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Orchestrated reciprocity over equilibrium: How relational behavior and task conflict configure pathways to relationship quality in inter-organizational projects

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ABSTRACT

Managing behavioral interactions and conflicts across organizational boundaries remains a persistent challenge in project management. Inter-organizational relationship quality is closely related to the sustainable development of future cooperation, yet prior studies have reported contradictory findings. Rooted in the field of project behavior and conflict management, this study examines how relational behavior and task conflict jointly shape inter-organizational relationship quality. This study employs fuzzy-set qualitative comparative analysis (fsQCA) to uncover multiple configurational pathways leading to different levels of inter-organizational relationship quality. It examines how situational factors (task conflict and time delay) interact with behavioral factors (the relational behavior of both parties) to shape these outcomes. Based on survey data from 212 questionnaires, this study concludes that a key factor driving high relationship quality is when the three dimensions of relational behavior of both parties are aligned or when one collaborator more closely meets the expectations of both parties. Conversely, low relationship quality occurs when both task conflict and time delay are in an unfavorable state, especially when the relational behavior of the two parties is not equal. The findings contribute to conflict management literature by advancing a configurational understanding of how behavioral reciprocity and situational stressors shape relationship outcomes. These configurations show high consistency and coverage, indicating robust and empirically relevant patterns in inter-organizational relationship quality.

1. Introduction

Inter-organizational projects are fundamentally temporary arrangements, yet research indicates that sustaining effective inter-organizational relationships is vital for influencing the behavioral dynamics that enable coordination and collaboration across organizational boundaries (Levering et al., 2013; Sydow & Braun, 2018). In recent years, both scholars and practitioners have been placing greater emphasis on enhancing the inter-organizational relationships between collaborating organizations during project execution. These relationships encompass the organizational-level interactions that arise through the collaboration of project representatives, who facilitate cross-firm activities and resource exchanges. High-quality inter-organizational relationship has a significantly positive impact on the successful delivery of collaborative construction projects (Denicol et al., 2020). Inter-organizational relationship quality is defined as the overall evaluation of the strength, depth, and stability of inter-organizational exchange relationships (Bove & Johnson, 2001). It is worthwhile to build efficient and practical paths to promote the quality of inter-organizational relationship (Nikulina et al., 2022).

In the existing project management literature, the quality of inter-organizational relationships is generally understood to be shaped by two major categories of determinants: the behavioral interactions between collaborating parties and the situational factors of project execution, such as task conflict and time delay. Following this logic, prior studies have increasingly emphasized relational behavior as a focal behavioral construct that reflects how project partners coordinate and maintain their collaboration.

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As for behavior, in addition to opportunistic behavior attracting widespread attention (Athanasopoulou, 2009), scholars and practitioners pay more attention to the behaviors based on the maintenance of the relationship between two parties, namely, "relational behavior" (Ning & Ling, 2013; Zheng et al., 2021). This study specifically focuses on relational behavior and conflict interactions between organizations, as assessed from the perspectives of their project-level representatives, aligning with the growing relevance of project behavior and conflict management as a research domain (Huemann & Turner, 2024). This field of project behavior and conflict management emphasizes how behavioral patterns, reciprocity, and conflict interactions shape the quality and outcomes of inter-organizational collaborations (Wang et al., 2016).

Inter-organizational conflict is one of the important representative variables of situational factors (Hu et al., 2017), which is broadly defined as the perceived incompatibility of goals, interests, or values between organizations engaged in a shared project. Existing research has focused on the relationship between inter-organizational conflict and the inter-organizational relationship quality (Leonidou et al., 2014). Inter-organizational conflict can typically be categorized into relationship conflict and task conflict (Zhao et al., 2024). Relationship conflict refers to the disagreement and incompatibility arising from interpersonal relationships, which manifests as interpersonal friction, tension, and divergences in personal values, preferences, and interaction styles (Wu, Liu, et al., 2017). Task conflict reflects the cognitive differences between the two parties to the transaction, concerning ideas and opinions about the task being performed (Wang et al., 2023). The existing project management research shows that the impact of relationship conflict is consistent and negative: relationship conflict is not conducive to satisfaction and performance (Wu et al., 2022). However, when focusing specifically on task conflict, studies show inconsistent findings regarding its impact on relationship quality (Leung et al., 2014; Wu, Zhao, et al., 2017). These inconsistencies suggest that the effect of conflict depends on interactions with other behavioral and contextual conditions, calling for a more integrative and configurational understanding of inter-organizational conflict(Antoniadis et al., 2011).

Another critical situational factor considered is "time delay", an established dimension of project performance. Time delay refers to the situation where the actual project duration exceeds the planned schedule. Delays in project completion can adversely impact both behaviors and relationships (Williams et al., 2015). Thus, how task conflict, time delay, and relational behavior jointly affect inter-organizational relationship quality should be deeply and comprehensively analyzed.

However, existing studies predominantly adopt a unilateral or static view of relational behavior, overlooking how behavioral reciprocity evolves under situational stressors such as conflict and delay.

Moreover, despite recognizing conflict and time delay as influential factors, prior research rarely examines how these conditions interact with bilateral behaviors in a configurational manner. This reveals a critical research gap: the lack of holistic perspectives that capture the joint, context-dependent mechanisms shaping inter-organizational relationship quality. To address this gap, this study examines how combinations of relational behaviors (from both parties), task conflict, and time delay configure to produce high or low inter-organizational relationship quality.

To answer this question, this study employs fuzzy-set qualitative comparative analysis (fsQCA) to uncover causal pathways of relationship quality in project-based inter-organizational settings. fsQCA is especially suitable for analyzing multiple interacting factors and identifying equifinal configurations that lead to similar outcomes (Mellewigt et al., 2018; Rihoux, 2003). This approach allows us to uncover not just whether but under what configurations task conflict and behavior lead to high or low relationship quality, which is particularly valuable in complex, non-linear project environments. The findings advance the notion of orchestrated reciprocity, emphasizing the proactive coordination and mutual behavioral adjustment by both parties to foster high-quality relationships, even under adverse project conditions. This configurational lens offers an alternative to traditional equilibrium-based perspectives, revealing the asymmetric and synergistic mechanisms behind both success and breakdown in inter-organizational collaboration.

2. Theoretical background

2.1. Relationship quality

Relationship quality has been recognized as a key behavioral determinant of collaborative success, shaping how individuals from different organizations develop trust, establish shared expectations, and interact throughout the temporary lifespan of the inter-organizational project (Sydow & Braun, 2018). Despite variations in conceptualization, most studies agree that trust and satisfaction constitute its core dimensions (Ma et al., 2022; Wei et al., 2024). Thus, this study divides relationship quality into two dimensions: satisfaction and trust (Martin & Benson, 2021; Ulaga & Eggert, 2006a). In the context of construction projects, satisfaction represents one party's overall evaluation of the other's performance, such as contractual fulfillment or delivery quality. Trust refers to the willingness of one party to rely on the other's actions based on positive expectations about competence and reliability (Mayer et al., 1995), and it has been widely identified as a critical success factor in megaprojects (Cerić et al., 2021). These two dimensions together reflect the affective and cognitive foundations of sustainable collaboration and governance effectiveness.

