Nexus of Inter-Organizational Trust, Principled Negotiation, and Joint Action for Improved Cost Performance: Survey of Chinese Megaprojects

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Abstract: Drawing on the theory of relational governance, this study determines the nexus of inter-organizational trust, principled negotiation, and joint action in cost performance. To this end, it formulates five hypotheses based on established management theories or principles of organizational studies. The study uses partial least squares structural equation modeling to analyze the 248 valid questionnaires collected from the analyzed organizations involved in megaprojects. The results show that inter-organizational trust has a direct and indirect positive effect on improving cost performance. Principled negotiation and joint action can serve as multiple mediating roles between inter-organizational trust and cost performance. Contractual governance also has different moderation effects on principled negotiation and joint action toward cost performance. In conclusion, this study contributes to the knowledge on inter-

organizational trust and its mediating effects on cost performance from the perspective of megaprojects. The results are generalizable to other projects with complicated organizational and working relationships.

Keywords: inter-organizational trust; principled negotiation; joint action; cost performance; megaprojects

Introduction

Poor cost performance remains a pervasive issue in megaprojects (Shahtaheri et al. 2017). The contracting parties should share project risks equally through their either working or contractual relationships (Chong et al. 2016). Owing to the different types of project delivery systems, effective negotiation is vital in maintaining these relationships during the contract formation stage and contract lifecycle. The mutual benefits of inter-organizational trust would thus create an efficient and harmonious working environment, resulting in improved project performance (Pinto et al. 2009). However, conflicting relationships could drive self-centered behavior and opportunism (Anderson and Polkinghorn 2008).

Generally, addressing cost performance issues revolves around project planning and scheduling (Flyvbjerg et al. 2004; Doloi 2011), contracts and tendering (Lee and Hwang 2007), cost management and prediction (Love et al. 2017), and project team management (Scott-Young and Samson 2008). Previous studies often adopt a deterministic approach in identifying the various causes of cost overrun in megaprojects (Olaniran et al. 2015; Siemiatycki 2018) and give only generic suggestions for mitigating and containing such issues (Olawale and Sun 2010; Kim et al. 2017). Some

studies also investigate the impact of inter-organizational trust on project performance through relationship optimization (Stevens et al. 2015) and risk allocation in the contract (Sumo et al. 2016). Other studies highlight the importance of negotiations in improving inter-organizational trust (Koeszegi 2004) and project performance (Kalkman and Waard 2017). However, the detailed interactions between the multiple determinants of cost performance have yet to be attempted either in project management or megaprojects, particularly through an integrative analysis of inter-organizational trust, using the appropriate negotiation method and the resulting joint action for improved cost performance. Furthermore, the increasing need for megaprojects is obvious due to economic and urban growth (Jaffee 2015), including the academic preoccupation with organizational complexity (Qureshi and Kang 2015).

This study draws on the theory of relational governance, which can prevent other stakeholders' opportunistic behaviors similarly to contractual governance (Williamson 2002). Regarding the complexity of megaprojects, contractors often take the averages of changes and price adjustments to maximize their profits, which would increase project cost (Lumineau and Henderson 2012). In this context, relational governance could enable stakeholders to establish trust as to perform collective actions (Das and Kumar 2010), where negotiation and collaboration are the main two process strategies (Krapfel et al. 1991). This study thus adopts principled negotiation as negotiation approach, owing to its established and structured approach (Carneiro et al. 2013). The study also considers joint action resulting from inter-organizational trust and/or principled negotiation. Further, this study focuses on megaprojects, as these projects

67 are bound to suffer cost overruns or cost performance issues (Flyvbjerg 2014). A
68 simplified approach is used to determine the scale of megaprojects, targeting large
69 projects in China, of approximately RMB 1 billion, to appreciate the complexities of
70 the project and organizational relationships in terms of cost performance issues.
71 Consequently, the study employed the questionnaire survey approach to collect data
72 from the organizations involved in megaprojects. The data were then analyzed using
73 partial least squares structural equation modeling. Section 2 provides the theoretical
74 background of inter-organizational trust, principled negotiation, and joint action.
75 Section 3 discusses the research hypotheses and model. Section 4 describes the research
76 setting, including sampling, data collection procedures, measures, and instruments.
77 Section 5 presents the results and analysis. Section 6 discusses the findings and
78 contributions. Section 7 concludes the research.

79 **Theoretical Background**

80 Literature on megaprojects is limited, especially on inter-organizational trust,
81 principled negotiation, and joint action. Hence, the following review and theoretical
82 foundation mainly refer to established management theories or principles of
83 organizational studies.

84 ***Trust-based relational governance***

85 A non-repetitive transaction between contracting parties can easily establish a
86 relationship based on “opportunism” in construction projects. Project owners tend to
87 impose risks on contractors through contract clauses, while contractors make full use
88 of the “loopholes” in the clauses to make up for their losses (e.g., unbalanced quotations,

changes, price adjustment, claims). This opportunistic behavior affects project performance, owing to poor coordination of relational and contractual governance (Lumineau and Henderson 2012).

