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Towards Efficient Construction Projects: Addressing Team Coordination and Risk Management in Jordan: Higher Model Imperial Study

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Abstract

The Jordanian construction industry is plagued by critical challenges such as poor team coordination and inadequate risk management, leading to project delays, increased costs, and compromised quality. This study focuses on identifying these issues and proposing strategic interventions to enhance project outcomes. A survey of 204 engineering managers was conducted, and data were analyzed using Partial Least Squares (PLS) to assess the impact of team coordination and risk management practices on project performance. Findings reveal that miscommunication, unclear role definitions, and lack of centralized coordination significantly hinder project success. By applying the Resource-Based View (RBV) theory, this research underscores the importance of strategic management of internal resources, particularly team coordination, to achieve competitive advantage and improved project performance. The study recommends policy adjustments to facilitate the hiring of skilled expatriate labor, investment in continuous professional development, and the adoption of modern engineering management practices, including advanced project management tools like BIM and mobile apps. Additionally, implementing systematic risk management practices tailored to the Jordanian context is crucial for mitigating potential risks and ensuring project stability. These strategic interventions are expected to enhance project performance, reduce costs, and ensure timely completion, contributing to the sustainable growth and development of Jordan's construction industry. This research provides valuable insights and a comprehensive roadmap for industry stakeholders to address current challenges and improve overall project outcomes.

Keywords: *Project Performance, Jordan, Team Coordination, Construction, Engineering Management, Risk Management.*

Introduction

The construction industry in Jordan faces a unique set of challenges that critically impact project success. Jordan's construction sector faces a host of challenges that threaten its performance and economic contribution. For example, recent data from the Jordanian Construction Contractors Association (JCCA) reveals that over 30% of construction projects experience delays due to a shortage of skilled labor and communication barriers. Additionally, the sector recently recorded a negative growth rate of -3.1%, Prominent among these are team coordination difficulties, a diverse yet under-skilled labor force, and stringent regulations on expatriate workers. These factors collectively exacerbate the skilled labor shortage, jeopardizing project quality and inflating costs (Abu Raje et al. 2024) & (Yusoff, Rahim, and Chuing 2021). Miscommunication, unclear role definitions, and lack of centralized coordination further hamper collaborative efforts, complicating the integration and productivity of both local and expatriate workers (De Bel-Air 2019) and (Al-Abbadi and Agyekum-Mensah 2022).

Problem Statement

In the Jordanian construction industry, pressing challenges such as team coordination difficulties and a diverse yet under-skilled labor force significantly impedes project success. The sector's demand for a broad spectrum of skilled professionals starkly contrasts with the reality of a skilled labor shortage, exacerbated by cumbersome regulations surrounding expatriate worker permits (Mansoor et al., 2024). This deficiency not only jeopardizes project quality and inflates costs but also complicates the integration and productivity of a workforce comprising both local and expatriate workers costs (Abu Raje et al. 2024) and (Yusoff, Rahim, and Chuing 2021). Additionally, the industry grapples with persistent coordination challenges within construction teams, characterized by miscommunication, unclear role definitions, and a lack of centralized

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coordination platforms, further hampering collaborative efforts (De Bel-Air 2019) and (Al-Abbadi and Agyekum-Mensah 2022). These issues are compounded by inadequate risk management practices, which fail to effectively identify, evaluate, and mitigate potential project risks, leading to unforeseen challenges that cause project delays, budget overruns, and compromised quality ((Taher and Raba'iyah 2019) (Rauzana and Dharma 2022) (Chin et al. 2020)). Addressing these multifaceted challenges necessitates a systematic approach, including policy adjustments, specialized training programs, and the adoption of modern engineering management practices to enhance team coordination, bridge the skills gap, and improve risk management practices, thereby ensuring the successful execution of construction projects in Jordan.

Significance of the Study

This study addresses critical challenges in Jordan's construction industry, focusing on team coordination and risk management. Effective team coordination is essential for mitigating project delays and budget overruns ((Taher and Raba'iyah 2019) (Rauzana and Dharma 2022). By proposing strategic interventions, this research aims to enhance project performance and quality. Additionally, robust risk management practices are crucial to avoid unforeseen challenges such as project delays and cost overruns ((Johnson et al. 2021), (Mdongwana 2020). The study highlights the importance of systematic risk identification, analysis, and continuous monitoring tailored to the unique challenges in Jordan (Taher and Raba'iyah 2019) (Amoah and Pretorius 2020). Applying the Resource-Based View (RBV) theory, this research links strategic resource management, particularly team coordination, to competitive advantage and project success (Borgia et al. 2022). The findings offer practical implications for policymakers and construction managers, promoting policy adjustments, training programs, and modern management practices to address the skilled labour shortage and improve risk management (Abu Raje et al. 2024), (Yusoff, Rahim, and Chuing 2021).

Research Scope

This study focuses on examining the critical challenges and strategic interventions related to team coordination and risk management within the Jordanian construction industry. It evaluates existing team coordination practices, identifying key issues such as miscommunication, unclear role definitions, and lack of centralized coordination (De Bel-Air 2019) and (Al-Abbadi and Agyekum-Mensah 2022). The research proposes strategic interventions, including specialized training programs, policy adjustments, and modern engineering management practices to enhance team coordination and overall project performance ((Taher and Raba'iyah 2019) (Chin et al. 2020)). In the realm of risk management, the study systematically identifies potential risks, including geopolitical uncertainties and technical expertise shortages, and develops effective risk response strategies tailored to the Jordanian context, emphasizing continuous risk monitoring and management ((Aburumman, Sweis, and Sweis 2023) (Mdongwana 2020) (Taher and Raba'iyah 2019) (Ur Rehman et al. 2022). Additionally, the research applies the Resource-Based View (RBV) theory to link strategic resource management, particularly team coordination, to achieving competitive advantage and improving project outcomes ((Borgia et al. 2022). This approach provides actionable insights for construction managers and policymakers to enhance resource management practices and address the skilled labor shortage (Abu Raje et al. 2024) & (Yusoff, Rahim, and Chuing 2021). Empirical analysis involves gathering quantitative data from managerial personnel within Jordan's construction sector through surveys and structured questionnaires and using statistical methods to identify patterns and draw conclusions. The study offers recommendations for policymakers to implement effective strategies that bridge the skills gap, improve team coordination, and enhance risk management practices, providing a roadmap for construction firms to adopt modern management practices, improve workforce integration, and ensure project success. By encompassing these areas, the study aims to provide a comprehensive understanding of the challenges and potential solutions in the Jordanian construction industry, contributing to academic discourse and offering practical solutions for industry stakeholders.