2.2. Relational behavior

Relational behavior describes a set of proactive actions that maintain and enhance inter-organizational relationship. Following Heide and John (1992), this study focuses on three dimensions: flexibility, information exchange, and solidarity. Flexibility denotes adaptive responsiveness under uncertainty; information exchange entails timely and accurate communication; and solidarity reflects long-term commitment and shared problem-solving orientation. Grounded in social exchange theory, these behaviors foster trust and satisfaction through reciprocal reinforcement and relational commitment (Cropanzano & Mitchell, 2005). Empirical studies in construction contexts confirm their importance: flexible responses and transparent communication facilitate trust-building and knowledge sharing under contractual incompleteness (Ju & Ning, 2022) while reciprocity and information quality strengthen collaborative cohesion (Rudawska & Sławik, 2025). Collectively, these findings affirm the relevance of flexibility, information exchange, and solidarity as essential mechanisms linking relational behavior to relationship quality.

2.3. Task conflict

A substantial body of research has examined task conflict—the cognitive disagreement between collaborating organizations regarding project goals, methods, or resource allocation—and its mixed effects on relationship quality. Some scholars argue that moderate levels of task conflict enhance collective learning and coordination (Mu et al., 2021; Peterson & Behfar, 2003), while others emphasize its disruptive potential, showing that excessive disagreement hinders team performance and satisfaction (Khosravi et al., 2020). Evidence also indicates nonlinear relationships; for example, Leung et al. (2002) found an inverted U-shaped association, suggesting that moderate conflict stimulates constructive debate, whereas high conflict damages collaboration. However, task conflict does not operate in isolation. Its influence depends on interaction with relational and situational factors. Studies demonstrate that conflict management styles, communication norms, and behavioral reciprocity moderate how task conflict affects trust and satisfaction (Bradford & Weitz, 2009; DeChurch Leslie & Marks Michelle, 2001). Consequently, the impact of task conflict is contingent upon whether relational behavior compensates for or amplifies the strain it imposes. Although this study's sample covers both contractor–owner and contractor–subcontractor dyads, it focuses on inter-organizational task conflict at the project level rather than differentiating between these relationship types. Prior studies indicate that subcontractor–contractor conflicts often concern operational coordination and resource constraints, whereas contractor–owner conflicts typically involve strategic expectations and scope management (Assaf & Al-Hejji, 2006; Chen et al., 2012). While their origins may differ, both forms share comparable behavioral mechanisms that influence trust and satisfaction, justifying an integrated analytical approach.

2.4. A configurational approach to methodological complexity

Divergent empirical findings on inter-organizational relationship quality partly stem from inconsistent measurement and analytical strategies. For instance, task conflict has been measured by frequency, severity, or perceived intensity, leading to conflicting interpretations (Ye et al., 2025). Similarly, relationship quality has been conceptualized either as a single construct or a composite of trust, satisfaction, and commitment (Ma et al., 2024; Ulaga & Eggert, 2006b), complicating cross-study comparisons. Moreover, traditional variable-centered methods such as regression or SEM emphasize net effects and linear causality, often masking causal asymmetry and interdependence among conditions.

To address these limitations, this study adopts a configurational perspective grounded in fuzzy-set qualitative comparative analysis (fsQCA). FsQCA accommodates causal complexity by identifying multiple conjunctural pathways—combinations of behavioral and situational conditions—that lead to high or low relationship quality (Mellewigt et al., 2018; Rihoux, 2003; Schneider & Wagemann, 2012). This approach recognizes that task conflict may enhance trust when both parties demonstrate flexibility and transparency, but deteriorate satisfaction under behavioral asymmetry or time-induced strain (Greckhamer et al., 2008). Accordingly, we investigate how configurations of relational behavior, task conflict, and project delay jointly influence trust and satisfaction. The theoretical framework is presented in Fig. 1.

3. Method

3.1. Research design

In this study, the fsQCA method was used to analyze the combinations of antecedent conditions that affect inter-organizational relationship quality (Campbell et al., 2016). This method is particularly suited for identifying multiple causal pathways that traditional linear methods might overlook, allowing us to address the core research question about configurational effects. Traditional correlation analysis, such as multiple linear regression and structural equation modeling, is based on the mutual independence, one-way linear relationship, and causal symmetry of independent variables to analyze the independent net effect of a single independent variable on the dependent variable while controlling for other variables. Inter-organizational relationship quality is highly likely to be affected by complex combinations of interrelated relational behavior of both parties and inter-organizational task conflict. Thus, identifying and understanding the configuration composed of multiple conditions is more in line with project practice than verifying the effects of each antecedent (Rihoux & Ragin, 2009). QCA develops conjunctural causation, integrates the advantages of qualitative and quantitative methods, adopts a holistic perspective, and is more in line with the interdependence and multiple conjunctural causation of management practices (Campbell et al., 2016). The traditional QCA method is used to check for the presence or absence of conditions. A "fuzzy" technique of QCA, known as fsQCA, allows the value of a condition to include continuous changes between high and low.

Recent studies have applied fsQCA to explore complex governance mechanisms in inter-organizational relationship (Yan et al., 2025), demonstrating its growing value in project-based and cross-boundary relationship research. This study employs fsQCA, as relationship quality is understood to result from the interplay of multiple interdependent conditions. fsQCA is particularly well-suited to capturing equifinality, asymmetry, and non-linearity—characteristics commonly observed in inter-organizational contexts—offering analytical advantages over traditional regression-based methods. Although fsQCA was initially developed for small-N case studies, recent studies in the field of project management have successfully applied it to larger samples (e.g., N > 100), demonstrating its effectiveness in uncovering diverse configurational pathways. The relatively large sample size in this study enhances the robustness, stability, and generalizability of the findings (Huarng &

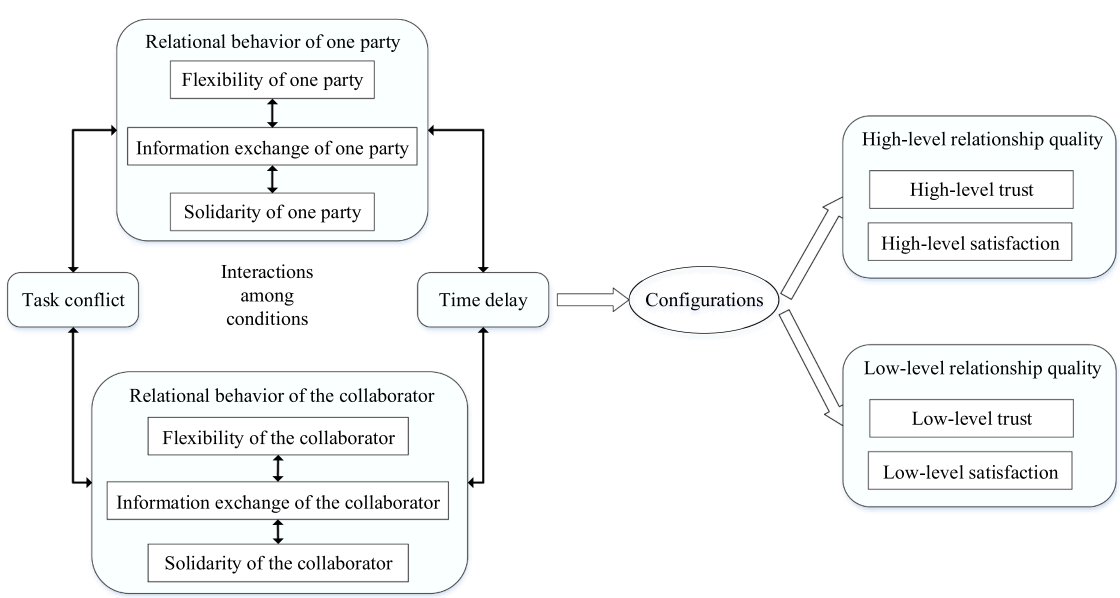

Fig. 1. Theoretical framework.

