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RESEARCH ARTICLE

Identification of supplier partnership critical success factors in the construction industry

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ABSTRACT - In the construction industry, supplier partnerships and collaboration are crucial for overcoming competing objectives and fostering growth. Challenges such as interpersonal conflicts, lack of trust, unequal risk sharing, overdependence, cultural barriers, inefficient problem-solving, communication breakdowns, insufficient effort to sustain long-term cooperation, inadequate training, and exclusion can disrupt these partnership and hinder project progress. Thus, this paper aims to investigate the critical success factor (CSF) of supplier partnerships in the construction industry. The survey-based study was conducted using purposive sampling among top management in construction companies, resulting a final sample of 190 respondents. The study highlights the importance of trust, mutual commitment, and effective dispute resolution in shaping key relationship traits linked to successful supplier partnerships in the construction industry. The findings on CSFs in supplier partnerships provide valuable insights for construction practitioners, helping them prevent disputes, improve partnership efficiency, and eliminate adversarial interactions.

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1. INTRODUCTION

The construction industry is facing increasing complexity and uncertainty, leading to the need for significant improvements (Liu et al., 2019). This has prompted a global effort to reorient the industry, focusing on methods used effectively in other sectors, particularly related to the supply side of the business (Panahi et al., 2015). Liu et al. (2019) found that the failure of traditional procurement methods is a cause of construction efficiency and performance issues. Therefore, they proposed an approach that uses a "radically different approach to procurement" to address these performance issues. As a result, the emphasis has shifted towards the relationship between various construction stakeholders, with partnerships being an increasingly popular management tool to reverse the negative effects of adversarial relationships in construction (Musonda & Gambo, 2020). However, partnership models in construction projects are not without issues, including a lack of understanding, trust issues, and ineffective problem-solving (Irfan et al., 2019). Additionally, they opined that subcontractors often struggle to understand the partnership structure of contracts, leading to apprehension about future collaborations. Despite these challenges, successful restructuring in the construction industry requires changing traditional relationships to a shared culture, with partnerships embodying this shared culture as a key characteristic (Musonda & Gambo, 2020). Partnerships are particularly crucial for progress toward sustainability in the construction industry (Dzhengiz et al., 2023). Understanding the relationship between stakeholders and construction companies is a significant contribution to the research in this area, as specific assessments of the topic are still in their early stages (Araujo et al., 2016). In conclusion, the construction industry is undergoing a significant reorientation towards partnership models to address performance issues and achieve sustainability. While partnerships offer potential benefits, challenges such as trust issues and ineffective problem-solving must be addressed to ensure their success.

2. LITERATURE REVIEW

2.1 Overview of Construction Industry

The construction sector plays a pivotal role in community development, as highlighted by Musarrat et al. (2016). Its substantial contribution to a country's economic prosperity is emphasized by Alaloul et al. (2020a). The sector not only generates millions of jobs but also enhances the economy and communities. Employment in the construction industry reached 7,505,000 people as of July 2019, with a predicted 12% growth rate and 864,700 more jobs anticipated by the end of 2026 (Doyle, 2019). Despite technological advancements improving construction processes, challenges persist in meeting project goals (Gamil and Rahman, 2017; Alaloul et al., 2020b). Labor expenses constitute a significant portion (30-50%) of the total project budget, underscoring their importance not only in construction but also in budget estimates before project initiation. Project success, tied to timely completion and adherence to allocated budgets, is emphasized by Musaratet al., 2020. Studies by Altaf et al. (2023) and Nigussie and Chandrasekar (2020) reveal that many construction projects exceed budgets, often due to changes in orders, lack of necessary action, or fluctuations in the price of goods. The construction sector faces challenges of efficiency and comparatively low costs compared to other sectors, necessitating improvement to meet stakeholder expectations (Mashali et al., 2022; Ekung, 2020).

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2.2 The Supplier Partnership

Partnering has consistently been a priority on the management agenda in the construction industry for many years, serving as a key approach to enhancing performance (Sundquist et al., 2018). Hosseini et al. (2018) pointed out that partnering by prioritizing relationships helps control costs, stay on schedule, and avoid conflicts. According to Bemelmans et al. (2012), the term supplier covers subcontractors, material suppliers, and service suppliers. As highlighted by Mulyaningsih et al. (2021), collaborating partnerships involve commitment as sustained economic relationships and mutual dependency will maximise the effectiveness of each participant's resources. Common traits associated with partnerships include a high level of long-term orientation, mutual commitment, dependency, trust, and a shared willingness to take risks and reap gains.

