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Managing Disputes for a Sustainable Construction: A Perspective of Settlement Facilitating Elements in Negotiations

Sen Lin [1,*], Keyao Li [2] and Saion Cheung [1]

[1] Construction Dispute Resolution Research Unit, Department of Architecture and Civil Engineering, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon 999077, Hong Kong; saion.cheung@cityu.edu.hk
[2] Future of Work Institute, Faculty of Business & Law, Curtin University, Perth 6000, Australia; keyao.li@curtin.edu.au
* Correspondence: slin24-c@my.cityu.edu.hk

Abstract: Construction 4.0 presents a multitude of opportunities; however, it also increases the chance of disputes. Efficient dispute management contributes to the sustainable production of construction works. Enhancing negotiation management and negotiators' settlement ability is valuable, given that negotiation is recognized as the most effective dispute resolution method. This study explores negotiation settlement by identifying negotiators' settlement facilitating elements in construction dispute negotiation (CDN). A purposive literature review identified six key elements, naming preparation, integration, goodwill, continuity, commitment, and self-efficacy. With data collected from experienced construction dispute negotiators, the partial least squares structural equation modeling (PLS-SEM) results confirmed the significance of these elements. Accordingly, recommendations for negotiators include (i) technique (i.e., good preparation and applying integrative tactics); (ii) interaction (i.e., showing goodwill and relationship maintenance); and (iii) attitude (i.e., commitment to negotiate and being confident) if the negotiation settlement is desired. Management can implement these recommendations in their training manual to cultivate negotiators' problem solving and settlement-oriented mindset. Negotiators can also review their behaviors throughout the negotiations and make timely adjustments as deemed necessary. Reaching an amicable negotiated settlement would not only save resources, preserving business relationships is of equal importance for a sustainable construction industry.

Keywords: construction 4.0; construction dispute negotiation (CDN); PLS-SEM method; settlement facilitating elements

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1. Introduction

In the realm of Construction 4.0, the availability of cloud computing, fast internet connections, collaborative platforms, and project management software offers great opportunities [1]. It can bring together construction project stakeholders with diverse skills and expertise to work together in close to real-time regardless of location [2]. Networked and automated systems are fundamentally changing how, when, and where people connect, promising unprecedented improvements in efficiency and productivity [3,4]. However, the rapid technological advancements and the increasingly complex collaborative contracting network can exacerbate various sources of conflicts and disputes. In this regard, disputes may arise over, among others, disagreements about technology integration, privacy and security of data sharing, determining liability for discrepancies in digital models and unexpected software glitches [1]. According to a 2021 report by the World Built Environment Forum, based on an analysis of 1200 construction and engineering projects in 88 countries, it was found that the total amount of disputes had reached over USD48.6 billion, and the resulting delays had extended the project schedule by more than 71% of its original timeline [5]. Protracted and unresolved disputes would be a fatal blow to the sustainability of projects. Effective settlement is instrumental not only for cultivating an amicable working

environment, but also for the psychological and social aspects of the workforce amid the transition towards sustainable construction.

Prompt dispute resolution through negotiation can be the most cost- and time-efficient way to end disputes. Based on the data from Arcadis Global Construction Disputes Report 2019, the average duration of arbitration or litigation was around 17 months [6]. Even in the smallest construction case with the most cost-conscious legal counsel, the legal cost would amount to USD300,000 [7]. The inhibiting cost and delay associated with these formal methods are commonly unaffordable and will destroy the long-lasting relationship. Negotiation is widely recommended for early resolution and sustainable work. However, other than two-person negotiations, construction dispute negotiations (CDNs) are negotiations that include two interdependent parties who have incompatible interests [8]. The characteristics of construction projects, such as their multidisciplinary nature, substantial financial investments, time sensitivity, and technical complexity, make disputes more challenging to negotiate [9]. Both parties have to rely on each other to fulfill their work goals, while simultaneously satisfying both parties' interests [10]. With the paradox of solving the differences and maintaining the cooperative relationship, reaching a mutually acceptable settlement is not easy. Furthermore, CDNs are voluntary. There is no imposition of external mandates or any coercive measures. Negotiators can choose to be engaged or not at will [11]. Even with the unprecedented technological advancements in the construction industry, the nature of CDNs determines that human behaviors are still the determining element [12]. Behavioral analyses are imperative in CDNs to explore how to enhance the chance of dispute settlement and, in turn, a healthy and sustainable work environment within the construction industry. After all, with less disputes lingering during the construction stage, the delivery of the project would be more efficient, sustainable in the sense of efficiency and wise use of resources can be enhanced.

To achieve that, this study conducted a structured literature review and an empirical study to verify the settlement facilitating elements. Theoretically, this study expands upon negotiation settlement theories from the perspective of negotiators. Previous research on negotiation settlement is fragmented, covering various factors across multiple aspects, including the nature of the negotiation [13,14], negotiation relationship [15,16], negotiators' skills [17,18], negotiation styles [19,20], and, negotiation settings [21], etc. The findings of this study provide a focused viewpoint of negotiators to reveal how negotiators should behave, regarding technique, interaction, and attitude, to foster an amicable dispute resolution. In practice, recommendations are provided for both management and negotiators to assess the negotiation conditions and their own behaviors. These measures will enhance the likelihood of achieving a negotiated settlement, thereby fostering a harmonious built environment for a sustainable future in construction.

The remainder of the paper is organized as follows. First, the settlement facilitating elements identified from a comprehensive literature review is presented. Accordingly, six key elements are detailed. Second, the research methods and design of the work are explained, with data collected from construction practitioners in Hong Kong. Discussion and recommendations come next. Suggestions for negotiators in CDNs to enhance the efficacy of negotiation settlement form the conclusion of the study.

