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1 **How to Govern Behavioral Relationship in Megaprojects? Examining the Effect**
2 **of Three Governance Mechanisms under Project Uncertainties**

3 **Xian Zheng¹, Yujie Lu^{2*}, Ruidong Chang³**

4 **Abstract:** The relational behavior of project participants is crucial to the success of a
5 megaproject. Although project governance has been widely studied with the aim of improving
6 participants' relational behavior, limited research examines the distinct effectiveness of various
7 governance mechanisms on influencing relational behavior, especially in megaprojects.
8 Through examining three varieties of governance mechanisms, including contract, trust and
9 institutional support, a hierarchical moderated regression analysis has been used to explore the
10 impact of each of the governance mechanisms in facilitating the relational behavior of
11 megaproject participants and further team performance. The analysis is based on data collected
12 from 202 contractors and consultants working at megaprojects in China. Results unveiled that
13 both contractual term specificity and its interaction with trust can facilitate relational behavior.
14 Project uncertainty moderates the relationship between governance mechanisms and relational
15 behavior in affecting project team performance. The findings offer both theoretical and
16 managerial implications for megaproject participants to cultivate beneficial relational behavior
17 so as to improve team performance in megaprojects.

18 **Keywords:** Contractual governance, Governance mechanisms, Institutional support,

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19 Megaprojects, Relational behavior, Trust

20 **INTRODUCTION**

21 Relational behavior has been receiving considerable attentions as one of the approaches to
22 realize high-quality inter-organizational relationships in construction projects (Ning and Ling
23 2014). Relational behavior refers to the desired actions involved in the exchange that promote
24 the development of a collaborative relationship. Three most commonly observed relational
25 behaviors are those pertaining to flexibility, information exchange and solidarity (Heide and
26 John 1992; Hewett and Bearden 2001; Lusch and Brown 1996). Specifically, *flexibility* refers
27 to the shared expectations between the partners regarding the way they will behave when
28 unanticipated changes in the contractual environment occur; *information exchange* is the shared
29 expectation that information will be continually and freely exchanged; and *solidarity* is defined
30 as the shared expectation that each partner will behave in a manner that benefits the
31 collaboration as a whole rather than simply protecting their own interests (Heide and John 1992).
32 Such behaviors have been proved to be critical to foster and maintain a value-enhancing
33 relationship among organizations and to enhance their performance (Griffith et al. 2006). This
34 is especially true for successful megaprojects, such as the Thames Barrier and the Heysham 2
35 Nuclear Power Station, in which project organizations tend to involve active relational behavior
36 and high relationship quality between one another (Morris and Hough 1987). The reason is that
37 megaprojects are expected to accomplish a challenging goal that cannot be completed by
38 individual party alone, thereby calling for multiple stakeholders to conduct intensive relational
39 behavior so as to achieve the success of projects (Zheng et al. 2017).

40 Dyer and Singh (1998) pointed out that governance “plays a key role” in the creation of

41 inter-organizational relationship because it influences transaction costs and the willingness of
42 partners to engage in value-creation initiatives. In the construction field, a project created by
43 contracts could be regarded as a temporary coalition of firms working collectively with clients
44 (Winch 1989). A project's temporary, uniqueness, heterogeneous, short-term orientation and
45 lack of organizational routines pose special challenges to stakeholders' relationship
46 management (Hanisch and Wald 2011). For instance, the collaboration in the coalition could be
47 difficult (Phelps and Reddy 2009) and opportunism often occurs (Lau and Rowlinson 2009; Lu
48 et al. 2016). Thus, effective governance that is able to develop a trustworthy relationship and
49 implement relational behaviors among project participants is pivotal to the success of
50 construction projects.

51 The literature has suggested that two main types of governance are at play in an inter-
52 organizational relationship, namely contractual governance and relational governance (Heide
53 1994; Jap and Anderson 2003; Poppo and Zenger 2002). Contractual governance refers to
54 mechanisms that to govern interparty exchanges and to avoid uncertainties through
55 emphasizing the importance of the contracts between transaction partners (Lumineau et al.
56 2011). The role of contractual governance has been greatly emphasized by transaction cost
57 economics in explicit terms and conditions (Cannon et al. 2000). Relational governance
58 emphasizes inherent and moral control mechanisms, which are used to govern exchanges
59 through consistent goals and a cooperative atmosphere (Lu et al. 2015). Relational governance
60 such as trust is based on the relational exchange theory, which offers a less explicit set of terms
61 to maintain a value-enhancing relationship (Macneil 1980).

62 The effectiveness of contracts and trust in governing inter-organizational behavior and their

63 effects on cooperation performances have been widely studied (Luo 2002; Yang et al. 2011). In
64 megaprojects, there are many endogenous factors driving relation conflicts such as ambiguous
65 contracts, opportunistic behaviors, differences in goals and operational routines, and
66 unexpected market changes (Jap and Ganesan 2000). Most importantly, megaprojects are large-
67 scale sociotechnical undertakings that cost over 1 Billion RMB (Chinese Currency) and that
68 are complex and embedded in institutional frames (He et al. 2015). These project incorporated
69 both traditional infrastructure such as transportation megaprojects but also large-scale public
70 projects such as National Stadium for the 2008 Olympics and 2010 Shanghai World Expo
71 projects, providing fundamental public services for economic development, social production,
72 and people's life (Flyvbjerg 2011). Thus, Flyvbjerg (2014) argued that megaprojects are a
73 completely different breed of projects and have to be managed differently from conventional
74 projects. Prominent project management scholars have advocated that high attention needs to
75 be paid to the institutional environment in which megaprojects are situated, especially in
76 transition economies such as China (Chi et al. 2011), where the centralized political structure
77 is implemented and dominated by the government both financially and administratively. The
78 government who initiates a megaproject usually acts as both a regulator and a client. For
79 instance, the government in China, as a regulator, often relied on administrative powers and
80 means to govern megaprojects (Li et al. 2018). This is attributed to China's institutional systems
81 which are characterized by centralization governance and elitist governance. In addition, the
82 client's role of government is operationalized through the central role of the *Construction*
83 *Headquarters*—a project-specific organization set up by the government for managing the
84 megaproject (Zhai et al. 2017). Thus, in this study, the institutional support is regarded as a

85 governance mechanism to influence relational behavior in megaprojects.