Conventional practices in construction mainly rely on contractual governance, which defines roles, responsibilities, processes, rewards, and punishments through explicit provisions to prevent opportunistic inter-subjectivity and achieve predetermined project objectives (Poppo and Zenger 2002; Reuer and Ariño 2007). However, owing to contract rigidity, incomplete information, and project complexity, contracting parties may adopt adverse behaviors to maximize their interests, such as making inappropriate changes that increase project cost (Cheung and Yiu 2006). Such working environments require relational governance to mediate behaviors and relationships (Lu et al. 2015). As a result, the proper use of relational governance could provide benefits similar to those of contract governance in controlling opportunism and facilitating adaption (Heide and John 1992). However, there is no unanimous conclusion on the role of contractual and relational governance on project performance, in terms of complementarity or substitution. They not only prevent behavioral uncertainties, but also enable stakeholders to establish trust and understanding to perform collective action (Das and Kumar 2010). However, the substitution perspective builds around the notion that formal rules can initiate an escalating spiral of formality and distance, thereby undermining the operation of social norms underlying informal dealings (Larson 1992).

Megaprojects are particularly suitable for relational governance, owing to their

111 complexity, uncertainty, ambiguity, and long time-scales, which induces collaborative
112 work among stakeholders and promotes project performance (Gil et al. 2011). The
113 relational governance mechanism shows increased more, participation, and solidarity
114 (Lumineau and Henderson 2012). Particularly, solidarity refers to stakeholders who
115 consider mutual benefits in the project implementation process, engage in bilateral
116 problem solving, and commit to joint and coordinated action toward shared objectives.
117 Implementing relational governance involves mutual adaption and adjustment by all
118 project stakeholders, based on inter-organizational trust (Yu et al. 2006; Shahtaheri et
119 al. 2017). Here, trust is "a disposition or attitude concerning the willingness to rely upon
120 the actions of another party, under circumstances of contractual and social obligations,
121 with the potential for collaboration" (Edkins and Smyth 2006). Inter-organizational
122 trust can thus promote and strengthen information sharing, flexibility, solidarity, and
123 cooperation between organizations (Kim 2000; Poppo and Zenger 2002). Therefore, it
124 is not only the basis of relational governance, but also a function of adopted relational
125 governance to improve project performance (Gil et al. 2011).
126 ***Negotiation and joint action as the process of relational governance***
127 Interest commonality and power balance are two important aspects of implementing
128 relational governance. Interest commonality is the basis for maintaining organizational
129 relations, while the balance of power is key to the relationship between project
130 organizations (Thorelli 1986). Referring to these two dimensions, Krapfel et al. (1991)
131 proposed six strategies for relational governance, based on resolution of conflicts,
132 degree of information sharing, and coordination and decision-making, which, as Fig. 1

133 shows, have been adapted to the construction industry.

134 **Insert Fig. 1 here**

135 In construction projects or megaprojects, formal contracts link various stakeholders
136 and each stakeholder is an independent legal entity. They may perceive and hope for a
137 balance of power in the project through negotiation and collaboration (joint action),
138 which are the mediating roles of rational governance, as per the Krapfel et al.'s (1991)
139 model.

140 Hence, on the one hand, negotiation is an important means of establishing an
141 effective working relationship between stakeholders, which can reduce cognitive and
142 operational differences in project scope, cost, schedule, and quality (Love et al. 2017).
143 Negotiations can then be divided into distributive and integrative bargaining, based on
144 differences in the opposition and unity of interests between negotiators. Distributive
145 bargaining can resolve disputes where parties have opposing interests (Tremblay 2016).
146 Project stakeholders bargain to maximize their interests, which is not conducive to the
147 realization of project objectives and worsens trust and working relationships between
148 parties. On the other hand, integrative bargaining induces a cooperative negotiation
149 approach in which the interests of parties are common or complementary. Principled
150 negotiation is an established and well-known method of integrative bargaining
151 developed by Roger Fisher and William Ury in the 1980s through the Harvard
152 Negotiation Project (Fisher et al. 2011). This method emphasizes win-win solutions,
153 while protecting participants who might take advantage of their bargaining power. It
154 contains four basic points, each of which addresses a basic element of negotiation and

suggests an action: (a) separate the people from the problem; (b) focus on interests, not positions; (c) generate a variety of possibilities before deciding what to do; and (d) insist that the result be based on some objective standard. However, mutual trust is the most basic condition, and its lack will soon return the negotiation to distributive bargaining (Tremblay 2016).

On the other hand, joint action is another strategy for relational governance among project organizations. It is a form of inter-organizational cooperation, which includes a set of conditions to determine the exchanges of members in the decision-making process（Heide and John 1990). Meanwhile, it also serves as the procedural dimension of relational governance (Zaheer and Venkatraman 2010). Joint action among project stakeholders means different stakeholders can share information and jointly formulate the project implementation plan. This enables stakeholders to address various types of uncertainties during the implementation process more effectively. In numerous cases, joint action derives from the outcomes of negotiations during a project's life. Therefore, joint action among project stakeholders improves cost performance.