In the construction industry, partnerships can be short-term, focusing on immediate project goals, or long-term, aimed at maximizing shared benefits through close collaboration (Xu & Qi, 2018). Therefore, effective communication and trust are crucial for establishing long-term relationships and avoiding things that endanger the financial and operational status of the construction companies (Sulistyorini et al., 2018). However, suppliers are diverse, and the factors affecting relationship quality and the role of trust differ widely between large and small suppliers, as well as the level of turnover dependency in the relationship (Martin & Benson, 2021). These findings underscore the critical role of partnerships and collaboration in driving innovation, sustainability, and success in the construction industry.

2.3 Critical Success Factors

Critical Success Factors (CSFs) are those which are essential to the success of any program or technique, in the sense that if objectives associated with the factors are not achieved, the process stands a good chance of failing (Rungasamy et al. 2002; Thiagarajan & Zairi, 1998). To shape project success, CSFs interact in both reactive and dynamic ways. Strategies are adapted to address contingencies, with resources influencing managerial approaches, while favorable contingencies and resources contribute positively to outcomes (Crisan et al., 2023). Tamgadge and Shinde (2018) have suggested that construction projects encounter challenges due to unexpected changes, making it necessary to study CSFs. In addition, critical success factors identification is crucial for a construction system to thrive, as it supports economic viability and fulfills stakeholder needs with minimal resource consumption (Gunduz & Yahya, 2018; Mavi & Standing, 2018). Table 1 shows a CSF of supplier partnerships in the construction industry. For these studies, trust, mutual commitment objectives, and dispute resolution are selected factors to be further investigated.

Table 1. The critical success factors of supplier partnerships

Critical Success Factors	Eriksson (2010)	Bennett (2007)	Bygballe et al. (2010)	Nyström (2008)	Chen et al., 2019	Naoum (2003)	Ng et al. (2013)	Yeung et al. (2013)	Kadefors (2004)
Trust	x	x	x	x	x	x	x	x	x
Common Perception		x	x	x	x		x		x
Collaborative Clauses in Contracts	x				x		x	x	
Early Supplier Involvement	x		x				x	x	
Rewards, Pain, and Gain Share	x			x		x			x
Mutual commitments and objectives	x	x			x	x	x	x	x
Activities for Building Teams	x	x	x	x					x
Structured Workshop/Meeting	x	x		x				x	x
Facilitator	x	x		x			x		
Participants that are Devoted		x		x			x	x	
Dispute Resolution	x	x		x	x	x	x	x	x
Effective and Open Communication		x		x			x	x	
Economy of Open Books	x	x		x	x				
Continual Development					x	x		x	
Joint Evaluation ongoing							x		

2.3.1 Trust

Trust is a critical factor in various aspects of business and organizational relationships. In the context of service supply chains, trust among partners is essential for effective commitment, fostering affective attachment, credibility, and behavioral obligation, ultimately reducing the inequality of exchange and promoting sustainability (Khan et al., 2018). Furthermore, in the e-commerce industry, the quality of partnerships and information sharing significantly influences express delivery service performance, highlighting the importance of timely, relevant, and reliable information in creating trust and enhancing cooperation among supply chain partners (Zhong et al., 2020). Additionally, in the SMEs of batik, trust, along with information sharing and informal contracts, has a direct impact on the performance of supply chain management, emphasizing the role of trust in enhancing operational efficiency and reducing unnecessary costs (Susanty et al., 2018). Moreover, the sharing economy relies heavily on trust, transparency, and security, with the government playing a crucial role in building trust among platform users (Singh et al., 2019). In the vendor-buyer relationship, trust serves as an operational mechanism to expedite information sharing among channel members, underscoring its significance in facilitating collaboration and effective communication. These studies collectively highlight the multifaceted impact of trust on sustainability, performance, and collaboration within various business contexts, emphasizing the need for trust-building mechanisms and transparent governance to foster successful relationships and operations.

