

# IMPACT OF COORDINATION FACTORS ON CONSTRUCTION PROJECT SUCCESS: A QUANTITATIVE AND STATISTICAL ANALYSIS OF THE CONSTRUCTION INDUSTRY IN PAKISTAN

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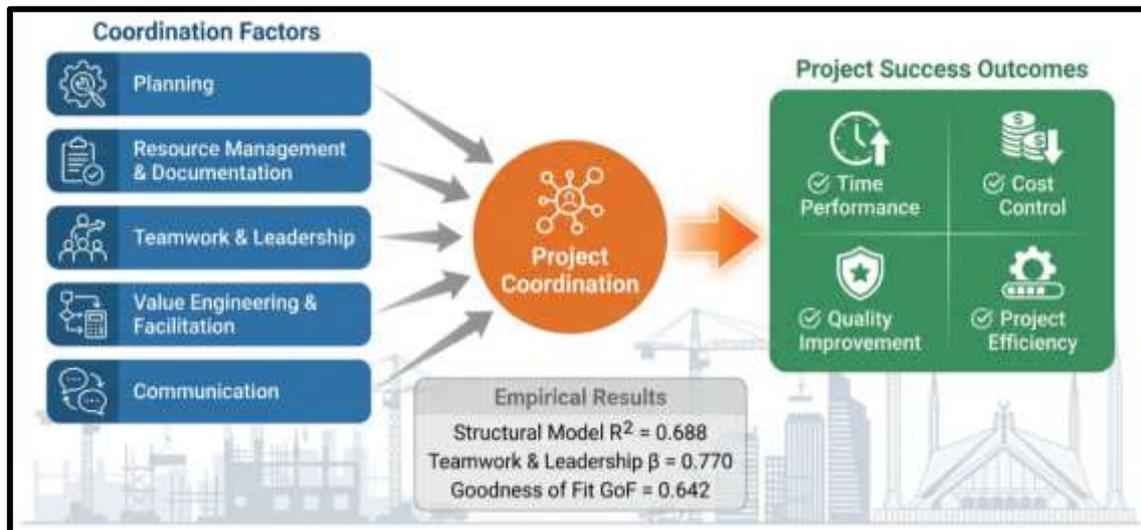
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## Abstract

The construction industry plays a critical role in economic development by supporting infrastructure growth, employment generation, and industrial expansion; however, achieving successful construction project outcomes remains a persistent challenge, particularly in developing countries. Construction projects involve complex and interdependent activities that require effective coordination among multiple stakeholders, including project managers, contractors, consultants, engineers, suppliers, and regulatory authorities. This study investigates the impact of coordination factors on construction project success in Pakistan by examining key coordination constructs, including planning, resource management and documentation, teamwork and leadership, value engineering and facilitation, and communication-related factors. A quantitative research design was adopted, and primary data were collected using a structured questionnaire distributed to 166 construction professionals, yielding 90 valid responses (response rate: approximately 54%). Statistical analyses, including factor analysis, reliability testing, and Structural Equation Modeling (SEM), were employed to evaluate the relationships between coordination variables and project success indicators. The results demonstrate that coordination significantly influences project success, with the structural model explaining 68.8% of the variance in project performance ( $R^2 = 0.688$ ). Among the examined constructs, teamwork and leadership exerted the strongest influence on coordination, with standardized path coefficients of  $\beta = 0.770$  and  $R^2 = 0.625$ , while communication and value engineering factors were also identified as highly influential determinants of coordination effectiveness. The conceptual model achieved a Goodness of Fit (GoF) value of 0.642, confirming the adequacy and reliability of the proposed framework. The findings indicate that inadequate coordination among project participants leads to schedule delays, cost overruns, and reduced quality performance, whereas effective coordination mechanisms enhance communication, streamline project activities, and improve overall project outcomes. This research contributes to the theoretical understanding of coordination as a critical success factor in construction project management and provides practical insights for policymakers and industry professionals seeking to improve construction project performance through enhanced coordination practices.



Graphical Abstract

### 1.1 INTRODUCTION

The construction industry has undergone significant structural and operational changes since the mid-twentieth century. These changes are reflected in the increasing number and complexity of construction projects as well as the growing demand for specialized skills and advanced technologies (Wu et al., 2016). Modern construction projects frequently involve sophisticated structural designs and integrated mechanical and electrical systems that must accommodate the needs of diverse user groups, including individuals with disabilities. The fragmented nature of the construction industry further increases project complexity and creates challenges in managing project activities effectively. As a result, strong coordination among project participants has become essential for successful project delivery (Olanipekun et al., 2017). Unlike many other industries, construction projects consist of numerous interdependent activities and work packages that require the participation of multiple stakeholders, including owners, architects, engineers, contractors, subcontractors, suppliers, financial institutions, and government authorities.

Due to the involvement of many stakeholders, project participants often have difficulty accessing relevant information at the appropriate time and location. This lack of information flow can lead to poor productivity, low-quality outcomes, schedule delays, and cost overruns. Consequently, coordination and

communication among stakeholders have become critical determinants of project success in the construction industry. In many developing economies, including Pakistan, the construction sector plays a key role in national economic growth and infrastructure development. The industry is closely linked with other economic sectors such as transportation, housing, education, and commercial development. Therefore, improving coordination practices on construction projects is essential to enhancing project performance and supporting broader economic development. Project success is a complex and multidimensional concept that is difficult to define precisely. Evaluating whether a project is successful often depends on subjective judgments and varies according to stakeholder perspectives (Parfitt & Sanvido, 1993; Chan, 2002). Elattar (2009) proposed a framework for evaluating the success of construction projects by identifying three main perspectives: project owners, designers, and contractors. Each stakeholder group evaluates project success using different criteria. For project owners, success is typically associated with completing the project within the planned time and budget, achieving functional requirements, ensuring high quality, generating a satisfactory return on investment, and minimizing inconvenience during construction.

From the designers' perspective, project success includes delivering a high-quality architectural product, achieving professional and financial

objectives, meeting project deadlines and budgets, avoiding legal claims, and maintaining a clearly defined scope of work. For contractors, success is primarily defined by completing the project on schedule, within budget, and with acceptable quality standards while maintaining profitability and client satisfaction. Traditional project management literature has long emphasized the “iron triangle” of time, cost, and quality as the primary indicators of project success. However, scholars argue that these criteria alone are insufficient to capture the complexity of project performance (Thomas, 2002). Modern approaches to project evaluation emphasize additional dimensions such as stakeholder satisfaction, leadership effectiveness, and the efficiency of project management processes.

Research by Pinto and Slevin (1989) examined critical success factors across 159 research and development projects and found that the determinants of project success vary across the project life cycle. These stages include project initiation, planning, execution, and closure. Each phase requires different managerial strategies and coordination mechanisms to ensure successful outcomes. In construction projects, achieving success typically involves completing them on time, within budget, and meeting required quality standards. However, inadequate coordination among project stakeholders often becomes a major barrier to achieving these objectives. Large construction projects require continuous collaboration among project owners, contractors, consultants, designers, suppliers, and regulatory authorities. The project manager plays a crucial role in coordinating these activities by developing strategies that ensure efficient communication and collaboration among stakeholders. Effective coordination helps manage dependencies among project tasks and improves the overall efficiency of project delivery. By managing interactions between different processes and activities, coordination enhances project performance and reduces the likelihood of delays and conflicts (Buehner, 2015). Therefore, coordination factors are fundamental components that significantly influence the overall performance of construction projects. Identifying and managing this coordination

elements can improve collaboration among project participants and enhance project outcomes. Contractors, consultants, and project owners must work together throughout the project lifecycle to ensure that project objectives are achieved efficiently (Brown et al., 2017).