86 Given limited studies on the governance of relational behavior in megaprojects, three
87 research gaps can be identified as follows. First, extant research regards the contract mechanism
88 as an individual construct, but ignores different functions of the contract, e.g. specificity and
89 adaptability, that might have a distinct effect on relational behaviors. Second, previous research
90 primarily focuses on contractual governance and relationship governance, but seldom
91 highlights the government's institutional support to influence relational behavior in
92 megaprojects. Third, limited research has focused on the megaproject's uncertainties that
93 influence the effect of governance mechanisms on relational behavior. To fill these gaps, this
94 study empirically examines the effectiveness of various governance mechanisms on relational
95 behavior among participating organizations under different levels of megaproject uncertainties
96 in transition economies.

97 Specifically, the three objectives of this study are: (1) to examine two different roles of
98 contractual governance mechanisms (i.e. contractual term specificity and contractual
99 contingency adaptability) on relational behavior in megaprojects; (2) to investigate the effect
100 of trust and institutional support on relational behavior; and (3) to investigate the moderating
101 effect of project uncertainty in influencing distinct governance mechanisms. These issues were
102 examined using survey data from 202 contractors and consultants of megaprojects in China.
103 The results could be helpful to strategize the relationship management and to further improve
104 team performance.

105 The remainder of this paper is organized as follows. In the following section, we proposed
106 the research hypotheses, followed by the next section where the research method for data

107 collection and analysis is provided. We then discussed the findings and their managerial
108 implications, and concluded the study with limitations and suggestions for future research.

109 **LITERATURE REVIEW**

110 **Relational Behavior**

111 The concept of relational behavior is drawn from the relational exchange norms
112 framework proposed by Macneil (1980) that identified 28 overlapping relational exchange
113 norms, each of which refers to a set of shared expectations regarding a particular type of
114 exchange behavior that reflects the parties' mutuality of interests and a common long-term
115 orientation (Sezen and Yilmaz 2007). This concept was developed further by Heide and John
116 (1992), who proposed that the three most commonly observed relational behaviors are those
117 pertaining to the norms of flexibility, information exchange, and solidarity. This conjecture has
118 now been supported by a variety of reports in the literature (Hoppner and Griffith 2011; Ni et
119 al. 2017) and was thus selected as the component of relational behavior for this study.

120 The extant literature on relational behavior in the construction industry has, for the most
121 part, concentrated on its drivers, hindrances, measure, and consequences (Memon 2014; Che et
122 al. 2015). Regarding its drivers, the effectiveness of contracts and trust in governing inter-
123 organizational relationship and their effects on relational behavior have been studied
124 respectively. For example, Ning et al. (2013) suggested that trust is among one of the most
125 significant promoters of relational behavior, while Ke et al. (2013) examined the effects of
126 various relational behaviors on relationship quality and project outcomes under different
127 contract strategies. However, systematic analysis on the effect of governance mechanisms to
128 relational behavior is scarce in the field of construction, especially in the context of the

129 megaproject.

130 Compared with ordinary projects, both the frequency of interactions and the level of
131 uncertainty are high in megaprojects from the perspective of transaction costs economics.
132 Besides, the outcome of megaprojects is unpredictable, which indicate it is difficult to specify
133 the contractual terms and clauses in advance (Park et al. 2017). These facts may mean that trust
134 and the role of government are more important than contracts to facilitate relational behavior
135 in megaprojects, especially in China — a country rich with *guanxi*. Li et al. (2018) highlighted
136 that megaproject governance includes mandatory approaches such as formal policies,
137 regulations, and programs, as well as informal project culture and relationship governance.
138 Take World Explo 2010 in China as an example, the government support, such as the
139 appointment of top management teams, the establishment of “project-oriented state-owned
140 enterprises,” and the relations between government and private entities have great effect on the
141 project performance. Therefore, it is essential to test the effect of various governance
142 mechanisms on relational behavior in the context of megaproject settings.

143 **Governance Mechanisms in Megaprojects**

144 Governance mechanisms are safeguards that firms put in place to regulate inter-firm
145 exchange, minimize exposure to opportunism, protect transaction cost investment, and promote
146 the continuance of relationships (Jap and Ganesan 2000). It incorporates the formal and
147 informal rules of exchange between partners, such as incentive structures, monitoring
148 mechanisms, contractual provisions, reputations, norms, and trust (Jap and Anderson 2003).
149 The literature has suggested that two main types of governance for inter-organizational
150 relationships, namely the formal governance mechanism and informal governance mechanism

151 (Cao and Lumineau 2015). The theoretical category used in the main studies to summarize the
152 interplay of formal and informal governance is demonstrated in Table 1.

153 *(Insert Table 1 here)*

154 As shown in Table 1, contractual governance and trust are two main types suggested by
155 the previous literature. Contractual governance refers to the extent to which an inter-
156 organizational relationship is governed by a formal and written contract that explicitly stipulates
157 the responsibilities and obligations of each party (Williamson 1985). By specifying each party's
158 rights and duties, contractual governance may reduce opportunism and safeguard an inter-
159 organizational relationship (Williamson 1985). Contractual governance plays an important role
160 in reducing risks and facilitating coordination when megaproject participants conduct relational
161 behavior (Malhotra and Lumineau 2011; Schepker et al. 2014). However, the majority of
162 previous studies viewed contractual governance as an uni-dimensional construct (i.e., clause
163 specificity), and caused a debate upon whether contracts should be more specific. Extended
164 from this, contractual governance has been further defined as a two-dimensional construct that
165 includes both the extent to which contractual terms are clearly specified (i.e., contractual term
166 specificity), and the possible contingencies that a contract accounts for (i.e., contractual
167 contingency adaptability) (Luo 2002). These two dimensions capture different aspects of
168 contract completeness in which a transaction necessitates high contractual term specificity to
169 restrain opportunism and also requires descriptions of contingencies that foster adaptation when
170 unexpected events occur. Drawing on the multidimensional aspect of contracts, this study
171 intended to investigate the effect of these two contract dimensions on relational behavior in
172 megaprojects.