2.3.2 Mutual commitments and objectives

The construction sector emphasizes the importance of shared goals and commitments to enhance collaboration and improve project performance. The establishment of mutual objectives is crucial for fostering collaboration and improving supplier partnerships in construction projects, addressing the conflicting goals of project managers, designers, construction managers, and suppliers (Moradi et al., 2022). Furthermore, the focus on setting supplier partnership objectives in the construction sector aims to enhance performance through shared commitments and goals, aligning with the principles of total quality management and organizational performance (Faeq et al., 2021). The utilization of the innovation potential of suppliers in construction projects is highlighted as an area for improvement, emphasizing the need to leverage supplier knowledge for construction innovation (Sariola, 2018). Additionally, the selection and evaluation of suppliers in the construction sector plays a vital role in project performance, requiring continuous monitoring of supplier relationships to ensure project success (Hanák & Nekardová, 2020). Moreover, the effects of supply chain management practices on technological innovation in the manufacturing sector demonstrate the broader impact of supplier management on innovation and performance (Warsi et al., 2020). In the context of construction projects, the dynamic multicriteria decision-making approach for low-carbon supplier selection of low-carbon buildings is essential for addressing environmental considerations and sustainable construction practices (Cao et al., 2018). Furthermore, the application of innovative procurement approaches for the Industrialised Building System (IBS) reflects the industry's commitment to adopting innovative strategies to enhance project performance and sustainability (Ariffin et al., 2019).

2.3.3 Dispute resolution

Dispute resolution in organizational settings is crucial for achieving favorable outcomes and maintaining productive relationships among parties with differing objectives and expectations. It has been recognized that effective dispute-resolution methods are essential for fostering cooperation and achieving long-term success (Lim et al., 2022). In the construction industry, where disputes frequently arise between contracting parties, it is important to understand the causes and employ appropriate resolution methods to mitigate their impact (El-Sayegh et al., 2020). Similarly, in the healthcare sector, the role of mediation in resolving medical disputes has been highlighted as an alternative to litigation, emphasizing the significance of alternative dispute resolution methods in achieving favorable outcomes (Wang et al., 2020). Collaborative dispute resolution has been identified as an effective approach for addressing disputes and fostering teamwork, particularly in volatile environments (Hendarwati et al., 2021). This approach emphasizes group decision-making and knowledge construction, contributing to improved problem-solving activities and overall performance. Furthermore, trust-based cooperative relationships in supply chains have been linked to shared problem-solving, highlighting the importance of mutual, credible commitments and coordinated actions to achieve mutually beneficial behaviour (Ryciuk & Nazarko, 2020). Additionally, the impact of customer cooperative behaviour on reverse logistics outsourcing performance in the construction industry underscores the importance of collaboration in achieving successful outsourcing arrangements and overall performance (Bhardwaj & Ketokivi, 2020).

2.4 Overview Performance

The construction industry faces challenges in managing project performance due to its complexity and evolving nature, which necessitates the evaluation of additional factors beyond the traditional "Iron Triangle" of time, money, and quality criteria (Dziekoński et al., 2018). While the Iron Triangle is commonly used as a performance measure in construction projects, it has been criticized for being a "lagging" rather than a "leading" indicator and for its limited scope (Peng & Zhang, 2022). Projects in the construction sector vary in goals, resources, activities, and outcomes, highlighting the need for diverse success criteria (Xiahou et al., 2018). Furthermore, the traditional project triangle is prevalent in the construction industry for performance evaluation, but it may not provide a comprehensive view of project performance (Wang & Razavi, 2019).

In addition to time, cost, and quality measures, other factors such as social performance, safety, and communication planning significantly impact project success (Setiawan et al., 2021; Murguia et al., 2022; Zhang et al., 2023). For instance, safety performance assessment is crucial in construction projects, as accidents and fatalities can result from poor safety management (Peng & Zhang, 2022; Setiawan et al., 2021). Moreover, the outsourcing of complex projects and the impact of supervision styles on craftsmen's performance are important considerations for achieving quality performance in construction projects (Xiahou et al., 2018). Furthermore, the lack of a consistent industry-wide performance framework for construction projects hinders decision-making and consistent performance measurement. This highlights the need for a more comprehensive approach to evaluating construction project performance, considering factors such as public satisfaction, environmental impact, and the influence of psychological factors on safety performance (Dziekoński et al., 2018; Setiawan et al., 2021).

2.4.1 Key performance indicators to measure project performance

The construction sector has evolved into a highly competitive environment, necessitating the establishment of key performance indicators (KPIs) to evaluate organizational and project performance (Murguia et al., 2022). KPI benchmarking techniques are widely used in the construction sector to track and manage project and organizational performance, providing insights into current success and potential future trends (Shan et al., 2021). These KPIs play a crucial role in improving decision-making and achieving organizational goals by evaluating the performance of individual operations, thereby enhancing the efficiency and effectiveness of construction projects (Ansari et al., 2022). In the context of construction projects, KPIs encompass various aspects such as time, cost, quality, customer satisfaction, customer retention, company performance, and health and safety (Garza-Reyes et al., 2018). However, due to the fragmented nature of the industry and varying performance criteria across organizations, achieving a consensus on successful project performance standards remains challenging (Maestrini et al., 2018). Despite these challenges, KPIs are essential for evaluating different stages of a project and can be improved by assessing the interactions between project agents to enhance project goal achievement (Murillo et al., 2019). Furthermore, the use of KPIs in the construction industry extends to specific areas, such as safety performance, where KPIs play a crucial role in promoting safety in construction projects (Mahmoud et al., 2020). Additionally, KPIs are utilized to measure the success of construction projects, with indicators such as productivity metrics, environmental value stream mapping, and total factor productivity being employed to assess project performance (Ali & Mansor, 2022; Andary et al., 2019). Moreover, KPIs are instrumental in evaluating the performance of healthcare construction projects, contributing to the development of a framework for total productivity measurement and driving sustainable construction development through post-contract KPIs and drivers (Iskandar et al., 2019; Ayele & Fayek, 2019; Lam, 2020).