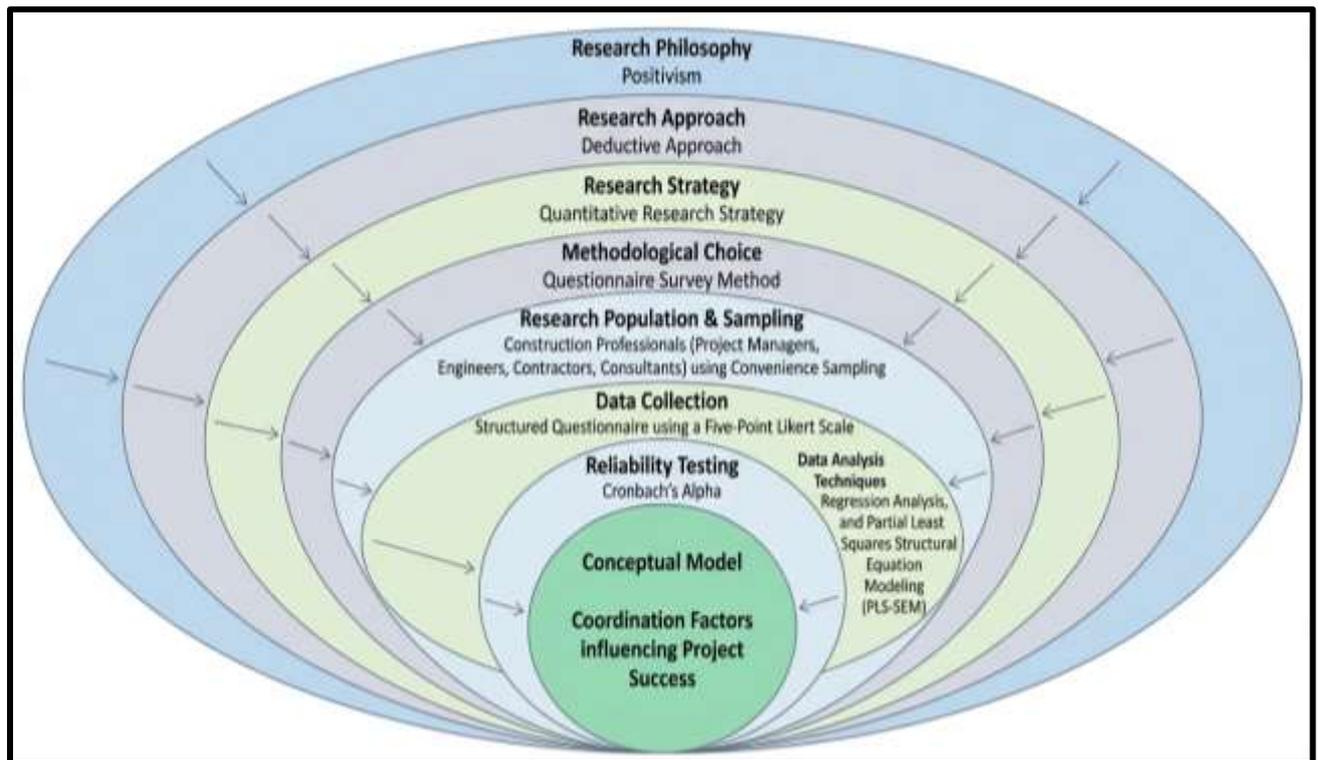
Ensuring the success of construction projects remains a major concern for governments, project owners, and communities worldwide, especially in developing countries. A project is generally considered successful when it meets stakeholder expectations and achieves its intended objectives. However, differing stakeholder perspectives often make it difficult to determine whether a project has been successful (Doloi, 2013). Traditionally, project success in the construction industry has been evaluated using the iron triangle of cost, time, and quality. Projects that are completed on schedule, within budget, and with acceptable quality standards are typically considered successful (Singh, 2017; Israr, 2018). Over time, however, this perspective has evolved to include additional dimensions such as stakeholder satisfaction and overall project performance.

Despite advances in project management practices, many construction projects still experience significant challenges, including low productivity, poor quality, unexpected costs, and schedule delays (Damoah et al., 2018). These problems are often linked to inadequate coordination among project stakeholders. In Pakistan, the government has invested heavily in construction and infrastructure projects. For example, by December 2020, approximately 389 construction projects worth PKR 157 billion had been submitted for approval under government development initiatives (Government of Pakistan, 2020). Given the substantial financial investment and strategic importance of these projects, ensuring their successful completion has become a national priority. However, limited research has examined the role of coordination factors in determining construction project success in Pakistan. Therefore, this study aims to investigate the impact of coordination mechanisms on project success and identify the most critical coordination factors affecting construction project performance in the country.

### Research Methodology

Research explains the methodological framework used to investigate the coordination factors influencing the success of construction projects. Research methodology, as seen in **Figure 1**, plays an essential role in ensuring that research findings are reliable, valid, and scientifically credible. It describes the

procedures, techniques, and strategies used to collect and analyze data to achieve the research objectives and answer the research questions. The methodology of this study follows a structured research design based on the research onion framework proposed by Saunders, Lewis, and Thornhill (2019), which provides a systematic approach to research planning and execution.



**Figure 1: Methodological framework illustrating the research design used in this study, including research philosophy, research approach, sampling method, data collection procedures, and statistical techniques used to analyze coordination factors influencing construction project success.**

### 2.1 The Research Onion

The research onion model provides a comprehensive framework for designing research methodology by presenting multiple layers of research decisions that researchers must address when conducting a study. The research onion was introduced by Saunders, Lewis, and Thornhill (2007) to help researchers understand the sequential stages involved in developing a robust research design. The model comprises several layers: research philosophy, research approach, research strategy, methodological choice, time horizon, and data collection and analysis techniques. Each layer represents a

methodological decision that contributes to the overall research design and ensures that the research process is logically structured and theoretically grounded. The research onion helps researchers justify their methodological choices by systematically moving from general philosophical assumptions to specific research techniques. The outer layers represent broader research perspectives, while the inner layers focus on specific procedures such as sampling, data collection, and statistical analysis. By adopting the research onion framework, researchers can ensure methodological consistency and transparency in their research design. In the present study, the research onion

framework was used to guide the selection of research philosophy, research strategy, research approach, sampling technique, and data analysis methods to investigate coordination factors affecting construction project success.

**2.2 Research Philosophy**

Research philosophy refers to the set of beliefs and assumptions about the nature of knowledge and reality that guide the research process (see **Figure 2**). It influences the way researchers interpret data, formulate research questions, and select appropriate research methods (Bryman, 2016). Among the commonly used philosophical paradigms in social science research are positivism, interpretivism, realism, and pragmatism. The present study adopts a positivist research philosophy, which assumes that reality is objective and can be measured using empirical data and statistical analysis. Positivism is widely used in quantitative research because it focuses on testing theoretical relationships among measurable variables using structured data-collection instruments and statistical techniques (Creswell & Creswell, 2018). In this research, the positivist paradigm is appropriate because the study aims to examine the relationship between coordination factors and project success through measurable

indicators. The importance of investigating project success in the construction industry has increased significantly in recent years, particularly in developing countries such as Pakistan.

The construction sector in Pakistan has faced numerous challenges, including economic fluctuations and the impact of the COVID-19 pandemic, which disrupted construction activities during 2018 and 2019. During the early stages of the pandemic, government-imposed lockdowns temporarily halted construction. However, in April 2020, the government allowed the industry to resume operations to support economic recovery and employment generation. To stimulate growth in the construction sector, the government introduced a construction stimulus package that included tax incentives, subsidies for the Naya Pakistan Housing Scheme, and policies to promote affordable housing development. Given the strategic importance of the construction sector for economic growth and infrastructure development, it is essential to identify the factors that influence the success of construction projects. Therefore, this research aims to analyze coordination factors that contribute to project success within the construction industry.