2. Taxonomies of Settlement Facilitating Elements in CDNs

As discussed, the overarching aim of this study is to unearth negotiators' settlement facilitating elements. To achieve this, a structured literature review was applied as it is a commonly recommended method to identify influencing factors in organizational research [22]. The development of the settlement facilitating elements is presented in Figure 1.

The first step is to select articles in broad fields that are relevant to the influencing factors of negotiation outcomes. For a more comprehensive collection of these factors, a purposive review was approached to search the keywords including "influencing factor", "willingness to settle", "negotiation behavior", "negotiation settlement", "negotiation outcome", and "negotiation performance". Applicable publications were identified by

screening the keywords within major databases (e.g., ASCE, Google Scholar, and ScienceDirect). To confirm the eligibility of these articles, the paper screening process was conducted in Step 2. Only empirical studies with established evidence to support the influencing factors were kept. With these selected papers, the influencing factors for negotiated settlement were summarized in Table 1 (Step 3).

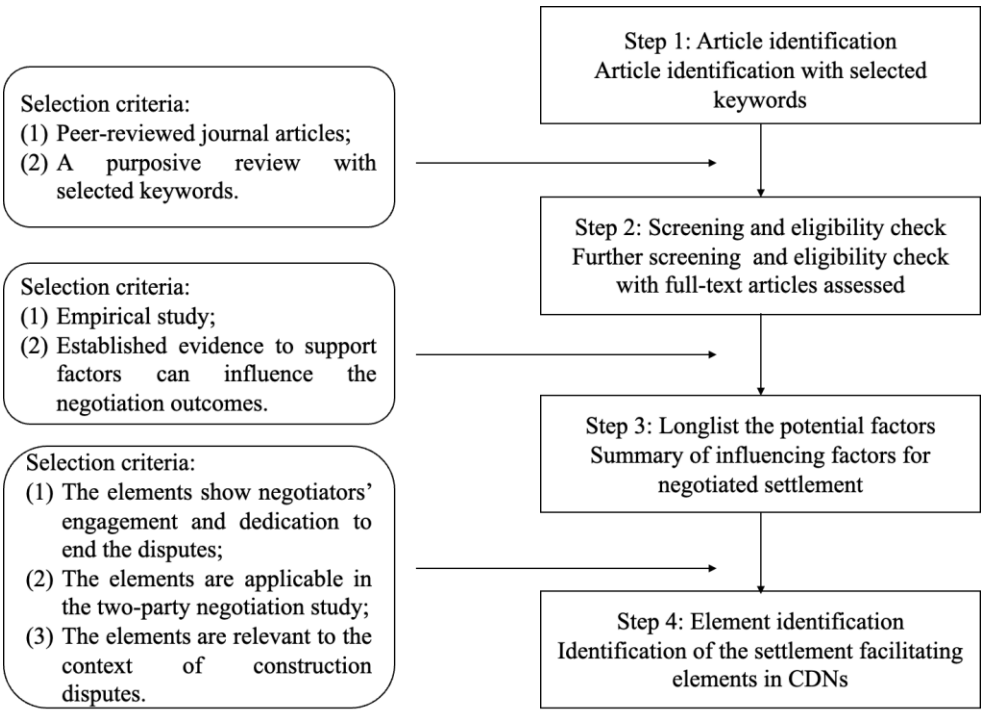

Figure 1. The development of the settlement facilitating elements.

Table 1. Summary of influencing factors for negotiated settlement.

Influencing Factors	References
(1) Preparation and planning; (2) Adopt a win-win approach; (3) Practice communication competence; (4) build solid relationships; (5) be patient and confident	[17]
(1) Preliminary planning; (2) present yourself well; (3) watch the language; (4) watch the attitude; (5) follow the rules of negotiation; (6) know the trade-off zone in detail	[23]
(1) Contract; (2) trust; (3) bilateral lock-in; (4) relationship type; (5) future business prospect	[24]
(1) Personal experience; (2) knowledge; (3) the support of a strong reference group; (4) fair process	[25]
(1) Relationship; (2) goal; (3) expectation; (4) cooperation behavior	[26]
(1) Initial and ongoing relationship; (2) information sharing	[27]
(1) Experience; (2) preparation; (3) relationship	[28]
(1) Negotiator confidence/self-efficacy	[29,30]
(1) Commitment to negotiation	[31]

Finally, Step 4 was taken to screen elements that can represent negotiators' settlement facilitating behaviors. The selection criteria were based on the fact that the elements numbered (1) are showing negotiators' engagement and dedication to end the disputes; (2) are applicable in the two-party negotiation study; and (3) are relevant to the context of construction disputes. Accordingly, six settlement facilitating elements were summarized: preparation, integration, goodwill, continuity, commitment, and self-efficacy. The first two elements describe the technical moves of negotiators trying to achieve a negotiated settlement, showing how negotiators deal with the negotiated issues. Goodwill and continuity signify negotiators' desire to maintain a harmonious and long-lasting relationship, demonstrating how negotiators deal with their counterparts. The last two elements illustrate negotiators' self-engagement and confidence in the negotiation, indicating how negotiators deal with themselves. Negotiated issues, counterparts, and negotiators themselves are the

three key objects in a CDN. The identified six elements are suggested as the settlement facilitating elements of negotiators. Each element is discussed seriatim.

2.1. Preparation

Preparation in negotiation refers to information collection of the negotiated issues and potential option development at the pre-negotiation stage [32]. Negotiation outcome not solely depends on the interactions on the negotiating table, preparation is also key to the effectiveness of negotiation. Especially for CDNs with high stakes and complicated contract terms, sufficient preparation becomes imperative and can be a sign that negotiators pay great attention to settling [33]. Peterson and Lucas [32] specified four aspects in the pre-negotiation stage, which are (1) collecting and evaluating available data, (2) setting goals for negotiated issues, (3) planning strategies to achieve goals, and (4) rehearsing the proceedings of the negotiation. These steps are applicable in CDNs. Negotiators should actively collect evidence and seek support from contract terms and laws to prove their point of view. Furthermore, preparing the trading-off zone with acceptable reservation and aspiration prices is necessary to clarify their party's interests and concerns [34,35]. As the proverb goes, "By failing to prepare, you are preparing to fail." Negotiators would get a better chance of settling with sufficient preparation.