2.5 Research Frameworks and Hypotheses

It is argued that effective management techniques and creating an environment can make collaboration successful. The process of sharing essentially requires the development of relationships between organizations. Effective relationship management skills are essential. They serve as a framework to initiate and support the sharing process. Conversely, some properties in a shared environment can either strengthen or inhibit partner interactions. To maximize partnership performance, it is important to identify key success factors or CSFs. The level of CSFs in partner organizations should be assessed through the development of specific processes. Therefore, three hypotheses were developed to look at the effects of these supplier partnership factors on construction industry performance.

2.5.1 Trust

Trust is a crucial factor in the success of a project, as it fosters satisfaction and positive sentiments in relationships (Li, 2020). High levels of dependence can lead to increased trust in a relationship, as the dependent party is less likely to take risks that may harm the relationship (Yuan et al., 2020). Conversely, low trust can result in fewer positive sentiments (Kaufmann et al., 2018). Trust becomes unnecessary when the customer can anticipate or regulate the supplier's activities (Guo et al., 2022). Partners must be sensitive to actions or outcomes for trust to be effective, and high levels of dependency can lead to vulnerability, fostering trust (Butt & Ahmad, 2019). Additionally, partnerships with high levels of dependence often feature intense interpersonal involvement, enabling the emergence and development of reciprocal trust (Chang et al., 2023).

H1: Trust has a significant positive relationship with the construction industry's performance.

2.5.2 Mutual commitments and objectives

The relationship between commitment and trust in commercial partnerships has been extensively studied. Commitment leads to stronger relationships when partners are loyal and can balance short-term issues with long-term goals (Mungra & Yadav, 2019). Committed customers also prefer reliable suppliers to reduce opportunistic behavior, especially when trust is present. Furthermore, the resource dependence hypothesis suggests that a firm's tendency towards external control stems from its dependence, and dependent parties value the partnership and want to maintain it (Kandade et al., 2021). High levels of dependence also lead to a greater willingness to comply with requests from main suppliers (Roberts-Lombard et al., 2019). Moreover, cooperation increases trust in the supplier's benevolence and buyer commitment to the supplier, strengthening the relationship (Graça, 2021).

H2: Mutual commitments and objectives have a significant positive relationship with the construction industry's performance.

2.6 Dispute Resolution

The exchange of relevant and timely information between partners is crucial for effective communication in dispute resolution (Bond-Barnard et al., 2018). Information sharing serves as a protective mechanism for the supplier, as it allows the disclosure of unexpected information that can impact the supplier's operations (Burtch et al., 2021). Trust plays a significant role in promoting information sharing, as customers are more likely to provide information in the presence of high mutual trust (Janssens et al., 2023). Additionally, the development of trust in a commercial partnership leads to improved communication over time (Bond-Barnard et al., 2018). Dependence is identified as a key driver of user information sharing, as a high level of dependency leads the focal firm to respond to the partner's direct request for information (Difrancesco et al., 2022). Furthermore, cooperation and communication required for high dependency increase the flow of information (Guo et al., 2023).

H3: Dispute resolution of supplier partnership has a significant positive relationship with the construction industry's performance.

Figure 1 shows this study's conceptual framework, which includes three CSFs of supplier partnership (i.e. Trust, Mutual Commitments and Objectives and Dispute Resolution) as independent variables and Construction industry performance as dependent variables.