Hypotheses Development

Relationship between inter-organizational trust and cost performance

The measurement of cost performance does not include control over the cost estimate but includes cost overruns due to uncertainties (Thomas et al. 2002). As such, project cost performance has a close relationship with cooperation between contracting parties, which becomes vulnerable without trust (Cheung et al. 2013). Additionally, inter-organizational trust takes different forms, such as calculus-based, relational-based, and

177 institutional trust (Rousseau et al. 1998). Inter-organizational trust can lower the risks
178 taken by contracting parties, facilitate negotiation, and reduce transaction costs (Diallo
179 and Thuillier 2005). Therefore, inter-organizational trust directly influences the actions
180 and performance of organizations engaged in dyadic and network relationships (Zaheer
181 and Harris 2008), which run through the entire project management process, namely
182 planning, designing, scope changing, resource allocating, organizing, and controlling
183 (Doloi 2011; Cheung et al. 2013). Wong and Cheung (2005) state that competence,
184 problem solving, communication, openness, alignment, information flow, reputation,
185 alternative techniques of dispute resolution, and satisfactory terms are essential trust
186 attributes in projects. Trust-based relationships create advantages in conducting
187 business, such as lowering cost and improving performance (Doloi 2009).
188 Consequently, inter-organizational trust enables cooperative behavior, promotes
189 adaptive organizational forms, reduces damaging conflicts, and transaction costs.
190 Therefore, inter-organizational trust is posited to contribute significantly to cost
191 performance as per the following hypothesis:

192 H1: Inter-organizational trust is positively and directly related to cost performance.

193 ***Mediation effect of principled negotiation***

194 Establishing a relationship of mutual trust is crucial in any negotiation, as it can
195 change the "resistance" mentality of individuals, particularly in the construction
196 industry. Subsequently, it can initiate negotiations, reduce difficulties during the
197 negotiation process, and increase the chances of success. Trust is one of the
198 deterministic factors in reducing negotiation costs and conflict levels (Fiala et al. 2013).

199 High inter-organizational trust translates into similar underlying assumptions in
200 negotiating positions and faster agreements (Zaheer et al. 1998).

201 Moreover, organizations can adopt principled negotiation for all types of
202 disagreements to maintain a harmonious relationship throughout the process and avoid
203 adverse impacts on the project (Cheung et al. 2009). It also decreases monitoring cost
204 and increases the possibility of achieving mutually beneficial agreements (Khalfan et
205 al. 2007). Therefore, inter-organizational trust between project organizations would
206 directly promote negotiation efficiency and project performance (Zuppa 2009).
207 Consequently, the following hypothesis is proposed:

208 H2: Principled negotiation mediates the relationship between inter-organizational
209 trust and cost performance.

210 ***Mediation effect of joint action***

211 Joint action indicates closer relationships, which involve the parties performing
212 cooperative and coordinated focal activities (Heide and John 1990). Joint action is also
213 part of a governance process comprising joint planning and problem solving. Inter-
214 organizational trust is an important antecedent of joint action that will positively
215 influence any activities of joint planning or problem solving (Claro et al. 2003). Inter-
216 organizational trust can thus facilitate the process of cooperation and maintain stable
217 partnerships (Chua et al. 2008). Consequently, inter-organizational trust can promote
218 positive expectations from project stakeholders, help reduce opportunism, and promote
219 joint action for improved cost performance.

220 Furthermore, joint planning reduces the risk of unexpected problems, which in turn

reduce the need for a sophisticated monitoring apparatus, while joint problem solving enables creative resolutions to disagreements and other contingencies. Therefore, joint action can increase feedback and circulation among processes before and after the project, reduce the feedback path during the project life cycle, and reduce costs through comprehensive communication and interaction between project stakeholders. Substantial evidence demonstrates that close cooperation among subjects in a project can improve project cost performance (Claro et al. 2003). Therefore, the following hypothesis is proposed:

H3: Joint action mediates the relationship between inter-organizational trust and cost performance.

Multiple mediation effect of principled negotiation and joint action

Principled negotiation and joint action are important parts of relational governance. The objective of principled negotiation is to work with the opponent to explore potential solutions for fair and equitable settlement and maintain a harmonious relationship between parties (Ren et al. 2011). When implementing principled negotiation, parties share information, communicate clearly, maintain a cooperative attitude, and focus on developing common interests, all of which promote cooperation between organizations (Soliman and Antheaume 2017). Macritchie et al. (2017) proposed that successful joint action requires negotiation, especially in the event of goal incongruence. Overall, principled negotiation is an interest-based cooperative negotiation, which can resolve low consensus or disagreements among stakeholders in the temporary working environment of projects. Therefore, the following hypothesis is proposed:

H4: Principled negotiation and joint action play multiple mediating roles between inter-organizational trust and cost performance.

Moderation effect of contractual governance

The nature of a contract is likely to influence existing relational norms between parties. Contract governance deals with the problem of creating and monitoring rules that ensure a partner performs in accordance with one's desires or expectations (Salbu 2010). Under strict contract control scenarios, both parties would spend most efforts on their respective tasks and carry out rewards and punishments in accordance with the terms of the contract, which hinders them from spending time and resources in joint action (Lumineau and Henderson 2012). Specifically, if the project were under very high levels of environmental uncertainties, formal contracting and relational governance would weaken (Abdi and Aulakh 2014). Therefore, it seems difficult to align joint action with contractual governance, as all contractual obligations and expectations are fixed at the start of the project (Ghoshal and Moran 1996).

However, principled negotiation is more applicable at the time of stipulated events in the contract. Therefore, the provisions of the control clause in the contract often lack a moderating role. Meanwhile, principled negotiation resolves disputes and chooses solutions based on objective criteria to which everyone agrees (Tremblay 2016), which ensures contract control will not have a significant impact on the project. Therefore, the following hypothesis is proposed:

H5a: Contractual governance dose not moderate the positive influence of principled negotiation on cost performance.

H5b: Contractual governance moderates the positive influence of joint action on cost performance.