Yu, 2024).

3.2. Sampling and data collection

Questionnaires are used to obtain first-hand data, a common way to obtain specific behaviors in project management. The sampling strategy intentionally targets diverse project roles (owners, contractors, subcontractors) to capture variations in reciprocal relational behaviors and task conflict perceptions. The whole process of questionnaire distribution lasted 3 months. The snowball sampling method was employed for this study. Questionnaires were distributed on-site and online. The authors distributed the paper version of the questionnaire to project management practitioners from different construction companies who were trained in Chinese universities and encouraged them to share the electronic version of the questionnaire with professional participants in other projects. All the empirical data come from Chinese professionals engaged in the construction industry, who are the key "informants" and fully understand the inter-organizational transaction (Schweitzer, 2016). Finally, 238 paper-based questionnaires were distributed on-site, and 266 electronic questionnaires were distributed online. A total of 179 paper-based questionnaires and 183 electronic questionnaires were received, with a total response rate of 71.8 %. The authors screened the questionnaires, deleting those with incomplete responses (predominantly from paper-based versions, as electronic versions prevented submission of incomplete responses), or completed in a very short time (within two minutes), or with identical scores across most variables, or containing logical contradictions (Guo et al., 2024). Finally, 212 questionnaires were valid, with an effective response rate of 42.1 %.

SPSS 20 was used for descriptive statistics, as shown in Table 1. To mitigate the potential bias of snowball sampling, the study employed initial seeds from diverse company sizes, project types, and roles. Both paper-based and online versions were distributed independently to avoid clustering within social or organizational networks. The descriptive statistics of the sample indicate that 80.19 % of the respondents have at least 3 years of work experience in construction, and most respondents hold professional qualifications, which ensures that they have a deep understanding of the project performance process and enhances response quality and diversity. Our sample has a diverse distribution of enterprises and project types. This study employed one-way ANOVA to examine whether the perception of relational behaviors of both parties varies significantly by role in the project or project type. As Table 2 shows, the results demonstrate no statistically significant differences across groups in any dimension of relational behaviors (p≥0.05), thus justifying the pooling of data for subsequent integrated analysis.

Table 1
Descriptive statistics of the sample.

Characteristics		Number	Percent
Contractual relationship	Contract (owner-contractor relationship)	116	54.72
	Subcontract (contractor-subcontractor relationship)	96	45.28
Role in the project	Owner	51	24.06
	Contractor	101	47.64
	Subcontractor	60	28.30
Project type	Building Construction	48	22.64
	Road and bridge	35	16.51
	Port and waterway	1	0.47
	Energy	45	21.23
	Municipal engineering	20	9.43
	Telecommunication	3	1.42
	Industry (e.g., petrochemical industry)	34	16.04
	Others	26	12.26
Professional qualification	Project manager	37	17.45
	Department manager	28	13.21
	Professional engineer (e.g., Contract, Technical, and Cost engineer)	114	53.77
	Other managerial staff	33	15.57
Working experience	< 3 years	42	19.81
	3-10 years	113	53.30
	11-20 years	42	19.81
	> 20 years	15	7.08

Table 2
ANOVA of role in the project and project type.

Test variables	Role in the project		Project type	
	F	Significance	F	Significance
Flexibility of one party	1.245	0.290	1.012	0.424
Information exchange of one party	0.537	0.585	0.604	0.753
Solidarity of one party	2.462	0.088	0.382	0.912
Flexibility of the collaborator	0.215	0.807	2.059	0.050
Information exchange of the collaborator	0.156	0.856	1.567	0.147
Solidarity of the collaborator	0.271	0.763	1.596	0.138

3.3. Measurement

The measurement scales used in the questionnaires are all based on existing literature and slightly modified according to the characteristics of inter-organizational construction projects. Since the respondents were Chinese, the authors followed a rigorous four-step translation process (forward translation, evaluation, backward translation, and re-evaluation) to adapt the measurement items into Chinese (Sharifirad, 2011). Subsequently, in-depth interviews were conducted with five construction industry experts to assess the completeness and relevance of the questionnaire items. Both the structure and wording were refined based on the experts' recommendations. Furthermore, a pilot study was implemented before the formal survey distribution - the preliminary questionnaire was administered to 15 construction project managers, and the final wording was adjusted according to their feedback. For instance, "Exchange of information in this relationship takes place frequently and informally, and not only according to a prespecified agreement" was modified to "Our party provides information, including what is required by the contract and additional information."

The respondents were asked to respond to the questionnaire based on a recently completed project and transaction experience with the collaborator. The measurement items of constructs are shown in Table 3. The scale of Heide and John (1992) is drawn to measure relational behavior, which divides relational behavior into flexibility, information exchange, and solidarity. Task conflict intensity was adopted to measure inter-organizational task conflict, drawing on the scale of Aibinu et al. (2008). The measurement of inter-organizational relationship quality is based on the scale of Ulaga and Eggert (2006a), which divides inter-organizational relationship quality into satisfaction and trust. Since the collection of paired data is extremely difficult and not feasible for the time being, respondents needed to answer both their relational behavior and the perceived relational behavior of the collaborator. Thus, for the sake of conciseness, the term "relational behavior of the collaborator" or similar expressions used hereinafter in this paper refers to the perceived relational behavior of the counterpart. Time delay is measured by two options: the project was delayed, or the project was completed on time or early. This binary coding reflects a practical threshold in project performance assessment, as any delay beyond the planned completion is typically treated as a coordination failure in project management. While more granular continuous measures could offer additional insights, fsQCA accommodates binary variables when they are theoretically or practically meaningful, which has been adopted in project management research (Lu & Guo, 2019).

4. Analysis and results

4.1. Reliability and validity analysis

The results showed that the largest single factor accounted for

Table 3
Reliability and validity test results.