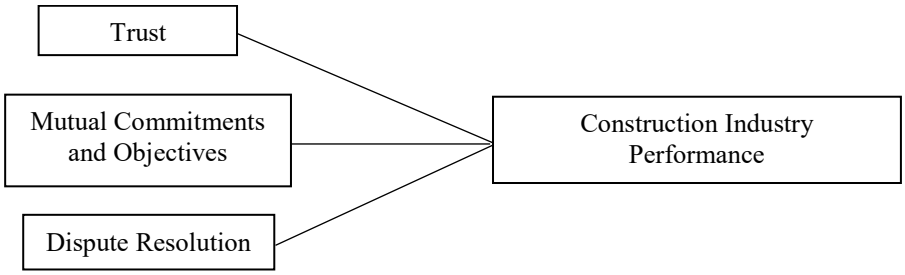

Figure 1. Conceptual framework

3. RESEARCH METHODOLOGY

This research employed quantitative analysis to gather information and replies from participants. The goals of quantitative research include examining research models, the significance of interactions between variables and factors, and hypotheses (Mohajan, 2020). Information is gathered using a purposive sampling procedure among the construction companies' top management. One hundred and ninety respondents from this sector participated in this study. The online survey was used to collect data. Figure 2 illustrates the flow of this research.

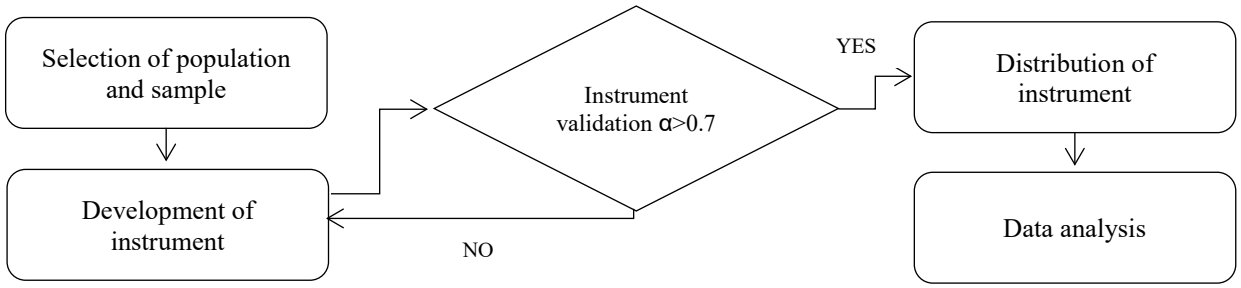

Figure 2. Research flowchart

3.1 Selection of Population and Sample

In order to determine the required sample size, it is important to establish the population size, the desired confidence level, and the margin of error. The widely preferred confidence level is 95%, and the standard margin of error is 5% (Gyllstad et al., 2021). For the upper management population, at least 115 respondents were required to achieve statistical power. These calculations were carried out using G-Power sample size software, a reputable tool for sample size determination across a wide range of fields. The software was configured with a precision level of 5%, an internal confidence level of 95%, and a P value of 0.50. A non-probability sampling method was employed in this study, and it was selected to target individuals who were willing to participate and share their insights and information relevant to the research.

3.2 Development of Instrument

The Likert scale applied in this study is an ordinal scale that ranges from 1 (strongly disagree) to 5 (strongly agree). The questionnaires were created to gather information for the structure of the research model. The questions are strategically designed to assist in the inquiry into the research aims. The questionnaire is divided into three sections. The first section includes demographic data, followed by the second section with questions about the critical success factor, and the third section consists of questions about performance in the construction industry. All these questionnaires were adopted and adapted from various authors' sources, as shown in Table 2.

Table 2. Sources of measurement items

Variables	Sources of Measurement items
Trust	Chen et al., 2019
Mutual commitment and objective	
Dispute resolution	
Performance of the construction industry	Maestrini et al., 2018

3.3 Instrument Validation

The questionnaire was validated through a pilot study with 25 respondents from the construction sector prior to the main data collection. A reliability analysis was conducted on the pilot study data, with the results presented in Table 3. The analysis yielded Cronbach's alpha values of 0.793 for trust, 0.768 for mutual commitments and objectives, 0.700 for dispute resolution, and 0.765 for construction performance. According to Taber (2018), a Cronbach's alpha value above 0.7 is considered acceptable for internal consistency, with values above 0.8 being preferable for stronger reliability. The item means across all variables ranged from 2 to 4. Construction performance exhibited the highest mean (M = 4.16, SD = 0.987), while mutual commitments and objectives had the lowest mean (M = 2.72, SD = 1.487). Among the variables, dispute resolution had the highest standard deviation (SD = 1.514, M = 2.72), indicating greater variability in responses, while trust displayed the lowest standard deviation (SD = 0.889, M = 4.04), reflecting more consistent respondent perceptions. These reliability and variability indicators suggest that the questionnaire items exhibit acceptable internal consistency and provide useful insights into the perceptions of respondents in the construction sector.