Theoretical Background

This review explores the intersection of project quality dimensions—feasibility, conformity, durability, and serviceability—with project performance, framed within the Resource-Based View (RBV) theory.

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Project Performance in Construction

Project performance in the construction industry is a critical barometer of success, embodying a broad spectrum of dimensions including timeliness, cost management, quality adherence, scope definition, and participant satisfaction. These facets are crucial for engineering managers tasked with ensuring projects meet predefined standards, are delivered within budgetary confines, and achieve stakeholder contentment. Highlighting the complexity of construction projects, studies by (15, 16) emphasize the pivotal roles of cost management and project timeliness, respectively, in averting delays and budget overruns that significantly detract from project value. Similarly, (Goel, Ganesh, and Kaur 2019) underscore quality targets as indicative of project success, while (Smith, Hillon, and Liang 2019) point to scope management as foundational to effective project planning and execution. Participant satisfaction emerges as a holistic success metric, encompassing the collective approval of all stakeholders, thereby encapsulating the project's overarching success (Fewings and Henjewele 2019).

The nuanced distinction between project success and performance is further elaborated through evolving definitions that extend beyond the traditional 'golden triangle' of scope, time, and cost to include stakeholder perceptions and the broader impacts of projects (Gough 2022), (Moradi, Ansari, and Taherkhani 2022). This evolution reflects the complex, multifaceted nature of construction projects and the diverse array of actors involved. The construction sector's significance to national economies underscores the imperative of navigating the myriad challenges inherent in modern construction projects, from design complexity to stakeholder participation (Amoah, Berbegal-Mirabent, and Marimon 2021), (Doloi 2009).

Success criteria and factors are instrumental in delineating project goals, with various studies presenting a range of objective and subjective measures for assessing construction project success. These include project management success, product success, and market success, highlighting the multifaceted approach to evaluating project outcomes (Gilbert II 2024), (Chan et al. 2002). Success factors, identified as key characteristics or conditions crucial for project success, underscore the significance of maintaining effective teamwork and efficient project management practices throughout the project lifecycle (Villalba-Romero, Liyanage, and Roumboutsos 2015).

Team Coordination and Managerial Influence

The paramount importance of team coordination within the construction industry, recognized for its inherent complexity and necessity for a harmonized workforce, is increasingly underscored in contemporary research. As (Shamim 2024) articulates, effective coordination across diverse and multifaceted teams is foundational to the success of projects that shape our physical environment, a sentiment echoed by historical and modern thought leaders alike, from Henry Ford's early recognition of teamwork's value to (Pilny et al. 2020) affirmation that 'Teamwork makes the dream work'. Theoretical and empirical studies converge on defining coordination as the strategic alignment of team members' actions, knowledge, and objectives towards achieving unified goals, highlighting the criticality of complementary work activities directed at a common purpose without redundancy or fragmentation (Wernerfelt 1984), (Hsu, Li, and Sun 2017). This body of work underscores the challenges posed by virtual teams in navigating time zones, cultural divides, and divergent mental models, yet also points to the strategic management of knowledge and cross-functional collaboration as enablers of competitive advantage in multinational contexts (Piccoli, Powell, and Ives 2004), (Malik 2004). Recent investigations further illuminate the correlation between well-coordinated teams and enhanced project performance, emphasizing that effective coordination, especially in virtual settings, is positively related to performance outcomes, mitigating the delays commonly associated with geographical dispersion (Rico et al. 2008), (Ahuja and Van Vugt 2010).

Central to the discourse on team coordination are the dimensions that critically influence its effectiveness. Interpersonal skills emerge as a fundamental aspect, with research highlighting their role in fostering strong team connections that boost collaboration and reduce misunderstandings, thus leading to improved project outcomes (Xiao and Jin 2010). Equally vital are technical skills, which underpin the technical competence of construction teams. Continuous training and development in this area are crucial for enhancing project

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efficiency and quality, as (Li et al. 2023) have underscored. Quality management also plays a pivotal role, involving adherence to stringent benchmarks essential for meeting construction projects' quality targets and ensuring outcomes meet required standards (Levinson 2016). Effective team coordination is further elaborated by (Thompson et al. 2017), who stress the importance of streamlined communication and information sharing for project efficiency. Additionally, the concept of team maturity, defined by the experience gained over multiple project cycles, is highlighted as a significant factor contributing to construction excellence and the effective handling of challenges (Park et al. 2020). This comprehensive view underlines the universality of effective team coordination as a requisite for successful construction projects, emphasizing that its absence can lead to significant risks, errors, and rework, impacting projects globally (Kim, Lee, and Choi 2018).

This synthesis of current research underscores the indispensable role of team coordination in the construction industry, suggesting that despite the proliferation of teams designed to navigate today's dynamic environments, significant challenges remain in ensuring the effective management and execution of projects (Ahaotu 2018), (Stahl and Maznevski 2021). Consequently, the literature calls for an enhanced focus on cultivating interpersonal connections, technical competencies, and quality management practices as vital components of successful team coordination, ultimately contributing to the realization of construction excellence and the effective navigation of the multifaceted challenges endemic to the sector.