173 In addition to formal contracts, Trust is one of the most significant relational governance
174 mechanisms which is proposed based on the relational exchange theory to maintain value-
175 enhancing relationship. A higher level of relational governance mechanism application in
176 megaprojects indicates more informal interaction among stakeholders and less focus on formal
177 contracts, thus contributing to organizational mutual adaptability and self-enforcing safeguard
178 against conflicts and commitment-level relationship (Xue et al. 2016). Seen from Table 1,
179 institutional support from the government has also been regarded as a significant relational
180 mechanism in emerging economies like China (Chi et al. 2011). Institutional support is
181 determined by the institutional environment of a country or a state. Emerging economies are
182 commonly characterized by extensive government involvement and intervention in economic
183 exchanges and market transactions (Davies and Walters 2004; Hellman and Schankerman 2000).
184 Researchers have suggested the importance of aligning project governance with projects’
185 surrounding institutions to facilitate project success (Ahola et al. 2014). Institutional support
186 from the central or local governments can support relational behavior among parties. Moreover,
187 a bonding and commitment rested on a relationship can help overcome turbulences in the course
188 of projects (Henisz et al. 2012). In a real-world situation, several safeguarding measures will
189 be employed in combination.

190 In addition to a contract as a frequently employed formal mechanism and trust being a
191 typical informal mechanism, several other mechanisms, such as institutional support from the
192 government are the third category. Those mechanisms can be categorized to either the formal
193 or informal influence since in a megaproject, the government could act as both a regulator and
194 a client to reflect both its administrative powers and informal actions. In this study, those

195 mechanisms are referred as institutional support (by the government) and it highlights the
196 significant role of government in megaprojects. Thus, three main types of governance
197 mechanisms for inter-organizational relationships, namely the contract, trust and institutional
198 support, were identified to examine their effects on relational behavior in megaprojects.

199 Although an increasing number of studies evaluated the effect of several safeguards to
200 enhance relationship performance (Osipova 2015), few studies examined the dependent nature
201 of contracts, trust, and institutional support on influencing relational behavior in the context of
202 a megaproject which is situated in a wide socio-political environment and is subject to a high
203 level of uncertainty. relationship performance (Osipova 2015), few studies examined the
204 dependent nature of contracts, trust, and institutional support on relational behavior in the
205 context of a megaproject which is often subject to the impacts of a wider socio-political
206 environment and is subject to a high level of uncertainty. For collaboration among multiple
207 megaproject participants, project uncertainty cannot be ignored as the effect of governance
208 mechanisms on participants' relational behavior may vary under various levels of project
209 uncertainty. Consequently, there is a need for empirical research to determine the effect of the
210 simultaneous use of multiple governance mechanisms on relational behavior under different
211 megaproject context.

212 **HYPOTHESIS DEVELOPMENT**

213 **Governance Mechanisms and Relational Behavior**

214 As one of the main component of contractual governance mechanism, contractual term
215 specificity refers to the extent to which contractual terms are clearly specified. It may reinforce
216 the relational behavior of megaproject participants through three mechanisms. First, Myers

217 (2007) suggested that contractual term specificity protects a partner's strategic resources and
218 reduces operational and financial uncertainties by controlling opportunism and spurring
219 information flow. Using appropriate contractual safeguards to reduce opportunism and preserve
220 relationships is of paramount importance in megaprojects that typically involve long duration
221 and the commitment of idiosyncratic assets (Ke et al. 2013). Thus, both decreased opportunism
222 and increased relationship are beneficial for cultivating the relational behavior of megaproject
223 participants. Second, contractual specificity can help project participants to exchange their
224 understanding, expectations, and respective roles in the transaction (Beatty and Samuelson
225 1990) and to mitigate the risk of misunderstandings that will disrupt collaboration among
226 (presumably) well-intentioned parties (Malhotra and Lumineau 2011). Thus, specific contracts
227 could facilitate the formation of relational behavior among participants with reduced risks,
228 potential conflicts and disputes (Zhang et al. 2016). Third, when clients explicitly specify the
229 performance outcome, they expect the service supplier to deliver (Das and Teng 2001;
230 Eisenhardt 1985). It aligns with the preferences and goals of all contracting parties. With a
231 substantial reduction in incongruent self-interests, contractual term specificity may further
232 enhance participants' relational behavior.

233 Contractual contingency adaptability is the extent to which unanticipated contingencies
234 are accounted for and relevant guidelines that are delineated in a contract for handling these
235 contingencies (Luo 2002). It stipulates principles, guidelines, and possible solutions for dealing
236 with conflicts and contingencies, outlining a mutually agreed tolerance zone or excuse doctrine
237 for dealing with unexpected events. In practice, these guidelines or possible solutions are
238 incorporated in a contract as independent terms (e.g., procedures for handling important

239 contingencies, guidelines in case of doubt or hazards, approaches for overcoming conflict and
240 handling *force majeure*) or as a part of relevant clauses in specific cases (e.g., how to handle
241 unanticipated changes in the market or governmental policies). With contractual contingency
242 adaptability, a contract is expected to foster flexibility by furnishing customized approaches
243 and contingency procedures for dealing with future contingencies, especially in megaprojects
244 with great uncertainties, as contracting parties know that the contract is not perfectly rigid and
245 will evolve as needs change, calling for the processes that can accommodate such changes. For
246 instance, a demand forecast plan or business continuity plan may contain provisions that entail
247 contingency plans for the relationship. These provisions reflect the joint expectation that
248 megaproject participants are willing to make necessary adaptations to the contract as business
249 and environmental circumstances change (Dwyer et al. 1987). Contractual contingency
250 adaptability is important and especially conducive to promote inter-organizational relational
251 behavior (Doz 1996) when a conflict arises. Otherwise, disputing participants are unlikely to
252 further engage in effective communication (Hinds and Mortensen 2005). Therefore, this study
253 proposes the following two hypotheses firstly:

254 Hypothesis 1a (H1a): Contractual term specificity in a contract has a positive effect on the
255 relational behavior of megaproject participants.