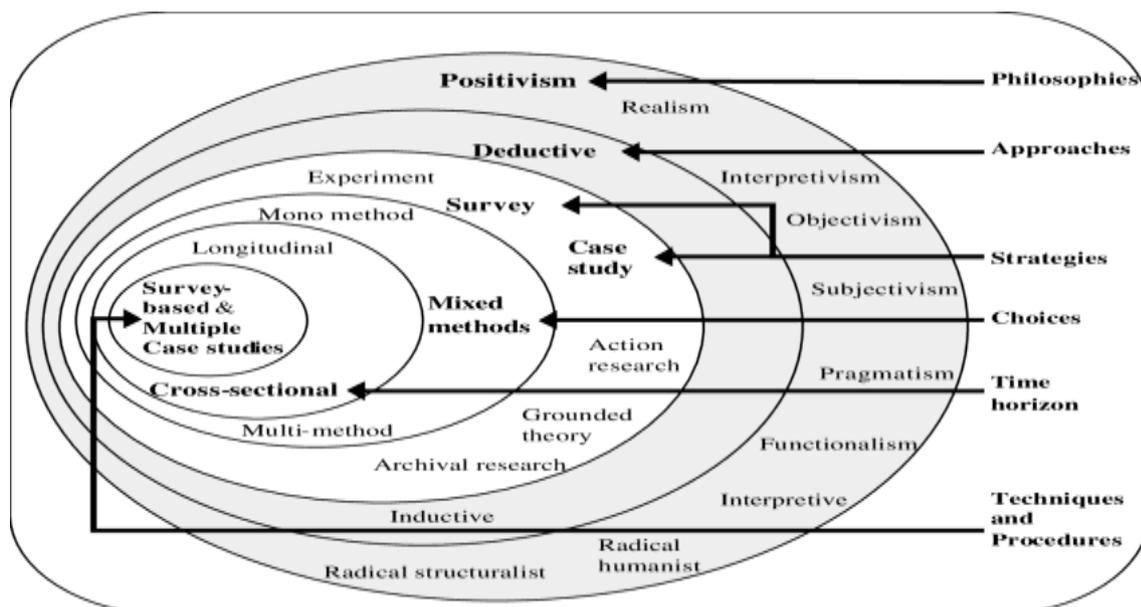


Figure 2: Research Onion framework illustrating the methodological structure of the study, including research philosophy, approach, strategy, methodological choice, time horizon, and techniques used for data collection and analysis.

### 2.3 Research Strategy

Research strategy refers to the overall plan for conducting research and achieving the research objectives. It determines how data will be collected, analyzed, and interpreted in order to answer the research questions (Saunders et al., 2019). In this study, a quantitative research strategy was adopted because the research focuses on measuring relationships between coordination variables and project success indicators using statistical analysis. A structured questionnaire was used as the primary data collection instrument. Questionnaires are commonly used in quantitative research because they allow researchers to efficiently and cost-effectively collect standardized information from large numbers of respondents (Bryman, 2016). The questionnaire used in this study was developed based on previous literature related to coordination factors and construction project management. The questionnaire consisted of multiple sections designed to measure coordination factors, project success indicators, and respondents' demographic information. Before distributing the questionnaire to respondents, reliability and validity were assessed using statistical techniques, including factor loadings and varimax rotation. These techniques help determine whether the questionnaire items accurately measure the intended constructs and ensure that the data collected are reliable for statistical analysis. The questionnaire was then distributed to construction professionals, including project managers, engineers, consultants, and contractors who are actively involved in construction project management.

### 2.4 Research Approach

The research approach used in this study is deductive, involving developing hypotheses based on existing theories and testing them with empirical data. Deductive research begins with theoretical concepts derived from previous studies and then formulates hypotheses that can be tested through data analysis (Creswell & Creswell, 2018). Since the objective of this study is to examine the relationship between coordination factors and project success, the deductive approach is appropriate. The questionnaire used in this research consisted of

three sections. The first section included questions designed to measure coordination factors identified from previous literature on construction project management. The second section collected demographic information about respondents, including their professional roles, years of experience, and organizational affiliations within the construction industry. The third section focused on evaluating project success indicators. Statistical techniques, such as analysis of variance (ANOVA), were used to examine differences among demographic groups and to identify patterns in participants' responses.

### 2.5 Research Population and Sampling

The study's population consists of professionals working in the construction industry. These professionals include project managers, contractors, engineers, consultants, and other construction practitioners who are directly involved in the planning and implementation of construction projects. These individuals were selected as the target population because they possess practical experience and professional knowledge related to coordination practices in construction projects. Due to practical constraints associated with data collection during the COVID-19 pandemic, a non-probability sampling technique was used in this study. Specifically, convenience sampling was adopted because it enables researchers to collect data from readily accessible participants who are willing to participate in the research (Etikan et al., 2016). Although convenience sampling may limit the generalizability of the findings, it is commonly used in social science research when access to respondents is limited.

### 2.6 Data Collection

Primary data were collected using a self-administered questionnaire distributed to professionals working in the construction industry. Primary data collection was selected because it provides firsthand information about the experiences and perceptions of construction professionals regarding coordination practices and project success. The questionnaire was structured using a five-point Likert scale from strongly disagree to strongly agree, allowing respondents to indicate their level of agreement

with statements on coordination factors and project success indicators. The questionnaire was distributed electronically to participants to facilitate data collection during the pandemic period. The use of online surveys allowed respondents to complete the questionnaire at their convenience and ensured that the data collection process complied with health and safety restrictions during the COVID-19 outbreak.

### 2.7 Data Analysis

Data analysis is a crucial step in the research process because it involves interpreting collected information to identify meaningful patterns and relationships. In this study, statistical analysis techniques were used to examine the relationships between coordination factors and project success variables. An exploratory research design was adopted because the study seeks to identify coordination factors that influence project success in the construction industry (Schoonenboom & Johnson, 2017). Correlation analysis was used to examine the strength and direction of relationships between variables, while regression analysis was used to test the research hypotheses and determine the impact of coordination factors on project success. Additionally, Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied to analyze complex relationships among latent variables and observed indicators. PLS-SEM is widely used in management and social science research because it allows researchers to examine multiple relationships simultaneously and analyze complex conceptual models (Hair et al., 2017).

### 2.8 Reliability of the Instrument

Reliability refers to the consistency and stability of a research instrument in measuring a particular concept. Ensuring the questionnaire's reliability is essential for producing accurate and trustworthy research results (Bryman, 2016). In this study, the questionnaire's reliability was assessed using Cronbach's alpha, a measure of internal consistency. Cronbach's alpha values above 0.6 are generally considered acceptable for exploratory research studies. The reliability analysis conducted in this study indicated that the Cronbach's alpha values for the study

variables exceeded the acceptable threshold, confirming that the questionnaire items were internally consistent and reliable. Similar reliability testing procedures have been widely used in construction management research to ensure the accuracy of measurement instruments (Li et al., 2006).

### 2.9 Conceptual Model

A conceptual model was developed in this study to examine the relationship between coordination factors and project success in construction projects. The conceptual model provides a theoretical framework that explains how different coordination mechanisms influence project performance outcomes. Structural Equation Modeling (SEM) was used as the analytical technique to test the relationships among the variables included in the model. The conceptual model consists of exogenous variables representing coordination factors and an endogenous variable representing project success. The coordination factors were categorized into five major groups: planning-related factors, resource management and documentation factors, teamwork and leadership factors, value engineering and facilitation factors, and communication-related factors. These factors represent key coordination mechanisms that influence collaboration among project stakeholders. Project success is treated as the dependent variable in the model and is measured using four indicators related to project performance. The variables included in the conceptual model were measured using a five-point Likert scale. By examining the relationships between these variables, the conceptual model helps identify coordination factors that significantly influence the successful completion of construction projects.

### 3. Results and Discussion

This study used a questionnaire survey to identify the critical success factors influencing construction project success in Pakistan and to examine the role of coordination in improving project outcomes. The questionnaire was developed following an extensive review of the relevant literature and consultation with local experts in construction project management practices. During the development stage, the

draft questionnaire was reviewed by an educationalist and a contract engineer to assess content validity, readability, appropriateness of language, and the relevance of the items to the Pakistani construction industry. Their feedback was used to refine the wording, improve clarity, and include additional items considered important for the study. As a result, the final version of the questionnaire was strengthened before formal distribution.

The final questionnaire was divided into two sections. Section 1 collected demographic and organizational information about the respondents, while Section 2 focused on the main study variables. Total of 16 items were organized into 4 major groups, with each group containing 4 related components. These items were measured using a five-point Likert scale, where 1 represented strongly agree, 2 represented agree, 3 represented some degree of agreement, 4 represented disagree, and 5 represented strongly disagree. Before final administration, a pilot test was conducted with a small number of potential respondents to identify possible weaknesses in wording or structure. The suggestions obtained during this stage were incorporated into the final design of the instrument. This process improved the overall reliability and practical usefulness of the questionnaire for measuring critical success factors in the construction sector.