Risk Management in Construction

Risk management is a cornerstone of engineering and project management, particularly vital in the construction industry, where the complexity and scale of projects demand meticulous planning and execution. The global acknowledgment of the significance of robust risk management practices is highlighted by research from (Aburumman, Sweis, and Sweis 2023) and (Mdongwana 2020), which outlines the severe consequences of inadequate risk management, such as project delays and cost overruns. These issues are notably pronounced in Jordan, where construction projects face unique challenges like geopolitical uncertainties, resistance to change, and a scarcity of technical expertise, emphasizing the need for strategies tailored to the local context.

At the core of effective risk management lies the systematic approach to risk identification, analysis, response, and monitoring. The importance of a methodical risk identification process, particularly tailored for the Jordanian context to preemptively address region-specific risks including regulatory and geopolitical factors, is stressed by (Taher and Raba'iyah 2019) and (Ur Rehman et al. 2022). This proactive identification is crucial for the development of focused risk analysis practices, which assess the impact and likelihood of risks to inform prioritization and mitigation strategies, as discussed by (Murray et al. 2022) and (Fatimah et al. 2018).

The literature also emphasizes the necessity of developing effective risk response strategies, as highlighted by (Zhou et al. 2019), (Zhang and Fan 2014), which are essential in mitigating identified risks. These strategies must be tailored to meet the unique challenges of the Jordanian construction industry. Continuous risk review and monitoring, underscored by (Abuyassin, Yousif, and Najm 2018), (Rahman et al. 2014) ensure that risk management practices are adaptable to dynamic project conditions and emerging risks.

The broader discourse on risk management underlines its role in enhancing project performance, with foundational discussions by Ahmadi et al. (2017), Aven (2016), and Bazin (2017) on the conceptual underpinnings of risk management and its application in project management. The distinction between risks and uncertainties, the systematic application of risk management processes, and the critical role of these processes in project success are well-established, with works by Dario (2017) and Carvalho & Rabechini (2015) emphasizing the importance of knowledge, skills, and organizational culture in effective risk management.

Recent studies further reinforce the impact of risk management on construction project performance, demonstrating a positive correlation between comprehensive risk management practices and project outcomes in terms of budget, schedule, and compliance with technical specifications, as shown by

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(Aarthipriya, Chitra, and Poomozhi 2020), (Hosseini et al. 2016), and (Adeleke et al. 2018). The necessity of addressing risks at various project stages, through comprehensive risk management practices, is a recurring theme, highlighting the role of risk management in achieving project objectives related to time, cost, quality, safety, and environmental sustainability.

Risk management emerges as a pivotal element in construction project management, reflecting a global consensus on its indispensable role in ensuring project integrity and success, particularly in Jordan's distinctive project landscape. The process begins with systematic risk identification, crucial for preempting project challenges, and extends through risk analysis, response strategy development, and continuous risk review and monitoring. This holistic approach, essential for navigating the complexities and uncertainties inherent in construction projects, is particularly relevant in the Jordanian context, demanding tailored risk management strategies to guarantee project success. This narrative not only underscores the structured methodology behind effective risk management but also positions it as a critical determinant of project performance, emphasizing the need for its meticulous integration into the project management lifecycle.

Resource-Based View (RBV) Theory in Construction

The Resource-Based View (RBV) theory, prominently developed by (Borgia et al. 2022) and (Maxwell 2002), serves as a pivotal framework for analyzing strategic resource management within construction projects, highlighting the crucial role of a firm's unique capabilities and resources, such as team coordination, in securing competitive advantage and elevating project performance. This perspective gains particular relevance in the Jordanian construction industry, where strategically leveraging internal resources, including adept teams, is essential for navigating the sector's inherent challenges. The integration of RBV in construction management, especially in Jordan, presents an underexplored avenue, offering this study a unique opportunity to augment the literature by delineating the connection between managerial practices in team coordination and the enhancement of project performance (Peteraf 1993).

By employing the RBV framework, this research endeavors to bridge the theoretical principles of resource management with the practical intricacies encountered in Jordan's construction sector. Emphasizing managers as primary respondents facilitates a deeper understanding of how strategic resource management, particularly in team coordination, can act as a lever for project performance improvements. This application not only reaffirms the theoretical validity of RBV in construction management but also underscores its practical utility in confronting the complexities and uncertainties prevalent in the industry. The focus on dynamic capabilities and core competencies inherent in RBV resonates with the construction sector's demand for adaptive strategies, rendering it an effective model for probing the internal determinants of project success. Consequently, this study's application of RBV to examine the dynamics between team coordination, risk management, and project performance articulates a concerted effort to enrich scholarly discourse and provide actionable insights for construction firms striving for superior outcomes in Jordan's competitive construction landscape (Galmai 2019).

Methodologies

This study adopts a quantitative research design to explore the relationship between team coordination dimensions (interpersonal skills, technical skills, quality targets, coordination, and team maturity), Risk management as risk identification, analysis, response, and monitoring, and project performance within the Jordanian construction industry, employing Structural Equation Modeling (SEM) through Smart-PLS (Hair et al. 2016), (Henseler, Ringle, and Sarstedt 2015). A total of 204 project managers from construction companies registered with the Jordan Engineers Association (JEA) and the Jordan Construction Contractors Association (JCCA) were surveyed, ensuring a representative sample based on statistical recommendations for SEM analysis (Jr Hair, Michael, and Brunsveld 2019). This methodology encompasses two main phases: the measurement model (outer model) assessment for reliability and validity, and the structural model (inner model) evaluation for hypothesis testing (Ringle, Da Silva, and Bido 2015). Data collection will be conducted through a survey, adhering to ethical standards to ensure confidentiality and informed consent (Creswell 2013). The sample size determination, indicator reliability, internal

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consistency, convergent and discriminant validity, and collinearity are rigorously tested ((Fornell and Larcker 1981), (Hair et al. 2016). Additionally, the methodology includes tests for mediation and moderation effects to fully understand the intricate dynamics between the constructs (Zhao, Lynch, and Chen 2010). Ethical considerations are paramount, with measures in place to protect participant privacy and integrity throughout the research process (Creswell 2013).