H1. *Preparation is a significant settlement facilitating element in CDN.*

2.2. Integration

There are commonly two typical tactics in negotiation: distributive and integrative, depending on the difference in motivation [36]. Negotiation tactics can be defined as "a functional mapping from a set of goal values to a set of decision-action rules" [27,37]. The distributive tactic is driven by the egoistic motive to maximize their own party's profits with less regard for the counterpart's outcomes (i.e., slicing the pie). Negotiators adopting distributive tactics tend to force their counterpart to comply with their offers by using threats or power [14]. This may help negotiators to gain more interest, but it will create a hostile atmosphere that adversely affects dispute resolution. On the other hand, integrative negotiators aim to create mutually beneficial agreements that satisfy the interests of both parties (i.e., enlarging the pie) [38]. They will take an open mind to deal with negotiated issues and seek to expand the available resources or options [39]. Even though the process of integration raises the risk of being exploited by the counterpart, applying integrative behaviors can be seen as negotiator's positive attitude to settle and is more likely to solve problems.

H2. *Integration is a significant settlement facilitating element in CDN.*

2.3. Goodwill

At the negotiating table, the best way to uncover the counterpart's hidden interests is to show your goodwill first. Goodwill means to treat others in an honest, respectful, and polite manner. As suggested by Macfarlane [25], goodwill is suggested as the foundation for resolving disputes. This is because people tend to respond to others in a similar manner if they are treated with respect [40]. Landau and Landau [41] summarized that the willingness to talk, to listen, and to meet the other's needs are the recommended gestures, for the purpose of gaining trust. Chebet [17] further suggested that negotiators should use an open and friendly tone to show their good faith and build solid relationships. Negotiators are less likely to give honest answers if they feel they are not being taken seriously. Accordingly, the act of positively showing goodwill can enhance the chance of settlement.

H3. *Goodwill is a significant settlement facilitating element in CDN.*

2.4. Continuity

Negotiations are not one-off interactions. Especially in construction projects, the end of negotiation does not mean the end of a relationship. They still need to continue their cooperation to fulfill the project [27]. This leads to a dilemma for negotiators to find balance between short-term interest and long-term relationship. Too much emphasis on profits causes intense relationships and protracted disputes [42]. However, if negotiators adopt a long-term perspective, negotiators will take the counterpart's satisfaction into account and avoid opportunistic behaviors [43]. Moreover, negotiators with this view are more likely to make compromises as considered investments rather than unrecoverable losses [44]. The willingness to sacrifice short-term interests for relationship continuity can undoubtedly facilitate the negotiation settlement.

H4. *Continuity is a significant settlement facilitating element in CDN.*

2.5. Commitment

Organizational commitment is defined as "the relative strength of an individual's identification with and involvement in a particular organization" [45]. A stream of research has identified commitment as a critical predictor in understanding working behaviors, such as employee retention [46], loyalty [47], organizational learning [48], and prosocial behavior [49]. It is suggested that the higher the commitment, the greater the chance to accomplish the assigned tasks. On the contrary, people with declining commitment are likely to form a negative work attitude or distal perception of their roles [50]. In negotiation studies, commitment to negotiation can be expressed in three forms: (1) emotional involvement in the negotiation; (2) the high perceived cost associated with discontinuing the negotiation; and (3) a feeling of moral obligation to stay at the negotiation table [31]. The low level of commitment is a sign of losing interest in staying on the negotiation table [51]. Only committed negotiators exhibit certain persistence and resilience in the face of obstacles or setbacks, thereby facilitating the negotiation settlement.

H5. *Commitment is a significant settlement facilitating element in CDN.*

2.6. Self-Efficacy

Self-efficacy is the belief or confidence in one's ability to undertake the course of action necessary to achieve the given goals [52,53]. Negotiators' self-efficacy is defined as "the belief in his or her ability to perform well in a negotiation" [54]. Self-efficacy affects negotiators' motivation, decision-making, and overall performance [29]. Whether negotiators have confidence in negotiation is key to the negotiation outcome [30]. Negotiators with low self-efficacy tend to develop negative emotions, avoid engagement, and interpret their performance as unsuccessful [55]. Instead, negotiators with relatively high self-efficacy are insulated from these negative perceptions and believe that they can build rapport through trade-offs and achieve mutual benefits [29]. In this regard, self-efficacy in negotiation drives people to anticipate a successful negotiation outcome, be more persistent in finding ways out, and spend more effort to overcome constraints [56]. Therefore, self-efficacy can be a strong force for negotiation settlement.

H6. *Self-efficacy is a significant settlement facilitating element in CDN.*

To summarize, the six settlement facilitating elements cover different aspects of key points that negotiators should pay attention to if a negotiated settlement is the target. From relevant references, a list of measurement items is compiled. To operationalize into the CDN context, appropriate linguistic changes were made, and the first-person narration was applied. For example, Com1, "I was willing to spend my leisure time to prepare for or work on the negotiation", was derived from "I would be very happy to spend the rest of my career with this organization" [57]. All the measurement items are listed in Table 2.

Table 2. The list of measurement items for settlement facilitating elements.