### 3.1 Variables Used for Critical Success

The study examined four major categories of variables considered essential to construction project success. These were the project manager's competencies, management-related risks, contractor-related factors, and consultant-related factors. Each category was selected based on prior literature and practical relevance to construction project execution. Together, these variables formed the basis for evaluating how different coordination-related dimensions contribute to project success in Pakistan.

The first category, project manager competencies, included variables such as commitment to meeting cost and quality targets, previous experience, monitoring of project progress, coordination ability, motivating skills, and adaptability to changes in the project plan. These factors were included because the project

manager is expected to play a central role in controlling project activities and ensuring that all stakeholders remain aligned with project objectives. The second category, management-related risk, consisted of possession of site, stakeholder issues, availability of skilled labor, and timely release of payments. These variables reflect the risks that can disrupt implementation and reduce project efficiency.

The third category covered contractor-related factors, including the extent of subcontracting, the contractor's technical capability, financial situation and assets, and the contractor's track record. These factors are critical because contractors are responsible for executing the work and directly influence productivity, quality, and timely delivery. The fourth category included consultant-related factors such as the consultant's track record, qualifications, and the strength of the monitoring and evaluation systems. These variables were included because consultants are responsible for technical supervision, guidance, and quality control. Overall, these four groups of variables provided a comprehensive structure for assessing the factors that influence project success in the Pakistani construction industry.

### 3.2 Response Rate of Questionnaire

A total of 166 questionnaires were distributed to construction professionals in Pakistan, both in paper and electronic formats. The questionnaire was available in both English and Urdu to make it easier for respondents from diverse professional backgrounds to participate. Of the 166 distributed questionnaires, 90 completed responses were received and deemed usable for analysis. This produced a response rate of approximately 54.2% when calculated directly from the numbers received. However, the study text reports a response rate of more than 58%, and in either case, the response rate falls within an acceptable range for questionnaire-based research according to survey research standards. The demographic information in **Figure 3** shows that the respondents were largely qualified, experienced professionals from the construction industry. The majority were engineers, while a smaller number were diploma holders or DAE-qualified practitioners. Their years of experience ranged from 5–9 years, 10–15 years, and 15 years

or above. According to the results described in the text, 68% of the respondents had more than 10 years of experience in the construction industry. This is an important finding because it indicates that the majority of respondents possessed sufficient professional experience to provide informed judgments regarding coordination, management, and project success. The distribution of responses presents the general response pattern of the survey participants. Results show that respondents had

handled multiple construction projects, with some reporting experience of 5–7 projects, others 15–18, and several respondents having managed as many as 21–24. This level of exposure suggests that the sample was not limited to junior or inexperienced personnel. Rather, it represented professionals with substantial industry knowledge, thereby enhancing the reliability of the findings and supporting the validity of the study’s conclusions.

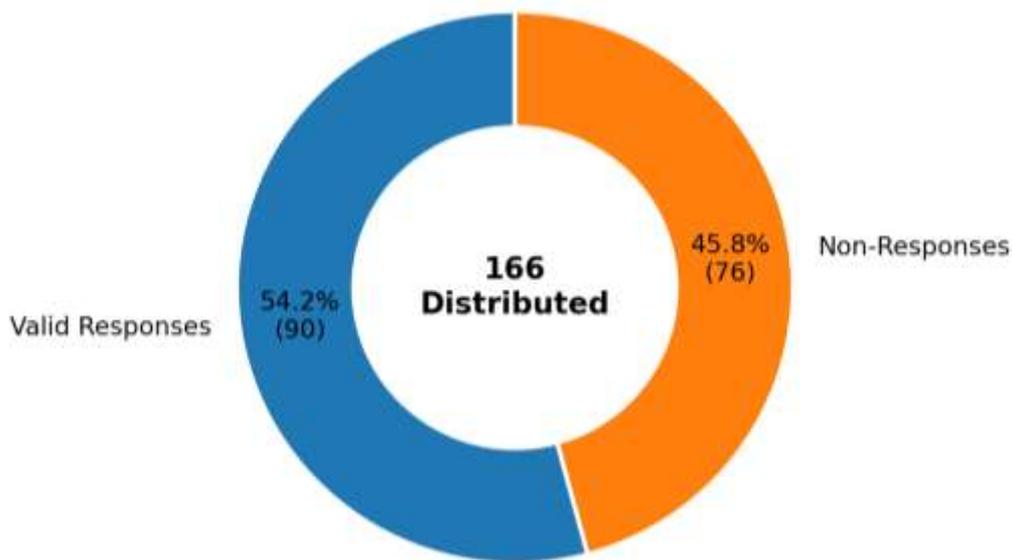


Figure 3: The demographic information shows that the respondents were largely qualified, experienced professionals in the construction industry.

### 3.3 Competencies of the Project Manager

The results indicate that the project manager's competencies are among the most important determinants of construction project success. This dimension included several important items, such as commitment to cost and quality targets, previous experience, monitoring of project progress, coordination ability, motivating skills, and adaptability to changes in

the project plan. The responses presented in Figure 4 show that most participants either strongly agreed or agreed with the importance of these project management competencies. This suggests that project managers are considered central to the successful delivery of construction projects in Pakistan.