Table 3. Reliability assessment

Constructs	Item	Scale	Mean	Std. Deviation	α value
Trust (FT)	5	FT1	4.04	.889	0.793
		FT2	3.56	1.446	
		FT3	3.16	1.434	
		FT4	2.92	1.256	
		FT5	3.12	1.536	
Mutual commitments and objectives (FM)	5	FM1	3.24	1.128	0.768
		FM2	2.72	1.487	
		FM3	2.76	1.451	
		FM4	3.76	1.200	
		FM5	4.08	1.077	
Dispute resolution (FD)	4	FD1	3.04	1.399	0.700
		FD2	2.72	1.514	
		FD3	2.52	1.194	
		FD4	3.48	1.418	
Performance of Construction (PC)	5	PC1	3.20	1.190	0.765
		PC2	2.76	1.451	
		PC3	2.72	1.429	
		PC4	3.88	1.054	
		PC5	4.16	0.987	

3.4 Distribution of Instrument

The online questionnaire was administered using Google Forms, and data collection was conducted from October to November 2023. Valid assessment methods were employed to create the survey instruments, ensuring their reliability. The survey was intentionally brief and focused to prevent respondent fatigue, as lengthy and intricate surveys tend to discourage participation. To guarantee clarity, all items and questions will be double-checked to ensure respondents can

easily understand the queries. Respondents need not worry about the confidentiality of their personal information, as it will not be shared with unrelated parties and will solely be utilized for research purposes. The collected information will be securely stored for later review by the researcher.

3.5 Data Analysis

In this study, the application of structural equation modeling (SEM) will enable the simultaneous analysis of multiple relationships between different sets of data. SEM provides the capability to construct PLS path models, assess convergent validity, and conduct tests for discriminant validity (Shmueli et al., 2019). The research utilizes the SmartPLS software to analyze multivariate data using the SEM method. Additionally, to facilitate data organization, the collection of respondent data will be conducted using Microsoft Excel.

4. RESULT AND DISCUSSIONS

4.1 Demographics

Out of the 190 total respondents, 59.5% were female, while 40.5% were male. Furthermore, respondents were categorized by age, academic level, race, and work experience, with detailed frequencies and percentages presented in Table 4. This demographic breakdown provides a comprehensive overview of the respondent characteristics, supporting a well-rounded analysis of perspectives within the construction sector.

Table 4. The respondents' demographic

Profile	Description	Frequency
Gender	Male	77
	Female	113
Age	21-29	116
	30-39	50
	40-49	20
	50 >	4
Academic Level	Degree	112
	Master	48
	PHD	27
	Other	3
Race	Malay	115
	China	38
	Indian	24
	Others	13
Working experience	< 1	87
	2-3	59
	4-5	23
	5-6	12
	>6	9

4.2 Assessment of Measurement Model

In constructing the measurement model, the initial assessment involves evaluating the outer loading criterion, requiring that outer loading values exceed 0.5. In this study, all outer loading values meet this threshold, indicating satisfactory item reliability. To assess data accuracy, Cronbach's alpha was used, reflecting positive interrelations among variables. For internal consistency and instrument reliability, Cronbach's alpha values above 0.6 were considered acceptable, falling within the range of 0.6 to 0.8. Furthermore, a corrected item-total correlation exceeding 0.3 was used as a reliability indicator for each item (Hajjar, 2018). Thus, all Cronbach's alpha values exceeding 0.6 were accepted for this analysis.

Composite Reliability was also utilized to validate convergence, with values exceeding the desired 0.5 threshold, ranging from 0.7 to 1.000, as shown in Table 5. These results affirm the model's internal consistency. Additionally, the Average Variance Extracted (AVE) was calculated to assess convergent validity by measuring the variance captured by each construct. An AVE of 0.50 or higher indicates that the construct explains 50% or more of the variance in its items, thus supporting convergence. In line with Hair et al. (2022), the AVE threshold was set at 0.50 for this study. Consequently, all AVE values surpass this threshold, confirming acceptable convergence and reliability in the measurement model.