Constructs and measurement items		SFL
Flexibility of one party (Cronbach's α=0.873, CR=0.876, AVE=0.703)	When unexpected situations arise, our party handles them flexibly.	0.839
	When unexpected situations arise, our party adjusts quickly and effectively.	0.881
	When unexpected situations arise, our party invites the collaborator to work out a new plan.	0.793
Information exchange of one party (Cronbach's α=0.849, CR=0.846, AVE=0. 579)	Our party provides the collaborator with information that may be helpful to the collaborator.	0.817
	Our party provides information, including what is required by the contract and additional information.	0.718
	Our party provides proprietary information if it can help the collaborator.	0.724
	Our party keeps the collaborator informed about events and changes that may affect them in time.	0.780
Solidarity of one party (Cronbach's α=0.748, CR=0.796, AVE=0. 575)	Our party seeks to solve the problems that arise jointly with the collaborator.	0.894
	Our party is committed to enhancing its relationship with its collaborator.	0.796
	Our party does not mind that the collaborator owes us favors.	0.540
Flexibility of the collaborator (Cronbach's α=0.840, CR=0.846, AVE=0.647)	When unexpected situations arise, the collaborator handles them flexibly.	0.819
	When unexpected situations arise, the collaborator adjusts quickly and effectively.	0.857
	When unexpected situations arise, the collaborator invites our party to work out a new plan.	0.733
Information exchange of the collaborator (Cronbach's α=0.875, CR=0.878, AVE=0.644)	The collaborator provides our party with information that may be helpful to our party.	0.795
	The collaborator provides information, including what is required by the contract and additional information.	0.812
	The collaborator provides proprietary information if it can help our party.	0.837
	The collaborator keeps our party informed about events and changes that may affect us in time.	0.764
Solidarity of the collaborator (Cronbach's α=0.762, CR=0.787, AVE=0.556)	The collaborator seeks to solve the problems that arise jointly with our party.	0.819
	The collaborator is committed to enhancing the relationship with our party.	0.809
	The collaborator does not mind that our party owes them favors.	0.586
Task conflict (Cronbach's α=0.831, CR=0.828, AVE=0.552)	Both parties often have differences concerning the division of tasks.	0.763
	Both parties often have differences concerning design or construction plans.	0.832
	These differences between the two parties are serious.	0.892
	These differences have affected the working relationship.	0.823
Trust (Cronbach's α=0.882, CR=0.883, AVE=0.655)	The collaborator keeps promises and is trustworthy.	0.823
	The collaborator is genuinely concerned that our party succeeds.	0.871
	The collaborator considers our welfare as well as their own when making important decisions.	0.803
	Our party trusts that the collaborator keeps our best interests in mind.	0.733
Satisfaction (Cronbach's α=0.887, CR=0.890, AVE=0.670)	Our party does not regret our decision to cooperate with the collaborator.	0.747
	Our party is very satisfied with the cooperation process with the collaborator.	0.881
	Our party is very satisfied with what the collaborator has done for us.	0.808
	Our party enjoys our working relationship with the collaborator.	0.831

36.880 % of the total variance, which is below the 50 % threshold commonly used for Harman's one-factor test, indicating that common method variance is not a serious concern in this study (Podsakoff et al., 2003; Podsakoff et al., 2012). As the results show in Table 3, Cronbach's α value of all constructs is above 0.7, indicating that the scale has satisfactory reliability (Nunnally & Bernstein, 1994). Standard factor loading (SFL) of all items is above 0.5, construct reliability (CR) values of all constructs are above 0.7, and average variance extracted (AVE) values exceed 0.5. Together, the three indicators show that the measurement items have acceptable convergent validity. As shown in Table 4, the squared correlation coefficients between each construct and all other constructs are consistently smaller than the square root of each construct's AVE, confirming adequate discriminant validity.

4.2. Calibration

To transform conditions and outcomes into fuzzy set values, it is essential to calibrate the raw data into set membership scores that range from zero to one (Misangyi et al., 2017). For the time delay variable, "one" indicates that "the project was delayed," while "zero" signifies that "the project was completed on time or early." To calibrate continuous conditions and outcomes into fuzzy-set scores between 0 and 1, we establish three qualitative thresholds: full membership, full non-membership, and the crossover point (Ragin, 2008). The three threshold values are determined through descriptive statistics and reference to the sample distribution (Misangyi et al., 2017): the sample mean of each antecedent condition or outcome variable signifies the intersection point; one standard deviation above and below the mean represent complete membership and complete non-membership, respectively. The configurational analysis was conducted using fsQCA 3.0 software. For all continuous antecedent and outcome variables, we applied a direct calibration procedure based on their empirical distributions, following Ragin (2009) and Misangyi et al. (2017). Specifically, the crossover point was set at the sample mean, while thresholds for full membership and full non-membership were set at one standard deviation above and below the mean, respectively. The fsQCA software application is employed to convert case values into fuzzy set memberships between zero (nonmembership) and one (full membership) (Misangyi & Acharya, 2014). The three thresholds for the calibration of each condition or outcome are presented in Table 5.

4.3. Analysis of necessary conditions

Before conducting configuration analysis via the fuzzy-set truth table, a critical step involves identifying necessary conditions, i.e., individual antecedents that must be present (or absent) for the outcome to occur (Alofan et al., 2020). In this study, necessity testing was performed for all antecedent variables (e.g., task conflict, relational behaviors, time

Table 4
Means, standard deviations, and correlations.

Construct	Mean	Standard deviation	OFL	OIN	OSO	PFL	PIN	PSO	TC	SAT	TRU	DEL
OFL	5.914	1.046	**0.838**									
OIN	5.644	1.121	0.700**	**0.761**								
OSO	5.906	1.086	0.666**	0.726**	**0.758**							
PFL	5.250	1.219	0.549**	0.495**	0.432**	**0.805**						
PIN	5.048	1.265	0.505**	0.689**	0.508**	0.740**	**0.802**					
PSO	5.184	1.225	0.501**	0.513**	0.597**	0.714**	0.755**	**0.746**				
TC	13.667	9.941	-0.229**	-0.135	-0.120	-0.342**	-0.260**	-0.226**	**0.743**			
SAT	4.928	1.368	0.389**	0.402**	0.347**	0.510**	0.509**	0.491**	-0.335**	**0.818**		
TRU	4.382	1.504	0.335**	0.363**	0.290**	0.542**	0.553**	0.573**	-0.259**	0.688**	**0.809**	
DEL	0.462	0.500	0.025	-0.030	0.002	-0.160*	-0.144*	-0.091	0.224**	-0.086	-0.135*	N/A

Note: 1) OFL= flexibility of one party; OIN=information exchange of one party; OSO=solidarity of one party; PFL=flexibility of the collaborator; PIN= information exchange of the collaborator; PSO=solidarity of the collaborator; TC=task conflict; SAT=satisfaction; TRU=trust; DEL=time delay. 2)
* $p<0.05$ (two-tailed);
** $p<0.01$ (two-tailed). 3) Bold numbers in the diagonal row are square roots of AVE. 4) N/A = not applicable.

Table 5
Calibration.

Condition/outcome	Full membership	The crossover point	Full nonmembership
1. Flexibility of one party	6.960	5.886	4.840
2. Information exchange of one party	6.765	5.622	4.501
3. Solidarity of one party	6.992	5.878	4.792
4. Flexibility of the collaborator	6.468	5.222	4.004
5. Information exchange of the collaborator	6.313	5.025	3.760
6. Solidarity of the collaborator	6.409	5.160	3.935
7. Task conflict	23.607	13.626	3.685
8. Satisfaction	6.296	4.904	3.536
9. Trust	5.886	4.355	2.851

delay). As shown in Table 6, none of the consistency scores for these conditions exceeded the threshold of 0.90, which is the benchmark for establishing necessity in fsQCA method. This indicates that neither the presence nor absence of any single antecedent is independently sufficient to determine high or low inter-organizational relationship quality in this study. Coverage measures the explanatory scope of a condition in relation to the outcome variable—that is, the extent to which the condition accounts for the observed outcome. In this study, there are no significant conditions of high consistency but low coverage.