256 Hypothesis 1b (H1b): Contractual contingency adaptability in a contract has a positive
257 effect on the relational behavior of megaproject participants.

258 Rather than contractual governance that relies on formal agreements with third-party
259 enforcement, relational governance relies on informal structure and self-enforcement by each
260 party (Dyer and Singh 1998; Malhotra and Murnighan 2002). In the existing literature, trust is

261 one of the most frequently discussed forms of relational governance (Griffith and Myers 2005).
262 In relational exchange theory, trust relates positively to relational behavior because confidence
263 in and reliance on the other partners promote their mutual flexibility, solidarity, and information
264 exchange (Lui et al. 2009). Poppo and Zenger (2002) proposed that trust not only enhances
265 mutual adaptability and facilitates joint planning (Claro et al. 2003) but also contributes to a
266 commitment-level relationship that operates as a self-enforcing safeguard against conflicts
267 (Malhotra and Lumineau 2011).

268 In megaprojects where many conflicts, differences, disputes, and other undesirable
269 behaviors exist with a high level of trust, participants reduce the cost of monitoring, controlling,
270 and enforcing (Goo et al. 2009) and increase the possibility to attain mutually beneficial
271 agreements (Khalfan et al. 2007), eventually improving project performance (Jiang et al. 2016;
272 Meng 2012). Pinto et al. (2009) found that trust helps to strengthen cooperation, which, in turn,
273 benefits the project as a whole.

274 In China, the role of trust may be even more salient (Möller and Svahn 2004). The lack of
275 a robust regulatory institution compels firms to rely more on social connections and trust to
276 obtain needed resources and protection (Jiang and Lu 2017; Memon et al. 2014). Business
277 conducted in China also has the tradition of heavily relying on informal ties with trustworthy
278 partners. As Xin and Pearce (1996) pointed out, trust and credibility are more instrumental than
279 a legal framework in guiding business cooperation in China. Chinese project managers prefer
280 to develop and maintain a good, even personal, relationship with their clients (Chen and
281 Partington 2004), which is an essential attribute of good project management. As a result, good
282 relationships with all involved parties are vital for resolving conflicts, facilitating

283 communication, and sharing knowledge (Rahman and Alhassan 2012). Thus, the following
284 hypothesis was proposed:

285 Hypothesis 2 (H2): Trust has a positive effect on the relational behavior of megaproject
286 participants.

287 Institutional support from the central or local government is another governance
288 mechanism that incorporates the availability of valuable industry information, subsidies, tax
289 reductions, and regulatory favors (Pistor et al. 2000). Due to these potential benefits,
290 megaproject participants would seek increased political networking with the government to
291 build a close relationship in the expectation of higher chances to win future contracts. Chi and
292 Javernick - Will (2011) proposed that political networking generates greater value when
293 located in certain strategic or hierarchical positions where useful information about
294 opportunities is available, with power derived from decision-making authority or access to
295 valued resources. In megaprojects, the government can also be understood as an intermediary
296 that combines its own legal stake and society's moral stake (Sallinen et al. 2013). The
297 government was actively promoting a shared view of the societal importance of the megaproject
298 to affirm the commitment of megaproject participants, thus facilitating their relational behavior.
299 In China, the use of this governance approach has earlier been demonstrated with linkage to
300 relational norms of national glory and individual values (Chi et al. 2011), and with the potential
301 to promote relational behavior among megaproject participants. The following hypothesis was
302 proposed:

303 Hypothesis 3 (H3): Institutional support has a positive effect on the relational behavior of
304 megaproject participants.

305 **Interaction of Governance Mechanisms**

306 As to the relationship between contractual and relational governance, two viewpoints arise
307 in the existing literature. Some scholars suggested that these two governance mechanisms can
308 complement each other's inadequacies and limitations in achieving higher exchange
309 performance and in constraining opportunism (Lui et al. 2009; Poppo and Zenger 2002).
310 However, others have viewed the relational mechanism as a substitute for a complex and
311 explicit contract (Cao and Lumineau 2015). Recent studies have provided more nuanced
312 explanations of the mutual relationship between contractual and relational governance. They
313 argued that both complementary and substitute propositions are possible, depending on the
314 contents and functions of contracts as well as contextual factors (Hinds and Mortensen 2005).
315 In particular, recent works indicate that multiple dimensions of contractual governance may
316 have different impacts on relational governance (Malhotra and Lumineau 2011; Schepker et al.
317 2014).

318 In terms of contractual term specificity, regardless of how explicit a contract is, the
319 interpretation and application of contracts may be different between cooperative parties. Some
320 firms use contractual terms rigidly while other firms use the terms in a more flexible way.
321 Different applications may generate conflicts and degrade cooperation. As such, project
322 participants may turn to a relational mechanism such as trust (Williamson 1985) because the
323 continuity and cooperation encouraged by relational mechanisms may generate contractual
324 refinements and further support greater collaboration (Poppo and Zenger 2002). Trust is broadly
325 considered as being flexible and adaptable, so it can overcome the adaptive limits of contractual
326 term specificity and complement it by fostering continuance and bilateralism when change and

327 conflict arise. From another perspective, trust is difficult to be formally codified as ambiguous
328 expectations and misunderstandings will arise, which undermines coordination and even results
329 in opportunism (Weitz and Jap 1995). Overcoming the informal limitations of trust, contractual
330 term specificity can complement it through formal clauses that help establish a solid basis for
331 the development of trust. Therefore, term specificity can provide a formal framework for a
332 megaproject and trust can eliminate contract limitations; that is, they function as mutual
333 complements instead of substitutes. Jointly using these two mechanisms can potentially
334 improve relational behavior more than using them separately (Liu et al. 2009).

