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EFFECT OF RELATIONSHIP MANAGEMENT ON CONSTRUCTION PROJECT SUCCESS DELIVERY

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Abstract. The dynamic, challenging, and complex nature of the construction projects environment often cause adversarial culture, disputed claims, and deteriorating relationships between project participants. This paper aims to study the correlation between Relationship Management (RM) and construction project success and to develop a framework that includes practical actions, tools, and strategies for managing relationships in construction projects. Literature review and interviews were used to explore and validate the RM's relevant associated traits. Subsequently, a piloted questionnaire was used to collect the data from 264 construction experts and assess the effect of RM on the overall project success. The data were analyzed using Partial-Least Squares Structural Equation Modeling (PLS-SEM), where the structural and measurement models of the higher and lower order constructed were assessed. The study findings categorized the RM-associated traits into three main pillars: Contractual Measures, Team Interactions, and Top Management Actions. The findings also confirmed that RM has a significant positive effect on the overall success of construction projects. In addition, this paper proposed an integrated framework for managing relationships in construction projects, allowing construction firms to monitor the relationships in their projects and identify key areas for strengthening the relationships throughout their projects to foster their projects' success rates.

Keywords: relationship management, construction projects, United Arab Emirates, structural equation modeling, project success.

Introduction

Relationships in construction projects are formulated and regulated by contracts. Usually, contracts are prepared to assign obligations, responsibilities, and liabilities to the project parties. Therefore, the concept of relational contracting was first introduced by Macneil (1974), where the notion was to apply mutual planning and better working relationship development. Traditional procurement approaches and standard forms of contracts do not typically promote working relationships since their primary goals are to blame where there is a liability. As a solution, collaborative procurement approaches were introduced with contracts that have a greater capacity for collaboration to promote better relationships between project participants. Those approaches are known as relational contracting methods.

Over decades, the traditional mechanisms have been the model in construction projects procurements where formal contracts impose obligations among the contracting parties (Cheung et al., 2006; Zhao et al., 2022). Traditional procurement routes can effectively succeed in cost and quality performance (Steane & Walker, 2000). Also, a competitive tender is considered an effective mechanism

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for generating cost savings in construction projects (Domberger & Rimmer, 1994). On the other hand, traditional procurement routes produce a defensiveness culture in which each organization spends considerable time and money defending its contractual stand. When a dispute arises, both parties concentrate on blame allocation to the other party rather than realizing a feasible solution for the problem (Jones, 2001). The risk of arising disputes is continuous and generates a defensiveness in the contractual negotiations in which each party tries to transfer more risk onto the others.

In contrast to traditional procurement, collaborative approaches adopt a project management process in which all parties work together as an integrated team to achieve the mutual objectives and the desired outcome (Alarcón & Mourgues, 2002). Instead of penalizing for non-conformance with the threat of liquidated damages and extreme variation claims in the traditional procurement practice, the participants in a collaborative agreement share the profit that is determined by the overall team performance (Davis & Walker, 2009; Xie & Li, 2021; Wang et al., 2022).

There is a growing perception among the researchers that relational contracting, i.e., collaborative procurement routes, could attain many benefits to the project. For instance, partnering agreements can achieve an enhanced relationship between the parties, better communications, increased productivity, and lessened disputes (Chan et al., 2004). Also, partnering agreements facilitate reduced cost, decreased project duration, high level of team integration; continuous improvement in quality; and improved client satisfaction (Bresnen & Marshall, 2000). Partnering can increase innovation, lead to fewer conflicts between the project stakeholders, improve informed decisions (Cheung et al., 2006), and help in expanded possibilities of future business opportunities (Cox & Thompson, 1998). Also, collaborative procurement and relational characteristics support overcoming impediments emerging during the construction stage (Adami et al., 2019). According to Rahman and Kumaraswamy (2008), the concept of sharing the project profit in collaborative procurement approaches contributes to the best possible outcome for the project.

On the other hand, other researchers argue that there are serious challenges in benefiting from collaborative procurement approaches such as partnering. For instance, Anvuur and Kumaraswamy (2007) argued that characteristics such as mutual trust, accountability, and team integration do not emerge easily. These can be formed only through lengthy and complex interactions, which eventually establish a social relation and bind the stakeholders for a mutual objective. Also, Bresnen and Marshall (2000) made a very critical point by indicating that the success stories of collaborative procurement approaches are mainly recognized in countries such as the UK, USA, and Australia; therefore, corporations and governments need to be more careful while applying them in other national contexts. The actual benefits of these collaborative approaches can be attained only by customizing them based on local conditions. Nyström (2008) went to the extreme and claimed that there are no tangible benefits arising out of collaborative approaches These contradicting thoughts still have to be investigated by procuring and completing more projects through collaborative approaches and judging whether the desired objectives and benefits have been attained, especially in countries such as the United Arab Emirates (UAE), where the collaborative approaches are not or less used. In the UAE, collaborative approaches require a fundamental change in the industry's culture, which involve a wide range of underlying problems, issues, and dilemmas (Elhag et al., 2020).

The problematic issue of poor relationship management exists in construction projects until today (Jelodar et al., 2016; Zou et al., 2014; Khoso et al., 2021). Therefore, construction project management is being steered to more relational procurement methods, and several efforts have been made for better relationships in construction projects over the past few decades. Many researchers shared the dominant perception that relationships should be governed by formal legal restrictions and arrangements. Thus, many articles focused on relational contracting methods such as alliancing, partnering, and Integrated Project Delivery (IPD), where the relationships are formally governed by the contracts (Alderman & Ivory, 2007; Chan et al., 2003; Crespin-Mazet et al., 2015; Eriksson et al., 2009; Sparkling et al., 2010; Walker et al., 2002; Guerola-Navarro et al., 2021). However, according to Construction Industry Institute (1991), relational contracts such as partnering realize that divergent objectives of all parties need to be met and aligned to accomplish the desired strategic outcomes. The said alignment may involve informal objective alignment outside the contractual setting. Relational contracts still acknowledge that there is an informal part of the relationships outside the contract setting that cannot be imposed or orchestrated by contracts (Jelodar et al., 2016), where researchers believe that the formal application of relationships in construction projects might affect the transactions flexibility and make the relationships superficial and unrealistic. Therefore, more attention must be paid to the informal part of the relationships while maintaining the contractual governance through relational contracts.

To sum up, any construction project, regardless of the used procurement route, whether a collaborative approach with formal (Relational contracting) and informal parts or a traditional approach, requires a certain level of Relationship Management (RM) which could boost and maintain the Relationship Quality (RQ) of the relationships between the project participants. Accordingly, individual research efforts have been carried out to identify the individual relationship factors, attributes, or enablers that may affect construction project participants' relationships. Nevertheless, few studies are available on studying the relationship between those attributes of relationship and the overall construction project success. For instance, Meng (2012) studied the effect of RM on construction project performance in the UK; however, the study considered only 10 RM characteristics which are now extended to multiple

traits associated with RM in the construction industry. Moreover, the study only focused on the client–main contractor relationship on project success and considered neither the Consultants nor sub-contractors. Also, Walker et al. (2015) analyzed the relationship between using alliance models and the performance of engineering infrastructure projects in Australia, they reported evidence of a significant industry improvement in large-scale engineering infrastructure project delivery using alliance models. However, the findings might not be generalized as considering other relational contracting forms "other than Alliance", different construction categories "other than infrastructure", and different regions "other than Australia" with lower maturity levels in relational contracting would probably lead to different findings.

The need for the study came out based on recognizing that only few previous articles have studied the relationship between RM and the overall construction project success, especially in the context of UAE. The relational agreements and readiness of the industry's culture in UAE are way behind its counterparts in other countries such as the UK, Australia, Hong Kong, and Singapore, where relational contracting, e.g., partnering, Alliancing, and IPD has been progressively regarded as sufficient procurement strategy to deliver construction projects (Kwan & Oforp, 2010; Rahman & Kumaraswamy, 2004; Walker & Hampson, 2003; Williams & Lilley, 1993). Therefore, the primary objective of this paper is to examine the relationship between Relationship Management (RM) and the overall construction projects' success in UAE. Besides, this study aims to propose a practical framework for RM in UAE construction projects, considering the UAE's construction industry's existing culture and level of readiness.

The following are the individual research questions to be tackled in this study: Q1) What are the key associated traits of RM in construction projects? and Q2) What is the relationship between RM and construction projects' success delivery in UAE? Also, the study introduces a practical framework to the construction firms to guide them on how to manage the relationships in their projects to foster collaboration and promote project success. The upcoming sections of the paper are organized as follows: Section 1 sheds light on UAE's construction industry. Section 2 presents general background about RM. While the research methodology is described in Section 3, the review stage is summarized in Section 4. Section 5 elaborates on the theoretical model, hypothesis, data collection, and analysis. Sections 6, 7 and 8 discuss the findings, present the practical framework. Final section provides the conclusion.

1. United Arab Emirates construction industry

As a consequence of the vigorous growth in tourism and business activities, the United Arab Emirates (UAE) has a very vibrant economy, and therefore continuous growth is witnessed in the construction industry (El-Sayegh et al., 2020). The construction industry in UAE has gone through revolutionary expansion in the last three decades (Faried et al., 2018). This progressive expansion draws the international contractors' and investors' attention to the large, innovative, and unique projects ongoing in UAE. The construction sector in the UAE has continuously contributed to developing the economy and enrichment of the Gross Domestic Product (GDP) (Almarri & Abu-Hijleh, 2017). As per the Dubai Chamber of Commerce, the construction sector is one of the significant contributors to the GDP of UAE, and it is expected to continue expanding in the short and long term to have the capacity to achieve the UAE's strategy ambitious goals with significant spending in infrastructure, hospitality, green and renewable energy construction projects (Elhag et al., 2020).

Fundamentally, most construction projects in the UAE encounter time delays, cost overruns, and complex disputes (Faridi & El-Sayegh, 2006). On top of that, the said accelerated growth of the construction sector in the UAE has even increased the existing issues encountered by the UAE's construction projects. Due to the increase in the complexity and the dynamic nature of the construction projects in UAE, construction disputes have increased drastically in the last five years (El-Sayegh et al., 2020), reflecting the relationship challenges, trust issues, lack of collaboration, and opportunistic behavior deeply rooted in the UAE's construction industry culture (Elhag et al., 2020). Regarding the value of construction disputes, UAE is one of the two highest countries in the Middle East. Besides, with 14.5 months, the dispute resolution settlement in the Middle East scored the most prolonged average duration worldwide (Awwad et al., 2016).