Elements	Manifestations	References
Preparation	Pre1. I allowed adequate time to collect the available information for the negotiation	[58–60]
	Pre2. I prepared the claim documents according to the contract requirements	[61]
	Pre3. I checked the accuracy of the evidence provided by my counterpart	[62,63]
	Pre4. I assessed the potential settlement options according to the priorities of the issues	[64,65]
Integration	Int1. I brainstormed settlement options based on the interest of both negotiating parties	[30,59]
	Int2. I shared my views with my counterpart and encouraged them to do the same	[30,58,59]
	Int3. I tried to understand the perspectives from my counterpart's point of view	[30,59]
	Int4. I suggested integrative solutions to seek the support of my counterpart	[30,59]
Goodwill	God1. I showed positive emotions to elicit favorable response from my counterpart	[14,59]
	God2. I communicated with my counterpart honestly	[40,66]
	God3. I avoided offensive communication with my counterpart	[17,25]
	God4. I respectfully listened to my counterpart's grievances	[25,67]
Continuity	Cot1. I respected the relationship with my counterpart	[40,59]
	Cot2. I made concessions to maintain good relationship with my counterpart	[59,68]
	Cot3. I was willing to accept short-term losses on the belief that it will be balanced out in the long run	[58,66]
	Cot4. I took the long-term relationship and future collaboration with my counterpart into consideration	[59,68]
Commitment	Com1. I was willing to spend my leisure time to prepare for or work on the negotiation	[9,57]
	Com2. I had a strong sense of belonging to my project team	[9,57]
	Com3. I believed in the value of remaining loyal to my project team in resolving the dispute	[9,57]
	Com4. I felt staying with the project team was a matter of necessity as much as desire	[9,57]
Self-efficacy	Sel1. I was confident in my ability to undertake the negotiation effectively	[29,55,69]
	Sel2. I felt I was able to achieve most of our party's goals in the negotiation	[29,55,69]
	Sel3. I felt I could perform quite well even the negotiation was tough	[29,55,69]
	Sel4. I thought about my own responsibility if settlement failed	[63]

3. Research Method

An empirical study was conducted to test the proposed hypotheses and confirm these settlement facilitating elements in the context of CDN. Questionnaire-based data collection was undertaken in Hong Kong with construction professionals who have experience with negotiations.

3.1. Data Collection

The questionnaire survey has two parts. Part A is about respondents' particulars, such as their professions, organization type, and working experiences. In Part B, respondents were required to recall a CDN they have been involved in recently and assess it on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Their level of agreement with the statements indicates the extent of the significance of the behaviors for negotiation settlement.

The survey was distributed via email invitation in September 2021. The target respondents were from the Hong Kong Institution of Engineers, Hong Kong International Arbitration Centre, and Hong Kong government works departments. To ensure the quality of the data, a filter question, "Have you ever been involved in construction dispute negotiations", was used at the start of the survey. If the answer was "no", the survey would be ended. Furthermore, the data screening was applied to exclude questionnaires with missing data or any outliers [70]. Finally, 117 valid responses were achieved. The profile of the respondents is displayed in Figures 2–4. Around 60% of the respondents have more than 5 years of working experience in CDNs, suggesting the reliability of the data.

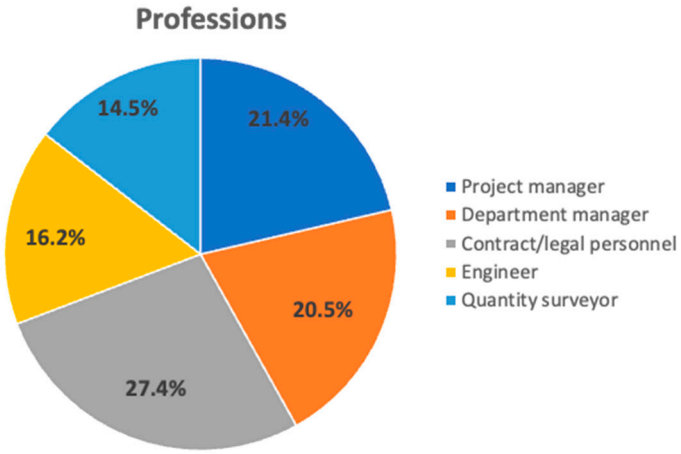

Figure 2. Professions of the respondents.

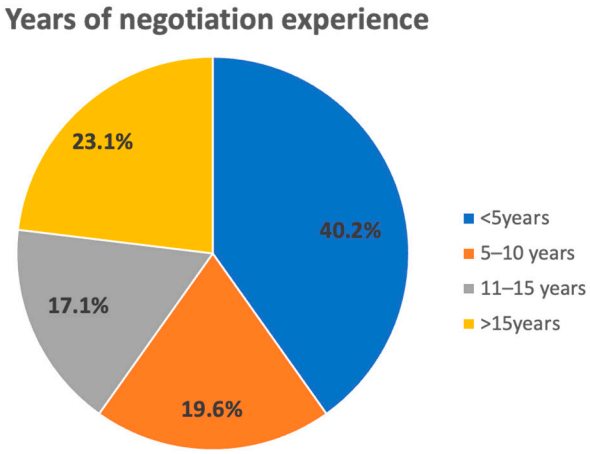

Figure 3. Working experience of the respondents.

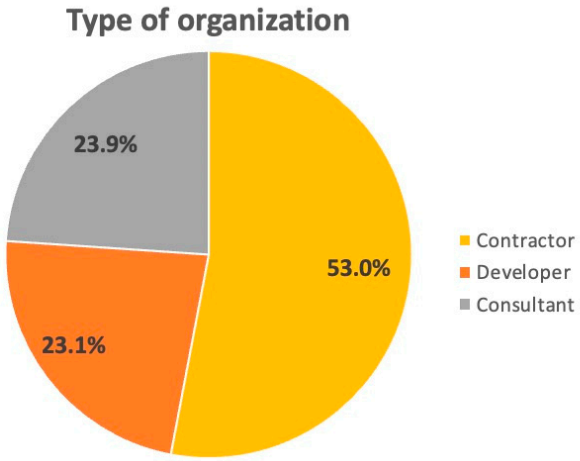

Figure 4. Organizations of the respondents.