335 Regarding contractual contingency adaptability, due to humans' natural bounded
336 rationality, it is impossible to write a complete contract that anticipates all possible
337 contingencies and clarifies the appropriate actions of each party (Wuyts and Geyskens 2005).
338 Project managers cannot predict and contractually resolve every future contingency and,
339 therefore, request an "incomplete" contract that is less legally binding as it contains fewer
340 clauses and/or the clauses are neither observable nor verifiable (Dooley and Ven 1999).
341 However, a lack of specific clauses may also introduce ambiguity and leave space for
342 opportunistic behavior (Luo 2002). Furthermore, a higher level of contractual contingency
343 adaptability may signal a lack of trust, which may be detrimental for the cooperative inter-
344 organizational relationship (Poppo and Zenger 2002). The following hypotheses were therefore
345 proposed:

346 Hypothesis 4a (H4a). Contractual term specificity and trust are complementary in
347 promoting the relational behavior of megaproject participants.

348 Hypothesis 4b (H4b). Contractual contingency adaptability and trust are substitutes in

349 promoting the relational behavior of megaproject participants.

350 **Moderating Effect of Project Uncertainty**

351 Project uncertainty refers to the frequency of changes and the degree of instability during
352 the project lifecycle (Wang et al. 2011). Pertinent studies suggest three main sources of project
353 uncertainty in a megaproject: task uncertainty, technological novelty, and environmental
354 uncertainty (Yan and Dooley 2013). Task uncertainty arises from a large number of components
355 and/or a high level of differentiation and interdependencies between them (Dooley and Ven
356 1999). High task uncertainty causes equivocality and multiple or conflicting interpretations of
357 task situations (Koufteros et al. 2002). High uncertainty also requires highly differentiated
358 expertise, making the integration of knowledge and skills very difficult. During the
359 development of a megaproject, the complex interdependences among components make it
360 challenging to predict and understand the impacts of distributed decisions on the overall task
361 performance. As a result, megaprojects often take a longer time to complete. In addition,
362 technological novelty is another source of megaproject uncertainty, and it varies at different
363 levels (Tatikonda and Montoya-Weiss 2001). Novel technologies refer to those that are new to
364 be used by the participating organizations. At the beginning of a megaproject, when novel
365 technologies are initially adopted, project members may not fully understand the technology
366 well neither knowing the appropriate means nor even the consequences of using such
367 technology. Such unfamiliarity leads to high degree of uncertainty about accomplishing project
368 development tasks. Empirical studies have found that megaprojects using novel technology are
369 often less likely to succeed due to their higher level of uncertainty (Tatikonda and Rosenthal
370 2000). The last source of uncertainty originates from the project's environmental and contextual

371 factors, and that may preclude the effective use of mechanisms to safeguard and enforce a
372 business relationship (Anderson and Weitz 1989). Environmental uncertainty refers to the rate
373 of change and the degree of unpredictability in the environment and generated by resource
374 scarcity and by a lack of perfect knowledge about environmental fluctuations (Dess and Beard
375 1984). Such environmental uncertainty may lead to information asymmetry among parties and
376 enable participating organizations to behave opportunistically.

377 The optimal response to uncertainty, based on neoclassical contract theory, is to rely on
378 the safeguard of a contract (Carson et al. 2006). Megaproject participants may seek to tie down
379 terms and definitions as a way to remove uncertainties, particularly ambiguity, from a contract.
380 A specified contract along these lines is one approach to remedy the problems of volatility and
381 ambiguity. In megaprojects, firms often enter into exceptionally complex contracts to deal with
382 uncertain contracting situations. The more complex and complete a contract the less flexible
383 and adaptable it is. Such inflexible contracts create challenges to contractual governance. Ex
384 post adjustments in megaprojects become problematic when all parties need to renegotiate to
385 accommodate changes, substantially weakening or eliminating the contract safeguard
386 capabilities for megaproject participants in conducting relational behavior. Therefore, this study
387 proposes:

388 Hypothesis 5a (H5a): The higher the project uncertainty, the weaker the positive
389 relationship between contractual term specificity and megaproject participants' relational
390 behavior.

391 Another main challenge of project uncertainty is the difficulty in obtaining useful
392 information (Molm et al. 2009) as information asymmetries place a premium on opportunism

393 (Williamson 1985). From a review of opportunism in exchange relationships, Crosno and
394 Dahlstrom (2008) found that external uncertainty would increase opportunism by increasing
395 the likelihood that participants would shirk responsibilities and break the agreements to seek
396 their own interests (Katsikeas et al. 2009). Under such circumstance, the increased opportunism
397 dampens inter-organizational commitment, resulting in less relational behavior. Clauses for
398 contractual contingency adaptability are devised to address different environmental scenarios,
399 especially unpredicted environmental changes. With adaptable approaches and contingency
400 procedures for dealing with such inevitable changes, megaproject participants could deal with
401 uncertainties in a flexible way to decrease conflicts, contributing to the more relational behavior.
402 Therefore, this study proposes:

403 Hypothesis 5b (H5b): The higher the project uncertainty, the stronger the positive
404 relationship between contractual contingency adaptability and megaproject participants'
405 relational behavior.