Table 5. Validity and reliability for constructs

Constructs	Items	Loading	α	ρc	AVE
Trust (FT)	FT1	0.615	0.705	0.817	0.531
	FT3	0.643			
	FT4	0.831			
	FT5	0.801			
Mutual Commitment and Objective (FM)	FM2	0.838	0.702	0.812	0.522
	FM3	0.720			
	FM4	0.604			
	FM5	0.708			
Disputer Resolution (FD)	FD1	0.698	0.702	0.817	0.529
	FD2	0.673			
	FD3	0.788			
	FD4	0.744			
Performance of Construction Industry (PC)	PC1	0.693	0.700	0.808	0.513
	PC3	0.753			
	PC4	0.696			
	PC5	0.722			

*Note: Items FT2 and FM1 were removed to fulfil the convergent validity threshold

Table 6 presents the analysis of the Heterotrait-Monotrait ratio (HTMT) to assess discriminant validity in this study. Discriminant validity determines whether constructs that theoretically should not be correlated indeed show minimal or no correlation. An HTMT value below 0.9 is generally considered acceptable for confirming discriminant validity. In this research, all items yielded HTMT values within this acceptable range, thereby affirming the discriminant validity of the constructs. Figure 3 illustrates the measurement model used in this study, providing a visual representation of the constructs and their relationships within the model.

Table 6. Discriminant validity result (HTMT ratio)

	FD	FM	FT	PC
FD				
FM	0.106			
FT	0.240	0.501		
PC	0.363	0.130	0.269	

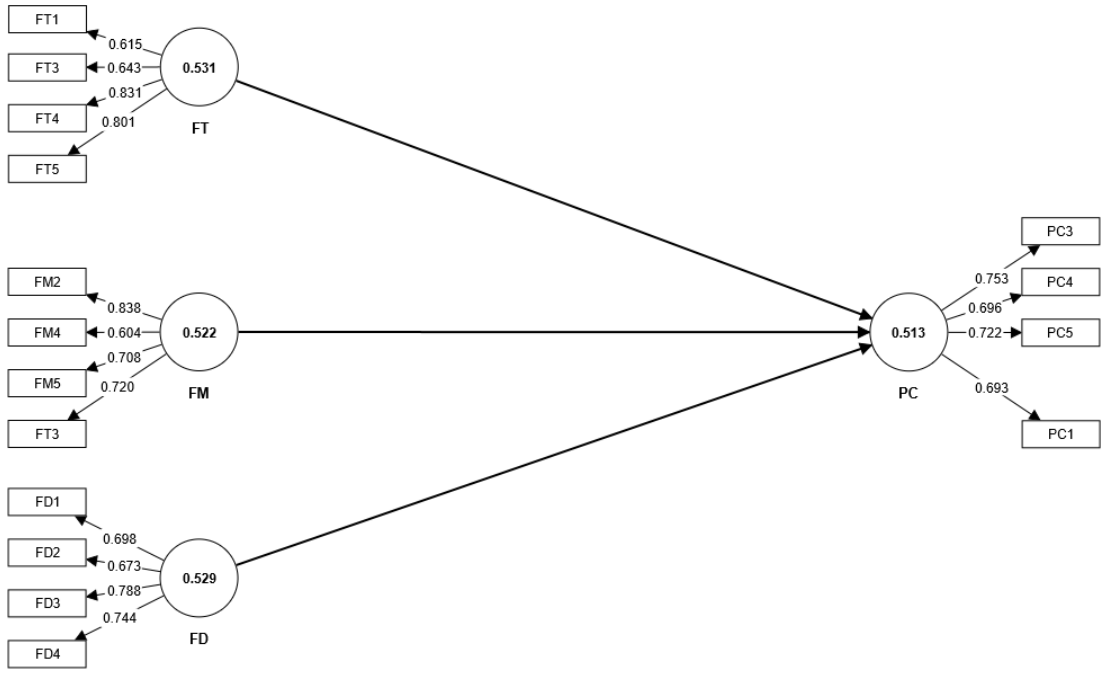

Figure 3. Measurement model

4.3 Assessment of Structural Model

PLS-SEM version 4 was employed to analyse the structural model in this research, specifically examining the correlation between variables. This analysis serves to refine the hypotheses concerning the relationships between each variable initially proposed in the study's early phases. The process involves bootstrapping alongside other procedures such as effect size, R2, and f2. Consequently, the analysis will indicate whether the suggested hypotheses are supported or not. The Adjusted R2 value of 0.922 signifies that 92.2% of the variation in the construction industry's performance is influenced by Critical Success Factors (CSF). This outcome provides insights into whether the proposed hypotheses receive support. In Table 7, the research findings reveal p-values of 0.000, 0.003, and 0.007, indicating that these p-values support the developed hypotheses.