3.2. Research Approach

Two data analysis methods, including the analysis of variance (ANOVA) and partial least squares structural equation modelling (PLS-SEM), were used in this study.

ANOVA is a statistical test used to analyze the differences between multiple groups in a study [71]. It determines whether there are significant differences in the means of the groups being compared. The test assesses the variability within each group and compares it to the variability between the groups. In this study, ANOVA was conducted to test whether there

is any divergence of responses from different organizations (i.e., consultant, contractor, and developer) regarding the six settlement facilitating elements [72,73]. This can help provide insights into the willingness of different negotiating parties to resolve disputes.

Structural equation modelling (SEM) is an effective method to conduct both confirmatory factor analysis and path analysis [74,75]. Compared to covariance-based SEM, partial least squares structural equation modelling (PLS-SEM) requires small data volume and nonnormal conditions [76]. According to Zeng et al. [77], many empirical studies chose PLS-SEM mainly because of these data characteristics. Furthermore, PLS-SEM has proven effective in dealing with survey-based construction management studies and results in insightful findings [77,78]. For example, PLS-SEM has been applied to project communication management [79], conflict management [80], organizational innovation [81], etc. PLS-SEM is considered the most suitable technique to confirm the settlement facilitating elements in CDNs.

4. Data Analysis

4.1. ANOVA Test

Several steps were conducted with the ANOVA test. First, the data set was divided into three groups based on their organization types. Second, under each organization, the score of settlement facilitating elements was calculated as the average of corresponding measurement items. For example, preparation is the average of the items of Pre 1, 2, 3, and 4. The exercise was then undertaken with SPSS Statistics 29 at a 5 percent significance level. The null and alternative hypothesis was applied to assess the difference of opinions among the construction professionals. The null hypothesis (H_0) postulates that there is no significant difference in the opinion on settlement facilitating elements from different organizations. The alternate hypothesis (H_a) suggests a significant difference in the opinion on settlement facilitating elements from different organizations. If any of the group means is significantly different from the others, the null hypothesis is rejected.

The results in Table 3 indicate that professionals with different backgrounds differed significantly under settlement facilitating elements ($p < 0.05$), except for preparation. The consultant group got the lowest scores in the rest five elements. As third-party neutrals, consultants can be more rational and objective. Compared with the contractor and developer, consultants' desire to reach a negotiated settlement may be less potent, thus showing the lowest level of these settlement facilitating behaviors. Another interesting finding is that the contractor's scores are significantly higher than those of the developer's. It suggests the contractor is more proactive and cooperative in resolving disputes. This can be explained by the fact that the contractor is on the relatively weak side in their relationship, and they have to perform well to push forward the settlement and pursue further cooperation opportunities.

4.2. PLS-SEM Method

The PLS-SEM method, involving the measurement model assessment, structural model assessment, and significance and relevance of path coefficients, was taken following the guidelines by Hair et al. [74].

4.2.1. Measurement Model Assessment

SEM measurement models mainly contain two types of variables: latent variables and observable variables. In this study, the six settlement facilitating elements are the latent variables that are predicted by corresponding observable variables (i.e., measurement items). Each latent variable is measured by four items.

(1) Common method variance (CMV)

Harman's single-factor test was conducted to examine whether the common method variance (CMV) problem exists [82]. Results indicate that the first factor accounted for a 35.49% variance, fitting the threshold of <50%. Thus, it suggests that CMV does not pose a significant threat to the model evaluation.

Table 3. ANOVA multiple comparisons.

Element	Group (I)	Group (J)	Mean Difference (I–J)	SE	Sig.	ANOVA Results	
						F	*p*
Preparation	Consultant	Contractor	−0.154	0.145	0.290	0.791	0.455
		Developer	−0.192	0.162	0.238		
	Contractor	Consultant	0.154	0.145	0.290		
		Developer	−0.037	0.136	0.784		
	Developer	Consultant	0.192	0.162	0.238		
		Contractor	0.037	0.136	0.784		
Integration	Consultant	Contractor	−0.389 *	0.141	0.006	4.519	0.012
		Developer	−0.412 *	0.157	0.009		
	Contractor	Consultant	0.389 *	0.141	0.006		
		Developer	−0.023	0.132	0.861		
	Developer	Consultant	0.412 *	0.157	0.009		
		Contractor	0.023	0.132	0.861		
Goodwill	Consultant	Contractor	−0.621 *	0.153	0.000	8.546	0.000
		Developer	−0.534 *	0.171	0.002		
	Contractor	Consultant	0.621 *	0.153	0.000		
		Developer	0.087	0.143	0.544		
	Developer	Consultant	0.534 *	0.171	0.002		
		Contractor	−0.087	0.143	0.544		
Continuity	Consultant	Contractor	−0.452 *	0.174	0.010	3.584	0.030
		Developer	−0.210	0.194	0.279		
	Contractor	Consultant	0.452 *	0.174	0.010		
		Developer	0.242	0.162	0.139		
	Developer	Consultant	0.210	0.194	0.279		
		Contractor	−0.242	0.162	0.139		
Commitment	Consultant	Contractor	−0.526 *	0.159	0.001	6.062	0.003
		Developer	−0.210	0.177	0.236		
	Contractor	Consultant	0.527 *	0.159	0.001		
		Developer	0.316 *	0.148	0.035		
	Developer	Consultant	0.210	0.177	0.236		
		Contractor	−0.316 *	0.148	0.035		
Self-efficacy	Consultant	Contractor	−0.421 *	0.158	0.009	3.548	0.031
		Developer	−0.276	0.176	0.119		
	Contractor	Consultant	0.421 *	0.158	0.009		
		Developer	0.146	0.148	0.325		
	Developer	Consultant	0.276	0.176	0.119		
		Contractor	−0.146	0.148	0.325		

Note: * significant at the 0.05 level.