Method

Sample and procedures

Questionnaire data were obtained from the owners and contractors of large and complex construction projects in the areas surrounding Jiangsu province, China. The questionnaire was administered to 80 organizations, requesting the respondents to answer based on their participation in projects. Mega construction projects of approximately RMB 1 billion were targeted and 350 questionnaires sent to project stakeholders or involved organizations in early April 2016, receiving 296 responses by the end of May 2016. The response rate was 84.6%. The high response rate was due to the support and cooperation of local authorities, who helped in distributing and collecting the questionnaires. After removing all incomplete responses, 248 valid questionnaires from 69 owners, 148 contractors, and 31 others (including external designers and consultants) were obtained, representing 27.8%, 59.7%, and 12.5%, respectively.

Most megaprojects were transport infrastructure ones (67.8%) and others were large and mixed development of industrial and commercial buildings (7.6%), residential buildings (3.6%), and public buildings (15.3%). The duration of most projects was 3–5 years (72.2%) and most had very large contract amounts, such as RMB 5–10 billion (34.7%) and above RMB 10 billion (18.1%). Most respondents (86.7%) are construction professionals (registered designers and engineers) with over five years of

287 work experience. Table 1 shows the details of survey participants and projects.

288 **Insert Table 1 here**

289 ***Measure***

290 This study adopts the questionnaire survey method, and each questionnaire item is
291 rated using a five-point Likert scale (i.e., 1 = strongly disagree to 5 = strongly agree).
292 Before issuing the questionnaires, two specialists with experience of more than 15 years
293 in megaprojects were invited to examine the questionnaire content. They agreed that
294 cost performance includes budget and overruns, as well as litigation or claims-related
295 costs, to ensure the questionnaire is realistic.

296 (1) Inter-organizational trust

297 Inter-organizational trust was divided into calculus- and relational-based trust. The
298 scale developed by Rousseau et al. (1998) to measure inter-organizational trust using
299 seven items was adopted here.

300 (2) Principled negotiation

301 The four philosophies of principled negotiation were considered in designing the
302 questions (Fisher et al. 2011). The questions examine the importance of using principled
303 negotiation to achieve better cost performance from the perspective of inter-
304 organizational trust.

305 (3) Joint action

306 The construct of joint action reflects the degree of interpenetration of organizational
307 boundaries and the extent of cooperation and coordination in exchange activities
308 (Zaheer and Harris 2008). Notably, joint action should include joint problem solving

309 and planning (Wang 2011).

310 (4) Cost performance

311 Four variables were developed to gauge the construction project cost performance by
312 measuring related estimated budgets, overruns, litigation, or claims (Chan and Chan
313 2004).

314 (5) Contractual governance

315 Contractual governance defines roles and responsibilities, the performance of which
316 is necessary, especially for monitoring penalties and noncompliance. More importantly,
317 it also determines outcomes or outputs (Wong and Cheung 2005).

318 Table 2 shows all the variables or questions in the questionnaire.

319 **Insert Table 2 here**

320 ***Data analytical procedures***

321 SmartPLS 3.0 is a common software that utilizes the PLS approach to estimate both
322 theoretical models and hypothesized relationships (Ringle et al. 2015). The PLS
323 approach is considered to be a more effective modeling method with fewer stringent
324 requirements (including multivariate normality, measurement levels of manifest
325 variables, large samples) than co-variance based SEM (Bernroider et al. 2014).
326 Following Hair et al. (2014), a two-stage analytical procedure was used. In the first
327 stage, the measurement model (also known as the outer model in PLS) was assessed to
328 confirm its validity and reliability. In the second stage, the structural model (also known
329 as the inner model in PLS) was tested to confirm direct and indirect interaction
330 relationships in the hypothesized model.

Results

Common method bias

There is a possibility of potential bias with all self-reported data resulting from multiple sources, such as consistency motif and social desirability. Podsakoff et al. (2003) noted there are both procedural and statistical remedies in controlling for the bias. The procedural methods used in this questionnaire were rigorously reviewed by peers, both pre- and pilot testing. These methods improved the study and provided more consistent and unbiased scales. As per the statistic method proposed by Liang et al. (2007), all constructs were reflectively associated with the method factor and variance could be explained by the construct and the method factor (bias). As shown in Table 3, the average substantive explained variance is 0.69 and the average common method-based variance 0.02. This shows substantive variance to method variance is 34.5:1. Additionally, the structural model shows different levels of significance for path coefficients. Most method factor loadings are not significant. Given the small magnitude and insignificance of method variance, the method is unlikely to be a serious concern in this study.

Insert Table 3 here

Measurement model

According to PLS researchers (Hair et al. 2014; Palanski et al. 2011; Ringle et al. 2015), the measurement model test includes two primary parts: (a) convergent validity and (b) discriminant validity. Convergent validity examines whether indicators are sharing a high proportion of variance and convergence within the same concept, while

353 discriminant validity different constructs and indicators to confirm whether they are
354 distinct and unique (Hulland 2015).

355 ***Convergent validity***

356 The test for convergent validity usually assesses individual item reliability, internal
357 consistency reliability, and average variance extracted (AVE). These tests were
358 conducted by performing the PLS algorithm, as implemented in SmartPLS.

359 First, individual item reliability was assessed by examining outer loadings, as the
360 accepted items should have more explanatory power than error variance (Fornell and
361 Larcker 1981). Generally, the accepted cutoff for item loadings is 0.70 or greater
362 (Palanski et al. 2011). As Table 1 shows, all factor loadings are equal to or greater than
363 the recommended cutoff value. Therefore, individual item reliability is significantly
364 robust.