Table 6. Significance of hypothesized relationships (direct)

Relationships	VIF	β	SD	*t*-value	*p*-value	Confidence Interval		Effect Size (f^2)	Explanatory Power (R^2)
						LL	UL		
H1: FT -> PC	1.169	0.124	0.050	2.473	0.007	0.039	0.686	0.028	
H2: FM -> PC	1.135	0.234	0.084	2.797	0.003	0.082	0.358	0.132	0.922
H3: FD -> PC	1.042	0.633	0.069	9.173	0.000	0.039	0.203	0.557	

*Note. SD=Standard Deviation, LL= Lower Limit, UL=Upper Limit, VIF=Variance Inflation Factor

5. DISCUSSION

The main objective of this study is to investigate the critical success factors (CSFs) influencing supplier partnerships within the construction industry. To identify these critical success factors, the study delves into three key elements: trust, mutual commitments and objectives, and dispute resolution. These factors collectively contribute to an understanding of the nuanced dynamics within supplier relationships and their potential impact on the performance outcomes within the construction industry. One of the objectives of this study was to assess trust as a critical success factor in supplier partnerships on the construction industry's performance. To address this objective, Hypothesis 1 was formulated. The analysis of the structural model revealed that trust had a Beta value of 0.124 and a p-value of 0.007, indicating a significant influence on partnership performance. There is a divergence in the understanding of partnering, with some viewing it as a process and others to build trust and foster positive working relationships in projects. The variation in the definitions of partnering may stem from the different goal's authors have when implementing partnering. Some authors consider partnering as a procurement choice, framework, or set of means. Naoum (2003) articulates this perspective, stating that partnering is a concept providing a framework for establishing mutual objectives among the building team, attempting to reach an agreed dispute resolution procedure, and encouraging the principles of continuous improvement. Naoum emphasizes that this framework instils trust, cooperation, and teamwork into a fragmented process, enabling the combined effort of industry participants to focus on project objectives. Similarly, Nyström (2008) incorporates soft elements, specifically trust and mutual understanding, as core components of his partnering family. He uses the Wittgenstein family resemblance concept to define partnering, and all forms of the family share these core elements. Nyström, like Naoum, supports the idea that partners can be used as a set of tools rather than solely as a procurement choice to achieve the desired outcomes.

Next, the objective of this study is to establish mutual commitments and objectives and their impact on the performance of the construction industry. To address this objective, Hypothesis 2 was formulated. The analysis of the structural model revealed that dispute resolution had a Beta value of 0.234 and a p-value of 0.003, indicating a significant influence on partnership performance. This finding aligns with the perspective of Bygballe et al. (2010), who emphasized the importance of establishing long-term relationships in partnering to ensure the creation of mutual commitments and objectives between supplier partnerships. Additionally, Andersen et al. (2012) further underscored that a robust project mutual commitment and objective play a key role in building trust among project stakeholders, contributing to effective and sustainable working relationships in the long run.

Lastly, the objectives of this study were to assess the relationship between dispute resolution and the performance of the construction industry. To address this goal, Hypothesis 3 was formulated. The structural model analysis revealed that dispute resolution had a Beta value of 0.633 and a p-value of 0.000, indicating a significant influence on partnership performance. Consistent with prior research, our findings suggest that the incorporation of dispute resolution into construction industry projects enhances project efficiency and elevates partnership performance, aligning with the assertions made by She and Tang (2017). This study highlights that project managers for supplier partnerships on the East Coast believe that dispute resolution has a substantial impact on the quality of partnership performance. Building on the insights from Bond-Barnard et al. (2018), it is anticipated that giving more consideration to project dispute resolution would lead to improved partnership performance.

6. CONCLUSION

Based on a survey and a review of previous studies, the top three key factors were highlighted through a comprehensive assessment to identify Critical Success Factors (CSFs) for supplier partnerships in the construction industry. This study identifies trust, mutual commitments and commitments, and dispute resolution as essential elements for fostering effective supplier partnerships. The consensus is that project manager commitment and involvement are crucial for quality and overall performance. The present study reveals that human factors, particularly the quality of supplier partnerships, are crucial to achieving project success, especially for architectural works. The findings on CSFs in supplier partnerships provide valuable insights for construction practitioners, helping them prevent disputes, improve partnership efficiency, and eliminate adversarial interactions. For future research, the CSFs identified in this study could serve as a basis for further analysis or comparisons with other studies. Expanding the research database could lead to more robust findings, and qualitative approaches could provide deeper insights into the effectiveness of these CSFs on construction industry performance.

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AUTHORS CONTRIBUTIONS

Fatimah Mahmud (Conceptualization; Supervision; Revision; Editing)

Sharifah Nora Fadiani Syed Abu Bakar (Methodology; Writing - original draft)

AVAILABILITY OF DATA AND MATERIALS

The data supporting this study's findings are available on request from the corresponding author.

ETHICAL STATEMENT

Not applicable.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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