(2) Internal consistency reliability and convergent validity

Cronbach's alpha and composite reliability (CR) were assessed for internal consistency reliability. As shown in Table 4, all factors' Cronbach's alpha and CR values reached the recommended mark of 0.7, suggesting the robustness of the measurement items [83]. The convergent validity was evaluated by the average variance extracted (AVE) with a standard of higher than 0.5 [84]. Results in Table 4 show that the AVE of each factor was above 0.5, indicating a satisfactory level of convergent validity.

(3) Discriminant validity (HTMT)

The heterotrait–monotrait (HTMT) ratio of the correlations is suggested for discriminant validity [85]. Discriminant validity problems exist when HTMT values are higher than 0.90. The HTMT results in Table 5 prove the discriminant validity for all factors.

Table 4. Results of composite reliability and average variance extracted (AVE).

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Preparation	0.783	0.859	0.604
Integration	0.807	0.874	0.635
Goodwill	0.842	0.894	0.679
Continuity	0.817	0.879	0.646
Commitment	0.847	0.897	0.687
Self-efficacy	0.826	0.885	0.661

Table 5. Results of discriminant validity.

Construct	Preparation	Integration	Goodwill	Continuity	Commitment	Self-Efficacy
Preparation						
Integration	0.565					
Goodwill	0.431	0.685				
Continuity	0.282	0.469	0.663			
Commitment	0.470	0.485	0.519	0.629		
Self-efficacy	0.483	0.546	0.620	0.584	0.628	

4.2.2. Structural Model Assessment

As the measurement model has been confirmed as reliable and valid, the next step can be conducted to assess the explanatory power and associations of these constructs, including VIF, R^2, and Q^2 value, as well as the path coefficients.

(1) VIF

VIF is applied to ensure no collinearity issues in the regression results. The tolerance value of VIF < 5 is acceptable [86]. Results showed that the VIF ranges were: for preparation (1.469–1.646), for integration (1.432–1.902), for goodwill (1.698–2.089), for continuity (1.633–1.901), for commitment (1.558–2.515), for self-efficacy (1.336–2.173), thus suggesting the collinearity is not at critical levels.

(2) R^2 value and predictive relevance Q^2

R^2, indicating in-sample predict power, is explained in each of the endogenous constructs [87]. The higher level of the R^2 represents the greater explanatory power of the structural model. Higher than 0.1 is commonly considered satisfactory for R^2 and adjusted R^2 [88]. Q^2 value is recommended to test the explanatory power of the structural model based on blindfolding procedure [89]. As a rule of thumb, Q^2 value higher than zero represents a meaningful predictive accuracy [74]. As shown in Table 6, the results of R^2, adjusted R^2, and Q^2 depict a satisfactory level of explanatory power and predictive accuracy of the model.

Table 6. Results of R^2, R^2 Adjusted, and Q^2 value.

Construct	R^2	R^2 Adjusted	*SSO*	*SSE*	Q^2 (=1 − *SSE*/*SSO*)
Preparation	0.370	0.367	684	537.88	0.214
Integration	0.548	0.546	684	453.992	0.336
Goodwill	0.633	0.631	684	396.101	0.421
Continuity	0.529	0.526	684	455.867	0.334
Commitment	0.577	0.574	684	422.196	0.383
Self-efficacy	0.604	0.601	684	415.333	0.393

(3) Significance and relevance of path coefficients

The bootstrapping technique is used to test the path coefficients and hypotheses [90]. The number of subsamples is 5000 and the significant level is 0.05, as suggested by Hair et al. [91]. Table 7 and Figure 5 show that all the path coefficients are significant with the two-tailed test.

Table 7. Results of path coefficients.

Hypotheses	Path Coefficients	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	*p* Values	Interpretation
H1	0.609	0.052	11.755	0.000	Supported
H2	0.740	0.042	17.819	0.000	Supported
H3	0.796	0.034	23.143	0.000	Supported
H4	0.727	0.044	16.388	0.000	Supported
H5	0.760	0.043	17.752	0.000	Supported
H6	0.777	0.032	23.949	0.000	Supported