365 Second, unlike individual item reliability reflecting convergent validity at the
366 indicator level, AVEs were used to assess the convergent validity of measurement
367 models at construct level. Huang and Jiang (2012) suggest that the threshold value of
368 AVE should be 0.5. All AVEs for each construct are greater than 0.5, which indicates
369 good convergent validity.

370 Finally, both Cronbach's alpha and composite reliability were used to assess internal
371 construct consistency. Cronbach's alpha should be at least 0.70 (Fornell and Larcker
372 1981), while the accepted range of composite reliability should be between 0.60 and
373 0.95 (Hair et al. 2014). All constructs in the study meet these criteria.

374 By simultaneously analyzing the main items, the results show the measurement

model has adequate convergent validity, such as Trust (AVE = 0.667, CR = 0.936, α = 0.96), Principled negotiation (AVE = 0.669, CR = 0.89, α = 0.837), Joint action (AVE = 0.702, CR = 0.904, α = 0.859), Cost performance (AVE = 0.65, CR = 0.881, α = 0.822), and Formal contract (AVE = 0.679, CR = 0.914, α = 0.882).

Discriminant validity

Following Chin (2010) and Huang and Jiang (2012), the Fornell-Larcker mode of analysis was used to examine discriminant validity. Hence, the square root of the AVE of a construct should be greater than all the correlation levels between that construct and the other constructs in the model (Fornell and Larcker 1981). Table 2 (square roots of AVEs between parentheses along the diagonal axis) shows the square root of the AVE for each construct is greater than its respective correlation value, indicating the constructs in this study exhibit good discriminant validity (Bock et al. 2005). The heterotrait-monotrait (HTMT) ratio of correlations test was also performed, following Henseler et al. (2015). Table 4 shows all values of the HTMT ratio are below 0.9, thus passing the discriminant validity assessment between latent variables.

Insert Table 4 here

Predictive relevance

Stone–Geisser's Q-square test validates the predictive relevance of the research model (Geisser 1974; Stone 1974). The blindfolding procedure was implemented in SmartPLS to generate the Q-square results. There are two types of Q-square: cross-validated redundancy and communality. Generally, cross-validated redundancy can be validated through prediction. Table 5 shows all cross-validated redundancy values are

above 0, indicating the research model has well predictive relevance.

Insert Table 5 here

R square

The *R* square (R^2) value predicts the amount of variance in the outcome variable that can be explained by all predictor variables linked to it. As shown in Table 6, the R^2 values range between 0 and 1, with higher values representing higher levels of predictive accuracy (Ringle et al. 2015). Chin (1998) divided the measured coefficient value in the PLS model into high (0.67), medium (0.33), and low (0.19). If an endogenous latent variable in the structural model is explained only by few (one or two) exogenous latent variables, a medium degree of measurement coefficient is acceptable. Otherwise, if the endogenous latent variable is explained by an increased number of variables (at least three), coefficients are only acceptable at a higher level. Table 5 shows that all R^2 values are above 0.33, which indicates the prediction variable is effective.

Insert Table 6 here

Structural model

The PLS algorithm and bootstrapping are used to evaluate the structural model. Standardized path coefficient β is obtained from the PLS algorithm, while the statistical significance of each path is determined by the t-value for a given bivariate relationship based on a bootstrapping function with 5,000 iterations (Palanski et al. 2011). Specifically, the critical t-values are 1.96, 2.58, and 3.29, respectively representing $p < 0.05$, $p < 0.01$, and $p < 0.001$,.

Insert Fig. 2 here

As shown in Fig. 2 and Table 7, inter-organizational trust is significantly and positively related to cost performance ($\beta = 0.552$, $p < 0.001$). Therefore, **H1 is supported.**

Insert Table 7 here

To test the mediation hypotheses, an analysis procedure based on the direct and indirect effects was adopted (Zhao et al. 2010). Meanwhile, this study adopted the bootstrap test of the indirect effect, which is usually more powerful than the Sobel test (Preacher and Hayes 2004). Hence, as shown in Table 8, Product Confidence Limits for Indirect effects (PRODCLIN) was used to measure the confidence interval of specific indirect mediating effects (Mackinnon et al. 2007). First, direct effects of inter-organizational trust on principled negotiation ($\beta = 0.701$, $p < 0.001$), inter-organizational trust on joint action ($\beta = 0.435$, $p < 0.001$), principled negotiation on joint action ($\beta = 0.382$, $p < 0.001$), principled negotiation on cost performance ($\beta = 0.241$, $p < 0.01$), and joint action ($\beta = 0.185$, $p < 0.05$) on cost performance are, respectively, significant. Second, the statistical significance of indirect effects was determined through 5,000 bootstrap iterations. Estimates were taken within a 95% confidence interval. As Table 7 shows, the total indirect effect (difference between total and direct effects/c-c') of inter-organizational trust on cost performance is statistically significant (point estimate = 0.299 and 95% BCa CI [0.165, 0.430]). The mediation test of principled negotiation on the relationship between inter-organizational trust and cost performance shows the point estimate is significant (point estimate = 0.169 and 95%