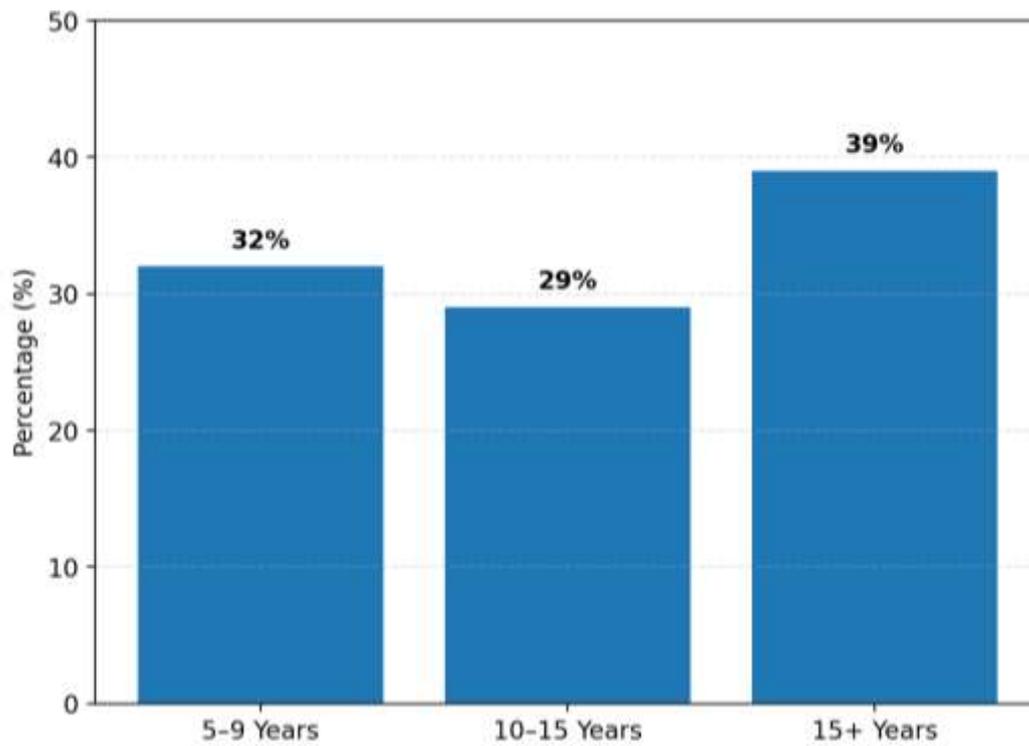


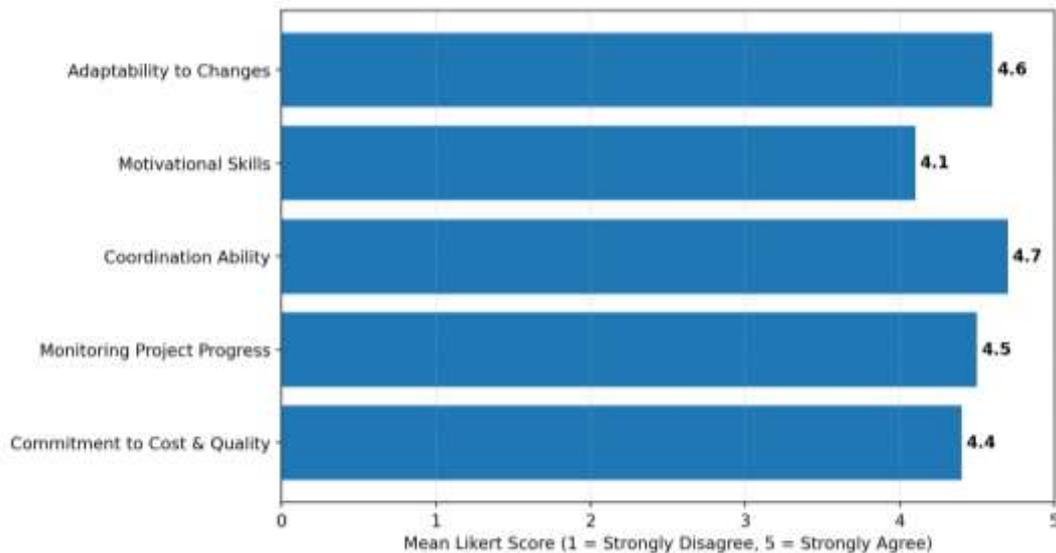
Figure 4. Participants either strongly agreed or agreed with the importance of these project management competencies.

The findings further indicate that respondents with different levels of experience shared similar views on the importance of project manager competencies. Participants with 5 to 10 years of experience, as well as those with more than 15 years, emphasized that project managers must possess both technical and interpersonal skills to execute projects effectively. According to the survey discussion, 29% of respondents had more than 10 years of project management experience, which reinforces the reliability of the views expressed regarding managerial competence. This is significant because experienced professionals are more likely to understand how project managers influence project outcomes in practice. The pattern of responses indicates strong agreement that the project manager's skills are directly linked to project success. The discussion of these findings suggests that project managers are expected to fulfill multiple responsibilities simultaneously, including administrative control, team leadership, communication management, and stakeholder coordination. In complex construction environments, these responsibilities become

even more critical because delays, design changes, and resource shortages require quick decisions and strong leadership. The results therefore confirm that the project manager's competence is not only a supporting factor but a core success factor that influences cost performance, time performance, quality achievement, and team coordination.

### 3.4 Management-Related Risk

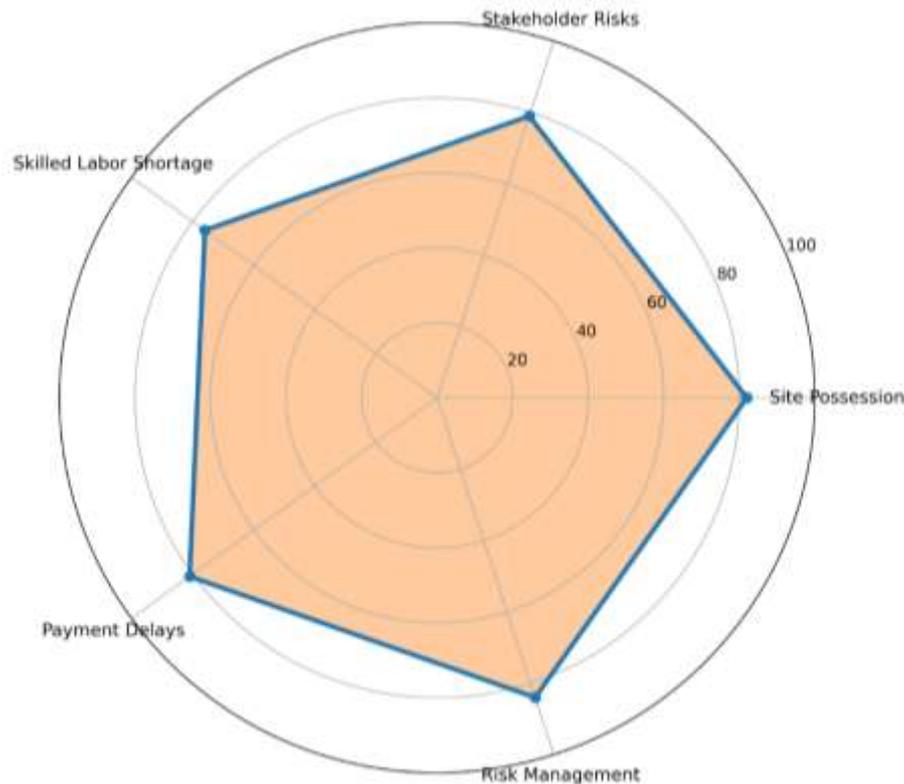
Management-related risk was also found to be a major determinant of project success. This category included possession of site, stakeholder-related risks, shortage of skilled labor, and delay in release of payments. The responses shown in **Figure 5** indicate that most respondents either strongly agreed or agreed that these risks significantly affect construction project outcomes. The figure clearly shows that professionals across different experience levels regarded risk management as an essential aspect of successful project delivery.



**Figure 5: Most respondents either strongly agreed or agreed that these risks significantly affect construction project outcomes.**

The results reveal that respondents with experience ranging from 5 years to 25 years consistently recognized the importance of management-related risk. This broad agreement suggests that risk is not viewed as an isolated issue affecting only certain projects or firms but rather as a common challenge throughout the construction sector. Risks such as delayed site possession can halt project initiation, while stakeholder conflicts can lead to disputes and coordination breakdowns. Similarly, lack of skilled labor affects workmanship and productivity, and delayed payments can disrupt contractor performance and resource flow. These risks may create cumulative negative effects on project time, cost, and quality.

As reflected in **Figure 6**, the responses demonstrate that management-related risks are strongly linked to project performance. The discussion suggests that risk management practices within the construction industry are still developing and require further improvement in awareness, training, application, and the use of analytical tools. The findings imply that the success of construction projects depends not only on technical planning but also on managers' and organizations' ability to identify, assess, and proactively respond to risks. In this respect, risk management should be treated as an integral part of project coordination rather than a separate or secondary activity.



**Figure 6: Management-related risk factors, including site possession, stakeholder risks, skilled labor shortages, payment delays, and overall risk management, were perceived as strongly influencing construction project success.**

### 3.5 Factors Related to Contractor

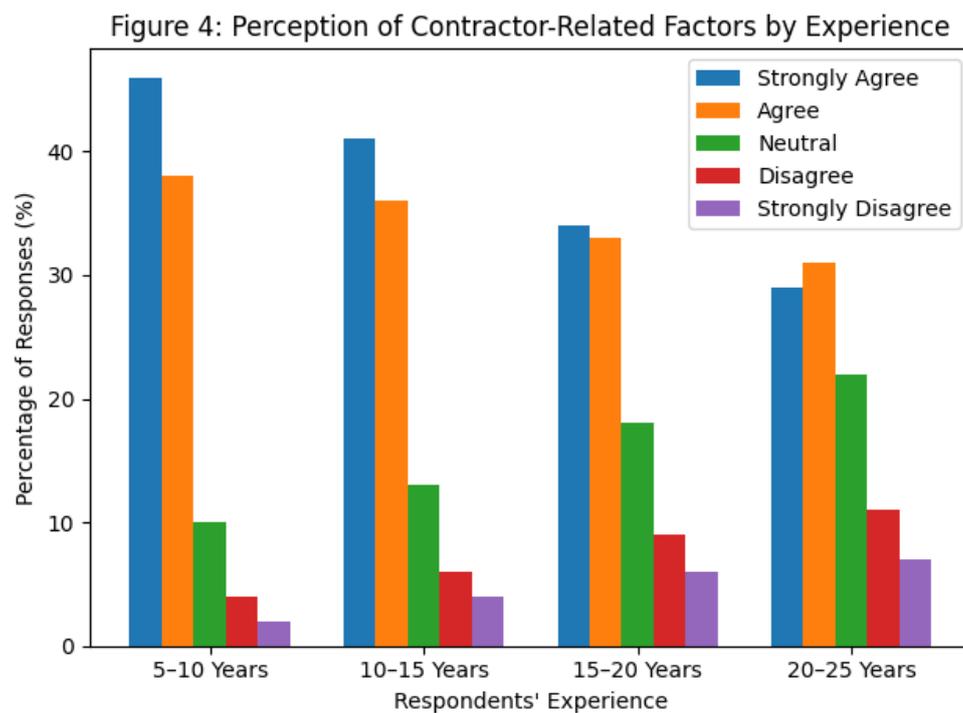
Contractor-related factors were found to significantly influence the success of construction projects. These factors included the contractor's technical capability, financial strength and assets, contractor track record, and the extent of subcontracting. Results indicate that respondents generally considered contractor-related variables important for project success, with most responses clustered in the strongly agree and agree categories. This suggests that the contractor's performance and organizational strength are considered essential for successful project implementation. The findings show that respondents considered contractor contributions especially important during the early and middle phases of project execution, when technical expertise, financial stability, and timely resource allocation are necessary to maintain progress. Results indicate that contractor-related factors were perceived as strongly contributing to project development over a 5- to 10-year experience perspective, whereas their perceived contribution was less pronounced in the 15- to 25-year range. This