Traditional procurement routes are the most used routes in UAE's construction industry; understanding traditional approaches and cost certainty at the outset of the project makes clients hesitant to deploy alternative collaborative approaches (Elhag et al., 2020). Though, UAE's clients do not recognize that these traditional routes may not always provide them with the best value for money and time certainty (Asamoah, 2012). According to Albaloushi and Skitmore (2008), project managers in the UAE's construction industry are often more concentrated on typical project management techniques such as planning, monitoring, and controlling rather than managing people and their relationships. Concentrating on these typical approaches while neglecting the significance of managing the relationships between project participants often causes several challenges in the construction project environment, such as adversarial culture and poor performance (Meng, 2012). In contrast, collaborative relationships play a vital role in achieving project objectives, top performance, and overall success (Chan et al., 2015; Wang & Huang, 2006; Zou et al., 2014). Also, Al-Hajj and Sayers (2014) stated that the UAE's construction project managers are often unaware of the criticality of monitoring the relationships in their projects despite being well qualified in their primary discipline and knowledgeable in construction management in general.

Attributing all drawbacks of the UAE's construction industry to the absence of collaborative procurement, deteriorated relationships between project participants, and unawareness of best relationship management practices is unreasonable and unfair; however, it has undoubtedly severe limitations and disadvantages to the industry. Therefore, the UAE construction industry requires a fundamental alteration to collaborative relationship approaches instead of traditional adversarial relationships, and changing the culture related to relationship management shall play an essential role in this transformation.

2. Relationship management – background

RM was initially introduced as Customer Relationship Management (CRM) and was defined as the core business strategy to build and maintain good relationships with clients to reduce cost, increase mark-up, and achieve the organizational targets for current and potential customers (Buttle, 2008). Other industries have pursued and articulated the concept of RM long before the construction industry. Therefore, they have attained a level of maturity and expertise in both research and application of collaborative and relational approaches. Over decades, several researchers contributed to achieving the said maturity levels with seminal works in relationship marketing (e.g., Berry, 2014; Gronroos, 2000; Gummesson, 2002), in business and customer relationship management (e.g., Dyché, 2001; Peel, 2002; Wang & Zhao, 2019), and in manufacturing (e.g., Jacobs, 2011; Vachon & Klassen, 2008; Theodoraki et al., 2022).

Over the last two decades, there have been growing research efforts related to relationships and RM in construction project management literature. For instance, Walker and Hampson (2003) established relationship-based procurement approaches for construction projects. Hauck et al. (2004) analyzed a case study to demonstrate that alternative project delivery systems, i.e., alliancing that focuses on relationship and RM, can be the key to lessening the adversarial nature of most construction projects. Another relationship approach for managing complicated projects in the construction industry was introduced by Pryke and Smyth (2006). Davis and Walker (2009) demonstrated how building capable social relationship capital could be the key to deliver construction projects. Yeung et al. (2009) developed a performance index for managing construction projects through relationship-oriented approaches. Davis and Love (2011) suggested that alternative relationship-oriented project delivery systems can add value to the construction project through a structured way of relationship development. Meng (2012) studied the effect of RM on project performance in UK construction projects. Jelodar et al. (2016) recommended a framework of relationship quality in managing construction projects based on trust, commitment, and teamwork. Meng and Boyd (2017) identified the role of project managers in managing internal and external relationships within their construction projects. Vaux and Kirk (2018) examined the effect of interpersonal relationship conflict on construction management professionals' performance and productivity. Ke et al. (2019) presented a comparative study of how the relationships are being managed in large construction projects in China and Singapore. Recently, Routledge has published the Handbook of IPD edited by Walker and Rowlinson (2020) to contextualize and thematically investigate the IPD concept as an alternative project delivery that considers people, culture, and collaboration as critical elements to the successful and effective delivery of construction projects. All these studies and many others made a joint effort to evolve RM in both research and application fields in construction management.

RM is commonly known as a high-order construct that cannot be measured directly (Crosby et al., 1990) and can only be assessed through more than one layer of latent variables (Hair et al., 2016), where the constructs' conceptual definitions are tied to their traits or attributes. Therefore, several studies in the literature tried to identify the traits of RM regardless of the expressing language they used to describe those traits where other terms such as "characteristics", "enablers", "attributes", and "indicators" were used. The said RM traits can be described as the critical factors or key performance indicators that the project participants should closely and proactively monitor to manage the relationships in their projects effectively. In other words, RM-associated traits are the main areas that should be dealt with to improve relationship status and RQ among project participants.

3. Research methodology

The overall objective of this study is to examine the relationship between RM and construction projects' success delivery in UAE; a two-stage methodology has been designed and implemented to achieve this objective. In stage 1 (Review stage), a comprehensive review of relevant literature from trusted sources has been carried out to identify different traits/attributes related to RM in construction projects. Validating the information extracted from the literature through semi-structured interviews also forms part of stage 1. In stage 2 (Investigation stage), a questionnaire survey was distributed to collect the data. The Structural Equation Modeling (SEM) was deployed to analyze the survey outcome, examine the relationship between RM and project success delivery in UAE, and produce the RM framework. Figure 1 illustrates the stages and the components of the research design.

4. Stage (1) Review stage

Different publications and research work related to relationships and RM in construction have been identified using keyword research in 5 renowned journals selected based on their prominence in project and construction management. These journals were as follows: *International Journal of Project Management*, *Journal of Management in Engineering*, *Journal of Construction Engineering and Management*, *Engineering*, *Construction and Architectural Management*, and *International Journal of Construction*

Management. These journals mainly cover the mainstream knowledge areas of construction project management (Jelodar et al., 2016; Tang et al., 2010; Wing, 1997). "Relationship management" AND "Construction projects" was used as the main keyword to fetch the data; however, to explore more articles, another research run was implemented using "Partnering" OR "Trust" OR "alliance" OR "relational contracting" AND "construction" as keywords. The search results revealed many articles; however, after the title analysis and the abstract analysis, 48 papers (see Appendix) were shortlisted for full-text review because of their relevance to this study.

Further to conducting a full-text review to extract the previously RM traits in the shortlisted papers, an output of 56 RM traits was identified, as shown in Table 1. It was observed that many authors used different expressions to describe similar terminologies related to relationships in the construction project environment. Also, few relationships related traits available in the literature might not apply to the setting of UAE as a developing country with a distinct culture and market conditions. Therefore, the next step of categorizing, classifying, and validating the traits picked from the review in the context of UAE was indispensable.

Further, as illustrated in Figure 1, the next step involved a qualitative mini-study where nine semi-structured interviews with construction professionals were conducted to re-contextualize the extracted 56 RM traits. Simple criteria were set to select the relevant interviewees as follows: A) Must have at least 20 years of experience in the UAE construction industry, and B) Must have relevant experience in delivering at least three large scale complex projects holding a Senior role involved in managing different parties, multiple significant packages and a tenth of professionals. The interviewees were shown the list of 56 traits (Table 1) and were asked three main questions: 1) Are there any similarities between the terms used to describe each item? If the answer was yes, the interviewee was asked to merge those traits; 2) Is this item most likely to affect the quality of the relationships between the project participants? 3) Rank the items descending from the most significant to the least. The duration of each interview was 45 minutes on average. This step merged traits with similar concepts, excluded traits that do not apply to UAE from the interviewees' perspective. In summary, out of 56 individual traits picked from the review process (Table 1), 48 were merged and represented by 13 traits

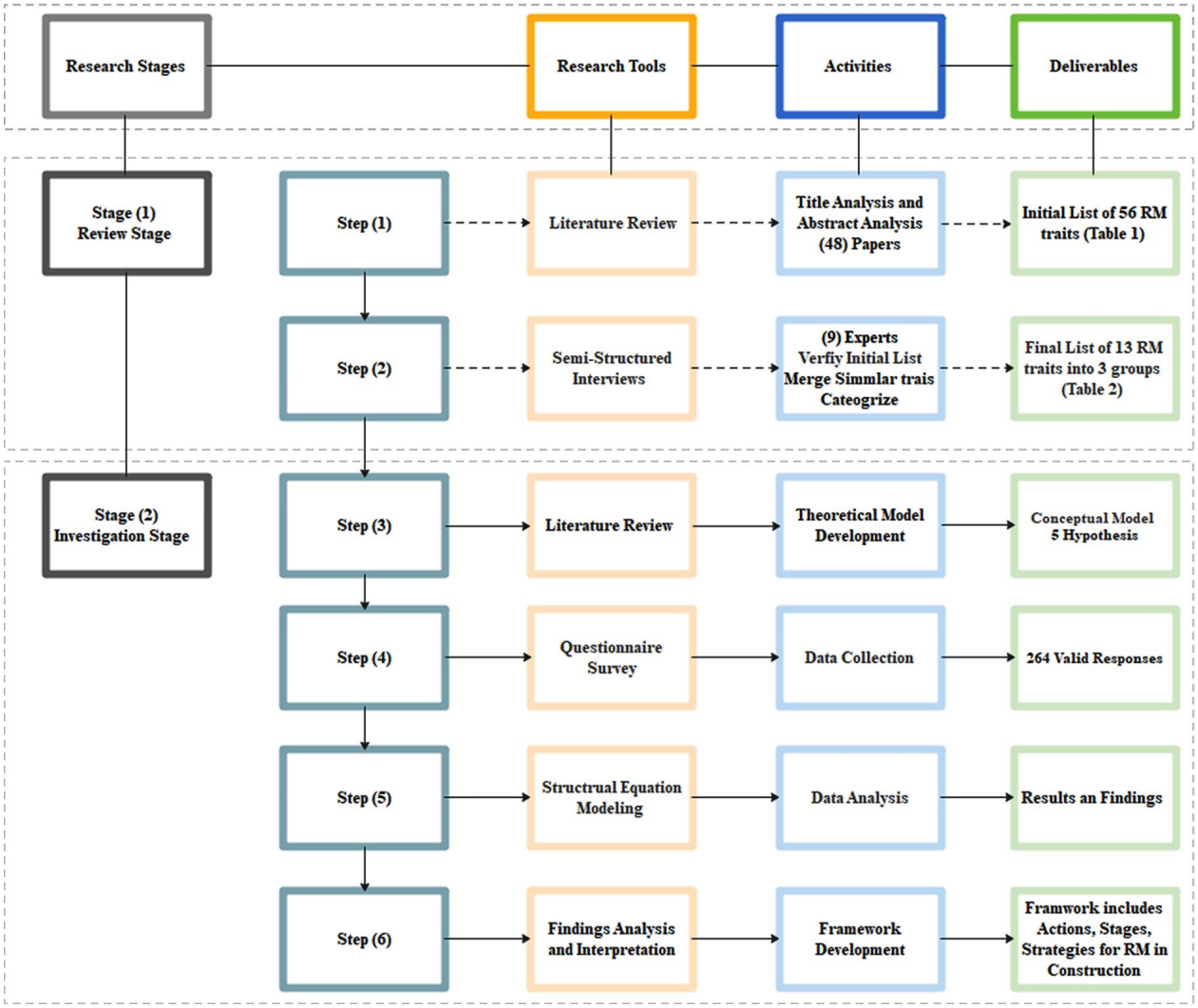

Figure 1. Research design

that were further categorized under three groups of related traits, as presented in Table 2. The balance 8 traits were excluded for not being relevant in the UAE setting. For instance, the individual traits "Procurement strategy" and "Collaborative procurement methods" were excluded as those approaches are not used in UAE, and this study is only considering the Design-Bid-Build traditional procurement approach.

