negotiation, drafting, execution, oversight, and termination.

Table 3

Summary Table on Process Control

Key Result Areas	Composite Mean	VI	Rank
Quality Control	2.87	Agree	2
Progress Control	2.63	Agree	3
Cost Control	2.90	Agree	1
Grand Composite Mean	2.80	Agree	

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

Table 3 provides a comprehensive evaluation of the key outcome areas of process control. The total comprehensive average is 2.80. This value indicates that respondents generally believe that various aspects of process control have been implemented, but there may still be room for improvement. The overall comprehensive average value of 2.80 may reflect that although process control has received some recognition in actual implementation, respondents believe that there is still potential for further improvement. In the table, "Cost Control" achieved the highest ranking with a comprehensive average of 2.90. The highest cost control score may be due to its direct impact on the economic feasibility and profitability of the project. Effective cost control can help the project avoid overspending and ensure reasonable allocation of resources. Additionally, Pinto et al. (2023) stated that to guarantee that projects are finished within budget, cost control is an essential component of project management. Efficient cost control strategies can maximize the utilization of project resources, including personnel, supplies, and machinery, resulting in increased productivity and decreased expenses. Cost control can help reduce risks and avoid financial surprises by spotting and resolving cost overruns early on. Project management procedures can be more efficient by using cost control data to pinpoint problem areas. Project managers can improve future projects by implementing adjustments based on their analysis of cost performance.

Table 4

Summary Table on Organizational Coordination

Key Result Areas	Composite Mean	VI	Rank
Personnel Coordination	3.17	Agree	1
Material Coordination	3.12	Agree	2
Fund Coordination	3.06	Agree	3
Grand Composite Mean	3.12	Agree	

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

This table is a comprehensive evaluation of key outcome areas for organizational coordination. The total comprehensive average is 3.12. This value indicates that respondents generally believe that various aspects of organizational coordination have been actively implemented and recognized. Organizational coordination is a key factor for successful project management, which includes personnel coordination, material coordination, and financial coordination. The overall comprehensive average of 3.12 reflects the overall satisfaction of the respondents with organizational coordination practices but may also suggest areas for improvement. In the table, "Personal Coordination" achieved the highest ranking with a comprehensive average of 3.17. The highest score in personnel coordination may be due to its involvement in key factors such as communication, decision-making, problem-solving, and role allocation among team members, which are important foundations for project success.

An efficient collaborative team can improve the efficiency and effectiveness of project execution.

Table 5

Relationship Between Project Management and Process Control

Variables	rho	p-values	Interpretation
Contract Management			
Quality Control	0.747**	0.000	Highly Significant
Progress Control	0.653**	0.000	Highly Significant
Cost Control	0.713**	0.000	Highly Significant
Information Management			
Quality Control	0.778**	0.000	Highly Significant
Progress Control	0.876**	0.000	Highly Significant
Cost Control	0.770**	0.000	Highly Significant
Security Management			
Quality Control	0.780**	0.000	Highly Significant
Progress Control	0.740**	0.000	Highly Significant
Cost Control	0.769**	0.000	Highly Significant

** . Correlation is significant at the 0.01 level

Table 5 displays the correlation between project management and process control, measuring the degree of correlation between different fields by calculating rho values (a correlation coefficient), and using p-values to test whether these correlations are statistically significant. The table indicates that the correlation is significant at the 0.01 level, with over 99% confidence that the correlation does not occur by chance. As shown in the table, the calculated rho values range from 0.653 to 0.876, indicating a strong to very strong direct relationship between the sub variables of project management and process control. There is a statistically significant relationship between project management and process control, as the p-value obtained is less than 0.01. As disclosed by Al-Tamimi et al. (2023), project management and process control are interdependent. Effective project management requires tight process control to ensure that project activities are carried out as planned. In turn, effective process control can be achieved through good project management practices (Chen et al.,2021). Both project management and process control aim to achieve project objectives. They work together to ensure that project activities are consistent with overall objectives and that resources are used efficiently. Effective process control helps identify and mitigate risks that can affect project performance. Both project management and process control are iterative processes that involve continuous improvement. By monitoring and evaluating project performance, managers can identify areas for improvement and make necessary adjustments.

The correlation between contract management and quality control, schedule control, and cost control is 0.747, 0.653, and 0.713, respectively, with p-values of 0.000, indicating that these correlations are highly significant. This means that there is a strong positive correlation between the effectiveness of contract management and the quality, schedule, and cost control of the project. The correlation between information management and quality control, schedule control, and cost control is 0.778, 0.876, and 0.770, respectively, with a p-value of 0.000, indicating that these correlations are also highly significant. This indicates that information management has an extremely important impact on project quality, schedule, and cost control. The correlation between safety management and quality control, schedule control, and cost control is 0.780, 0.740, and 0.769, respectively, with a p-value of 0.000. These correlations are also highly significant. This indicates that the implementation of safety management is equally crucial for ensuring project quality, progress, and cost control.