406 In contrast, trust may overcome the inflexibility disadvantages of contractually-based
407 governance in a turbulent environment. Trust provides the flexibility to cope with inevitable
408 uncertainties that arise in a long-term exchange. Such flexibility helps mitigate exchange
409 hazards under uncertainties and strengthens bilateral commitment to exchange-specific
410 investments (Luo 2002). Thus, flexibility enables firms to adapt to unforeseeable technological
411 and market changes. High uncertainty, especially in transition economies like China (Zhou et
412 al. 2003), is likely to reinforce the cultivation of trust between contracting partners. From
413 another perspective, trust is supposed to absorb the environmental uncertainty through joint
414 planning and problem solving (Nyaga et al. 2010). Megaproject participants may employ trust

415 to manage an environment that is more turbulent than each can cope with alone (Morgan and
416 Hunt 1994). The following hypotheses were therefore proposed:

417 Hypothesis 6 (H6): The higher the project uncertainty, the stronger the positive
418 relationship between trust and megaproject participants' relational behavior.

419 **Relational Behavior and Team Performance**

420 Pertinent studies have proposed a positive relationship between inter-firm relational
421 behavior and performance in a supply chain. For example, particularly cooperative behavior,
422 such as flexibility, shared problem-solving, voluntary information exchange, and restraint in
423 the use of power, can improve the performance of a supply chain (Singh and Teng 2016;
424 Koolwijk et al. 2018). Johnston et al. (2004) found that increased cooperative behavior
425 contributes to higher perceived performance and satisfaction among the buyer firms. Research
426 also shows that partners who share critical, accurate, and sensitive information in a timely
427 manner are more successful than those do not exhibit relational behaviors (Chen et al. 2004).

428 Although relational behavior may increase the integrated value of megaprojects, the
429 sustainability of such behavior depends on how much of the value is captured by each
430 participating organization (Bowman and Ambrosini 2000). Paulraj et al. (2008) pointed out that
431 through effective and efficient information sharing between participating organizations,
432 performance-related errors can be reduced and, task efficiency and stakeholder satisfaction of
433 individual team can be improved. Especially, when sharing important information regarding
434 megaproject design issues and materials procurement, participating organizations are more
435 likely (1) to improve the quality of the megaproject (Carr and Kaynak 2007), (2) to reduce
436 response time, (3) to reduce the costs of protecting against opportunistic behavior, and (4) to

437 increase cost savings through operational efficiencies (Carr and Pearson 1999). Moreover,
438 relational behavior also enables participating organizations to make dependable delivery, hence
439 leading to a high level of project integration and positively contributing to obtaining the loyalty
440 of project participants.

441 A high degree of solidarity of participants' relational behavior, such as joint planning and
442 joint problem solving, is expected to contribute to a high level of perceived satisfaction and
443 team performance. For instance, joint planning could facilitate the efficiency of business
444 transactions between megaproject participants and improve a team's time performance by
445 reducing the risk of unexpected problems and a sophisticated negotiation process. As for joint
446 problem solving, it allows for creative forms of dealing with disagreements and other
447 contingencies of business relationships, contributing to the reduction of transaction costs and
448 improving the cost performance of individual teams. Besides, joint problem solving could
449 promote knowledge transfer between contracting parties by allowing parties to learn from each
450 other through experience, observation, and/or demonstration (Cai et al. 2009), resulting in the
451 higher task efficiency of an individual team. Finally, megaproject participating organizations
452 closely engaging in the current project could build strong social relations for future business
453 collaboration (Lu and Yan 2007). Thus, it is hypothesized that:

454 Hypothesis 7 (H7). The relational behavior of megaproject participants has a positive
455 effect on their team performance.

456 After consolidating all hypotheses into a framework, the conceptual model can be
457 established and shown in Fig. 1.

458 *(Insert Figure 1 here)*

459 **RESEARCH METHOD**

460 To test the research model and hypotheses, a questionnaire survey was developed based
461 on literature review, refined through a pilot study, and subsequently used for the data collection
462 and analysis.

463 **Measurements**

464 The development of measurement began with an investigation of the theoretical and
465 empirical literature on inter-organizational relationship governance. Then the identified
466 measurement items used for the constructs were modified based on the context of megaprojects.
467 Specifically, the measures of contractual governance mechanisms concentrated on the
468 contractual term specificity and contractual contingency adaptability in megaprojects, which
469 were reflective constructs composed of three items and two items, respectively, based on the
470 measures reported in the studies of Jap and Ganesan (2000), Goo et al. (2009) and, Luo (2002).
471 Trust that reflects the confidence of participating organizations in others' reliability and
472 integrity was also a reflective construct measured by five items referring to the study of Lu et
473 al. (2015). To measure institutional support, two reflective items were used to assess the
474 government's support for and protection of megaprojects (Li and Atuahene-Gima 2001).
475 Consistent with the literature of Hoppner and Griffith (2011), relational behavior was
476 operationalized as a second-order reflective construct composed of three sub-constructs:
477 solidarity, flexibility, and information sharing. Project uncertainty was captured by three items
478 describing change and instability of the external environment, technology, and task during a
479 megaproject's lifecycle (Yan and Dooley 2013). Based on the work of Lu et al. (2015) and
480 interviews with field practitioners, team performance was operationalized as a reflective construct

481 of five items, tapping the dimensions of (a) time performance, (b) quality performance, (c) cost
482 performance, (d) building long-term partnerships, and (e) collaborating joint projects in the
483 future. Table 2 presents all constructs, along with their measurement items.

484 *(Insert Table 2 here)*

485 The model also incorporates three control variables that have been suggested by previous
486 studies to have a potential influence on relational behavior, namely prior collaborative
487 experience with other participating organizations (“prior collaborative experience”), project
488 duration, and project delivery method. Relational behavior may be influenced by the historical
489 interactions among participating organizations as prior experience determines their familiarity
490 and trust development (Buvik and Rolfsen 2015; Zhang et al. 2009). In terms of project duration,
491 a longer duration is generally expected to cultivate the development of a high-quality
492 relationship (Levinthal and Fichman 1988), thus, in turn, facilitating relational behavior.
493 Previous research also suggested that project performance varies under different project
494 delivery methods (Ling et al. 2004), such as design–bid–build (DBB), design-build (DB), and
495 EPC, as each delivery method indicates distinct organizational behaviors and team
496 collaboration. Regarding measurement, megaproject duration was scaled with a dummy
497 variable: duration less than 3 years (= 1) and above 3 years (= 2). Project delivery method was
498 treated as a categorical variable, including DBB, EPC, DB, and other methods. The prior
499 collaborative experience was measured by asking respondents whether they had historical
500 cooperative experience with contracting partners based on a dichotomy variable (0 = without
501 prior collaborative experience, 1 = with prior collaborative experience).