Table 1. RM associated traits extracted from the literature review

#	RM trait	Sources in the literature (Per Appendix)	#	RM trait	Sources in the literature (Per Appendix)
1	Trust	1, 2, 3, 4, 6, 8, 9, 10, 11, 13, 14, 16, 17, 18, 20, 21, 23, 24, 25, 26, 29, 30, 31, 32, 33, 36, 37, 39, 40, 42, 44	29	Continuous improvement	1, 3, 6, 8, 10, 11, 26
2	Effective communication	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 17, 18, 21, 22, 23, 24, 25, 26, 30, 31, 32, 35, 37, 39, 40, 41, 42, 43, 44	30	Performance incentives	1, 9, 25, 30, 32, 33
3	Top management commitment	1, 2, 4, 5, 6, 8, 9, 13, 14, 16, 18, 22, 25, 31, 32, 33, 35, 36, 37, 39, 42, 45	31	Team building activities	1, 5, 17, 33, 37, 42
4	Problem solving	1, 4, 10, 11, 13, 14, 16, 18, 22, 24, 25, 26, 31, 32, 35, 42, 43, 45, 48	32	Respect	1, 3, 5, 8, 22, 37
5	Risk allocation	1, 2, 4, 6, 8, 9, 10, 11, 12, 13, 21, 23, 24, 25, 26, 30, 35, 44, 45	33	Dispute resolution system	1, 24, 33, 40
6	Open/Transparent communication	1, 2, 4, 5, 6, 7, 8, 9, 13, 17, 24, 25, 26, 31, 32, 39, 40, 41, 44	34	Benchmarking	1, 11, 25, 30
7	Clear contract	1, 5, 6, 8, 20, 24, 25, 26, 30, 32, 34, 35, 40, 41, 43, 45, 46	35	Harmony	9, 32, 40, 43
8	Collaboration culture	9, 10, 13, 14, 23, 26, 30, 31, 33, 39, 42, 43, 44, 45	36	Leadership	1, 9, 21, 37
9	Mutual objectives	1, 2, 4, 6, 10, 11, 13, 14, 16, 18, 22, 25, 30, 33, 44	37	Objective alignment	8, 9, 22, 39
10	Collaborative team culture	1, 6, 8, 23, 23, 24, 25, 28, 30, 33, 40, 43, 44, 45	38	Multi-disciplinary team	5, 25, 30, 37
11	Conflict management	1, 6, 12, 13, 16, 19, 23, 25, 26, 32, 35, 42, 45	39	Integrity	1, 8, 41, 46
12	Long term commitment	1 ,2, 4, 6, 9, 13, 14, 33, 22, 24, 26, 30, 36, 42	40	Education and learning	1, 13, 14
13	Teamwork	1, 6, 8, 13, 25, 31, 33, 39, 40, 43, 44, 48	41	Socializing outside the project	8, 21, 33
14	Openness and honesty	8, 9, 17, 24, 31, 32, 39, 40, 41, 44, 46	42	Understanding among team members	9, 32, 40
15	Using the right form of contract	8, 23, 24, 26, 34, 35, 41, 44, 45, 46	43	Training	1, 17, 60
16	Procurement strategy	1, 2, 4, 6, 8, 9, 21, 23, 25, 29, 35, 41	44	No Blame Culture	8, 11, 23
17	Knowledge sharing	2, 8, 10, 13, 16, 18, 21, 24, 25, 26	45	Resource sharing	1, 6, 30
18	Cooperative procurement methods	4, 6, 8, 9, 25, 29, 30, 38, 42	46	Setting clear objectives	5, 8, 25
19	Innovation	3, 13, 14, 30, 32, 40, 42, 43	47	Team flexibility	8, 30, 32
20	Well Defined Scope	8, 9, 32, 35, 40, 43, 44, 45	48	Reciprocity	16, 41
21	Team integration	12, 17, 30, 33, 42, 52, 55	49	Payment on time	45, 24
22	Fairness	1, 7, 9, 10, 24, 33, 45, 46	50	Tendering method	1, 9, 24
23	Working together before	1, 3, 18, 24, 25, 33, 40	51	Participants behavior	6, 8, 25
24	Gain and pain sharing	6, 8, 11, 25, 26, 30, 35	52	Collective understanding	8, 37
25	Joint Working	11, 13, 14, 39, 40, 43	53	Readiness to compromise on unclear issues	30, 33
26	Win-Win approaches	1, 6, 24, 26, 30, 42, 48	54	Sub-contractor selection criteria	10, 24
27	Flexibility in contract	1, 9, 20, 21, 34, 35	55	Empowerment of the team	34, 37
28	Early involvement of Key Participant	6, 24, 25, 26, 30, 42	56	Empowerment of the team morale	17, 35

Table 2. RM considered RM traits as refined by the interview experts

	RM Traits	Merged traits as per interviews output	Code	Group	Group Description
1	Contract clarity	Clear contract, Clear dispute resolution system, Well defined scope	CONT-CLAR	Contractual Measures (CM)	Specific contractual measures to be considered while drafting the construction project contracts
2	Contract flexibility	Flexibility in contract, Tendering method, Using the right form of contract	CONT-FLEX		
3	Fairness in risk allocation	Risk allocation, Fairness, Gain and pain sharing, win-win approaches	CONT-RISK		
4	Clear and mutual goals	Objective Alignment, Setting clear Objectives, Mutual objectives	MAN-OBJ	Management Actions (MA)	Specific actions to be considered by construction organizations management in the RM context. Starting from top management throughout project and construction management teams
5	Commitment	Top management commitment, Long term commitment, Early involvement of key participant, Performance incentives, Payment on time	MAN-COMM		
6	Reciprocity	Reciprocity, Resource sharing	MAN-RECI		
7	Continuous improvement and regular benchmarking	Continuous improvement, Benchmarking	MAN-CONT		
8	Conflict Management and Effective Problem Solving	Problem solving, Conflict management	MAN-CONF		
9	Trust and respect	Trust, respect	TEAM-TRUS	Team Interactions (TI)	Factors that explain the interactions between project participants. Those factors to be promoted and monitored closely to ensure healthy relationships and motivate collaboration to the greatest extent possible
10	Open, transparent, and effective communication	Effective communication, Open/ Transparent communication	TEAM-EFFE		
11	Teamwork and team flexibility	Teamwork, Team integration, Multi-disciplinary team, Collective understanding, Team flexibility, Readiness to compromise on unclear issues, Joint working	TEAM-FLEX		
12	Individuals collaboration culture and personal traits	No Blame Culture, Collaboration/ cooperation culture, Innovation, Integrity, Openness and honesty, Leadership	TEAM-TRAI		
13	Team harmony	Harmony, Working together before, Team building activities, Socializing outside the project, Understanding among team members	TEAM-HARM		

5. Stage (2) Investigation Stage

This study set to test the proposed model to assess the relationship between RM driving the quality of the relationships between project participants as an Independent Variable (IV) and Construction project success delivery in UAE as a Dependent Variable (DV), and the moderation effects of Project properties. The investigation stage includes the theoretical model, hypothesis development, data collection, SEM modeling, and model assessment. The visual representation of the conceptual model is shown in Figure 2.

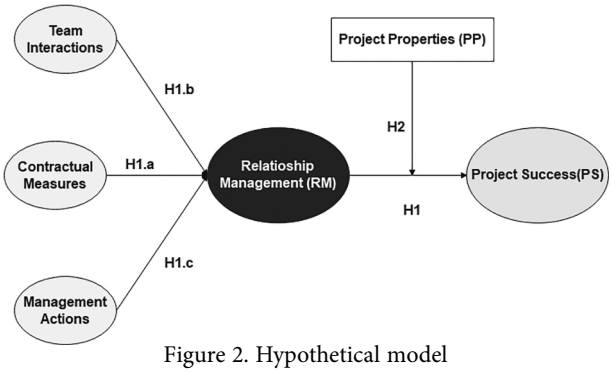

Figure 2. Hypothetical model

5.1. Theoretical model and hypothesis development

5.1.1. Relationship management and project success

The current literature follows a path towards exploring the role of RM in promoting project performance and achieving overall project success. Different researchers often highlighted the significance of RM in the construction industry, and it was suggested that collaborative relationships play a crucial factor in achieving project objectives, top performance, and overall success (Chan et al., 2015;

Zou et al., 2014). On the other hand, poor adversarial relationships among the construction project participants can hamper credibility and lower the project's sustainability (Meng & Boyd, 2017). Meng (2012) studied the effect of RM on construction project performance; it was concluded that RM significantly impacts project performance in terms of time, cost, quality, and safety. Also, Wang et al. (2019) found that RQ is significantly connected to project success through contract control and coordination.

Notwithstanding the above, Chan et al. (2015) reported that practitioners still tend to underestimate the importance of collaborative relationships between project stakeholders as the construction projects globally still have many relationship-related impediments (Jelodar et al., 2016; Zou et al., 2014), and the situation in UAE is no different (Elhag et al., 2020). Despite the overall perception that relationship state is correlated with project success, the quantification of this correlation is yet to be explored in the UAE context. Existing studies in UAE remain inconclusive to offer insights on how project relationships could be proactively managed to strengthen the project success probabilities. Construction project participants need to maintain positive relationships within their project boundaries to succeed in the current complex environment (Meng & Boyd, 2017). Therefore, the following can be hypothesized:

H1. (RM) has a significantly positive effect on project success in the UAE.

5.1.2. Contractual measures

RM is a running activity over the project lifecycle and should be monitored and practiced pre- and post-contract. The reviewed papers and interviews recommended specific contractual measures to be considered while drafting the construction project contracts in UAE to support collaboration and eradicate the adversarial relationships in the project environment. Those measures can be summarized as Contract clarity, Contract Flexibility, and Fair risk allocation.

Appropriate allocation of contract functions and clear contract stipulations are significant factors that help to reduce conflicts and promote sustainable relationships in construction projects (Ujene & Edike, 2015; Wang et al., 2019). Construction projects encompass uncertainties and unforeseen challenges; therefore, construction contracts shall accommodate the introductory provisions to address any futuristic events that might not be quantified and recognized while drafting the contract (Palacios et al., 2014). Also, it shall settle the principles to deal with unanticipated situations and emergencies (Wang et al., 2019). Contract flexibility shall allow the contractual parties to take early corrective actions facing unexpected circumstances, reducing conflicts, eliminating disputes, and fostering collaboration (Elhag et al., 2020).

Fair risk allocation between contractual parties is a fundamental element in strengthening the relationships between contractual parties (Lam et al., 2007). Xu et al. (2018) concluded that allocating the risk fairly between the owner and the contractor is positively related to the overall collaboration and project performance. In UAE, many projects tend to have dramatically poor relationships due to unfair risk allocation and the limited margin of risk that the owners are willing to take (Elhag et al., 2020). Based on the above, the following can be hypothesized:

H1.a. Contractual measures (Clarity, Flexibility, and Fair Risk Allocation) positively correlate with RM.