4.4. Analysis of sufficient conditions

Truth tables in fsQCA are constructed to illustrate all logically possible and empirically relevant configurations of fuzzy sets (Ragin, 2008). First, based on the sample size in this study, the frequency threshold for each configuration was set to 2 cases (Rihoux & Ragin, 2009). Second, in line with previous studies, the raw consistency threshold was established at 0.80 (Misangyi & Acharya, 2014). Third, following the first two steps, any configuration with a proportional reduction in inconsistency (PRI) of less than 0.70 was eliminated (Misangyi & Acharya, 2014). In Tables 4 and 5, the consistency cutoff, PRI consistency, and case frequency for each configuration are indicated in the footnotes. Finally, the overall solution consistency exceeds 0.80.

The intermediate solutions generated by the fsQCA software application through its standardized analysis outperform both the complex and the parsimonious solutions (Guo et al., 2022). This study provides intermediate solutions to explore configurations of relationship quality. In each configuration in the table, "●"means high level of a condition, "⊗" means low level of a condition, and a blank space indicates that the presence or absence of a condition is irrelevant. Larger circles represent core conditions, while smaller circles represent contributing conditions (Dwivedi et al., 2018). The results are grouped according to different core conditions in the configuration. As shown in Table 7 and Table 8, each high or low relationship quality has multiple configurations, and the consistency of the overall solution and the consistency of each path is greater than 0.80.

Table 6
Analysis of necessary conditions.

Condition	High satisfaction		Low satisfaction		High trust		Low trust	
	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
OFL	0.773	0.725	0.492	0.428	0.743	0.688	0.536	0.472
~OFL	0.390	0.453	0.683	0.736	0.430	0.494	0.645	0.704
OIN	0.754	0.731	0.501	0.450	0.733	0.702	0.526	0.479
~OIN	0.433	0.483	0.700	0.725	0.456	0.503	0.673	0.706
OSO	0.750	0.695	0.534	0.459	0.721	0.661	0.572	0.498
~OSO	0.417	0.491	0.646	0.705	0.452	0.527	0.611	0.675
CFL	0.755	0.749	0.468	0.431	0.751	0.737	0.479	0.446
~CFL	0.427	0.464	0.728	0.733	0.436	0.468	0.718	0.732
CIN	0.762	0.770	0.464	0.435	0.763	0.762	0.460	0.437
~CIN	0.441	0.470	0.754	0.746	0.436	0.460	0.749	0.750
CSO	0.742	0.745	0.481	0.447	0.766	0.760	0.455	0.429
~CSO	0.450	0.483	0.726	0.723	0.424	0.450	0.746	0.752
TC	0.458	0.509	0.660	0.680	0.485	0.533	0.634	0.662
~TC	0.712	0.693	0.523	0.472	0.692	0.665	0.552	0.504
DEL	0.424	0.476	0.503	0.524	0.412	0.458	0.515	0.542
~DEL	0.576	0.556	0.497	0.444	0.588	0.560	0.485	0.440

Note: 1) ~ denotes the negation of the conditions. 2) OFL= Flexibility of one party, OIN= Information exchange of one party, OSO= Solidarity of one party, CFL= Flexibility of the collaborator, CIN= Information exchange of the collaborator, CSO= Solidarity of the collaborator, TC= Task conflict, DEL=Time delay.

Table 7
Configurations for high satisfaction and low satisfaction.

	High satisfaction						Low satisfaction					
	1a	1b	1c	1d	2a	2b	3a	3b	4a	4b	5	6
Flexibility of one party	●	●	●	●	•	•	⨂	⨂	●	●		⨂
Information exchange of one party	•	⊗	•	•	⊗	•	⊗	⊗		⊗		⊗
Solidarity of one party	•		⊗	⊗		•	⊗			•	•	•
Flexibility of the collaborator	●	●	●	●	●	●	⨂	⨂	⨂	⨂	⊗	⨂
Information exchange of the collaborator	●	●	●	●	⊗		⊗	⊗	⨂	⨂	⊗	⨂
Solidarity of the collaborator	•	•	⊗	⊗	●	●	⨂	⨂	⊗		⊗	
Task conflict		⊗	⊗	•	⊗	⊗		•	●	●	•	●
Time delay		⊗	⊗	•	●	●			●	●	•	●
Consistency	0.875	0.908	0.925	0.904	0.916	0.887	0.891	0.945	0.906	0.938	0.910	0.878
Raw coverage	0.454	0.104	0.086	0.050	0.071	0.135	0.395	0.341	0.121	0.083	0.141	0.148
Unique coverage	0.232	0.015	0.016	0.014	0.019	0.002	0.046	0.013	0.015	0.015	0.013	0.015
Overall solution consistency			0.875						0.878			
Overall solution coverage			0.538						0.519			

Note: 1) core conditions are denoted by "●" (high level) and "⨂" (low level); contributing conditions are denoted by "•" (high level) and "⊗" (low level). 2) Configurations 1a, 1b, 1c and 1d (or 2a and 2b; 3a and 3b; 4a and 4b) are "neutral permutations" in that they share the same core conditions and differ only in their contributing conditions. 3) consistency cutoff = 080; PRI consistency = 0.70; Case frequency = 2 cases/configuration.

Table 8
Configurations for high trust and low trust.

	High trust		Low trust								
	1a	1b	2a	2b	2c	3	4	5a	5b	5c	6
Flexibility of one party	●	●	⨂	⨂	⨂		⊗	•	•	•	•
Information exchange of one party	•		⊗		⊗	⊗	⊗		•	•	
Solidarity of one party	●	●		•	•		⊗	●	●	●	⨂
Flexibility of the collaborator	●	●	⊗	⊗	⊗	⊗		⊗		⊗	⨂
Information exchange of the collaborator	●	●	⨂	⨂	⨂	⊗	⨂	⨂	⨂	⨂	⊗
Solidarity of the collaborator	•	•	⊗	⊗		⊗	⨂	⨂	⨂	⨂	⊗
Task conflict		⊗	●	●	●	•	⨂	⨂	⨂	⨂	●
Time delay		⊗		•	•	•	⨂	⊗	⊗		•
Consistency	0.893	0.905	0.928	0.962	0.956	0.939	0.849	0.898	0.881	0.902	0.910
Raw coverage	0.469	0.257	0.331	0.108	0.096	0.194	0.141	0.102	0.102	0.147	0.084
Unique coverage	0.221	0.008	0.062	0.017	0.008	0.013	0.035	0.008	0.010	0.018	0.008
Overall solution consistency	0.891						0.879				
Overall solution coverage	0.477						0.507				

Note: 1) core conditions are denoted by "●" (high level) and "⨂" (low level); contributing conditions are denoted by "•" (high level) and "⊗" (low level). 2) Configurations 1a and 1b (or 2a, 2b, and 2c; and 5a, 5b, and 5c) are "neutral permutations" in that they share the same core conditions and differ only in their contributing conditions. 3) consistency cutoff = 080; PRI consistency = 0.70; Case frequency = 2 cases/configuration.

(1) Dual Pathways to Satisfaction Outcomes

As shown in Table 7, 6 configurations lead to high satisfaction, the consistency of the overall solution is between 0.875 and 0.925, and the consistency of the overall solution is 0.875, indicating that the solution formula is very close to the actual subset in the empirical data. Moreover, the overall solution coverage is 0.538, indicating that these 6 configurations explain 53.8 % of the high satisfaction.