may suggest that highly experienced respondents view contractor performance as one of several interrelated factors rather than the only major determinant. Nevertheless, the overall pattern confirms that contractor capability remains a critical element in project delivery. The discussion further indicates that successful construction projects require effective collaboration between contractors and other project participants, especially subcontractors, consultants, and clients. Where contractor coordination is weak or where subcontracting is excessive without proper control, project performance can suffer. Therefore, the results imply that contractor-related factors should not be understood solely in financial or technical terms, but also in terms of communication, coordination, and collaborative capacity. In practice, the contractor's success depends not only on execution ability but also on how effectively the firm interacts with the wider project team.

### 3.6 Factors Related to Consultant

Consultant-related factors were also identified as important contributors to construction project success. These factors included consultant track record, consultant qualification, and the strength of monitoring and evaluation systems. The response pattern in Figure 7 clearly

indicates that respondents considered consultant-related issues highly relevant, with most responses again falling into the strongly agree and agree categories. This means that respondents recognized the consultant as a key factor in the successful coordination and control of construction projects.



**Figure 7** illustrates respondents' perceptions regarding contractor-related factors influencing construction project success across different levels of professional experience. The results show that respondents with 5–10 years of experience reported the highest level of agreement regarding the importance of contractor capability, financial strength, track record, and subcontracting management. As experience increases, the strength of agreement declines slightly, suggesting that more experienced professionals may view contractor performance as one of several interacting factors influencing project outcomes.

The findings suggest that respondents viewed consultant performance as essential because consultants provide technical guidance, quality assurance, supervision, and support to both project owners and contractors. A qualified consultant with a strong professional background is more likely to identify design issues, monitor construction quality, and

recommend timely corrective actions. Similarly, a consultant with a strong track record is likely to bring prior experience and credibility to the project. The importance of monitoring and evaluation systems was also highlighted, as they allow project deviations to be identified early and addressed before they escalate into more serious problems.

The results indicate that respondents' views show that consultant effectiveness is directly related to project success. The broader interpretation of these findings is that consultants serve not only as technical advisors but also as important coordination agents within the project environment. Their ability to communicate effectively with contractors, monitor site activities, and maintain technical standards is vital to ensuring project objectives are achieved. Therefore, consultant selection and performance management should be regarded as strategic priorities in construction project planning and execution.

### 3.7 The Influence of Coordination Factors on Construction Project Success: Inferential Statistics

To evaluate the influence of coordination factors on construction project success, inferential statistical analysis was performed using the structural model. One of the most important indicators used in this analysis was the

coefficient of determination ( $R^2$ ). The structural model produced an  $R^2$  of 0.688, indicating that 68.8% of the variation in project success was explained by the coordination-related variables as mentioned in **Figure 8**. This is a substantial result, indicating that the model has moderate to strong explanatory power.

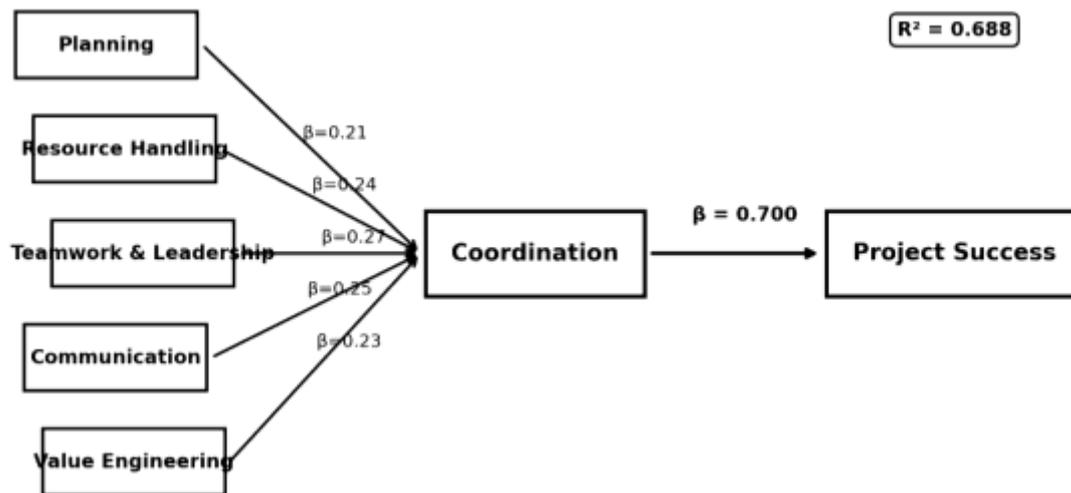


Figure 8: Coordination Factors on Construction Project Success Conceptual Model

An  $R^2$  value of 0.688 suggests that coordination-related problems account for a large proportion of the differences in construction project performance. In practical terms, this means that factors such as planning, communication, leadership, resource handling, and overall coordination contribute significantly to whether a project succeeds or fails. Since the minimum acceptable threshold for predictive relevance is often set at 0.10, the obtained value of 0.688 is well above this benchmark. This confirms that the conceptual model is statistically meaningful and capable of explaining project success to a considerable degree. The discussion of this result indicates that coordination is not a minor administrative issue but a central determinant of project performance in the construction sector. A large proportion of project success depends on how effectively project activities, people, documentation, and resources are aligned and controlled. The result also provides strong support for the study's theoretical basis by showing that coordination has measurable and significant explanatory value in the Pakistani construction context. Therefore, the findings

demonstrate that improving coordination mechanisms can substantially improve project outcomes.

### 3.8 T-Statistics and Path Coefficient

The significance of the hypothesized relationships was further examined through path coefficients ( $\beta$  values), t-statistics, and p-values, as presented in **Figure 9**. The path coefficient represents the standardized effect of one construct on another. A larger beta value indicates a stronger effect, while the t-statistic indicates whether the relationship is statistically significant. At the 5% significance level, a t-statistic of 1.96 or above is generally considered acceptable for significance. The relationship between coordination and project success factors (PSF) showed a beta value of 0.700, a t-statistic of 19.654, and a p-value of 0.000, as shown in Table 4.2. This is the strongest and most important path in the model. The beta value of 0.700 indicates a strong positive relationship, meaning that as coordination improves, project success also improves significantly. The very high t-statistic and the p-value of 0.000 confirm that

this relationship is statistically significant. This result strongly supports the argument that poor

coordination has a major negative effect on project success.