Data analysis shows that there is a significant positive correlation between various aspects of project management, including contract management, information management, and security management, and key areas of process control, such as quality control, schedule control, and cost control. This means that effective implementation in these areas is crucial for the success of process control in project management. These findings are consistent with the literature review on project management, which emphasizes the role and importance of various fields of project management in ensuring project success.

Table 6*Relationship Between Project Management and Organizational Coordination*

Variables	rho	p-values	Interpretation
Contract Management			
Personnel Coordination	1.000**	0.000	Highly Significant
Material Coordination	0.643**	0.000	Highly Significant
Fund Coordination	0.768**	0.000	Highly Significant
Information Management			
Personnel Coordination	0.643**	0.000	Highly Significant
Material Coordination	1.000**	0.000	Highly Significant
Fund Coordination	0.622**	0.000	Highly Significant
Security Management			
Personnel Coordination	0.768**	0.000	Highly Significant
Material Coordination	0.622**	0.000	Highly Significant
Fund Coordination	1.000**	0.000	Highly Significant

** . Correlation is significant at the 0.01 level

Table 6 describes the correlation analysis of the relationship between project management and organizational coordination. As shown in the table, a calculated rho value of 1 indicates a perfect relationship between contract management and personnel coordination, while a calculated rho value of 0.643 indicates a close and direct relationship between contract management and material coordination. Similarly, the calculated rho value of 0.768 indicates a close direct relationship between contract management and financial coordination. The calculated rho value of 1 represents the perfect relationship between information management and material coordination, while the calculated rho value of 0.643 represents the close relationship between information management and personnel coordination. Similarly, the calculated rho value of 0.622 indicates a close relationship between information management and fund coordination. The calculated rho value of 1 indicates a perfect relationship between security management and fund coordination, while the calculated rho value of 0.768 indicates a close relationship between security management and personnel coordination. Similarly, the calculated rho value of 0.622 indicates a close relationship between safety management and material coordination.

There is a statistically significant relationship between project management and organizational coordination, as the p-value obtained is less than 0.01. As revealed in the study of El-Gohary et al. (2020), both project management and organizational coordination aim to achieve project goals. Effective project management requires the coordinated efforts of various stakeholders, while organizational coordination ensures that these stakeholders work towards common goals. Project management involves the allocation of resources such as time, budget, and personnel. Huang et al. (2019) disclosed that organizational coordination ensures that these resources are used effectively and efficiently to achieve project goals. Effective communication and collaboration among stakeholders are essential for successful project management. Organizational coordination plays an important role in facilitating these processes. Project management and organizational coordination both involve identifying and mitigating risks that could affect the success of a project. Effective coordination can help identify and resolve potential problems before they become serious.

Data analysis shows that all correlations are highly significant at the 0.01 level, and there is a significant positive correlation between various aspects of project management, including contract management, information management, and security management, and various sub areas of organizational coordination. Especially, the correlation between contract management and personnel coordination, information management and material coordination, security management and fund coordination has reached a perfect positive correlation, which emphasizes the importance of these areas in organizational coordination. These findings are consistent with the literature review on project management, which emphasizes the role and importance of various fields of project management in ensuring project success. This positive correlation indicates that in this study, as the level of contract management, information management, and security management in project management improves. There has also been a corresponding increase in organizational coordination.

Table 7*Relationship Between Process Control and Organizational Coordination*

Variables	rho	p-values	Interpretation
Quality Control			
Personnel Coordination	0.747**	0.000	Highly Significant
Material Coordination	0.778**	0.000	Highly Significant
Fund Coordination	0.780**	0.000	Highly Significant
Progress Control			
Personnel Coordination	0.653**	0.000	Highly Significant
Material Coordination	0.876**	0.000	Highly Significant
Fund Coordination	0.740**	0.000	Highly Significant
Cost Control			
Personnel Coordination	0.713**	0.000	Highly Significant
Material Coordination	0.770**	0.000	Highly Significant
Fund Coordination	0.769**	0.000	Highly Significant

** . Correlation is significant at the 0.01 level

This is a correlation analysis of the relationship between process control and organizational consistency. As shown in table 7, the calculated rho values range from 0.653 to 0.876, indicating a strong to very strong direct relationship between the sub variables of process control and organizational coordination. There is a statistically significant relationship between process control and organizational coordination, as the obtained p-value is less than 0.01. The correlation between quality control and organizational coordination in three areas (personnel coordination, material coordination, and fund coordination) is 0.747, 0.778, and 0.780, respectively, with p-values of 0.000, indicating that these correlations are highly significant. The correlation between progress control and organizational coordination in three areas is 0.653, 0.876, and 0.740, respectively, with p-values of 0.000, indicating that these correlations are also highly significant. The correlation between cost control and organizational coordination in three areas is 0.713, 0.770, and 0.769, respectively, with a p-value of 0.000. These correlations are also highly significant. All correlations are highly significant at the 0.01 level, indicating a significant positive correlation between quality control, schedule control, and cost control in process control and personnel coordination, material coordination, and financial coordination in organizational coordination.