5.1.3. Team interactions

The way that teams interact can clearly give insights into the shape of their relationship. The reviewed papers suggested certain factors as the fundamental elements that explain the interactions between project participants, such as trust, respect, effective communication, team personal traits, team flexibility, and team harmony. Effective RM requires those factors to be promoted and monitored closely to ensure healthy relationships and motivate collaboration to the greatest extent possible.

Many researchers used trust as the starting point for their studies about relationships and social interactions in construction. According to Wang et al. (2019), trust and respect between construction project participants are crucial for relationship building and maintenance. Trusted relationships between project participants can foster collaboration, lower transaction costs, and boost project performance in all aspects (Manu et al., 2015; Xu, 2020). However, attaining trusted relationships is a time-consuming and hectic task, especially in the construction business, where transparency and openness are often hard to achieve (Pal et al., 2017).

Open, Transparent, and Effective Communication is the basis of healthy interactions and boosted relationships between project participants (Deep et al., 2019; Koutsikouri et al., 2008). Forming efficient collaboration processes is not possible without establishing transparent and effective communication protocols between all parties (Van Gassel et al., 2014). Effective communication enables project participants to understand each other's needs, capabilities, and expectations. It is crucial for developing mutual trust and establishing effective problem-solving mechanisms (Du et al., 2016). Also, effective two-way communication leads to less misunderstanding, fewer misinterpretations, and enhanced relationships (W. T. Chen & T. T. Chen, 2007).

The project team's personal traits could significantly affect the overall collaboration within the project (Che Ibrahim et al., 2018). Team members with a high level of integrity, leadership skills, emotional intelligence, openness, collaboration culture, and honesty are more likely to effectively manage relationships in their projects (Zaman et al., 2019). The higher we go in the project organization chart, the more significant individuals' personal traits will be in the context of RM and project success. For instance,

a project director with exceptional leadership skills and emotional intelligence is more likely to drive the whole team towards cultivating and exercising social relations to boost their performance and improve the overall project success odds (Treadway et al., 2013). On the contrary, a team leader with disingenuous behavior and a petrified mentality could be a fundamental part of project failure.

Team members' flexibility and the overall culture are often considered crucial in boosting project performance (Hughes et al., 2012). Team flexibility and readiness to compromise on unclear issues are considered high contributors to fostering collaboration and resulting in higher success rates and client satisfaction levels (Zheng et al., 2019). Fanatic mentalities and the absence of team members' collaboration culture can eventually lead to conflicts, delays, and underperformance (Faris et al., 2019). Human nature tends to blame others when a problem arises to avoid responsibility for the problem (Baiden et al., 2006). Individuals willing to hold responsibility for their mistakes and avoid blaming others are predominantly valuable assets to any project team. Team members with no blame culture try to determine the possible solutions for the problem instead of blaming each other are essential to deepening the relationships between the project participants (Bennett & Peace, 2007).

Researchers also paid particular attention to the harmony levels between team members and their vital role in promoting project success (Ptschelinzew et al., 2020). Teams with previous experience working together are more harmonic and more likely to perform in concordance. Moreover, team members engaged in social activities external to the work environment and frequently exchanging face-saving gestures are proven to have higher productivity and overall performance (Gulati & Gargiulo, 1999).

Based on the above, the following can be hypothesized:

H1.b. Team interactions (Trust, Effective Communication, Personal Traits, Flexibility, Culture, and Harmony) positively correlate with RM.

5.1.4. Top management actions

The management of construction project organizations has a critical role in promoting collaboration and fostering relationships in the project environment. The reviewed papers and the interviews underlined specific actions to be considered by the management of construction organizations, starting from top management throughout project and construction management teams in the RM context. Set clear and mutual goals, develop long-term commitment, establish an effective problem-solving mechanism, maintain on-time payments, practice reciprocity, continuous improvement, and regular benchmarking are examples of those actions.

Top management must set clear objectives to utilize the team's efforts toward accomplishing project success. Project parties usually have distinct goals and expectations (Thompson & Sanders, 1998). According to Pal et al. (2017), misalignment of the objectives results in one party's win and the other party's loss, leading to conflicts, disputes and eventually affecting overall performance. Therefore, aligning all participants' goals towards a mutual objective is critical to eradicating adversarial relationships.

Commitment toward the pre-agreed mutual objectives is vital for all parties to achieve collaboration. Two forms of commitment could assist in building and maintaining healthy relationships among the project participant as identified in the reviewed papers, top management commitment and long-term commitment. According to Faris et al. (2019), a lack of top management commitment to the project and the project team shall reduce confidence, increase disputes, create delays, and promote adversarial relationships. The top management has a fundamental role in spreading the commitment culture and supporting the overall relationship development process (Zhang et al., 2019). Long-term commitment is about creating and retaining long-term relationships among parties. Establishing long-term commitment needs strategic thinking to gain long-term benefits, even if sacrificing the short-term benefits is required (Wang et al., 2019). Long-term commitment between project parties allows for stable business relationships and eliminates relationship deterioration.

Carefully drafting the contract documents and setting the correct communication protocols would help to avoid conflicts in the construction project environment to a certain extent. However, most construction projects will endure unexpected rising conflicts (Randeree & El Faramawy, 2011).

Therefore, the top management of construction projects organizations needs to set principles and establish an effective problem-solving mechanism to spot early warnings of potential conflicts and identify opportunities to enhance project performance (Lu & Wang, 2017). The disinclination to timely and effectively manage the rising conflicts will negatively affect the relationships between project parties (Lu & Wang, 2017).

All the efforts made to ensure healthy and sustainable relationships between project participants will be meaningless unless all parties respect their payment terms and release the due payments to their contracted parties on time, regardless of the payment mechanism stipulated in the contract (Issa et al., 2018; Szewczyk & Radziszewska-Zielina, 2020). Top management needs to closely set performance indicators and monitor their payment process to fulfill contractual obligations. Also, performance incentives were suggested to increase efficiency, reduce disputes, and boost the collaboration level between contracting parties (Ptschelinzew et al., 2020). Elhag et al. (2020) stated that performance incentives cannot resolve relationship issues and disputes alone; however, they might improve the collaboration between project parties to a certain extent.

Continuous improvement is identified as the running endeavor to deliver a maximized value and improve the final product by focusing on the long-term results (Jones & O'Brien, 2003). Continuous improvement is about identifying opportunities and reducing productivity loss by

concentrating on the activities that add high value to the project. The significance of continuous improvement in supporting collaboration and strengthening relationships is represented by utilizing lessons learned from experience to extend the collaboration limits to future projects and avoid replicating the same conflicts (Jelodar et al., 2016; Pal et al., 2017). According to Yeung et al. (2007), regular measuring, analysis, and benchmarking of the performance results lead to continuous improvement, subject to a commitment and willingness from different parties to learn from experience (Meng, 2012).

According to Malhotra (2004), reciprocity is a type of social exchange; it occurs when one side of the relationship parties replies back to a sacrifice made by the other. Jiang et al. (2016) explained that initiating a sense of reciprocity requires one party to be reciprocal even before knowing the other party; such actions will urge the other party to reply, establishing mutual trust and strengthening relationships. Reciprocity is an ongoing social exchange process where both parties in a relationship need to consider each other's situation facing the high uncertainty level in construction projects (Wang et al., 2019). Top management of construction organizations shall act reciprocally to reinforce relationship building, maximize interest and utilize other parties' capabilities (Wong et al., 2008). Based on the above, the following can be hypothesized:

H1.c. Top Management Actions (Clear and Mutual goals, Commitment, Problem Solving, On-time payments, Continuous Improvement, Benchmarking, and Reciprocity) positively correlate with RM.

5.1.5. Moderating roles of project properties

Many researchers have studied numerous project properties to explain variations in project performance (De Rezende et al., 2018). Bosch-Rekveldt et al. (2011) stated that project complexity continues to be one of the essential factors that affect project performance. Misunderstanding the concept of project complexity can result in project failure or poor project performance (Kermanshachi et al., 2020). Researchers expressed project complexity in various properties and factors such as project scale, project type, level of construction complexity, percentage of repetitive elements, uniqueness, level of scope clarity, project scope definition completion when bids are invited, easy access to the project site location, uncertainties, and the number of parties involved. For this study, only the validated properties by the interviews that took place at stage one of this study were considered.

A number of expert interviewees suggested that different project properties might moderate the relationship between RM and construction project success in UAE. For example, the effect of RQ between project participants "driven by RM" on the overall project success should be significant in less complex projects where the project value is low, the number of parties is limited, and the project is more regulative. In contrast, the said effect might be more negligible in a complex project with a vast number of stakeholders and a high level of uncertainty and uniqueness. Therefore, the following can be hypothesized:

H2. Project properties moderates the relationship between the level of RM and project success in the UAE.

5.2. Data collection

5.2.1. Questionnaire survey and pilot study

A questionnaire survey was used as the main instrument in collecting the data to test the hypothetical model. Surveys have adequate flexibility to collate both open and/or closed response formats. The questionnaire consisted of four sections and 73 questions as follows: First, general information about the respondents, i.e., years of experience, level of education, current position. Second, information about the project, i.e., Value, Type, number of parties involved. Third, respondents' perception about whether each RM trait was practiced in their selected projects, a five-point Likert scale was used to elicit the data in the third Section as using Likert-scale are extensively common in collecting respondents' views in construction management research (Holt, 2013). Finally, the last Section gathered the information about the success of the selected project from the perspective of seven success criteria as follows: On-time completion, On-Budget completion, Level of Quality Achieved, Key stakeholder satisfaction, Long-term relationships, Impact on individuals and end-user, impact on organizational benefit, and the number of disputes. Those criteria are proven to be valid and frequently used by many authors in the literature (Wu et al., 2017, 2018).

A pilot study was conducted among five respondents from five different companies before distributing the survey among the UAE construction industry to validate the questions and ensure accurate translation of the overall hypotheses model. Based on the feedback, the questionnaire was refined, and a few questions were paraphrased to reflect practical terminologies rather than purely academic concepts to avoid confusing the potential respondents. The respondents were asked to select only one project from their experience, the project must be in UAE, and the respondents must have had full-time involvement in the selected project. In addition, the respondents were encouraged to select the most complex project he worked on before, in terms of (Number of involved stakeholders, Novelty of the requirements, and level of coordination required). The questionnaire was designed to measure the observed variables "indicators" used to measure the latent variables in the SEM model.

5.2.2. Sampling

The study adopted a selective sampling approach, also known as purposive sampling, where researchers define and select the respondent that poses the knowledge and expertise to be studied. According to Fathalizadeh et al. (2021), purposive sampling is the most effective method

when academics need to study a specific topic with experienced professionals. Establishing the appropriate sample size for SEM is critical for the validity of the results (Xiong et al., 2015). Researchers recommended the sample size to be at least 100 and preferred to be more than 200 to decrease the risk of sampling non-normality and increase the reliability of the results (Bagozzi & Yi, 2012; Xiong et al., 2015). The survey was distributed through several online platforms, i.e., Emails, LinkedIn, WhatsApp, among 741 potential respondents, including expert project directors, project managers, technical managers, and specialized senior engineers working with top tier contractors, consultants, and client representative organizations who had a track record for operating in UAE construction market and delivering large scale complex projects. In addition, the survey was distributed to a few academics who have a record of experience in construction management research in UAE universities. A four-month data collection period was utilized, and 264 valid completed responses were collected in total with a response rate of 35.6%. The response rates were deemed acceptable in survey-based studies in construction management (Chileshe et al., 2018).