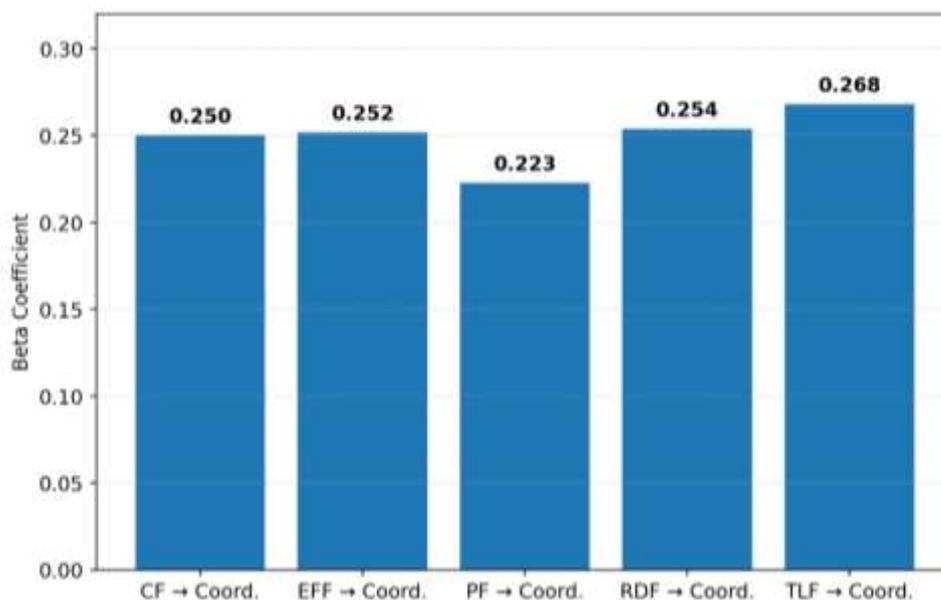


Figure 9: The significance of the hypothesized relationships analysis using path coefficients ( $\beta$  values), t-statistics, and p-values

Similarly, all exogenous constructs showed statistically significant positive effects on coordination. The path from CF to Coordination had a  $\beta$  value of 0.250,  $t = 22.102$ , and  $p = 0.000$ . The path from EFF to Coordination had a  $\beta$  value of 0.252,  $t = 23.131$ , and  $p = 0.000$ . The path from PF to Coordination had a  $\beta$  value of 0.223,  $t = 23.433$ , and  $p = 0.000$ . The path from RDF to Coordination had a  $\beta$  value of 0.254,  $t = 18.032$ , and  $p = 0.000$ . Finally, the path from TLF to Coordination had the highest effect among these predictors, with a  $\beta$  value of 0.268,  $t = 18.205$ , and  $p = 0.000$ . These values indicate that all of these constructs significantly contribute to coordination, and none of the hypothesized paths were rejected. Among the predictors of coordination, TLF (teamwork and leadership factors) showed the highest beta value at 0.268, followed closely by RDF at 0.254, EFF at 0.252, CF at 0.250, and PF at 0.223. Although the differences are not very large, the ranking suggests that teamwork and leadership may exert the strongest practical influence on coordination in construction projects. This interpretation is important because it shows that human and organizational dimensions of project management are slightly more influential than

some procedural factors in shaping coordination performance.

The predictive relevance of the model was also assessed using  $Q^2$ , yielding a value of 0.414. Since this value is greater than zero, it indicates that the model has acceptable predictive relevance. In other words, the model is not only statistically significant but also useful for predicting project success outcomes based on coordination-related factors. This strengthens confidence in the conceptual framework developed in the study. Results demonstrate that coordination has a strong and statistically significant influence on project success. The high beta value of 0.700, combined with the high  $R^2$  value of 0.688 and the positive  $Q^2$  value of 0.414, confirms that coordination is a key explanatory and predictive factor in construction project performance. These results provide strong empirical support for the study's main argument that a lack of coordination negatively affects the success of construction projects in Pakistan. They also suggest that efforts to improve planning, teamwork, communication, documentation, and leadership can substantially improve the likelihood of successful project delivery.

#### 4. Discussion

The results of this study demonstrate that project manager competencies play a crucial role in determining the success of construction projects in Pakistan. The survey responses indicated strong agreement among respondents that managerial commitment to cost and quality targets, previous experience, effective project monitoring, coordination skills, and adaptability significantly influence project outcomes. These findings align with the broader project management literature, which emphasizes that project managers' capabilities directly affect project performance, particularly in complex industries such as construction (Kerzner, 2019; Göküz & Akiner, 2025). Research shows that project managers serve as the central link between planning, execution, and stakeholder coordination, making their leadership skills essential for achieving project objectives (turn0search16).

The results of this study are consistent with findings from recent research that identifies project manager skills as one of the most influential critical success factors in construction projects. For example, a study by Altarawneh and Samadi (2019) found that managerial competence and leadership capability significantly improve project outcomes, particularly when projects involve multiple stakeholders and complex technical requirements. Similarly, a study conducted in Qatar identified project manager knowledge, leadership ability, and decision-making competence as the most influential factors affecting construction project success (turn0search9). These studies confirm that project success depends heavily on the knowledge, communication ability, and leadership style of project managers.

Furthermore, the strong emphasis placed on project manager competencies in this study is also supported by studies examining leadership behavior in project management. Leadership research demonstrates that effective project leaders contribute to improved collaboration, stronger team motivation, and better conflict resolution within project teams. These leadership qualities help ensure that projects remain aligned with cost, time, and quality objectives, thereby increasing the likelihood of

project success. Therefore, the findings of the present study reinforce the growing consensus in project management research that the competence of the project manager is one of the most critical determinants of construction project success.

This research also finds that management-related risks significantly influence construction project performance. Respondents indicated that issues such as delayed site possession, stakeholder conflicts, shortages of skilled labor, and delays in payment release can negatively affect project outcomes. These findings are consistent with previous studies that highlight risk management as a critical factor in construction project success. Construction projects inherently involve uncertainty due to their large scale, multiple stakeholders, and complex technical processes, making effective risk management essential for successful project completion (Göküz & Akiner, 2025).

Recent studies emphasize that effective risk management practices improve project stability and reduce the likelihood of project delays and cost overruns. For instance, research examining construction project coordination and process control found that risk management systems significantly influence project performance by improving organizational coordination and decision-making (turn0search7). Similarly, studies have shown that projects with well-developed risk management strategies are more likely to achieve their cost, time, and quality objectives compared to projects where risk management is poorly implemented.

The present findings also support earlier research suggesting that construction projects in developing countries face particularly high levels of management-related risk due to institutional, financial, and organizational challenges. In such environments, proactive risk management strategies are required to identify potential threats early and implement mitigation measures. Consequently, the results of this study highlight the importance of strengthening risk management frameworks in construction organizations, particularly through training, improved planning systems, and stronger coordination mechanisms.

The results of the study show that contractor-related factors significantly influence the success

of construction projects. Specifically, contractor technical capability, financial stability, previous project experience, and subcontracting practices were identified as important determinants of project performance. These findings support the argument that contractor competence is one of the most important factors influencing project outcomes, since contractors are responsible for executing construction activities and ensuring that project schedules and quality standards are achieved.

The importance of contractor competence has also been confirmed by recent studies in construction management. For example, research examining contractor selection processes found that contractor experience, financial strength, and technical expertise are among the most influential criteria for evaluating construction bids (turn0search5). Similarly, studies investigating critical success factors in construction projects indicate that contractor performance strongly affects project efficiency and overall project outcomes (turn0search14).

Another important aspect highlighted in the discussion is the role of collaboration between contractors and other project participants. Construction projects involve complex supply chains consisting of contractors, subcontractors, consultants, and suppliers. Effective communication and information sharing among these participants are essential for maintaining project coordination and avoiding misunderstandings. Studies on collaborative construction delivery systems suggest that projects with strong collaboration between contractors and project stakeholders achieve higher levels of project success (turn0search3). Therefore, the findings of the present study reinforce the idea that contractor performance must be evaluated not only in terms of technical capability but also in terms of coordination and collaboration capacity.

The results also indicate that consultant-related factors significantly influence construction project success. Respondents emphasized that consultant qualifications, professional experience, and monitoring systems play a crucial role in ensuring project success. Consultants are responsible for providing technical expertise, supervising project

implementation, and ensuring that project activities meet design specifications and quality standards.