The design of the questionnaire for this study draws upon seminal research in team coordination and project performance, specifically leveraging insights from (Fornell and Larcker 1981), (Zhao, Lynch, and Chen 2010), (Hartner-Tiefenthaler et al. 2022), (Ji and Yan 2020) on Team coordination dimensions, and incorporating performance evaluation frameworks from studies by (Chauhan et al. 2023) and (Demirkesen and Ozorhon 2017), (Nawgaje and Kadam 2022) and risk management from (Bahamid et al. 2022), (Hassan and Yazid 2019) and (Sax and Torp 2015). These works offer a comprehensive view on the critical aspects of managing coordination and assessing project success in the construction industry. The inclusion of diverse performance metrics, influenced by recent analyses from (Muneer et al. 2022), (Simon 2021), ensures the questionnaire reflects the multifaceted nature of project performance, capturing both traditional and contemporary indicators relevant to the Jordanian construction sector.

Results

This section delineates the empirical findings derived from the quantitative analysis of survey data collected from managerial personnel within Jordan's construction sector. The survey aimed to scrutinize the extent and impact of team coordination practices on project performance, as viewed through the lens of the Resource-Based View (RBV) theory. Following a comprehensive methodology that employed Structural Equation Modeling (SEM) to ensure rigorous statistical examination, the responses of 204 managers registered with the Jordan Engineers Association (JEA) and the Jordan Construction Contractors Association (JCCA) were analyzed. These respondents, encompassing a diverse demographic profile, provided insights into various facets of team coordination management in construction projects, including adherence to project schedules, cost management strategies, achievement of team coordination targets, the importance of scope definition, stakeholder satisfaction, challenges in technology implementation, the impact of project management software, and future investment priorities.

Respondents' Demographic

The analysis is structured to first present the respondents' demographic characteristics, offering a contextual backdrop that enriches the understanding of the perspectives and experiences influencing the reported outcomes. This structured presentation aims not only to shed light on the prevailing Team coordination practices but also to unveil the underlying challenges and opportunities for enhancing project performance in Jordan's burgeoning construction sector. By mapping the empirical data against the theoretical framework established in the literature review, this section endeavors to contribute substantively to the discourse on team coordination in construction, thereby addressing the identified research gap and advancing the body of knowledge within this domain.

The respondents' demographic profile as show in table 1., reveals a predominant participation of males (81.3%), mirroring the construction industry's traditional gender dynamics globally and within Jordan. This gender distribution underscores the need for diversity and inclusion efforts in the sector. The age demographics, primarily clustered within the 36-45 (32.8%) and 46-55 (29.9%) age brackets, indicate a workforce of seasoned professionals, suggesting that the industry benefits from a depth of experience likely influencing project management practices and decision-making processes. Furthermore, the high educational attainment among respondents, with a significant portion holding Bachelor's (45%) and Master's degrees (26.5%), reflects a well-educated management layer. This educational background is crucial for adopting and implementing advanced team coordination practices, aligning with the study's focus on team coordination management in construction. The data imply that the sector is underpinned by experienced and academically qualified professionals, which is beneficial for navigating the complexities of modern construction projects and team coordination challenges. This demographic foundation provides a

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context for understanding the study's findings on team coordination practices within Jordan's construction industry, offering insights into the sector's capacity to adopt and benefit from advanced management strategies.

Table 1. Respondents' Profile

Characteristics		Frequency	Valid Percent	Cumulative Percent
Gender	Male	166	81.3	84.2
	Female	38	18.7	100
Age group (year)	Less than 25	0	0	0
	26-35	48	23.5	23.5
	36-45	67	32.8	56.3
	46-55	61	29.9	86.2
	More than 55	28	13.8	100
Level of Education	High School	0	0	0
	Diploma	19	9.3	9.3
	Bachelor Degree	92	45	54.3
	Master's Degree	54	26.5	79.8
	PhD Degree	39	19.2	100
	Others	0	0	100
experience (year)	Less than 5	13	6.4	6.4
	06-Oct	57	28	34.4
	Nov-15	82	40.2	74.6
	16-20	28	13.7	88.3
	21-25	15	7.4	95.5
	More than 25	9	4.5	100

Descriptive Statistics

The study's descriptive statistical analysis as shown in Table 2., presents a nuanced understanding of Team coordination dimensions—Interpersonal Skills, Technical Skills, Quality target, Coordination and Team Maturity—within Jordan's construction industry, based on a survey of 204 managerial personnel. These dimensions collectively exhibit mean scores ranging from 3.5 to 3.81 on a 5-point scale, indicating a consistently positive evaluation across the board, with Serviceability slightly edging out as the most favourably assessed aspect of team coordination. The close clustering of these mean scores suggests a balanced perception of these team coordination dimensions among the respondents, reflecting an industry-wide acknowledgement of their importance in ensuring project success. Further, the standard deviations,

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minimal and closely aligned (around 1.1 for each dimension), underscore a homogeneity in respondents' views, suggesting a shared industry standard towards Team coordination assessment. This comprehensive assessment highlights a sector characterized by its commitment to maintaining a high coordination team in construction projects, evidenced by the positive evaluations across all key team dimensions. The descriptive statistics not only provide a snapshot of the current state of Team coordination in Jordan's construction industry but also set a baseline for comparative future research aimed at tracking coordination improvements over time.