5.2.3. Profile of the respondents

As shown in Figure 3, 39.20% of the respondents worked for main contractor organizations, 24.90% worked for the consultant side, 15.60% worked for the client or client representative organizations. The balance of 20.30% was distributed between specialized sub-contractors, project management firms, and cost consultancy businesses. The role they played in their companies varied: 11.00% were Site Engineers, 23.86% were Project Engineers, 32.90% were Project Managers, 9.40 were Project Directors, and 19.30% revealed other positions such as Architect, BIM Manager, Technical Manager, ID specialist, Energy Manager, Project Coordinator. Regarding education level, 4.10% had a higher diploma, 59.70% had a bachelor's degree, 30.20% had a postgraduate master's degree, and 6.00% held a PhD degree in their specific field.

The profile of the responses showed that most respondents possessed sufficient experience in the UAE construction market to complete the survey. In general, 9.90% had less than five years of experience, 22.30% 5–10, 36.40% 10–15, 20.00% 15–20, 8.20% 20–25, and 3.20% had more than 25 years of experience. For the UAE con-

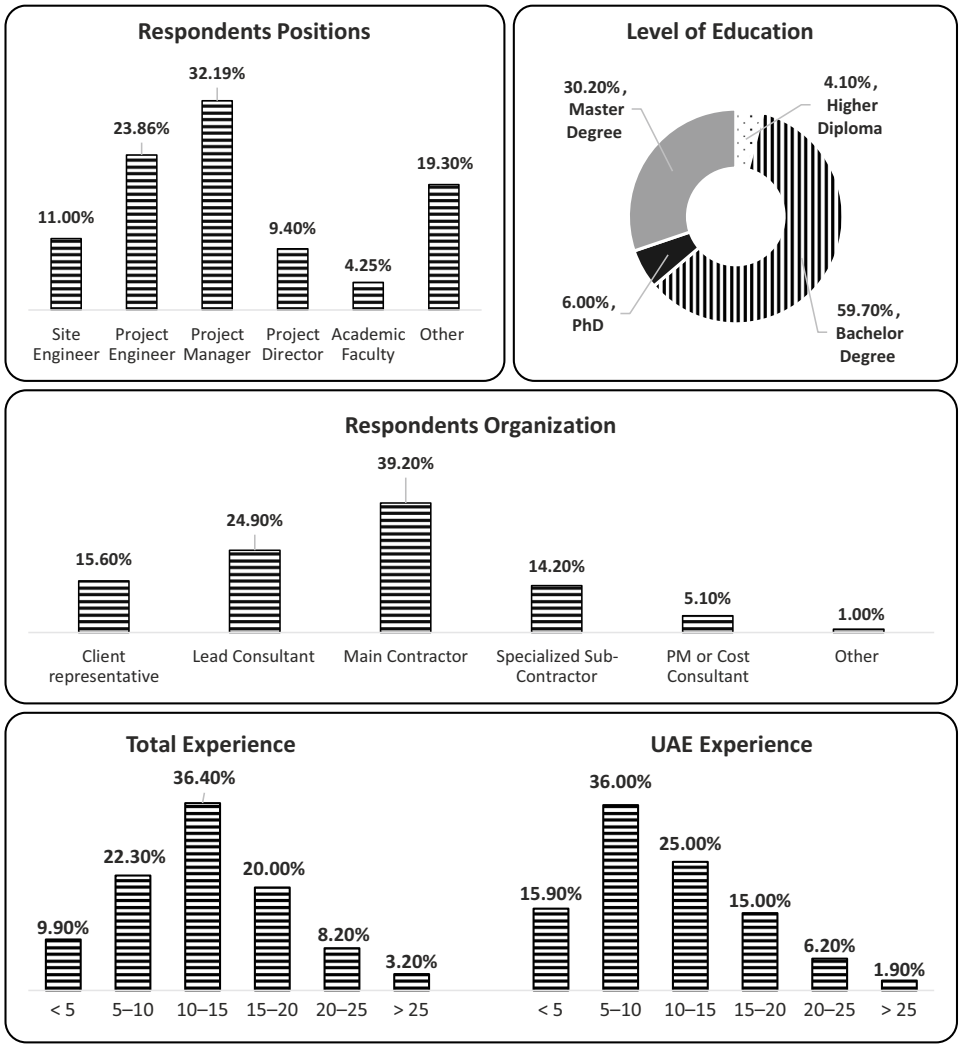

Figure 3. Profile of respondents

struction market specifically, the percentages were 15.90% for respondents who had less than five years of experience, 36.00% for 5–10, 25.00% for 10–15, 15.00% for 15–20, 6.20% for 20–25, and 1.90% had more than 25 years of experience.

6. Data analysis and results

Structural Equation Modeling (SEM) is a statistical method that uses a hypothesis testing approach to analyze a theory that builds on casual relations that generate observations on multiple variables (Hu & Bentler, 1998). The term structural equation modeling brings two concepts to attention; firstly, it means that a series of structural equations demonstrate the relationships under study; secondly, a more precise formulation or conceptualization of the theory under investigation can be achieved by modeling these structural equations into a visualization model (Byrne, 2013).

Partial Least Squares (PLS)-SEM has been used to analyze the collected data for multiple reasons. First, according to Hair et al. (2011), PLS-SEM has superior statistical power in estimating parameters and maximizing the explained variance; therefore, it is preferred over covariance-based SEM (Tajvidi et al., 2020). Second, PLS-SEM is considered one of the most suitable approaches to analyzing data from questionnaire surveys with Likert scales (Sarstedt et al., 2019). Third, according to Henseler et al. (2015), PLS-SEM is deemed suitable for estimating causal relationships among one or more dependent and independent variables simultaneously; therefore, PLS-SEM is particularly valuable for exploratory research purposes. Also, PLS-SEM is less sensitive to multivariate normal data and works competently with complex models involving mediations and moderations. In general, there is an understandable continuous increase in utilizing PLS-SEM in construction and project management literature (Zhang & Qian, 2017) as SEM-PLS is highly suited to small sample sizes and skewed distributions (Reinartz et al., 2009).

SMART-PLS 3.3.3 (Ringle et al., 2015) latest software version was used to test the empirical model and hypotheses. Reflective-Formative Higher-Order Constructs (HOC) were adopted in this study. All recommendations made by Xiong et al. (2015), who critically reviewed all SEM applications in construction management research, were considered to avoid previous flaws in construction management-related literature using SEM. The statistical analysis performed in this study, including specifying, estimating, and validating the HOCs, followed the approach explained by Sarstedt et al. (2019). The statistical analysis includes testing measurement models, including the reliability and validity of Lower Order Constructs (LOCs) and HOCs and the structural model analysis and assessment.

6.1. Measurement model for the lower order constructs

According to Hair et al. (2013), the assessment of the measurement model for the LOCs is based on reliability and validity. Reliability was assessed by individual item reliability (factor loadings), Composite Reliability (CR), Cronbach's alpha, and rho_A. After removing indicators with low loadings below 0.50, the factor loadings for 44 out of the 49 individual indicators were above 0.70 thresholds, and the balance of five indicators also exhibited loadings above the threshold of 0.50 recommended by Hair et al. (2013). Therefore, the individual item reliability was established. The constructs' reliability was assessed by CR (all constructs are more than 0.70), Cronbach's alpha (more than 0.8), and Rho_A (more than 0.70). Consequently, all constructs in this study are considered to have acceptable reliability levels. Reliability result details are presented in Table 3.

Validity was assessed by Convergent Validity Average Variance Extracted (AVE) and Discriminant validity (Heterotrait-heteromethod ratio (HTMT) criteria). Convergent validity indicates the extent of consistency between the items being used to measure a construct. The AVE values for all latent constructs were more than 0.50; therefore, the construct convergent validity was established as per Hair et al. (2013) recommendation. Convergent validity results are presented in Table 3. Discriminant validity demonstrates that the measured latent construct is empirically distinct and confirms that the observed concept is not captured by other measures in the same SEM model (Hair et al., 2013). HTMT criterion supersedes the classic approaches to assess discriminant validity, such as cross-loadings and the Fornell-Larcker criterion (Zaman et al., 2019), as it achieves high sensitivity and sensitivity rates through all conditions. According to Henseler et al. (2015), HTMT evaluates the correlation of indicators across concepts measuring different phenomena. If the HTMT value of the indicators measuring two different constructs is smaller than one, then the two constructs are distinct. Researchers suggested different threshold values for HTMT, 0.85 (Kline, 2016), 0.90 (Gold et al., 2001),

Table 3. Indicators reliability and convergent validity results

Latent Variable	Cronbach's α	rho_A	CR	AVE
C-CLAR	0.739	0.745	0.849	0.653
C-FLEX	0.881	0.885	0.926	0.808
C-RISK	0.799	0.807	0.87	0.629
M-COMM	0.764	0.778	0.85	0.588
M-CONF	0.875	0.877	0.941	0.889
M-CONT	0.719	0.725	0.826	0.543
M-OBJE	0.711	0.77	0.827	0.616
M-RECI	0.78	0.781	0.901	0.82
T-EFFE	0.833	0.887	0.921	0.854
T-FLEX	0.854	0.854	0.912	0.775
T-HARM	0.883	0.884	0.945	0.895
T-TRAI	0.827	0.834	0.896	0.742
T-TRUS	0.937	0.938	0.96	0.889
PP	0.779	0.826	0.858	0.606
PS	0.891	0.902	0.915	0.607

and 1.0 (Valaei & Jiroudi, 2016). In general, if HTMT is larger than 1.0, this means a lack of discriminant validity (Henseler et al., 2015). For this study, as shown in Table 4, all HTMT criterion values are below 0.90 except in one case, 0.924. Hence, the constructs have an acceptable limit of discriminant validity.

6.2. Measurement model for the higher-order constructs

As mentioned above, this study followed Sarstedt et al. (2019) in specifying, estimating, and validating the HOCs. At that point, as a reflective-formative model, the measurement model for the HOCs was assessed based on the Collinearity (VIFs) and the significance of both outer weights and outer Loadings. As shown in Table 5, the VIF values for all constructs are less than 5, indicating no critical collinearity level between the constructs (Sarstedt et al., 2019). The outer weights for all constructs (T statistics and P values were above 1.96 and 0.005, respectively) indicate an acceptable significance level. Only one construct (Contractual measures) had an outer weight with a significance level below 95%, P > 0.005; however, the corresponding outer loading for the same construct was >0.5 and P = 0.000. Therefore, H1.a, H1.b, and H1.c are supported, and the constructs were deemed acceptable as a formative constructs and were retained in the model as recommended by Sarstedt et al. (2019). Outer weights and outer loadings results are presented in Table 6.