These findings are consistent with earlier research highlighting the importance of consultants in construction project governance. According to recent studies, consultants act as intermediaries between project owners and contractors, ensuring that project objectives are clearly communicated and implemented effectively. Poor consultant performance can lead to technical errors, communication failures, and delays in decision-making, all of which negatively affect project outcomes (turn0search11).

Furthermore, recent research on construction coordination emphasizes that consultants play a vital role in facilitating communication and resolving conflicts among project stakeholders. Effective monitoring and evaluation systems implemented by consultants can improve project transparency and accountability, thereby enhancing project performance. Consequently, this study's findings suggest that selecting highly qualified consultants and ensuring robust supervision mechanisms are essential to improving construction project success rates.

One of the most important findings of this research is the strong relationship between coordination and project success. The structural model results showed that coordination has a standardized path coefficient of  $\beta = 0.700$  and a statistically significant  $t$ -value = 19.654, indicating a strong positive relationship between coordination and project success. Additionally, the model produced an  $R^2$  value of 0.688, which means that 68.8% of the variation in project success is explained by coordination-related factors. This demonstrates that coordination plays a critical role in determining the outcomes of construction projects.

These findings are strongly supported by previous research emphasizing the importance of coordination in construction projects. Studies show that construction projects involve multiple stakeholders, including owners, contractors, consultants, and suppliers, all of whom must coordinate their activities effectively in order to achieve project goals (turn0search0). When coordination mechanisms are weak, communication breakdowns occur, resulting in

project delays, cost overruns, and quality deficiencies.

Recent research also highlights the role of coordination in improving sustainable project performance. For example, a study examining mega-project coordination found that strong coordination relationships between project teams significantly improve project stability and performance outcomes (turn0search1). Similarly, studies focusing on collaborative project delivery systems emphasize that effective communication and coordination mechanisms improve stakeholder relationships and enhance project success.

The present study, therefore, contributes to the existing literature by providing empirical evidence that coordination is a central factor influencing project success in the construction industry. The findings confirm that coordination is not merely a supporting activity but rather a fundamental element that determines whether construction projects achieve their objectives.

The discussion of the results suggests several important implications for construction project management. First, construction organizations should invest in training programs to enhance project managers' leadership and coordination skills. Second, risk management systems should be strengthened in order to identify and mitigate potential threats before they affect project performance. Third, contractor selection processes should consider not only technical competence but also collaboration capacity and financial stability. Finally, consultant selection should emphasize professional qualifications and monitoring capabilities in order to ensure effective supervision of project activities. Overall, this study's findings demonstrate that construction project success depends on the combined influence of managerial competence, risk management practices, contractor performance, consultant effectiveness, and coordination mechanisms. Strengthening these areas can significantly improve the success rate of construction projects, particularly in developing countries where project management practices are still evolving.

### 5 Scientific Contribution

This study makes a significant contribution to the existing body of knowledge by empirically examining the relationship between coordination factors and construction project success. Although previous studies have investigated critical success factors in construction projects, limited research has focused specifically on how lack of coordination affects project performance. By addressing this research gap, the present study provides empirical evidence demonstrating that coordination-related issues significantly influence project outcomes. The findings confirm that ineffective coordination among stakeholders can negatively impact construction projects, thereby highlighting the need for improved collaboration and communication mechanisms within the industry.

Another important contribution of this research is the development and validation of a conceptual model that links coordination constructs with project success indicators. The model integrates five coordination constructs—planning, resource handling and documentation, teamwork and leadership, value engineering and facilitating, and communication-related factors—with four project success indicators. Using Structural Equation Modeling (SEM), the study provides a sophisticated analytical framework for examining complex relationships among coordination variables and project performance. The application of SEM in this research represents an advancement in construction management research methodologies, as it allows for a more comprehensive analysis of latent variables and their interactions.

Furthermore, this study contributes to both theoretical and practical knowledge in construction management. From a theoretical perspective, the research expands the literature on coordination and project success by demonstrating the direct impact of coordination deficiencies on project performance. From a practical perspective, the findings provide valuable insights for project managers, engineers, and policymakers by identifying key coordination factors to prioritize to improve project success rates. Consequently, the research offers practical recommendations for enhancing

coordination strategies within construction organizations.

### 6. Research Limitations

Despite the valuable findings of this study, several limitations should be acknowledged. First, the research was conducted within the context of the Pakistani construction industry, which may limit the generalizability of the findings to other countries or regions. Construction industries in different countries may operate under different regulatory frameworks, economic conditions, and organizational cultures. Therefore, the coordination factors identified in this study may not fully reflect the dynamics of construction projects in other geographic contexts.

Second, the study relied on data collected through a questionnaire survey from construction professionals. Although the respondents were experienced practitioners, the use of self-reported data may introduce potential biases such as subjective perceptions or response bias. Additionally, the sample size consisted of **90 respondents**, which, while acceptable for exploratory research, may limit the statistical power of the analysis. Future studies with larger sample sizes could provide more robust insights and improve the generalizability of the findings. Third, the research focused primarily on coordination-related factors and did not examine other potential variables that may influence project success, such as organizational culture, technological adoption, project complexity, or regulatory factors. While coordination is undoubtedly a critical factor in construction project success, other contextual variables may also play significant roles in shaping project outcomes. Future research should therefore consider incorporating additional variables to develop a more comprehensive understanding of construction project performance.

### 7. Future Research Directions

Future research could extend this study's findings by applying the proposed conceptual framework to construction industries in other countries. Comparative studies across multiple regions or countries would help determine whether the coordination factors identified in

this research are universally applicable or vary across cultural, economic, or institutional contexts. Such comparative research would contribute to the development of a globally validated model of construction project coordination and success.

Another potential direction for future research is to expand the conceptual model by incorporating additional variables related to project management practices. Factors such as digital project management tools, Building Information Modeling (BIM), organizational culture, and stakeholder engagement may significantly influence coordination effectiveness in construction projects. Integrating these factors into the conceptual model would provide a more comprehensive framework for understanding the determinants of project success.

Finally, future studies could adopt mixed-method research approaches that combine quantitative surveys with qualitative methods such as interviews or case studies. Qualitative insights from project managers, contractors, and consultants could provide deeper understanding of coordination challenges and help identify practical solutions for improving project performance. By combining statistical analysis with qualitative insights, future research could develop more comprehensive strategies for addressing coordination issues in the construction industry.

### 8. Conclusions

The primary objective of this study was to investigate the influence of coordination factors on the success of construction projects in Pakistan. The study examined how different coordination elements, such as planning, resource handling and documentation, teamwork and leadership, value engineering and facilitating, and communication, affect overall project performance. The results of the empirical analysis demonstrate that coordination plays a critical role in determining the success of construction projects. Construction projects involve multiple stakeholders, including contractors, consultants, project managers, and clients, and effective coordination among these participants is essential for ensuring project success. The study's

findings confirm that poor coordination negatively impacts project performance, leading to delays, cost overruns, and reduced quality.

The results obtained through Structural Equation Modeling (SEM) analysis provided strong support for the proposed conceptual model. The model showed that coordination factors significantly influence project success, with a coefficient of determination ( $R^2$ ) of **0.688**, indicating that approximately **68.8% of the variation in project success can be explained by coordination-related variables**. Among the coordination factors examined, communication, value engineering, and facilitating factors were identified as the most influential determinants of effective project coordination. Additionally, teamwork and leadership were found to have the highest standardized path coefficients ( $\beta = 0.770$ ) with an  $R^2$  value of **0.625**, demonstrating their strong impact on project coordination and overall project performance. The model also showed a **Goodness of Fit (GoF) value of 0.642**, indicating that the proposed conceptual framework has satisfactory validity and reliability in explaining coordination-related phenomena in the construction industry.

The findings of this research highlight the importance of improving coordination mechanisms within construction projects. Project managers and stakeholders should emphasize effective communication, collaborative teamwork, leadership capability, and structured planning to enhance project performance. Furthermore, construction organizations should develop strategic frameworks that facilitate better coordination among project participants throughout all project phases. The results of this study contribute to the understanding of coordination dynamics in construction projects and provide valuable insights for industry practitioners seeking to improve project outcomes through better management and coordination practices.

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