441 BCa CI [0.044, 0.325]). As such, **H2 is supported.** Similarly, joint action seems to play
442 a mediation role between inter-organizational trust and cost performance (point
443 estimate = 0.08 and 95% BCa CI [0.008, 0.186]). Therefore, **H3 is supported.** Finally,
444 the multiple-serial mediation of principled negotiation (point estimate = 0.268 and 95%
445 BCa CI [0.151, 0.412]) and joint action (point estimate = 0.071 and 95% BCa CI [0.008,
446 0.156]) are statistically significant, which shows principled negotiation and joint action
447 play multiple mediation roles between inter-organizational trust and cost performance.
448 Therefore, **H4 is supported.**

449 **Insert Fig. 3 here**

450 **Insert Table 8 here**

451 Moreover, as Table 7 shows, the moderating effect of contractual governance on the
452 relationship between joint action and cost performance is negatively significant (β = -
453 0.124, $p < 0.05$). Consequently, **H5a is supported.** As Fig. 3 shows, when the intensity
454 of contractual governance is lower, joint action will more significantly affect cost
455 performance. However, as per Fig. 4, contractual governance does not moderate
456 principle negotiation on cost performance (β = -0.076, $p > 0.05$). Therefore, **H5b is**
457 **supported.**

458 **Insert Fig. 4 here**

459 **Discussion**

460 ***Theoretical and practical implications***

461 This study investigates the connection between inter-organizational trust and project
462 cost performance and explores the multiple mediating effects of principled negotiation

463 and joint action. The empirical findings show that, as a core element of relational
464 governance, trust plays a key role in conserving project cost. Furthermore, principle
465 negotiation and joint action are the two important project tactics in relational
466 governance, with multiple mediating effects. Simultaneously, contractual governance
467 has different moderating functions in principle negotiation and joint action. This study
468 contributes to the literature on the nexus of inter-organizational trust and multiple
469 mediating effects in improving cost performance from the following aspects.

470 The first contribution of this empirical study is in terms of **inter-organizational**
471 **trust and cost performance.** This study focuses on the impact of internal team trust on
472 project performance (Fung 2014). Although some studies analyze organizational
473 performance from the perspective of inter-organizational trust, they only treat trust as
474 an independent construct (Zaheer et al. 1998; Cheung et al. 2013). However, a more
475 intensive analysis of cost performance is more reasonable for addressing budgetary
476 control and cost overruns (Thomas et al. 2002). Moreover, trust, negotiation, and
477 cooperation (joint action) are considered integral parts of relational governance theory,
478 which extends the existing theoretical boundaries and helps systematically analyze and
479 determine their impact on project cost performance, as well as their theoretical
480 relationship with contractual governance. The results show that inter-organizational
481 trust affects cost performance. Therefore, cost overruns are not only caused by the
482 technical aspects of the project, such as bidding methods, technical standards, and
483 resource management, but also by the trust relationship between stakeholders.

484 The second contribution of this study is referring to the **multiple mediating effects**

485 **of principled negotiation and joint action between inter-organizational trust and**
486 **project performance.** This is perhaps the most striking finding, as the study shows that
487 principle negotiation and joint action have multiple mediating effects and relationships
488 between inter-organizational trust and project performance. Previous studies on joint
489 action focused on the relationship between buyers and suppliers, and the interaction
490 experience in supply chain management (Heide and John 1990; Claro et al. 2003),
491 mainly to determine cooperation among organizations to strengthen alliances
492 (Bouncken 2016). This study shows that principled negotiation and joint action perform
493 mediating roles by upholding the balance of power among stakeholders, further
494 deconstructing the effect of inter-organizational trust on project cost performance from
495 the perspective of relational governance. As such, principle negotiation can directly
496 improve cost performance by solving various types of conflicts in the project (Chen et
497 al. 2014), and can also enhance cost performance by establishing a fair and cooperative
498 work scope through principled negotiation and by promoting inter-actor joint action.
499 On the other hand, joint action can share information, jointly formulate project
500 implementation plans, and problem-solving strategies to avoid mistakes or
501 disagreements, improving project cost performance (Larsen et al. 2016). Therefore,
502 principled negotiation and joint action are mediators. Furthermore, on specific
503 occasions, organizations can first adopt principled negotiation to resolve conflicts,
504 followed by joint action to improve project performance. These findings explore the
505 valuable and insightful internal working principles of relational governance.
506 Finally, the third contribution lies in the **moderating role of contractual**

governance. Recently, studies focus on relationships between contractual and relational governance in various supply chain management situations, such as supplementing, substitution, or dynamic effects (Abdi and Aulakh 2015; Lumineau and Henderson 2012; Zheng et al. 2008). This study finds contractual governance has different moderation effects on the impact of principle negotiation and joint action in relational governance's strategies on cost performance. The results reveal contractual governance could negatively affect joint action on cost performance. Joint action will then more significantly affect cost performance when the intensity of contractual governance is low. To this end, a contract should emphasize cooperation by strengthening coordination clauses, reducing the control clause, and increasing flexibility in contract execution. Consequently, joint action would yield better outcomes from contract provisions. However, the study also reveals that contractual governance has no moderation effect on the path of principled negotiation towards cost performance. This does not mean contractual governance will not affect relational governance. However, this is because project stakeholders only adopt principled negotiation as an alternative means from the original contract.

Limitations and future research directions

This study has certain limitations. Owing to the limited literature in this research area, the theoretical hypotheses refer to generic scenarios in project management. Although the questionnaire survey targeted megaprojects, the results could vary as per the ongoing theoretical developments in megaproject management. This area of research is still evolving in direction and management philosophies (Flyvbjerg 2014).