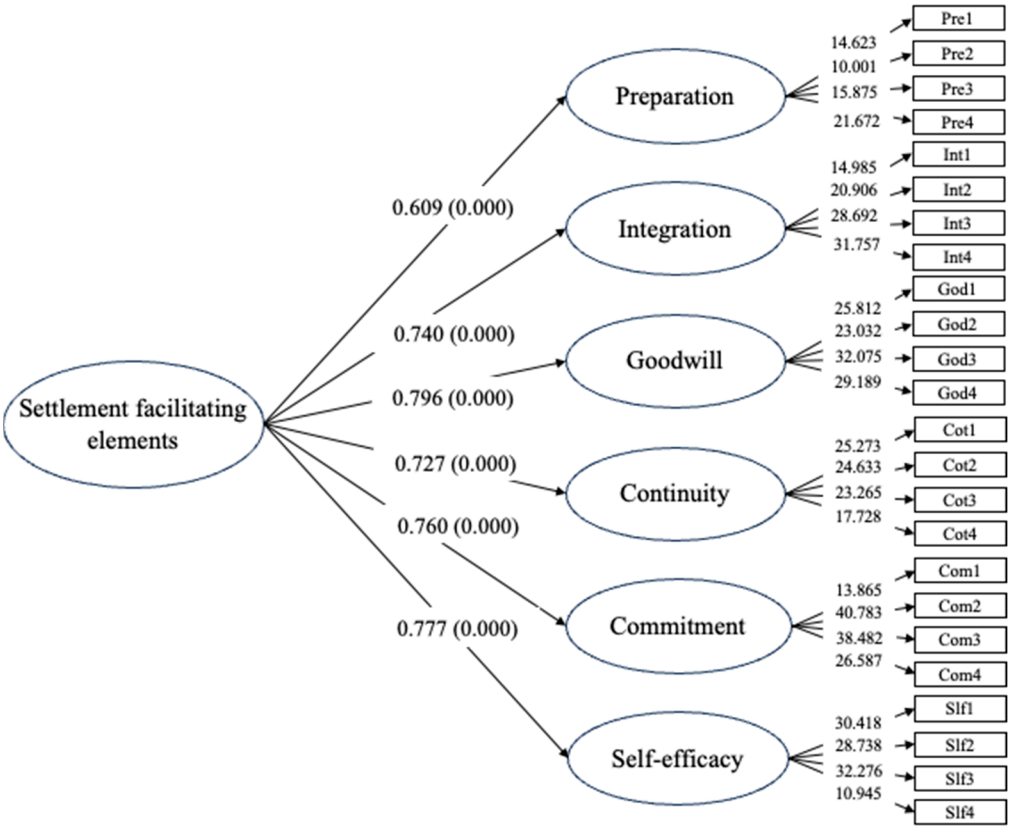

Figure 5. PLS-SEM analysis of the settlement facilitating elements in CDNs.

5. Discussion and Recommendations

The PLS-SEM analysis results confirm the fitness of the constructs and the respective measurement items. Based on the path coefficient values, the six identified elements are substantiated significantly. Therefore, preparation (H1), integration (H2), goodwill (H3), continuity (H4), commitment (H5), and self-efficacy (H6) are empirically tested as the key settlement facilitating elements in CDNs. The identified elements echo the findings of Thompson [92], who argued that negotiation behaviors could be measured by the perceptions of the negotiation condition, the counterpart, and the self. Moreover, Curhan et al. [93] proposed a similar category to assess negotiators' subjective value when they negotiate, including instrumental, self, process, and relationship, which are relevant to the identified elements in this study.

Six recommendations are derived from the six key elements to elicit the negotiation settlement. These recommendations can be regarded as best settlement-oriented practices. Specifically, (1) good preparation and (2) applying integrative tactics can be summarized as "technique", indicating negotiators' specific actions and approaches to solve the negotiated issues before and during the negotiation. (3) Showing goodwill and (4) relationship maintenance are the "interaction" to continue the harmonious relationship with the counterpart.

(5) Commitment to negotiate and (6) being confident indicate the "attitude" that negotiators should conceive if they desire to settle. The six recommendations are discussed as follows.

(1) Good preparation

Comparatively, preparation (path coefficient = 0.609) is identified as the least significant element. However, negotiation preparation should not be underestimated. Inadequate preparation has been found as the root cause of negotiation failure [12]. In this connection, negotiators should engage in thorough preparation before initiating a negotiation. The preparation phase is crucial for understanding the negotiated issues, identifying interests and priorities, and developing suitable strategies to achieve an amicable settlement. Information gathering, including contractual agreements, project documents, correspondence, and any other evidence related to the issues, is always suggested (Pre1 and Pre2). Moreover, the accuracy of both parties' proof should be confirmed at this stage (Pre3). Sufficient preparation can help negotiators anticipate the counterpart's proposals and assess the strengths and weaknesses of the negotiation situation. Determining potential areas of agreement and trade-offs is also suggested at the preparation stage (Pre4).

(2) Applying integrative tactics

Integration (path coefficient = 0.740), which is contrary to distribution, shows negotiators' problem-solving mindset to pursue mutually beneficial solutions. Taking integrative tactics requires a willingness to think creatively and embrace flexibility and open-mindedness throughout the negotiation (Int1). Identifying solutions beyond dividing resources but creating additional benefits for both parties is the essence of integration (Int4). To achieve that, negotiators should take the counterpart's point of view into consideration (Int3) and encourage the other side to take the same course (Int2). Reaching a win-win situation can be optimal but requires both parties' cooperation in identifying areas of common ground and shared goals.

(3) Showing goodwill

Goodwill (path coefficient = 0.796) achieves the most significant settlement facilitating element, indicating how negotiators treat their counterparts to foster a cooperative and constructive atmosphere. Negotiators are encouraged to use polite language, avoid personal attacks or derogatory remarks, and refrain from confrontational behaviors throughout the negotiation process (God3). Maintaining a professional tone and positive emotion can not only ease the tension, but also enhance the trust of counterparts (God1 and God2). Moreover, active listening to the counterpart's viewpoints is also essential to show respect and empathy (God4). As Nelson Mandela said, "Our experience has taught us that with goodwill, a negotiated solution can be found for even the most profound problems". Showing goodwill is always the first step forward to solving problems.

(4) Relationship maintenance

Continuity (path coefficient = 0.727), ranks as the fifth settlement facilitating element. Construction projects typically have extended durations and involve multiple phases. A negative or contentious relationship can harm professional reputations and limit future prospects (Cot1). If negotiators prioritize their long-term relationships, they will undoubtedly desire a cooperative settlement (Cot4). This is especially true for contractors, as it is their common practice to sacrifice some benefits in the negotiation in exchange for owners' commitment to future working chances (Cot3). Despite the confrontational nature of negotiations, negotiators should be aware of the negative consequences of a negotiation breakdown, and make necessary concessions to maintain their relationships if negotiated settlement is targeted (Cot2).