Table 4. HTMT Values for LOC

	CM			MA					PP	PS	TI			
	CLAR	FLEX	RISK	COMM	CONF	M-CONT	OBJE	RECI			EFFE	FLEX	HARM	TRAI
CLAR														
FLEX	0.261													
RISK	0.277	0.74												
COMM	0.234	0.428	0.642											
CONF	0.11	0.509	0.484	0.582										
CONT	0.222	0.506	0.722	0.677	0.681									
OBJE	0.489	0.454	0.505	0.791	0.54	0.456								
RECI	0.131	0.358	0.482	0.659	0.475	0.516	0.515							
PP	0.502	0.225	0.243	0.179	0.369	0.19	0.322	0.146						
PS	0.223	0.518	0.516	0.775	0.765	0.733	0.735	0.609	0.235					
EFFE	0.139	0.366	0.487	0.567	0.281	0.848	0.277	0.378	0.249	0.494				
FLEX	0.141	0.453	0.656	0.544	0.521	0.608	0.363	0.534	0.234	0.624	0.316			
HARM	0.223	0.497	0.448	0.66	0.77	0.557	0.734	0.519	0.368	0.924	0.3	0.595		
TRAI	0.247	0.375	0.382	0.569	0.637	0.643	0.604	0.444	0.149	0.84	0.449	0.566	0.767	
TRUS	0.251	0.511	0.446	0.609	0.865	0.554	0.745	0.442	0.39	0.851	0.272	0.541	0.898	0.793

Notes: CM: Contractual Measures, MA: Management Actions, TI: Team Interactions, PP: Project Properties, PS: Project Success.

Table 5. Collinearity values for LOCs and HOCs

VIF							
C-CLAR1	1.235	T-FLEX1	2.529	M-COMM2	1.544	M-RECI1	1.692
C-CLAR2	1.927	T-FLEX2	2.521	M-COMM3	1.369	M-RECI2	1.692
C-CLAR3	1.834	T-FLEX3	1.762	M-COMM4	1.648	P-VALU	2.085
C-FLEX1	2.345	T-HARM1	2.667	M-CONF1	2.539	P-COMP	1.321
C-FLEX2	2.785	T-HARM2	2.667	M-CONF2	2.539	P-PART	1.789
C-FLEX3	2.358	T-TRAI1	2.059	M-CONT1	1.398	P-TYPE	2.015
C-RISK1	1.364	T-TRAI2	1.853	M-CONT2	1.38	PS-COST	2.3
C-RISK2	2.408	T-TRAI3	1.789	M-CONT3	2.64	PS-DISP	2.741
C-RISK3	2.286	T-TRUS1	4.068	M-CONT4	2.676	PS-LONG	2.104
C-RISK4	1.865	T-TRUS2	4.317	M-OBJE1	1.694	PS-QUAL	1.472
T-EFFE1	2.038	T-TRUS3	4.967	M-OBJE2	1.915	PS-REVE	2.386
T-EFFE2	2.038	M-COMM1	1.767	M-OBJE3	1.227	PS-STAK	2.329
TI	2.953	MA	3.245	CM	1.659	PS-TIME	2.519

Table 6. Outer weights and outer loadings for the HOCs

	Outer Weights			Outer Loadings		
	Original Sample	T Statistics	P Values	Original Sample	T Statistics	P Values
CM -> RM	–0.057	1.689	0.092	0.576	12.799	0.000
MA -> RM	0.369	5.492	0.000	0.91	39.447	0.000
TI -> RM	0.713	12	0.000	0.978	120.151	0.000

6.3. Structural model assessment

After establishing the measurement model's acceptability, the structural model assessment was done by examining the path coefficients between observed coefficients to test the hypothetical model as per Sarstedt et al. (2019). Moreover, the Coefficient of Determination (R^2) and Predictive Relevance (Q^2) were also evaluated. The structural model examination has been performed by applying bootstrapping 5000 subsamples and blindfolding procedures. Figure 4 shows that hypothesis, H1, is supported, while H2 is rejected. Results demonstrated that RM has a significant positive effect on Project Success (H1: Path = 0.25, p = 0.000), where PP recorded no significant moderation effect on the relationship between RM and project success (H2: Path = –0.008, p = 0.779). The results also depict the R^2 value for the endogenous construct (Project Success) to be satisfactory (0.765) as per Reinartz et al. (2009) and Hair et al. (2011). The blindfolding procedure was applied to calculate the model's predictive relevance; Stone-Geisser's Q^2 value for the endogenous variable Project success is 0.452 > zero, confirming the model's predictive capabilities (Sarstedt et al., 2019).

7. Findings and discussion

Overall, this study investigates the relationship between RM and construction projects' success delivery in UAE; a discussion about the findings is stated below.

7.1. Effect of relationship management on project success

Through the supported hypothesis H1, Q2 of this study can be answered. The confirmed H1 suggests that managing relationships among project participants to improve

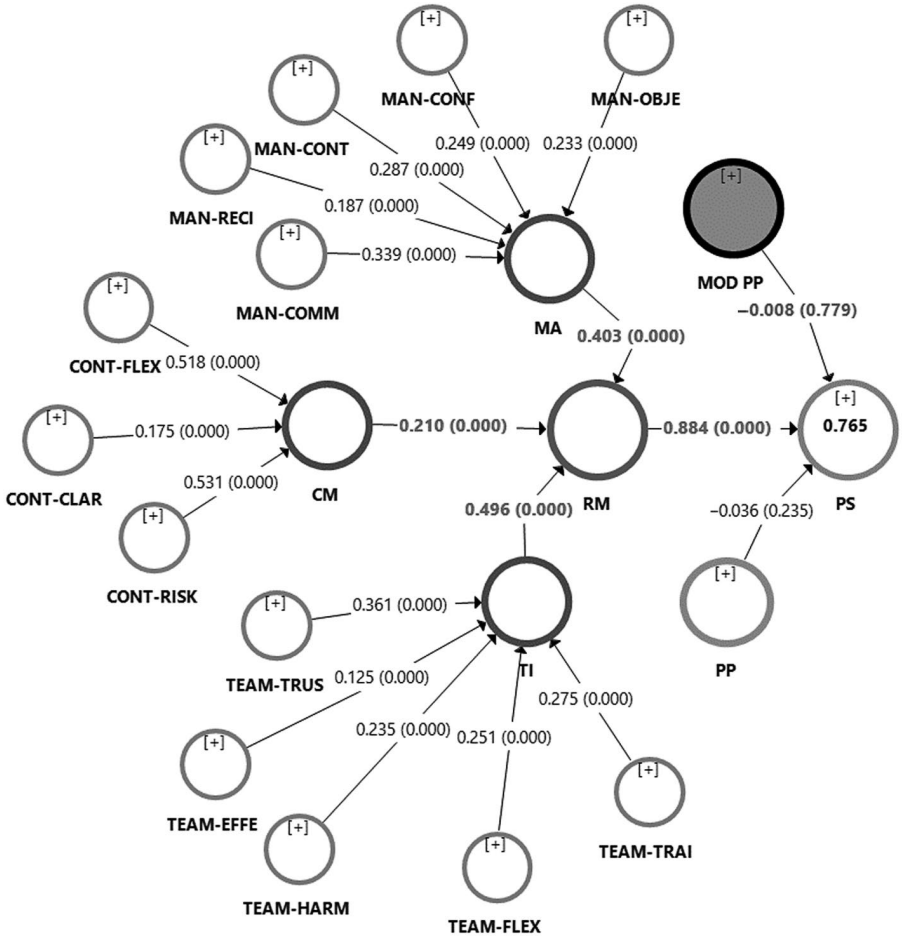

Figure 4. Hypothesis testing results (Path coefficients, P-value)

relationship state and boost RQ has a significant positive effect on project success in the UAE construction industry. This result is consistent with previous studies carried out in other countries (Wang et al., 2019) and other industries (Zaman et al., 2019). However, the RM-associated traits considered in those studies might be limited. The traits considered in this study are more comprehensive as they cover contractual and human-related factors and are more relevant in the context of the UAE construction market being validated by UAE's construction experts.

This research proves that for construction organizations working in the UAE's construction market to succeed and improve their project success rates, they need to manage the relationships in their projects effectively. Apart from the technical side, maintaining collaborative relationships with all involved parties became a fundamental contributor to today's project's overall success. Effective RM can build trust, facilitate communication, reduce conflicts, and lower opportunism among project participants. Consequently, effective RM can improve project success probabilities.

The research results encourage the organizations to pay close attention to the state of relationships in their projects and adopt an open mindset that includes different perceptions of project success. The results suggest that technical complexities faced by the project teams resulting in conflicts, disputes, and poor project performance; can be overcome "to a certain extent" by effective RM and relevant behavioral traits of the team. Therefore, the construction industry in UAE requires a significant culture and mindset al.ernation where more collaborative approaches and relationship-oriented mechanisms are adopted.

As per the supported hypothesis H1.a, there is a persistent need to invest sufficient attention in reviewing, modifying, and stipulating the construction contracts in UAE Projects. In order to establish a solid state of relationships, promote collaboration, and reduce conflicts, the construction contract must bring in three aspects: First, contract flexibility; the contract must be flexible enough to face unexpected situations, changes, and emergencies. Second contract clarity; contract stipulations must be clear and consistent. The third is fair risk allocation, where the risk has to be allocated fairly to the party who can take it. This outcome is similar to the results of the previous research. Palacios et al. (2014) found that contract flexibility directly affects the relationships between contracted parties. Wang et al. (2019) observed that contract clarity is a genuine contributor to reducing conflicts and promoting relationship quality. Elhag et al. (2020) concluded that unfair risk allocation massively affects project participants' willingness to collaborate.

Observing and fostering the daily interactions between team members is crucial to strengthening their relationships. Similar to Wang et al. (2019), this study reconfirms that building a state of trust creating an appropriate environment for information exchange and communication flow is essential to strengthening the relationships between project participants. Increasing harmony, encouraging flexibility, and rooting collaborative culture between project team members are crucial aspects of RM required to maintain a high level of RQ in the project. Those outcomes are supported by H1.b and are in line with (Faris et al., 2019; Zheng et al., 2019).

The findings suggest that the project team members who possess high integrity, innovative mindset, no blame culture, positive attitudes, leadership skills, emotional intelligence, openness, and honesty can promote team interactions and be considered RM's valuable assets. A team with those traits shall empower collaboration and foster the RQ levels between project participants. On the opposite, individuals with rigid mindsets, disingenuous behavior, dishonesty, and unwillingness to collaborate are considered obstacles to fully utilizing RM to foster project success. Those findings are in line with Zaman et al. (2019), who stated that Individual members with better personal traits are more capable of delivering successful projects. Also, Che Ibrahim et al. (2018) mentioned that team personal trait could affect project participants' overall collaboration.