Configurations 1a, 1b, 1c, and 1d are "neutral permutations", indicating that they share the same core conditions (flexibility of both parties is high, and information exchange of the collaborator is also high), but contributing conditions are distinct. Configuration 1a shows an ideal state where the three dimensions of relational behavior by the two parties are well-executed. Configuration 1b indicates that the combination of low information exchange of one party, high solidarity of the collaborator, low inter-organizational task conflict and no time delay can also foster high satisfaction. Configurations 1c and 1d show the symmetry of relational behavior by both parties, which is that the flexibility and information exchange of both parties is high. However, the solidarity of both parties is low. The difference lies in low task conflict and no time delay in configuration 1c, but high task conflict and time delay in configuration 1d. Configuration 2a and 2b have the same core conditions, namely high flexibility and solidarity of the collaborator and time delay, while low task conflict is a contributing condition. Configuration 2a also shows a certain symmetry; the flexibility of one party is high, but the information exchange of both parties is low. Configuration 2b shows that despite time delay, the relational behaviors of both parties are doing well. In addition, the differences in the unique coverage of these 6 configurations indicate that configuration 1a is the dominant path to high satisfaction, in which both parties need to engage in behaviors conducive to the relationship between them actively.

Table 7 shows 6 paths that result in low satisfaction. Configuration 3a is the dominant path leading to low satisfaction, in which both parties do poorly in the three dimensions of relational behavior. Distinct from Configuration 3a, in Configuration 3b, the solidarity of one party is an insignificant condition, and task conflict is high. Configurations 4a and 4b show that unilateral efforts could not redeem the result of low satisfaction in the case of high task conflict and time delay. In configuration 4a, the flexibility of one party is high, but the relational behavior of the collaborator is poor. In configuration 4b, the flexibility and solidarity of one party are high, but the flexibility of the collaborator is low, and the information exchange of both parties is low. Configuration 5 shows that despite the high solidarity of one party, the collaborator does not make efforts to maintain the relationship, and unfavorable conditions with high task conflict and time delay accompany this. Configuration 6 presents a similar situation where, although the solidarity of our party is high, both parties are in a disadvantageous situation of high task conflict and time delay, with insufficient flexibility and little information exchange between the two parties.

As shown in Fig. 2, to visually illustrate how combinations of behavioral and situational factors jointly influence relationship quality, we selected three representative configurations from Table 7 for diagramming: configurations 1a, 3a, and 5. These configurations were chosen because they combine relatively high raw coverage values with distinct core condition patterns and strong theoretical representativeness, thereby providing a clear contrast between pathways leading to high and low satisfaction. This selection provides an intuitive visual reference while maintaining consistency with the configurational results. All logically consistent configurations, including those leading to high and low outcomes, were retained and reported to ensure transparency and interpretability of configurational results, in line with recommended practices for fsQCA research.

(2) Trust Asymmetries in Partner Interactions

As shown in Table 8, the number of paths for high trust and low trust contrasts sharply. There are only two paths for invoking high trust. Since the unique coverage of configuration 1a is much higher than that of configuration 1b, configuration 1a is the dominant path to drive high trust, in which the relational behavior of both parties is at a high level. Similar to configuration 1a of driving high satisfaction, three dimensions of both parties' relational behavior are high. Configuration 1b reflects that in the case of low task conflict and no time delay, flexibility and solidarity of one party are well done, and three dimensions of the collaborator's relational behavior are also well done, which also drives high trust.

As shown in Table 8, nine configurations lead to low trust. The common feature is that one or more dimensions of one party's relational behavior are high while three dimensions of the collaborator's relational behavior are low (e.g., configuration 5a, 5b, and 5c). It can be divided into two categories based on task conflict and time delay. One is that the level of task conflict is high and/or the project is delayed: Configurations 2a, 2b, 2c, 3, and 6 can be classified into this category, and the level of relational behavior of the two parties is not equal. Configuration 2a reflects that three dimensions of the collaborator's relational behavior are very poor; in addition, the solidarity of one party is not important, and the flexibility and information exchange of this party are also very poor. The difference between configurations 2b and 2a is that the solidarity of one party is high, and the information exchange of one party is an irrelevant condition. Unlike configuration 2a, the solidarity of one party is high, and the solidarity of the collaborator is an irrelevant condition in configuration 2c, and the flexibility and solidarity of one party is an irrelevant condition in configuration 3. The flexibility of one party is high, the solidarity of one party is low, and the information exchange of one party is irrelevant to the effect of low trust in configuration 6. The second category is that the level of task conflict is low, and/or the project is not delayed. Another common characteristic of this category is that the party performs some behaviors that are in line with the common expectations of both parties. However, the relational behavior of the collaborator is generally poor, which leads to distrust in the collaborator. Configuration 5a shows that the party achieves high flexibility and solidarity, while the collaborator has poor relational behaviors in three dimensions. Unlike configuration 5a, the information exchange of one party is high, and the flexibility of the collaborator is an insignificant condition in configuration 5b. Unlike configuration 5a, the information exchange of one party is at a high level in configuration 5c. Configuration 4 reflects a combination of conditions in which both parties have generally low relational behavior, but the flexibility of the collaborator is irrelevant.

To enhance transparency and reduce potential bias in reporting, this study presents all empirically relevant, logically consistent configurations for both positive and negative outcomes, following established reporting guidelines (Misangyi et al., 2017; Pesämaa et al., 2021).

5. Discussion and implications

5.1. Synthesis of results

Our analysis reveals a critical asymmetry in collaborative success. While achieving high satisfaction and trust demands mutually aligned

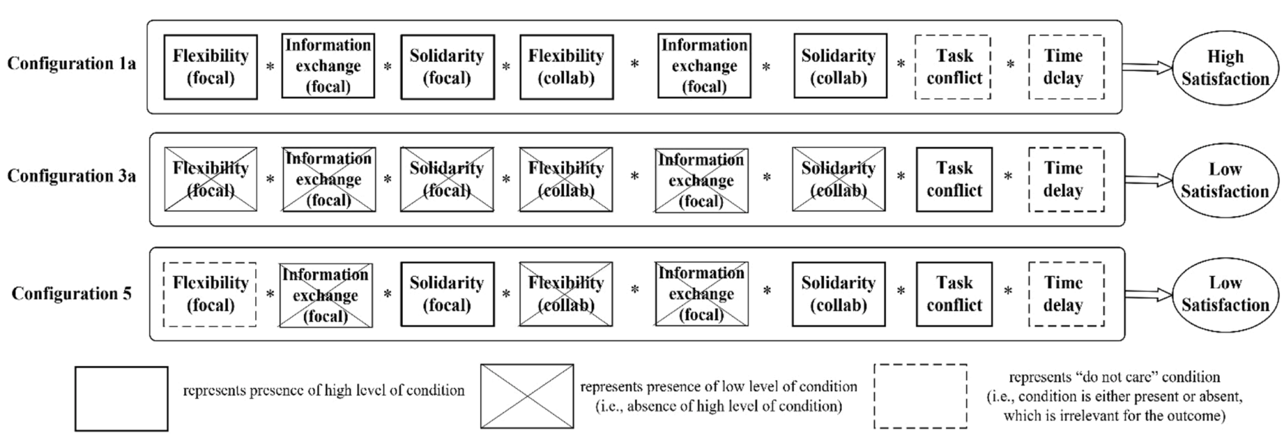

Fig. 2. Representative configurational paths for inter-organizational relationship quality.
Note:"focal"=focal organization (one party); "collab"=collaborating partne.

relational behaviors across flexibility, solidarity, and information exchange, these reciprocal conditions prove necessary yet insufficient.