(5) Commitment to negotiate

Commitment (path coefficient = 0.760) is also a critical element that can foster negotiation settlement (i.e., the third). Committed negotiators show a high level of dedication, persistence, and engagement in the negotiation process. They are suggested to take the settlement as their responsibility. As such, they should invest substantial time, effort, and resources to overcome difficulties and pursue mutual benefits (Com1). For management, commitment training is a valuable way to enhance negotiators' loyalty to their organizations

(Com2 and Com3). Furthermore, negotiators should be reminded of the advantages and benefits of reaching a settlement rather than pursuing prolonged litigation or arbitration, thus encouraging their active engagement with negotiation (Com4).

(6) Being confident

Self-efficacy (path coefficient = 0.777), indicating negotiators' level of self-confidence, ranks as the second significant element in fostering negotiation settlement. A high level of self-efficacy empowers negotiators to be more confident and proactive in pursuing favorable outcomes. To enhance self-efficacy, negotiators are suggested to set specific, challenging, and attainable goals, with which they can experience a sense of achievement along the way (Sel1 and Sel2). When facing difficulties, negotiators should remain vigilant of negative self-doubt (Sel3). Engaging in relaxation techniques, positive self-talk, or mindfulness practices can help negotiators reduce anxiety. In addition, it is necessary to self-reflect after negotiation interactions. Examining strengths or extracting valuable insights from instances of failure can also contribute to the enhancement of self-efficacy (Sel4). However, it is worth noting that overconfidence can be a barrier to rational decision-making.

The integrative findings are summarized in Table 8. Following these recommendations can help facilitate negotiated settlement and thereby foster an amicable environment conducive to construction sustainability.

Table 8. Integrative findings in this study.

Element	Ranking	Recommendation	Example Measures
Preparation	6	Technique: Good preparation	Information gathering; confirmation of the accuracy of both parties' proof; rehearsal of any possible negotiation situations
Integration	4	Technique: Applying integrative tactics	Identification of potential common ground and shared goals; taking the counterpart's point of view into consideration; actively pursuing trade-off solutions
Goodwill	1	Interaction: Showing goodwill	Maintaining a professional tone; showing respect and empathy during communication; keeping positive emotions
Continuity	5	Interaction: Relationship maintenance	Avoiding opportunistic behaviors; balancing between short-term interest and long-term relationship; making necessary concessions
Commitment	3	Attitude: Commitment to negotiate	Taking regular training to enhance loyalty; timely reminder of the advantages and benefits of reaching a settlement
Self-efficacy	2	Attitude: Being confident	Setting specific and attainable goals; remaining vigilant of negative self-doubt; practicing more to improve techniques

6. Implications for Sustainable Construction

With Construction 4.0 technologies enhancing flexible connections among project stakeholders through extended networks of communication, various origins of conflicts and disputes are magnified [94]. Through the lens of human factors, this study provides insights into settlement facilitating elements that can support effective CDNs, thereby contributing to the development of a harmonious and healthy work environment.

To ensure the efficiency of negotiation settlement, negotiation training should aim to equip professionals with the necessary skills and knowledge. The identified six key elements inform what negotiators should practice if a negotiated settlement is targeted. It is suggested that the developed elements can serve as a training tool to cultivate negotiators' settlement-directed mindset. The corresponding recommendations explicitly express the best settlement-oriented practices in terms of technique, interaction, and attitude. This is especially useful for less experienced negotiators. The biased view that negotiation is a competition that must be "won" other than "settled" can be alleviated. Furthermore,

the measurement items can be employed as a checklist for negotiators to review their behaviors throughout the negotiations. In this process, the settlement facilitating behaviors can enhance the chance of negotiation settlement and save construction projects from cost overrun and time delay as much as possible. Potential resources can be preserved from being wasted in the prolonged dispute resolution process and thus contribute to construction sustainability in economic and environmental aspects.

In the social aspect, negotiators adopting more settlement facilitating behaviors can ease the intense relationship between the parties. Construction projects require coordination, teamwork, and effective communication. Even though negotiation arises from disagreement, a positive working relationship is still expected due to the nature of interdependence. The six identified elements can help negotiators adopt a more rational and peaceful negotiation process. A positive and harmonious environment can be built with these behaviors. Mutual trust, partnership, and collaboration can thereby be fostered. Therefore, following the settlement facilitating behaviors in CDNs can not only pave the path for effective negotiation but also contribute to social sustainability in the construction industry.

7. Conclusions and Limitations

7.1. Conclusions

Materializing the visions enunciated in Construction 4.0 brings both opportunities and challenges. Upholding sustainability is the core mission and is to be met with enhancement in efficiency. While conflict and dispute remain inevitable, effective dispute management is pivotal in creating a healthy and sustainable work environment in the construction industry. In this regard, this study has examined negotiators' settlement facilitating elements in CDNs. Through a literature review, six key elements have been summarized: preparation, integration, goodwill, continuity, commitment, and self-efficacy. The views of construction professionals provide affirmative empirical support to these elements. Corresponding recommendations are provided to enhance negotiators' behaviors. The findings also set out foundations for negotiation training in how to improve negotiation practice and negotiators' skills. Management can formulate benchmarks with reference to these elements for both training and performance monitoring. Better performance of negotiators can be expected to minimize the potential expenses of the protracted dispute resolution process. Amicable settlement can also improve the relationship among negotiating parties and thus contribute to a robust and enduring work environment.

7.2. Limitations

This study has some caveats. First, the study aims to enhance the sustainability of construction developments by increasing the efficiency of negotiation settlement from the negotiators' perspective. Exploring the relationship between negotiation settlement and sustainability with input from the industry would provide relevant and informed views that can more readily be applied to future work. Second, negotiation situations may vary with different contract types, procurement methods, or project stages. Moreover, negotiating behaviors can be changed in terms of different power states. This study did not specify these negotiation conditions but provided a more general view of the settlement facilitating elements. Finally, the results should be read with the regional factor as the data were collected in Hong Kong. A greater number of data sets are also suggested to confirm the findings.

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