As confirmed by the supported H1.c of this study, the Top Management of the construction organization has a critical role in promoting relationships through specific actions and measures. The organization's management needs to honor the organization's commitments and establish long-term commitments with other parties to prevent relationship dissolution. Performance incentives and on-time payments to successors are a form of top management commitment toward the project. Also, management needs to set clear and mutual objectives to streamline the efforts toward the overall project objectives. Mutual objectives are the critical aspect that affects the overall state of the relationship among project participants. Without mutual objectives, the organizations' commitment to the project is jeopardized, and consequently, the relationships will struggle to last and stabilize. These results are in line with Palacios et al. (2014), Issa et al. (2018), and Pal et al. (2017). Agreeing with Lu and Wang (2017), the results of this study showed that Top Management has to establish an effective problem-solving mechanism, maintain continuous improvement and regularly benchmark the performance to maintain relationship efficiency and enhance the overall state of project relationships. Similar to the outcome of this study, Wang et al. (2019) found that reciprocity practiced by the management has a positive effect on the RQ between participants.

7.2. The moderating role of project properties

As stated above in H2, the negative moderating effect of PP on the relationship between RM and Project success is not supported. Accordingly, the result of this study shows that in the context of UAE, regardless of the project value, number of parties, and level of uncertainties and uniqueness, effective RM will still have a significant effect on project success. Although Wang et al. (2019) suggested that the success of megaprojects requires additional RM efforts

because megaprojects are facing more uncertainty, and their participants are more likely to act opportunistically. However, if the suitable level of RM efforts is being made and implemented in correlation with the project characteristics, then the moderating effect of PP on the relationship between RM and Project success is no more relevant.

8. Framework for RM in UAE construction industry

The findings of this study were formalized and re-contextualized into an integrated, systematic, and practical framework for managing relationships in UAE construction projects. The framework includes practical actions, tools, and strategies that allow construction firms to effectively manage the relationships in their projects to raise the relationship quality levels and foster their projects' success rates. The proposed framework encourages the construction firms to adopt a holistic approach to assess the success of their projects, where the success criteria are not limited to the hard objective measures, e.g., profitability; however, it extends to include soft and subjective benefits, e.g., long-term relationship development and future work opportunities.

The proposed framework is presented in Figure 5. The figure from left to right demonstrates how relationship management, with its three main clusters of contractual measures, team interactions, and management actions, facilitates the development of relationships and enhances relationship quality. The project lifecycle is divided into four stages, pre-contract, upon award, post-contract, and post-completion, in which each stage embraces specific actions, as summarized in Figure 6. The majority of actions fall under the category of "continuous activity" required throughout the four stages of the project lifecycle and do not fall under a specific stage. This highlight that relationship management is not a one-time activity; in contrast, relationship management is a tactical activity that requires paying continuous attention and streamlined efforts. The proposed framework allows for several actions to be taken by either the organization's top management or the project teams to put relationship management into practice and facilitate relationship development and maintenance. These strategies and actions are to be embraced by top management, adopted, and practiced by the project teams from all parties to ensure that the project achieves a categorical level of collaborative relationships.

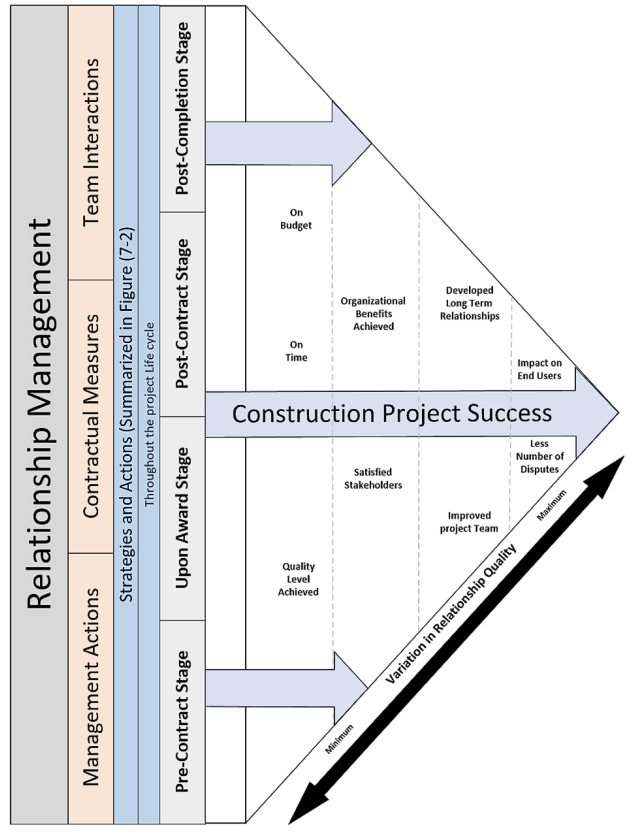

Figure 5. Framework for RM in UAE construction industry

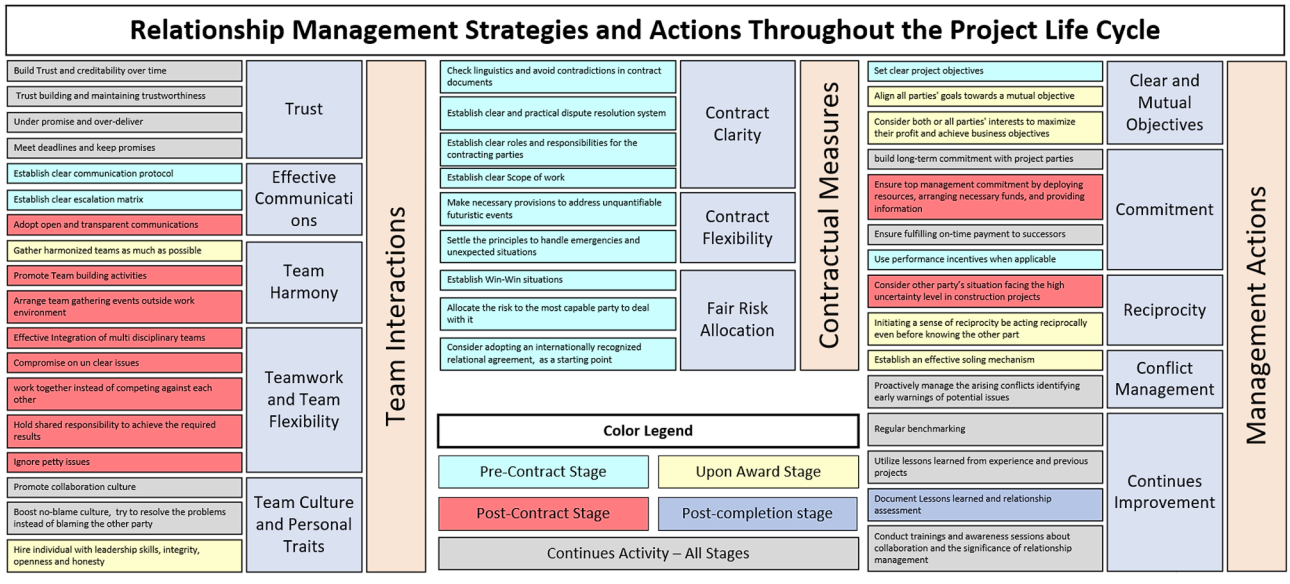

Figure 6. Relationship management strategies and actions throughout the project lifecycle

In UAE construction projects, adopting the relationship management strategies and actions presented in Figure 6 will promote relationship quality and boost project success probabilities. The framework depicts that relationship management does not target project management success of the iron triangle only; however, effective relationship management shall extend the project success perception to include other dimensions. Project success perception is extended to check whether the project outcomes have satisfied the stakeholders, benefited the organization, developed and empowered the project team, established long-term relationships, generated future work opportunities, and reduced claims and disputes. The proposed framework recommends that the more efforts invested in relationship management, the better relationship quality is attained, and the higher success rates are achieved. It is imperative to note that the relationship management framework can form part of the overall project management framework; therefore, the actions required in the framework might be part of a regular project management environment; however, this study calls for relationship-oriented actions and strategies. A complete and comprehensive operational process of the framework; concerning strategies and actions is presented in Table 7 in the next sub-section.

Table 7. Framework operational process

Stage (1) Pre-contact	
Action (1)	**Project Objectives Review**
Purpose	Review the project objectives and refine them in accordance with client priorities in terms of time, cost, and quality.
Tools	Workshops – Meetings – Expert judgment – Focus groups
Desired Output	Clear Project Objectives including items that the client will never compromise.
Involved Parties	Senior management from (Client/Client representative, The Designer/ Design Consultant, The Engineer/Lead Supervision Consultant, Cost Consultant)
Action (2)	**Construction Contract Review**
Purpose	Review the construction contract and contract documents to achieve the following: Ensure contract clarity in terms of (Scope clarity, roles, and responsibilities, dispute resolution procedures, linguistics, avoid any duplication or contradictions); Ensure Contract Flexibility in terms of (making necessary provisions to address unquantifiable futuristic events and settle the principles to handle emergencies and unexpected situations); Ensure the fairness of risk allocation (establish win-win situations, allocate the risk to the most capable party to deal with it, being fair and reasonable is the key to collaboration); Consider adopting an internationally recognized relational agreement, e.g., partnering, alliancing, and IPD, as a starting point for this exercise.
Tools	Workshops, Meetings, Expert Judgement, Focus groups
Desired Output	Clear Scope definition, Clear roles and responsibilities for all project parties, Clear dispute resolution process, flexible stipulations with the ability to deal with risk and uncertainties, fair risk allocation, minimized contradictions or duplications, and fundamentals to promote collaboration are established
Involved Parties	(Client/Client representative, The designer/ Design Consultant, The Engineer/Lead Supervision Consultant, Cost Consultant, and Third-party reviewers might be required)
Stage (2) Upon Contract Award	
Action (3)	**Team Formation**
Purpose	Form the project team by bringing the best available resources together, ensuring the following: Careful selection of the project lead (Project Director) as he has a determinant role to play in RM; Team members have an acceptable level of emotional intelligence, integrity, openness, honesty, self-leading skills; Team members have the appropriate combination of technical (Hard) and behavioral (Soft) attributes; Careful selection of team members with suitable personal traits; Selection of members who have the highest possible level of harmony (Previous experience of working together is preferred, having a relationship outside of the work environment is also preferred).
Tools	Organization Chart, SWOT analysis, Expert Judgment, Responsibility Matrix
Desired Output	Project team members list with roles and responsibilities (their potential relationship performance is maximized as much as possible
Involved Parties	(As applicable) (Every party has to do this exercise separately internally)
Action (4)	**Objective Alignment**
Purpose	Agree on mutual objectives; Establish consistency within project objectives from different perspectives; Establish a clear understanding of each party's role, responsibilities, accountability, and expectations; Establish problem-solving mechanisms and escalation matrix; Agree on the most effective communication protocol.