Configurations that drive high satisfaction and high trust are structurally different but conceptually similar. A common feature is that all three dimensions of relational behavior—flexibility, solidarity, and information exchange—must be high on both sides to promote high satisfaction and trust. This aligns with prior literature emphasizing the positive impact of behavioral alignment on relationship quality (Zheng et al., 2008). In distinguishing the dimensions of relationship quality, the number of paths or configurations that invoke high trust is significantly smaller than the number that invoke high satisfaction. This result reflects that the way to drive one party's high trust in the collaborator is relatively simple and fixed: either the two parties' three dimensions of relational behavior should be achieved, or there is not much disagreement between the two parties under the favorable environment (no time delay), most of the relational behavior of the party meets the norms, and relational behavior of the collaborator meets the common expectations. The paths that drive high satisfaction are more diverse and also reflect patterns of "behavioral equivalence" and "transaction calculation". Either "behavioral equivalence," that is, the two parties are at the same level of each dimension of relational behavior, or "transaction calculation", namely, the collaborator does better than the party and can achieve high satisfaction. Social exchange theory can be used to explain the "social man" characteristics reflected by "behavioral equivalence". In the process of transactions, people analyze the cost of taking behavior and the benefits obtained to determine the social welfare value given to the collaborator and the social benefit value obtained. Meanwhile, "transaction calculation" reflects the characteristics of an "economic man".

For the driving mechanism of high satisfaction, the high flexibility of both parties occupies a key position in each configuration. In addition, a "favorable" scenario, characterized by low task conflict and no time delay, or an "unfavorable" scenario, marked by high task conflict and time delay, fully demonstrates "behavioral equivalence": both parties exhibit high flexibility and information exchange. In contrast, the solidarity of both parties is low.

The obvious difference between the configuration of low satisfaction and low trust is that the number of paths for low trust is much more, demonstrating the diversity of ways to break trust. However, the common patterns are "behavioral asymmetry" and "transaction calculation". Namely, if one party perceives through comparison that the level of the collaborator's relational behavior is lower than their own, it leads to low satisfaction and low trust. In particular, it is more likely to lead to low relationship quality when the collaborator does not reciprocate one party's particular relational behavior. For instance, even in a "favorable" situation where task conflict is low and the project is not delayed, if the high flexibility and solidarity of one party do not resonate with the collaborator, the behavior that is responded to is low flexibility and low solidarity; one party's trust in the collaborator is extremely low (configuration 5a of low trust). Furthermore, another interesting finding is that task conflict and time delay are also important antecedents of relationship quality. The general rule is that if both are in a bad state, it is likely to lead to low relationship quality, especially when accompanied by "behavioral equivalence" (configurations 4a, 4b, 5, and 6 of low satisfaction; configurations 2b, 2c, 3, and 6 of low trust).

This study finds that antecedents affecting high or low relationship quality could not be attributed to a single factor. For example, both configuration 1b and configuration 1d can yield high satisfaction, though they differ in how task conflict functions. In configuration 1b, low task conflict co-occurs with the collaborator's comparatively stronger relational behaviors. Conversely, configuration 1d features high task conflict alongside behavioral symmetry between parties, demonstrating that behavioral congruence can enhance satisfaction even in the presence of significant disagreements. This illustrates how task conflict operates differently depending on the surrounding conditions—an insight made possible through configurational analysis. Furthermore, in the two configurations of high trust, the level of information exchange of one party is not stable; one is high, and the other is high or low. In the multiple paths of low trust, the level of information exchange of one party presents three irregular states. Thus, high or low information exchange does not correspond linearly to leading to high or low trust, but rather to the level of trust that information exchange and multiple other factors jointly affect. This study explains that the reason for the contradictory conclusions of the previous studies (Lu & Guo, 2019; Wu, Zhao, et al., 2017) lies in the interaction of the two parties' relational behaviors and situational factors (task conflict and time delay).

Thus, the fundamental logic affecting relationship quality is orchestrated reciprocity, not rigid equilibrium. In inter-organizational projects, high relationship quality is built through proactively designed and contextually adjusted behaviors by both parties, rather than reliance on a static equilibrium. The "behavioral equivalence" identified in this study differs from mechanistic symmetry. High relationship quality requires situational alignment and coordination of behaviors rather than fixed behavioral patterns. Moreover, the effect of any single antecedent depends on its configuration with other factors—a perspective overlooked by rigid equilibrium. For instance, configurations 1c and 1d for high satisfaction exhibit behavioral equivalence, but their effectiveness also hinges on situational factors (task conflict and time delay). Furthermore, the unilateral behavioral advantages that equilibrium fails to explain are also addressed through the lens of "transaction calculation" under orchestrated reciprocity. The pathways to high satisfaction require either behavioral symmetry between both parties across dimensions such as flexibility, information exchange, and solidarity (as in configuration 1a), or one party's relational behaviors being more aligned with shared expectations (as in configuration 2b). This reflects that such reciprocity is not coincidental but rather achieved through deliberate coordination by both parties.

5.2. Theoretical contributions

This study contributes to the broader domain of project behavior and conflict management by offering an integrative and configurational perspective on how behavioral reciprocity and situational stressors jointly shape relationship outcomes. Existing studies have mainly explained relationship quality from a unilateral or equilibrium perspective, emphasizing how one party's relational behavior (e.g., trust building or communication) directly enhances satisfaction or performance (Klitgaard & Gottlieb, 2024; Liu et al., 2021; Lumineau et al., 2015). However, these approaches often overlook the reciprocal and adaptive nature of behavioral coordination when conflicts or delays arise. This study addresses this gap by emphasizing the relational behaviors of both sides simultaneously and examining how these behaviors co-evolve with situational factors such as task conflict and time delay.

Compared to earlier literature that highlights either behavioral alignment (Zheng et al., 2017) or conflict impacts (Leung et al., 2014; Wu, Zhao, et al., 2017), the current research demonstrates that relationship quality emerges from specific combinations of bilateral behaviors and contextual conditions, rather than isolated factors. Instead of treating relational behavior as a static determinant, this study conceptualizes it as orchestrated reciprocity, reflecting an alignment of expectations and behaviors between actors. This approach enriches social exchange theory by illustrating that reciprocal behavior is not merely about equilibrium, but also about adaptive coordination under contextual pressures.

Moreover, unlike conventional conflict-management research that portrays task conflict primarily as destructive (Jehn & Mannix, 2001; Jia et al., 2021), our results show that high task conflict can coexist with high relationship satisfaction when behavioral symmetry and flexibility are jointly present. This insight contributes to the conflict management field by emphasizing that conflict does not inevitably erode trust; its outcomes depend on reciprocal behavioral orchestration rather than equilibrium alone.