529 Moreover, the method is based on horizontal research. The questionnaire data is static
530 interface data, which only verify the relationship between trust and project cost at the
531 point of completion of the project, but cannot describe the dynamic process of trust
532 change accurately. Future studies can thus consider using longitudinal data analysis for
533 further testing and validation. Furthermore, this study does not break down project
534 complexity, which can moderate the effect of inter-organizational trust for improving
535 cost performance in megaprojects. Future research should consider classifying the
536 details of project complexity in analyzing relational and contractual governance in
537 megaprojects.

538 **Conclusion**

539 Research on the influence of inter-organizational trust on project cost from the
540 perspective of relational governance is still in its infancy, and there is much to learn by
541 examining different variables. As they differ from permanent forms of organization or
542 project teams, cross-border inter-firm relationships bring new challenges for the
543 stakeholders and have significant effects on project cost performance. This study
544 empirically accumulated additional evidence for these effects, indicating principled
545 negotiation and joint action are important process strategies of relational governance,
546 which can play mediating roles in inter-organizational trust. Moreover, contractual
547 governance is the bedrock of a working relationship between stakeholders, moderating
548 the effect of relational governance on project cost performance. These findings
549 represent a promising and intriguing step toward a better understanding of improving
550 project cost performance. Project stakeholders can thus learn to leverage relational and

contractual governance better to improve cost performance.

Although the empirical data were from major infrastructure projects in China, most projects share generic characteristics, such as moral hazard, cost overruns, and complicated working relationships. Moreover, the SEM model hypotheses were based on general theory of relational governance and literature. Consequently, the research findings are generalizable, and other large and complex projects can refer to them.

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Table 1. Basic Information on Respondents and Projects

Item	Indicators	Frequency	Percentage (%)
Project organization	owner	29	11.7
	contractor	188	75.8
	others	31	12.5
Gender	male	217	87.5
	woman	31	12.5
Age	under the age of 25	55	22.2
	the age of 26-35	125	50.4
	the age of 36-45	50	20.2
	above the age of 45	18	7.2
Years of work	under 3 years	39	15.7
	3-5 years	97	39.1
	6-10 years	43	17.4
	above 10 years	69	27.8
Position	company director	3	1.2
	project manager	16	6.5
	department head	55	22.2
	construction professional	174	70.1
Project category	traffic infrastructure	168	67.8
	industrial workshop	6	2.4
	trade integrated	13	5.2
	residential district	9	3.6
	public buildings	38	15.3
	others	14	5.7
Project duration	under 3 years	24	9.7
	3-5 years	179	72.2
	4-5 years	39	15.7
	above 5 years	6	2.4
Project overall budget(RMB)	0.5-1 billion	45	18.2
	1-5 billion	72	29
	5-10 billion	86	34.7
	above 10 billion	45	18.1

812

Table 2. Factor Loadings, AVE, CR, and Cronbach's Alpha of Indicators

Constructs and measurements	Outer loadings	AVE	CR	Cronbach's Alpha
Inter-Organizational Trust		0.677	0.936	0.92
Item 1: We believe that another party has the ability to achieve expected results	0.917			
Item 2: We believe that another party can meet the technological and management requirements of the project	0.918			
Item 3: We believe that the contract has stipulated the rights, responsibilities and obligations of both parties fairly and clearly	0.893			
Item 4: We believe that another party can be trusted and will fulfilled by their promises	0.903			
Item 5: We believe that another party will abide by the contract in the whole project	0.882			
Item 6: We believe that another party will consider our interests when make a major decision	0.819			
Item 7: We believe that another party will not make use of our problems to make profits	0.83			
Principled Negotiation		0.671	0.891	0.837
Item 8: In negotiations, we will use deterministic contract as far as possible to share the responsibility objectively	0.825			
Item 9: In negotiations, we will recognize benefits of both sides and invent options for mutual gain	0.839			
Item 10: We can reach a consensus agreement in terms cost sharing, changes, material increases, and so on effectively or quickly.	0.833			
Item 11: We can reach a consensus agreement in terms cost sharing, changes, material increases, and so on easily.	0.777			
Joint Action		0.702	0.904	0.859
Item 12: We will promptly provide the information about cost structure to another party	0.817			
Item 13: We will provide information on master plan and schedule arrangement to another party	0.816			
Item 14: We will always be helpful when another party asks for help	0.869			
Item 15: Facing technical difficulties, we will work together with another party	0.849			
Cost Performance		0.651	0.882	0.822
Item 16: Our project' cost control is effective and completed within the budget	0.85			
Item 17: Our past projects did not appear significantly cost overruns	0.842			
Item 18: We have no litigation claims against other organizations	0.765			

Item 19: Compared with other similar projects in the industry, our organization's project cost control is better	0.768			
Contractual governance		0.679	0.914	0.882
Item 20: In our projects, we distribute the responsibilities, rights and obligations fairly and reasonably	0.836			
Item 21: In our projects, the contract terms are clear and satisfactory	0.88			
Item 22: In our projects, contract goals are consistent between organizations' needs	0.808			
Item 23: In our projects, contract has been considered an effective means to control the opportunism behavior	0.771			
Item 24: In our projects, we will regularly check and evaluate the behavior and performance between organizations according to the contract	0.822			