Table 2. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Interpersonal Skills	203	1.00	5.00	3.7754	.89242
Technical Skills	203	1.25	5.00	3.7993	.85345
Quality target	203	1.00	5.00	3.8095	.92148
Coordination	203	1.00	5.00	3.7094	.93833
Team Maturity	203	1.00	5.00	3.6650	1.02687
Risk Management	203	1.43	5.00	3.8163	.86005

Furthermore, Table 3. shows items loading across all the constructs, with Project Performance variable. 26 items with indication outer loading values below 0.708. Thus, weak items were waived. Appendices provides outer loading tables with and without weak items. Figure 1. shows items with proper loading.

Table 3. Outer Model Cross Loading

	Project Performance	Risk Management	Coordination	Interpersonal Skills	Quality Target	Team Maturity	Technical Skills
PP01	0.81	0.724	0.393	0.695	0.443	0.748	0.639
PP02	0.788	0.785	0.394	0.652	0.467	0.713	0.686
PPCM05	0.774	0.611	0.309	0.585	0.364	0.614	0.549
PPPS03	0.815	0.73	0.399	0.761	0.465	0.571	0.579
PPPS05	0.792	0.749	0.418	0.668	0.516	0.552	0.557
PPPT05	0.8	0.707	0.393	0.736	0.472	0.611	0.55
PPQT01	0.777	0.701	0.367	0.716	0.445	0.519	0.534
PPQT03	0.839	0.76	0.439	0.748	0.453	0.76	0.688
PPQT05	0.806	0.741	0.341	0.724	0.433	0.565	0.524
PPSP01	0.72	0.519	0.269	0.589	0.306	0.401	0.381
RM01	0.638	0.735	0.41	0.663	0.464	0.511	0.562
RM03	0.538	0.775	0.36	0.493	0.475	0.471	0.564
RM04	0.449	0.842	0.437	0.339	0.521	0.804	0.424
RM06	0.643	0.702	0.386	0.551	0.312	0.618	0.565
RMR04	0.398	0.776	0.405	0.72	0.387	0.612	0.561
RMRI03	0.538	0.775	0.36	0.493	0.475	0.471	0.564
RMRV02	0.51	0.707	0.413	0.419	0.475	0.428	0.509
TCC03	0.342	0.397	0.807	0.299	0.33	0.38	0.471
TCC05	0.408	0.406	0.77	0.367	0.356	0.328	0.464
TCC06	0.4	0.458	0.843	0.343	0.516	0.373	0.604
TCIS01	0.548	0.674	0.328	0.836	0.424	0.559	0.501
TCIS02	0.687	0.635	0.316	0.829	0.434	0.526	0.508
TCIS03	0.621	0.526	0.343	0.563	0.422	0.416	0.446
TCIS05	0.676	0.625	0.378	0.791	0.349	0.697	0.56
TCQT02	0.467	0.517	0.455	0.413	0.778	0.363	0.594
TCQT04	0.441	0.458	0.355	0.399	0.829	0.387	0.399

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TCQT06	0.435	0.447	0.417	0.388	0.843	0.325	0.454
TCTM02	0.635	0.617	0.396	0.585	0.344	0.85	0.53
TCTM05	0.601	0.583	0.338	0.526	0.349	0.848	0.529
TCTM06	0.523	0.682	0.38	0.698	0.402	0.807	0.585
TCTS01	0.468	0.485	0.509	0.409	0.434	0.377	0.775
TCTS02	0.465	0.573	0.404	0.435	0.467	0.377	0.799
TCTS03	0.521	0.57	0.659	0.445	0.564	0.48	0.805
TCTS05	0.526	0.68	0.343	0.633	0.385	0.69	0.778

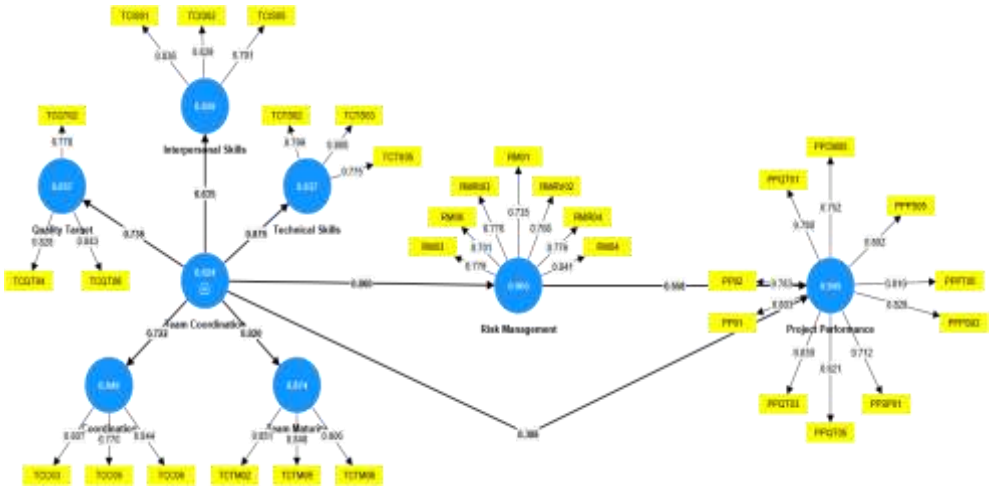

Figure 1. Cross Loading of Structural Model

Source: Smart PLS 3.3.9

Internall Consistency of Research Variables

Each variable should reflect a uniform concept, ensuring internal consistency, which can be assessed through Cronbach's Alpha or the composite reliability metric. A value exceeding 0.7 indicates success, while a threshold of 0.6 may be deemed adequate for preliminary studies (Wong 2013). The analysis detailed in Table 4 and Figure 2. includes these two variables along with their respective dimensions, with further discussion to follow. Concerning composite reliability, all figures surpass the 0.8 mark, demonstrating satisfactory internal consistency. Cronbach's Alpha values, ranging from 0.710 to 0.908, also indicate an acceptable level of internal consistency.