502 **Sampling and Data Collection**

503 Based on a comprehensive literature review, we developed a pilot survey questionnaire
504 that was evaluated by 26 experienced practitioners: 6 clients, 9 contractors and 11 consultants.
505 By considering the feedback and comments provided, we evaluated the content validity of the
506 items and tested measurement purification prior to the finalization of the questionnaire and the
507 execution of the survey. After removing one inappropriate item, splitting one item into two,
508 and rephrasing items that were not explicitly described, we present the final version of the
509 measurement items in Appendix S1 in the Supplemental Data.

510 The governance mechanisms are primarily designed and reinforced by megaproject clients
511 (including governmental officials involved as clients) to manage inter-organizational
512 relationships effectively, especially between them and service providers (refer to as
513 “consultants” and “contractors”). Thus, we selected the consultants and contractors as “key
514 informants” for data collection to investigate the effectiveness of various governance
515 mechanisms on their relational behavior. The use of key informants of one contracting party as
516 data sources to understand the inter-organizational relationship has been widely adopted in past
517 studies (Goo et al. 2009; Paulraj et al. 2008; Shiu et al. 2014). Ning and Ling (2013) emphasized
518 that the consultants’ and contractors’ behavior is of great importance to high-quality inter-
519 organizational relationships though they are reluctant to conduct relational behavior. In the
520 survey, key informants are primarily referred to as project managers who were intimately
521 involved with megaproject governance and have abundant knowledge about inter-
522 organizational relationships.

523 Large companies that often participate in megaprojects were approached to complete the

524 questionnaire, including China Railway Group, China State Construction Company, Shanghai
525 Construction Group Company, Tongji Architectural Design Group, CCDI Group, and Shanghai
526 Hua Dong Engineering Corporation. These companies are all listed among the Top 20 in the
527 2015 ENR Top Chinese Contractors and 2015 ENR Top Chinese Design Firms. Two criteria
528 were adopted to identify qualified participants in the above companies, namely, those who have
529 worked or are working on projects costing over 1 Billion RMB (Chinese Currency) (He et al.
530 2015) and those holding senior-level positions in their firm such as directors or managers. To
531 maximize the number of qualified respondents, a snowball sampling technique was used; that
532 is, all respondents to the survey were asked to refer other eligible individuals who might be
533 interested in participating.

534 The survey was completed between January and July 2016. A total of 238 responses were
535 collected from the 737 questionnaires distributed among potential project consultants and
536 contractors (32.3% response rate). We then cleaned the raw data by deleting incomplete
537 questionnaires. The final sample consists of 202 responses, in which 42.6%, 37.1%, and 20.3%
538 were collected on the spot, via an online survey, and by email, respectively. The answers from
539 the three types of collection were compared through one-way analysis of variance (ANOVA),
540 revealing no significant differences at the significance level of 0.05 among them. Hence, the
541 data from all three sources were used for the analysis without distinction.

542 Among all megaprojects indicated by respondents, 84.2% cost 1–5 billion RMB and 15.8%
543 cost over 5 billion RMB. Regarding project duration, 46.5% were completed in 2–3 years and
544 53.5% were completed longer than three years. Furthermore, 71.8% of the projects were public
545 and 28.2% were private projects. A majority of the megaprojects (86.1%) adopted design–bid–

546 build (DBB) as the delivery method while the remaining 13.9% employed other methods, such
547 as engineering, procurement, and construction (EPC), and design-build (DB). The rest of the
548 characteristics for these megaprojects and the survey respondents are shown in Table 3.

549 *(Insert Table 3 here)*

550 To further validate the data quality and address two common issues concerning survey
551 methodology, i.e., non-response bias and common method variance (Podsakoff et al. 2003), a
552 series of additional tests have been performed. Non-response bias was evaluated by testing
553 significant differences between the responses of the first 30 received surveys and that of the
554 last 30 received surveys (Armstrong and Overton 1977). In this survey, both T-test and ANOVA
555 results revealed that no significant differences existed. The possibility of common method
556 variance for all variables was then examined via Harman's one-factor test because respondents
557 were requested to answer questions on both the dependent and independent variables
558 (Podsakoff et al. 2003). The result satisfied the required threshold ($26.53\% < 50\%$) regarding
559 the ratio of the first factor accounting for the overall variance.

560 **ANALYSIS AND RESULTS**

561 To validate the proposed hypotheses, two steps were conducted. First, we estimated the
562 model's reliability and validity by using partial least square structural equation modeling (PLS-
563 SEM) and confirmatory factor analysis. Second, we tested the theoretical model with
564 hierarchical moderated regression analyses.

565 In the first step, the validity of all constructs, including their internal consistency, indicator
566 reliability, convergent validity, and discriminant validity, were assessed (Hair et al. 2011; Le et
567 al. 2014), with the results presented in Tables 4 and 5. Table 4 displays the descriptive statistics

568 and correlations for each construct and Table 5 shows that the composite reliability (CR) of
569 each construct was validated ($CR > 0.70$) and the results satisfied the requirement of internal
570 consistency (Hair et al. 2014). The indicator reliability was also assessed by examining the
571 loadings of the multiple items on their corresponding constructs, showing that all factor
572 loadings were statistically significant ($p < 0.001$). The result that average variance extracted
573 (AVE) of all constructs were greater than 0.50 showed that each item is strongly related to its
574 latent construct, in support of convergent validity. The discriminant validity used to reflect the
575 difference between two latent constructs is confirmed in both Table S1 of Appendix S2 and
576 Table S2 in the Supplemental Data.