813

814 **Table 3.** Common Method Bias Analysis

Path	Substantive factor loading (R1)	$R1^2$	Path	Method factor loading (R2)	$R2^2$
CP -> CP1	0.87***	0.7569	method -> cp1	-0.02	0.0004
CP -> CP2	0.911***	0.829921	method -> cp2	-0.074	0.005476
CP -> CP3	0.879***	0.772641	method -> cp3	-0.136	0.018496
CP -> CP4	0.556***	0.309136	method -> cp4	0.245**	0.060025
FC -> FC1	0.742***	0.550564	method -> fc1	0.096	0.009216
FC -> FC2	0.746***	0.556516	method -> fc2	0.141	0.019881
FC -> FC3	0.735***	0.540225	method -> fc3	0.081	0.006561
FC -> FC4	0.983***	0.966289	method -> fc4	-0.228	0.051984
FC -> FC5	0.932***	0.868624	method -> fc5	-0.112	0.012544
JA -> JA1	0.971***	0.942841	method -> ja1	-0.171**	0.029241
JA -> JA2	0.823***	0.677329	method -> ja2	-0.003	0.000009
JA -> JA3	0.82***	0.6724	method -> ja3	0.052	0.002704
JA -> JA4	0.747***	0.558009	method -> ja4	0.113	0.012769
PN -> PN1	0.562***	0.315844	method -> pn1	0.291**	0.084681
PN -> PN2	0.761***	0.579121	method -> pn2	0.082	0.006724
PN -> PN3	1.007***	1.014049	method -> pn3	-0.192**	0.036864
PN -> PN4	0.966***	0.933156	method -> pn4	-0.203**	0.041209
TR -> CT1	0.891***	0.793881	method -> ct1	-0.044	0.001936
TR -> CT2	0.913***	0.833569	method -> ct2	-0.094	0.008836

TR -> CT3	0.646***	0.417316	method -> ct3	0.2	0.04
TR ->TR1	0.832***	0.692224	method -> rt1	0.04	0.0016
TR ->TR2	0.857***	0.734449	method -> rt2	-0.02	0.0004
TR -> TR3	0.953***	0.908209	method -> rt3	-0.172	0.029584
TR -> TR4	0.669***	0.447561	method -> rt4	0.084	0.007056
Average	0.823833333	0.69461558		-0.001833333	0.0203415

Note: PN = principle negotiation; CP = cost performance; FC = contractual governance; JA = joint action; CT = inter-organizational trust. *, **, and *** indicate a significance level of $p < 0.1$, $p < 0.05$, and $p < 0.01$, respectively.

Table 4. Variable Correlations

Variables	CP	CT	FC	JA	PN	RT
CP	0.807					
CT	0.528	0.909				
FC	0.53	0.773	0.824			
JA	0.56	0.663	0.706	0.838		
PN	0.559	0.638	0.683	0.688	0.819	
RT	0.542	0.743	0.791	0.651	0.669	0.859

Note: PN = principle negotiation; CP = cost performance; FC = contractual governance; JA = joint action; CT = calculus-based trust; RT = relational-based trust.

Table 5. Heterotrait-Monotrait (HTMT) Test Results

Variables	CP	CT	FC	JA	PN	RT
CP						
CT	0.602					
FC	0.609	0.868				
JA	0.653	0.756	0.805			
PN	0.668	0.723	0.78	0.79		
RT	0.626	0.834	0.894	0.743	0.778	

Note: PN = principle negotiation; CP = cost performance; FC = contractual governance; JA = joint action; CT = calculus-based trust; RT = relational-based trust.

824 **Table 6.** CV-Redundancy and R Square

Variables	CV-Redundancy	R Square
CP	0.237	0.415
CT	0.662	0.847
JA	0.371	0.569
PN	0.306	0.492
RT	0.62	0.895

825 Note: PN = principle negotiation; CP = cost performance; FC = contractual
826 governance; JA = joint action; CT = calculus-based trust; RT = relational-based trust.

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Table 7. Hypotheses Test Results

Hypothesis	Path	Path Coefficient (β)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
H1	TR -> CP	0.253	0.1	2.522	0.012
	TR -> PN	0.701	0.047	15.017	0.000
	TR -> JA	0.435	0.084	5.177	0.000
	PN -> JA	0.382	0.075	5.075	0.000
	PN -> CP	0.241	0.092	2.616	0.009
	JA -> CP	0.185	0.082	2.242	0.025
H5a	Moderating Effect 1 -> CP	-0.124	0.054	2.283	0.022
H5b	Moderating Effect 2 -> CP	-0.076	0.045	1.663	0.096

Note: PN = principle negotiation; CP = cost performance; JA = joint action; TR = inter-organizational trust.

Table 8. Summary of Mediating Effect Tests

Hypothesis	Effects	Product of coefficients		95% Confidence Interval	
		Point estimate	t value	Lower	Upper
	Total effect	0.552	6.467	0.384	0.724
	Direct effect	0.253	2.522	0.055	0.448
	Total indirect effect=a_1*b_1+a_2*b_2+a_1*a_3*b_2	0.299	4.423	0.165	0.430
H2	a_1*b_1(via PN)	0.169	—	0.044	0.325
H3	a_2*b_2(via JA)	0.080	—	0.008	0.186
	a_1*a_3*b_2(via PN and JA)	0.050	—	—	—
H4	a_1*a_3	0.268	—	0.151	0.412
	a_3*b_2	0.071	—	0.008	0.156

Note: PN = principle negotiation; JA = joint action; a_1, a_2, a_3, b_1, b_2 respectively indicate the coefficients of each path, as shown in Fig. 2.