This revision maintains the original information's integrity, offering clarity on the standards for measuring consistency and reliability in research variables.

Table 4. Outer Model Cross Loading

		Composite Reliability	Cronbach's Alpha
TC	Interpersonal Skills	0.859	0.754
	Technical Skills	0.710	0.708
	Quality target	0.857	0.750
	Coordination	0.849	0.733
	Team Maturity	0.874	0.783
RM	Risk Management	0.905	0.879
PP	Project Performance	0.945	0.935

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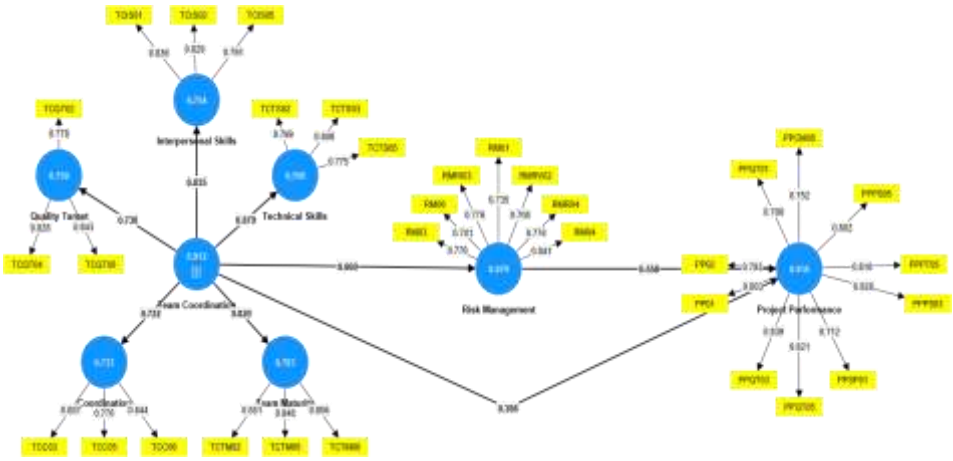

Figure 2. Composite Reliability of Structural Model

Source: Smart PLS 3.3.9

Convergent Validity of Research Variables

This section evaluates the degree of connection among items within the same variable, using the Average Variance Extracted (AVE) as a measure. AVE values exceeding 0.5 are considered acceptable. According to Table 5, which presents the AVE values for all constructs, the results fall within a range of 0.578 to 0.698, surpassing the 0.5 threshold and indicating an acceptable level of relativeness. Consequently, the dataset is deemed devoid of convergence issues, affirming its suitability for further analysis.

Table 5. Convergent Validity Assessment of Research Variables

		AVE
TC	Interpersonal Skills	0.671
	Technical Skills	0.630
	Quality target	0.667
	Coordination	0.652
	Team Maturity	0.698
RM	Risk Management	0.578
PP	Project Performance	0.631

Discriminant Validity of Research Variables

While AVE assesses the relativeness among items of the same variable, discriminant validity measures the distinctiveness of different variables. This analysis involves comparing the square root of the AVE values with the correlations among latent variables, where the square root of the AVE must exceed all correlations with other variables.

Table 6 demonstrates this concept using the (Mansour et al. 2023) criterion matrix, which organizes the correlations of latent variables. For the analysis to be considered successful, the diagonal values, representing the square root of the AVE, must surpass every other value in their respective row and column. For instance, Interpersonal Skills score 0.671, Technical Skills 0.630, Quality target 0.667, Coordination

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0.652, Team Maturity tops at 0.698 and Risk management 0.578 each higher than any of their correlating values. This outcome signifies that the variables maintain a satisfactory level of discriminant validity, confirming their distinctiveness and suitability for further examination.

Table 6. Discriminant Validity Assessment of Research Variables

	Coordination	Interpersonal Skills	Quality Target	Risk Management	Team Maturity	Technical Skills
Coordination	0.807					
Interpersonal Skills	0.417	0.819				
Quality Target	0.503	0.491	0.817			
Risk Management	0.522	0.787	0.583	0.76		
Team Maturity	0.446	0.727	0.439	0.755	0.835	
Technical Skills	0.64	0.64	0.596	0.738	0.659	0.794

Multicollinearity Assessment of Research Variables

The Variance Inflation Factor (VIF) is employed to determine the lack of significant multicollinearity between independent and dependent variables, where a VIF range of 0.2 to 5 is regarded as acceptable (Autodesk 2023). Moreover, to ascertain the absence of this effect, the average tolerance value should exceed 0.10, or the VIF should not exceed 10, as elucidated by sources (Wong 2013) and (Xie et al. 2023). The outcomes from the Multiple Regression Analysis, depicted in Table 7, indicate that tolerance values vary from 0.319 to 0.585 and VIF values range between 1.655 and 2.978. These metrics significantly surpass the 0.10 tolerance threshold and maintain VIF values below 5, suggesting no multicollinearity among the variables analyzed (Wong 2013). Consequently, all VIF metrics reside within an acceptable scope, confirming the absence of multicollinearity in the study.

Table 7. Multicollinearity Validity Assessment of Research Variables

	Tolerance	VIF
Interpersonal Skills	.277	3.607
Technical Skills	.319	3.136
Quality target	.585	1.710
Coordination	.557	1.795
Team Maturity	.347	2.886
Risk management	.253	3.951

Assessing Predictive Power of Research Model

The findings for the primary dependent variable, Project Performance, demonstrate a moderate level of predictive ability and a significant degree of predictive relevance. The corresponding R square value presented in the table is 0.832, indicating a predictive power of approximately 83.2%, while the Q square value is 0.745, reflecting a predictive relevance of 74.5%. Moreover, the constructs used for prediction—Interpersonal Skills, Technical Skills, Quality target, Coordination and Team Maturity—are shown in Table 8, to account for over 45.5% of the variance in Project Performance. This suggests that these factors combined offer a substantial explanation for the changes observed in the performance of projects.