Additionally, the findings deepen the theoretical foundations of project behavior and inter-organizational collaboration research by reframing reciprocity from a static principle of balance into an orchestrated mechanism of coordination. Traditional reciprocity models focus on equality in give-and-take (Cropanzano & Mitchell, 2005; Klitgaard & Gottlieb, 2024), whereas our findings indicate that effective reciprocity in inter-organizational projects involves continuous behavioral calibration in response to situational stressors. This re-conceptualization enriches the understanding of project behavior by explaining how trust and satisfaction emerge through adaptive alignment rather than fixed proportionality.

Overall, the study deepens theoretical understanding in the field of project behavior and conflict management by bridging configurational analysis with behavioral perspectives. It bridges micro-level behavioral mechanisms and macro-level project outcomes, thereby contributing to a more nuanced understanding of how orchestrated reciprocity sustains collaboration under conflict and uncertainty.

5.3. Managerial implications

Inter-organizational relationship quality is pivotal to the success and sustainability of collaborative projects, necessitating deliberate strategies to align relational behaviors across partnering entities. Project managers should first dissect the multidimensional nature of relational behavior, such as trust-building, communication norms, and conflict resolution, to identify targeted interventions that align with project-specific goals. For example, when task conflict is unavoidable, investing in proactive behaviors such as flexibility and information exchange can buffer its negative effects. Therefore, different combinations of relational and situational factors require differentiated strategies for maintaining relationship quality. Crucially, efforts must be synchronized between both parties; unilateral actions risk inefficiency or imbalance. For instance, social environment approaches, including joint workshops and alignment sessions, can harmonize expectations and behaviors (Liu et al., 2024), ensuring reciprocity rather than rigid equilibrium.

Simultaneously, managers must adopt a flexible, context-aware approach. This involves tailoring strategies to situational factors (e.g., project risk levels) and collaborator engagement—such as deploying small collaborative pilots in low-trust environments or establishing shared risk buffers to preempt delays. This insight is especially relevant under conditions of situational stress, such as time delay or conflict. In a large-scale construction project, high mutual flexibility enables the parties to manage disputes stemming from scheduling disruptions. This illustrates the potential buffering effect of behavioral symmetry against the negative consequences of uncertainty and conflict. For example, Wang (2024) found that in Chinese construction projects, high levels of owner–contractor relational trust combined with behavioral alignment significantly mitigated perceived project risk, illustrating how relational symmetry can serve as a practical buffer against uncertainty.

Moreover, by prioritizing proactive calibration of efforts (e.g., monitoring relational symmetry indices) and addressing mismatches early, managers can mitigate pathways to low-quality outcomes while amplifying collaborative resilience. From a managerial perspective, monitoring behavioral alignment between partnering organizations can offer practical benefits. One approach is to develop a relational symmetry index, which quantifies the degree of congruence in flexibility, solidarity, and information exchange. This index can be calculated as the average absolute difference between the parties' ratings on these dimensions, with lower values indicating greater alignment. As our findings suggest, higher behavioral alignment is linked to improved relationship quality. Ultimately, the interplay of situational awareness, dual-party alignment, and adaptive reciprocity forms a robust framework for sustaining high-quality inter-organizational relationship in complex construction projects.

5.4. Limitations and future research

First, this study does not employ a fully dyadic design due to the practical challenges of obtaining matched responses from both parties. The ideal approach for this research is to collect paired data of both parties rather than measuring one party's perceived relational behavior of the collaborator. However, due to limited resources, time, and other conditions, However, consistent with established practices in inter-organizational relationship research that commonly adopt a single-informant design for assessing both self and partner relational behaviors (Podsakoff et al., 2003), this study measures relational behavior, perceived task conflict, and inter-organizational relationship quality based on the respondents' perceptions. While this approach may introduce perceptual bias, it aligns with established practices that rely on single-informant assessments of both self and partner behaviors. Although this design allows consistent perceptual comparison, it inevitably constrains dyadic causal inference; future research should collect paired data from both sides of the dyad to validate and extend the configurational robustness identified here.

Second, the data of this study comes from Chinese practitioners, and different national cultures may affect the differences in perception. Cross-cultural comparative studies might be conducted in future research to support the conclusions. Future studies can draw on Hofstede's cultural dimensions framework to examine how national culture moderates the effects of behavioral symmetry and task conflict. Further research may also explore temporal changes in behavioral configurations through longitudinal fsQCA, extend the analysis to non-construction industries, and incorporate cross-cultural variables to assess the contextual robustness of relational symmetry and to capture changes in relationship quality over time.

Third, time delay was operationalized as a binary variable in this study. This operationalization reflects a practical threshold in project control, as any delay beyond the planned completion is typically regarded as a coordination failure, which makes it theoretically meaningful within the fsQCA framework. Future research can employ continuous measures, such as delay percentage, to capture more granular effects of time delay. Furthermore, researchers could investigate whether the severity of delay interacts with relational configurations, providing deeper insights into performance heterogeneity.

Finally, although the sample includes both contractor–owner and contractor–subcontractor dyads, we did not distinguish between them in the analysis. This decision aligns with the project-level orientation of the research, which emphasizes behavioral and situational mechanisms shared across hierarchical dyads rather than contract-type differences. Future studies may explore potential differences across dyad types using multi-group fsQCA.

6. Conclusions

This study challenges equilibrium-based models of partnership management, demonstrating that collaborative success requires not merely mutual commitment but orchestrated reciprocity. fsQCA results demonstrate that multiple equivalent paths exist toward both high and low relationship quality, with antecedents exhibiting asymmetrical effects contingent on combinatorial levels of other factors. The analysis confirms that relational behaviors between transacting parties are fundamentally intertwined, where unilateral actions produce divergent outcomes depending on collaborator engagement levels, thereby explaining previously unverified phenomena and counterintuitive patterns observed in inter-organizational contexts.

The exploratory study concludes that the paths to foster high relationship quality mode are relatively single and fixed. Correspondingly, the paths leading to low relationship quality are more diverse. The common feature that drives high relationship quality is that all dimensions of relational behavior of both parties are at the same level, or the collaborator is doing better than the party. A common rule that leads to low relationship quality is that both task conflict and project delay are at a disadvantage, especially when the perceived relational behavior of the collaborator is not equal to the relational behavior of one party. This rule exhibits very high robustness, with high consistency (ranging from 0.878 to 0.938 for low satisfaction; ranging from 0.910 to 0.910 for low trust) and meaningful raw coverage (ranging from 0.083 to 0.148 for low satisfaction; ranging from 0.084 to 0.331 for low trust). To sum up, the conclusions of this study are conducive to explaining the differences in inter-organizational relationship quality from the perspective of the whole and complex systems, and the proposed multiple concurrent causalities complement the empirical research conclusions, providing effective paths for improving inter-organizational relationship quality in construction projects.

CRediT authorship contribution statement

Wenqian Guo: Writing – review & editing, Writing – original draft, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Sixuan Yan:** Writing – review & editing, Validation. **Yan Liu:** Writing – review & editing, Supervision, Project administration, Conceptualization. **Hanfei Wang:** Software, Formal analysis, Data curation. **Marian Bosch-Rekveldt:** Writing – review & editing, Supervision. **Yan Ning:** Supervision.

Declaration of 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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