Both process control and organizational coordination aim to ensure successful project execution. Effective process control requires coordinated efforts from various stakeholders, while organizational coordination ensures that these stakeholders work towards common goals. Process control involves the efficient allocation of resources, while organizational coordination ensures that these resources are used effectively to achieve project goals. Further, effective communication and collaboration among stakeholders is essential for both process control and organizational coordination. Organizational coordination plays an important role in resolving conflicts that may arise during project execution, ensuring that processes can continue smoothly. In essence, process control and organizational coordination are two sides of the same coin. According to Khan et al. (2018), effective process control requires close organizational coordination and vice versa. This interdependence is essential to the successful execution of construction projects.

Table data analysis shows that there is a significant positive correlation between various aspects of process control, including quality control, schedule control, and cost control, and the various sub areas of organizational coordination. Especially, there is the highest correlation between schedule control and material coordination (rho=0.876), indicating that effective schedule control has an extremely important impact on material coordination and management during the project process. These findings are consistent with the literature review on project management, which emphasizes the role and importance of process control and organizational coordination in ensuring project success. Project management, process control and organizational coordination are three principal elements for the successful execution of a construction project, and there is a close relationship between them, which affects each other and jointly determines the performance and results of the project.

In summary, project management, process control and organizational coordination are interrelated and indispensable. Project management provides the overall framework and objectives of project execution, process control is responsible for achieving the objectives of project management, and organizational coordination is the basis of project management and process control to ensure efficient cooperation and information sharing among project teams. A good project management system requires effective process control and organizational coordination, and the effectiveness of process control and organizational coordination also directly affects the effectiveness of project management and project performance. Therefore, in construction projects, integrated consideration of project management, process control and organizational coordination is the key to ensuring successful project execution and reliable performance.

Construction Project Performance Framework

This study proposes a construction project performance framework for construction companies to improve the performance of project management, process control, and organizational coordination, thereby enhancing the quality of construction companies and more effectively promoting the development of construction companies.

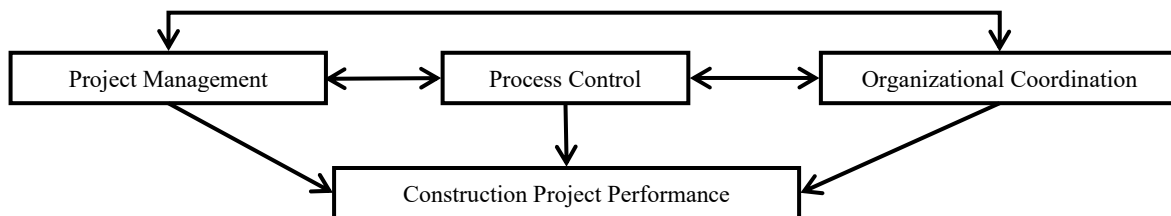


Figure 1. Construction Project Performance Framework

The Construction Project Performance Framework (CPPF) is an essential tool for evaluating the success of construction projects. It provides a structured approach to measuring and evaluating project performance across various dimensions, such as time, cost, quality, safety, and customer satisfaction. The interaction between project management, process control, and organizational coordination is essential to achieving successful project outcomes. The CPPF can help integrate these elements into a coherent framework for measuring and improving performance. Its key benefits are: The CPPF provides a data-driven approach to decision making, allowing project managers to identify areas for improvement and allocate resources effectively. By establishing clear performance measures, CPPF can enhance the accountability of project stakeholders and improve transparency. CPPF can help identify and mitigate potential risks that could impact project performance. By regularly monitoring and evaluating project performance, organizations can identify opportunities for improvement to improve future projects. From the figure above, based on the theoretical analysis of the relationship between project management, process control, and organizational coordination, the research results indicate that project management and process control have a significant positive effect on improving the professional ability of project managers. Therefore, organizational coordination enhances the supportive role of project management, and the professional identity of project managers continues to rise, which is an effective way to improve their professional abilities.

4. Conclusions and recommendations

The respondents have moderate agreement on project management as to contract management, information management, and security management and these are all essential for the successful completion of construction projects. The process control of the construction companies in terms of quality control, progress control and cost control were found to be an essential tool to improve the construction project outcomes. Results demonstrated that organizational coordination, which encompasses personnel coordination, material coordination, and fund coordination, are indispensable for the achievement of successful construction projects. There are significant

relationships between project management, process control and organizational coordination. A Construction Project Performance Framework was developed for construction companies.

Based on the conclusions of the study, the researcher produced the following recommendations. Construction managers may examine the role of technology in improving project management practices in construction companies which may involve studying the use of project management software, artificial intelligence, or other technologies to enhance project planning, execution, and monitoring. Project managers may examine the impact of process control on the quality, efficiency, and safety of construction projects which may involve studying how process control practices can be used to reduce defects, improve productivity, and prevent accidents. Construction managers may explore the use of organizational coordination to support innovation and continuous improvement in construction companies. The Construction Project Performance Framework may be used as reference and for utilization by the construction companies. Future researchers may explore other relevant variables in the field of construction to help improve the construction industry and make a positive impact on business.

5. References

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