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Table 8. Predictive Power and Predictive Relevance of Proposed Model

	Predictive Power		Predictive Relevance	
	R Square	Status	Q Square	Status
Interpersonal Skills	0.697	moderate	0.690	large
Technical Skills	0.773	strong	0.769	large
Quality target	0.542	moderate	0.534	large
Coordination	0.522	moderate	0.515	large
Team Maturity	0.672	moderate	0.666	large
Risk Management	0.740	moderate	0.749	large
Project Performance	0.832	strong	0.745	large

Assessing Constructs Effective Size f Square of Research Model

The f^2 effect size quantifies the impact level of a latent variable within a structural model, essentially measuring its contribution to the model's predictive power. Initially, the predictive power is assessed for the entire model; subsequently, a latent variable is removed, and the predictive power is re-evaluated. The discrepancy in predictive power with and without the latent variable represents the f^2 effect size of that variable on the model's predictive capacity. According to the guideline set by the source (Wong 2013), the f^2 values are categorized as follows: small for values around 0.02, medium at approximately 0.15, and large for values near 0.35. The assessment of effective size for research variables in Table 9 reveals that for Team coordination, the effect size is significant, with a value of 0.608 and risk management of 0.484 on Project Performance, indicating a substantial impact on Project Performance.

Table 9. Effective Size Assessment of Proposed Determinants

	Project Performance	
	f^2 value	Status
Team coordination	0.608	Large
Risk management	0.484	Large

Path Coefficient of Research Model Relations

Table 10 shows the path coefficient assessment with the values of T Statistics and Beta values. For the main dependent variable, Project Performance, the relation was accepted with the dependent variable, which is Team coordination was accepted with Project Performance. The precedence for the relations based on the path coefficient value (Beta) is TC (H1: $\beta = 0.412$).

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Table 10. Path Coefficient Assessment of Research Variables

Hypo	Relationship	Std. Beta	Std. Error	T-value	P-value	Status
H1	Team coordination –> Project Performance	0.412	0.057	6.183	0.000	Supported
H2	Team coordination –> Risk management	0.864	0.018	47.708	0.000	Supported
H3	Risk management –> Project Performance	0.535	0.064	8.705	0.000	Supported

Mediation Effect Assessment

In mediation assessment, there are three variables, the independent variable, the dependent variable, and the mediation variable. The mediation analysis is an estimation for the extent effect of the mediator in the relation between the independent and dependent variable. If there is a significant effect added indirectly through the mediator then there is a mediation effect (Hayes, 2017). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford publications.). In the mediation analysis, three scores must be calculated, direct effect to assess the path coefficient between the independent variable and dependent variable, the indirect effect to assess the path coefficient between the independent variable and dependent variable through the mediator, and total effect, which is the summation of both direct and indirect effect. The mediation can be full or partial, the partial is the availability of direct and indirect effect, and the full is the availability of indirect effect only.

Different approaches are available to assess the mediation effect; one of the commonly used approaches is proposed and refined by (Hayes, (2017). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford publications.), which is based on the known Sobel mediation procedure (see Figure 3). illustrates the findings of mediation analysis. Mediation analysis was performed to assess the mediating rule of (RM) on the linkage between TC and Project performance. The result (see Table 4.19) revealed that the total effect of TC and Project performance was significant (H1: β = 0.412 T = 6.183, P = 0.000). With the inclusion of the mediating variable (RM), the impact of TC on Project performance became significant (β = 0.480, T = 8.727, P< 0.001).

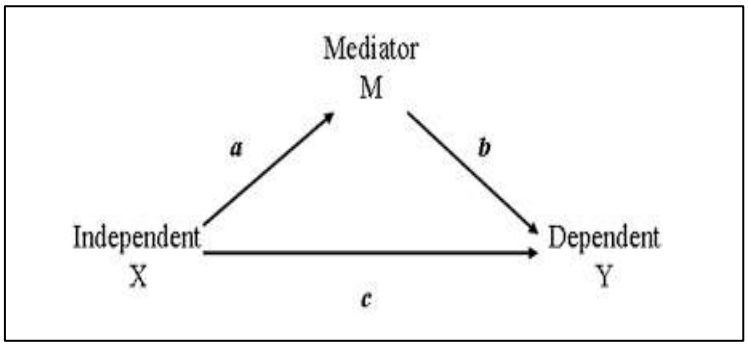

Figure 3. Sobel Mediation Procedure

Source: Hayes (2017)

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Discussion

This study's findings underscore the critical importance of addressing team coordination and risk management within the Jordanian construction industry to enhance project performance and mitigate prevalent challenges. The evaluation of existing team coordination practices reveals significant issues such as miscommunication, unclear role definitions, and lack of centralized coordination. These challenges are consistent with those identified in prior research, which emphasizes that effective team coordination is essential for the successful execution of construction projects (De Bel-Air 2019) and (Al-Abbadi and Agyekum-Mensah 2022). The proposed interventions, including specialized training programs and modern engineering management practices, align with global best practices and are expected to significantly improve project outcomes by fostering better communication, clear role delineation, and efficient collaboration among team members ((Taher and Raba'iyah 2019) (Rauzana and Dharma 2022). The application of the Resource-Based View (RBV) theory further supports the idea that strategic management of internal resources, particularly team coordination, can lead to a competitive advantage and improved project performance (Borgia et al. 2022). By focusing on enhancing team coordination, construction firms can better leverage their internal capabilities, leading to more efficient project execution and higher-quality outcomes (Abu Raje et al. 2024).