End of Table 7

Tools	Workshops, Meetings, Expert Judgement, Focus groups
Desired Output	Agreed Mutual Objectives, Effective Problem-Solving Mechanism, Effective Communication Protocol, Clear Understanding of roles and responsibilities
Involved Parties	Senior management from all parties, including the contractor
Stage (3) Post-Contract	
Action (5)	**Relationship Main actors' identification**
Purpose	Identify overall project stakeholders, Collect stakeholder information (contact details, communication preferences, interests, needs, expectations, etc.); Analyze stakeholders' power, interest, urgency, willingness to support, and their relationship (formal, informal, etc.); Prioritize the list and keep close monitoring of those actors while managing relationships.
Tools	Social Network Analysis – Stakeholder Mapping – Stakeholder Analysis – Expert Judgment
Desired Output	List of the project stakeholders with the most critical actors in relationship development and maintenance.
Involved Parties	(Every party has to do this exercise separately internally)
Action (6)	**Executive Relationship Management Meetings**
Purpose	Early identification of relationship problems/Alarms by engaging key parties in the relationship management process, the below questions/actions might be mutually asked/taken: Do you feel that there are unjustified rejections for your submittals? Do you experience an intended reluctance to collaborate and resolve your comments? Brian storms the root causes of the problems and identifies the key personnel in charge of it; Spread teamwork spirit and re-emphasize the mutual goals, ensure goals alignment is valid; Ensure top-management commitment towards the project and the agreed mutual objectives; Agree on reciprocal actions.
Tools	Meetings – Expert Judgment (Monthly during the execution stage or as agreed between project parties)
Desired Output	An evaluated and prioritized relationship alarm register is to be monitored and closed before the next meeting.
Involved Parties	Senior management from all parties, including the contractor
Action (7)	**Continuous Intervention**
Purpose	Continuous Intervention to resolve and closeout items from the relationships alarm register
Tools	(As applicable)
Desired Output	An updated register with resolved items to be presented in the next executive relationship meetings
Involved Parties	(Project director from each party has to lead this exercise internally in conjunction with corresponding project directors from other parties)
Stage (4) Post-Completion	
Action (8)	**Relationship Assessment**
Purpose	Assess project success from RM perspective and exploit any opportunities to build a long-term collaborative relationship with different parties; Assess stakeholder satisfaction over the project outcome and assess their impressions about the difference between the state of relationships at the project's commencement and completion; Assess individuals' satisfaction levels with their earned experience during the project life cycle; Assess the number and nature of disputes in the project and try to close out any ongoing contentious items amicably; Exploit opportunities to establish a long-term relationship and secure future work opportunities; Document any relationship related lessons learned, including identifying reasons behind relationship deterioration/ amelioration.
Tools	Close-out meetings
Desired Output	Documented records of project success statistics from holistic relationship perspectives and lessons learned database include strengths and weaknesses to be promoted/avoided in upcoming projects.
Involved Parties	(Every party has to do this exercise separately internally)

8.1. Framework for operational process

This part presents a practical guide of how the proposed framework can be sued to manage relationships in UAE construction projects. The framework's systematic operational process is presented in Table 7. The framework is tailored for the traditional Design Bid Build projects, which are the most used in UAE. The process starts from the pre-contract stage, where a series of meetings and workshops involving the senior management from relevant parties are conducted to set the project objective and carefully draft the project contract. As per the findings of this study, the most important outcomes of this stage would be a set of clear project objectives and a clear, flexible, and fairly risk-allocated contract.

Once the contract is awarded and the main contractor is officially on board, the focus of all parties shall be on forming the right team with the right personality traits and collaboration culture. Then aligning all parties' objectives and developing mutual win-win situations shall be primarily done. The post-contact stage embraces the most critical relationship management activities, including relationship central actors' identification, executive relationship management meetings, and continuous interventions from top management. Finally, the main activities in the post-completion stage are relationship assessment workshops, closeout meetings, and lessons learned documentation. The details of the activities, tools, involved parties, and desired outcome of each stage are illustrated in Table 7.

Conclusions, limitation, and future directions

This paper examined the traits associated with managing relationships and their relationship with the overall construction project success delivery in the UAE. The literature review and interviews categorized the RM traits into three parts: Contractual Measures, Team Interactions, and Management Actions, and each of these three parts includes several dimensions to be observed as part of the RM process. The findings and outcomes confirmed that resolving relationship issues and maintaining a healthy collaborative environment with a high level of relationship quality would significantly support the overall project success, not only in the sense of achieving cost, time, and quality targets but also by reducing disputes, establishing long-term relationships, securing future work opportunities, and satisfying key project stakeholders.

The study urges the construction practitioners in UAE to realize that relationship development, management, and maintenance are not the sole responsibility of the organization management or project managers only. On the opposite, RM is the shared responsibility of every project participant regardless of his role. RM is interrelating actions from all levels of participants, including site teams, mid-management, and top management. The study recommends that all project parties, either contractors, clients, or consultants, adopt a relationship-oriented approach as part of their project management framework to maintain collaborative work environments. The study also suggests that RM is not limited to the execution phase of the projects; on the contrary, effective RM is required throughout the project life cycle, including pre-and post-contract stages.

Finally, the study proposed a practical framework that includes practical actions and strategies to allow construction firms in the UAE construction market to evaluate their current RM practices and restructure them if needed.

Study limitation

Various limitations are present in this study. First, the empirical data used were collected from Typical Design Bid Build (DBB) projects, the most common procurement route in the UAE. However, other procurement routes, e.g., Turnkey, Public-Private Partnership (PPP), may lead to different research results due to the differences between the contractual mechanisms and social exchange of those routes and DBB. Second, one-time surveys were employed, which ignore the dynamic relationship development process that keeps changing over time, especially under specific events that cause a fundamental change in the relationships, e.g., Unagreed High-value contract Variations. Third, the proposed framework has not been validated against key case studies from the UAE markets due to time constraints.

Future directions

Recognizing the urgent need for cultural change from traditional adversarial relationships to collaborative relationships in UAE construction projects is the starting point for fully adopting relationship-oriented procurement approaches and alternative delivery mechanisms. The proposed framework in this study can be considered the first step in the said cultural change as it targets to praise relationships, spread a collaboration culture, and raise the level of awareness of the significance of RM among UAE construction industry practitioners. Further research is required to flatten the road for collaborative procurement approaches, e.g., partnering and IPD in UAE, by examining their suitability for local market culture and conditions.

Competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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APPENDIX

Selected articles

#	Title	Author
1	A conceptualization of relationship quality in construction procurement	Jelodar et al. (2016)
2	A systematic review of 'enablers of collaboration' among the participants in construction projects	Deep et al. (2019)
3	Developing a Performance Index for relationship-based construction projects in Australia: Delphi study	Yeung et al. (2009)
4	Establishing cooperative relationships and joint risk management in construction projects: Agency theory perspective	Osipova (2015)
5	Identifying the critical success factors for relationship management in PPP projects	Zou et al. (2014)
6	Investigating underlying factors of collaboration for construction projects in emerging economies using exploratory factor analysis	Faris et al. (2019)
7	Relationship management in the management of PFI/PPP projects in the UK	Smyth and Edkins (2007)
8	Relationships among internal stakeholders in construction projects: A cognitive evaluation for sustainable team integration in Nigeria	Ujene and Edike (2015)
9	Selection of Third-Party Relationships in Construction	Palacios et al. (2014)
10	The critical factors in managing relationships in international engineering, procurement, and construction (IEPC) projects of Chinese organizations	Pal et al. (2017)
11	The effect of relationship management on project performance in construction	Meng (2012)
12	The influence of conflict management styles on relationship quality: The moderating effect of the level of task conflict	Lu and Wang (2017)
13	The role of the project manager in relationship management	Meng and Boyd (2017)
14	Alliance contracting adding value through relationship development	Davis and Love (2011)
15	An interpretive comparison of Chinese and Western conceptions of relationships in construction project management work	Chen and Partington (2004)
16	Assessing collaborative performance on construction projects through knowledge exchange: A UK rail strategic alliance case study	Staykova and Underwood (2017)
17	Enhancing trust-based interface management in international Engineering- Procurement-Construction projects	Shen et al. (2017)
18	Formation of interorganizational relational behavior in megaprojects: Perspective of the Extended Theory of Planned Behavior	Zheng et al. (2018)
19	Improving project collaboration: start with the conflicts	Vaaland (2004)
20	Interplay of contractual governance and trust in improving construction project performance: Dynamic perspective	Yan and Zhang (2020)
21	Perceptions of trust in the US construction industry	Zuppa et al. (2016)
22	Reducing hindrances to adoption of relational behaviors in public construction projects	Ning and Ling (2013)
23	Relationship conflict in construction management: Performance and productivity problem	Vaux and Kirk (2018)
24	Relationships between main contractors and subcontractors and their impacts on main contractor competitiveness: An empirical study in Hong Kong	Tan et al. (2017)
25	Research synthesis connecting trends in architecture, engineering, and construction project partnering	Sparkling et al. (2010)
26	The definition of alliancing in construction as a Wittgenstein family-resemblance concept	Yeung et al. (2007)
27	Trust in projects: An empirical assessment of owner/contractor relationships	Pinto et al. (2009)
28	Trust influencing factors in main contractor and subcontractor relationships during projects	Manu et al. (2015)
29	Contractual management in PPP projects: Evaluation of legal versus relational contracting for service delivery	Edkins and Smyth (2006)
30	Critical review of collaborative working in construction projects: Business environment and human behaviors	Xue et al. (2010)
31	Effective partnering tools in construction: a case study on MTRC TKE contract 604 in Hong Kong	Bayliss et al. (2004)
32	Governing behavioral relationships in megaprojects: Examining effect of three governance mechanisms under project uncertainties	Zheng et al. (2019)
33	How mediated power affects opportunism in owner–contractor relationships: The role of risk perceptions	Zhang and Qian (2017)

#	Title	Author
34	How to foster contractors' cooperative behavior in the Chinese construction industry: Direct and interaction effects of power and contract	Zhang et al. (2018)
35	Interplay of relational and contractual governance in public-private partnerships: The mediating role of relational norms, trust and partners' contribution	Benítez-Ávila et al. (2018)
36	Major project managers' internal and external stakeholder relationships: The development and validation of measurement scales	Mazur and Pisarski (2015)
37	Making sense of team integration practice through the "lived experience" of alliance project teams	Che Ibrahim et al. (2018)
38	Partnering in major contracts: Paradox and metaphor	Alderman and Ivory (2007)
39	Relational factors in owner–contractor collaboration: The mediating role of teamworking	Suprapto et al. (2015)
40	Trust and productivity in Australian construction projects: a subcontractor perspective	Chalker and Loosemore (2016)
41	Trust and project success: A twofold perspective between owners and contractors	Jiang et al. (2016)
42	Exploring critical success factors for partnering in construction projects	Chan et al. (2004)
43	Impacts of different types of owner-contractor conflict on cost performance in construction projects	Chen et al. (2014)
44	Partnering: Why project owner-contractor relationships change	Drexler and Larson (2000)
45	Relationship between project's added value and the trust–conflict interaction among project teams	Wu et al. (2017)
46	The effectiveness of contractual and relational governances in construction projects in China	Lu et al. (2015)
47	Trust-building in construction contracting: Mechanism and expectation	Chow et al. (2012)
48	Partnering in construction: Critical study of problems for implementation	Chan et al. (2003)