Risk management emerges as another critical area that requires attention. The study identifies key risks in the Jordanian construction sector, including geopolitical uncertainties and a shortage of technical expertise (Aburumman, Sweis, and Sweis 2023) (Mdongwana 2020). The development of tailored risk response strategies and the emphasis on continuous risk monitoring are crucial for mitigating these risks and ensuring project stability ((Taher and Raba'iyah 2019) (Rauzana and Dharma 2022). The literature supports the study's findings that robust risk management practices are essential for avoiding project delays, budget overruns, and compromised quality (Mitchell & Smith, 2019). Effective risk management not only helps in identifying and mitigating potential risks but also enhances overall project performance by ensuring that projects are completed on time, within budget, and to the desired quality standards (Ur Rehman et al. 2022).

Comparison with Existing Literature

The study's findings on team coordination and risk management in the Jordanian construction industry align with existing literature on similar challenges globally. Previous research consistently highlights that miscommunication, unclear role definitions, and lack of centralized coordination are prevalent issues that hinder project efficiency and escalate costs.

Miscommunication often leads to project delays, increased expenses, and compromised quality, necessitating clear and consistent communication strategies (Mansour et al. 2023). Effective communication is crucial for preventing errors and ensuring that all stakeholders are aligned with project goals. Traditional methods like face-to-face meetings and printed plans remain essential but are now complemented by modern digital tools such as project management software, mobile apps, and Building Information Modeling (BIM). These technologies facilitate real-time updates, improve document sharing, and enhance collaboration across different teams, significantly improving project outcomes (Autodesk 2023). Training in communication skills is also vital. Active listening, clear messaging, and conflict resolution are essential for maintaining project timelines and quality standards. Studies show that construction professionals who receive such training are better equipped to handle the dynamic nature of projects, thereby reducing the likelihood of costly errors and delays (Xie et al. 2023).

Implications of this Study

The findings of this study have significant implications for the construction industry in Jordan, particularly concerning team coordination and risk management practices. Policy reforms are necessary to facilitate the hiring of skilled expatriate workers, addressing the skilled labor shortage and improving project quality and efficiency (Ur Rehman et al. 2022). Investing in specialized training programs for continuous professional development is critical, as enhanced technical and interpersonal skills among construction workers can improve team coordination, leading to better project outcomes (Taher and Raba'iyah 2019) (Rauzana and

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Dharma 2022). The adoption of modern engineering management practices, such as advanced project management tools like Building Information Modeling (BIM) and mobile apps, can streamline communication and collaboration, facilitating real-time updates and improving document sharing (AgilityPortal, 2023; Boom & Bucket, 2024).

Implementing robust risk management practices is crucial for mitigating potential risks and ensuring project stability. This involves systematic risk identification, continuous risk monitoring, and tailored risk response strategies to avoid project delays, budget overruns, and compromised quality (Mdongwana 2020). Applying the Resource-Based View (RBV) theory to construction management provides a framework for leveraging internal resources, such as team coordination, to achieve competitive advantage and improved project performance (Hair et al. 2016).

The study offers actionable insights for policymakers and construction managers, suggesting that policy adjustments, investment in training programs, and the adoption of modern management practices are essential for overcoming current challenges. These interventions are expected to create a more efficient and effective construction sector, leading to higher quality outcomes, reduced costs, and timely project completion. By providing empirical evidence from the Jordanian context, this study enriches the existing body of knowledge on team coordination and risk management in construction projects, highlighting their critical role in ensuring project success and offering a roadmap for future research to explore these interventions in different contexts and settings. Overall, the implications of this study offer a comprehensive strategy for improving project performance in the Jordanian construction industry, addressing the skilled labor shortage, enhancing team coordination, and implementing effective risk management practices.

Conclusions

This study has highlighted the significant challenges faced by the Jordanian construction industry, particularly in terms of team coordination and risk management. The findings indicate that miscommunication, unclear role definitions, and lack of centralized coordination are major obstacles to effective team collaboration. These issues, coupled with inadequate risk management practices, exacerbate project delays, budget overruns, and compromised quality. By applying the Resource-Based View (RBV) theory, this research underscores the importance of strategic management of internal resources to achieve competitive advantage and improved project outcomes. The proposed interventions, including specialized training programs, policy adjustments, and the adoption of modern engineering management practices, are crucial for addressing these challenges and enhancing overall project performance.

Recommendation

Address the critical challenges identified in the Jordanian construction industry, several practical recommendations is proposed. Policy adjustments, such as revising regulations surrounding expatriate workers, are essential to facilitate the hiring of skilled labor and bridge the skills gap (Ur Rehman et al. 2022). Additionally, investing in specialized training programs for continuous professional development is crucial for enhancing both technical and interpersonal skills, thereby improving team coordination (Ur Rehman et al. 2022). The adoption of modern engineering management practices, including the use of advanced project management tools like BIM and mobile apps, can further streamline communication and collaboration, ensuring that all stakeholders are aligned with project goals and real-time updates (Autodesk 2023), (Xie et al. 2023). Implementing systematic risk management practices, including continuous risk monitoring and tailored risk response strategies, is vital for mitigating potential risks and ensuring project stability (Aburumman, Sweis, and Sweis 2023) (Mdongwana 2020). Overall, these strategic interventions will enhance project performance, reduce costs, and ensure timely project completion, contributing to the sustainable growth and development of Jordan's construction industry.

Future Research

Conduct further studies to explore the implementation and impact of these strategic interventions in

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different contexts and settings, providing comparative insights and broader applicability. Investigate the long-term effects of improved team coordination and risk management practices on project performance and quality outcomes in the construction industry.

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