577 Regarding the second-order construct — relational behavior, we evaluated the reliability
578 and validity as well. Firstly, all the outer loadings of eight measurements are well above the
579 critical value of 0.70. Specifically, the relational behavior's composite reliability (0.84) is
580 greater than the critical value of 0.70, thus supporting internal consistency reliability. The AVE
581 of relational behavior has a value of 0.51, also providing evidence of convergent validity.
582 Furthermore, based on the result of correlations of variables in Table 4, the square root of the
583 AVE for relational behavior in the diagonal was greater than its highest off-diagonal value (Hair
584 et al. 2014), providing evidence of discriminant validity among the theoretical constructs.
585 Finally, it is verified that the relational behavior has strong relationships with its first-order
586 constructs — solidarity (0.73), flexibility (0.66) and information sharing (0.82). Hence, all first-
587 order constructs are sufficiently highly correlated for their second-order construct (i.e.,
588 relational behavior) with high level of explanation for more than 50% of each first-order
589 construct's variance.

590 *(Insert Table 4 here)*

591 *(Insert Table 5 here)*

592 In the second step, because the proposed model contains interaction terms between
593 governance mechanisms and project uncertainty, hierarchical moderated regression analysis
594 was used for validation (Liu et al. 2009) and the results are presented in Table 6. The baseline
595 model (Model 1 in Table 6) contains control variables as the only inputs. The results revealed
596 that control variables were not significantly related to relational behavior, as they accounted for
597 only 1% of the variance in relational behavior. Model 2 adds three kinds of governance
598 mechanisms — contractual term specificity (X1), contractual contingency adaptability (X2),
599 trust (X3), institutional support (X4) and the moderator — project uncertainty (X5), resulting
600 in increasing the predictive power ($\Delta R^2 = 0.32$, $F = 11.95$, $p < 0.001$) in explaining the variance
601 of relational behavior. Model 3 features all the interactive effects between governance
602 mechanisms and project uncertainty on relational behavior. Prior to the creation of the
603 interaction terms in Model 3, the independent variables were centered to reduce
604 multicollinearity (Aiken and West, 1991) and the variance inflation factors (VIF) was calculated
605 for every regression equation. The result indicates that the maximum VIF of the model (3.50)
606 meets the requirement of $VIF < 10$ (Nachtsheim and Chris 2004). The addition of the interaction
607 terms in Model 3 further increased the R-square value than Model 2 ($\Delta R^2 = 0.05$, $F = 8.99$, p
608 < 0.01), in support of the significant moderating effects of project uncertainty. Finally, we
609 assessed the effect of relational behavior on team performance in Model 4, in which the
610 explained variance was significant ($R^2 = 0.32$, $F = 93.54$, $p < 0.001$).

611 **Main Effect**

612 The results in Model 3, demonstrate that term specificity had a significant, positive effect
613 on relational behavior ($\beta = 0.23, p < 0.01$), providing support for H1a, whereas contractual
614 contingency adaptability was found to have no significant effect on influencing relational
615 behavior ($\beta = -0.01, n.s.$), not in support of H1b. These results corroborate previous
616 recommendations to distinguish contractual term specificity and contingency adaptability and
617 to examine their differential impacts (Luo 2002). The results also suggest that trust ($\beta = 0.29,$
618 $p < 0.001$) was positively related to relational behavior, in support of H2, and institutional
619 support significantly increased relational behavior in megaprojects ($\beta = 0.19, p < 0.001$), in
620 support of H3, revealing the necessity to take institutional support into account. H7, which
621 predicted that relational behavior was positively related to team performance of participating
622 organizations, was also supported ($\beta = 0.57, p < 0.001$). However, the main effect of project
623 uncertainty slightly facilitates relational behavior of megaproject participants, though not
624 significantly ($\beta = 0.04, n.s.$).

625 **Moderating Effect**

626 By examining the path coefficients of the interaction variable on relational behavior, we
627 suggest that contractual term specificity and trust increase relational behavior complementarily
628 in megaprojects ($\beta = 0.57, p < 0.001$), supporting H4a. In contrast, contractual contingency
629 adaptability and trust are neither pure substitutes nor complements (Model 3: $\beta = -0.09, n.s.$).
630 Thus, our results do not support H4b.

631 H5a and H5b predicted the moderating influence of project uncertainty on the relationship
632 between contractual governance and relational behavior. Seen from Model 3, the coefficient of

633 contractual governance multiplied by project uncertainty is negative and significant ($\beta = -0.35$,
634 $p < 0.001$). Thus, project uncertainty negatively moderates the relationship, and H5a is
635 supported. Meanwhile, the coefficient of contractual contingency adaptability is positive and
636 significant in Model 3 ($\beta = 0.18$, $p < 0.1$), thus H5b is also supported. Regarding the interplay
637 of trust and project uncertainty, in line with our prediction, the results indicate that project
638 uncertainty positively moderates the relationship between trust and relational behavior ($\beta =$
639 0.13 , $p < 0.1$), in support of H6.

640 To further interpret these moderating effects, the respective effects of contract and trust on
641 relational behavior for low and high levels of project uncertainty are plotted in Fig. 2. The
642 calculation of the simple slopes and their significance levels was based on Aiken et al. (1991)
643 approach. Fig. 2(a) reveals that the sloped regression line for the relationship between
644 contractual term specificity and participating organizations' relational behavior was negative
645 and not significant for high project uncertainty ($\beta = -0.08$, *n.s.*), but was positive and significant
646 for low project uncertainty ($\beta = 0.54$, $p < 0.001$), in support of H5a of the negative moderating
647 effect. In contrast, the positive moderating effect of project uncertainty was confirmed in both
648 Figs. 2(b) and 2(c). In Fig. 2(b), project uncertainty strengthened the effect of contractual
649 contingency adaptability on participating organizations' relational behavior, though the
650 relationships between them were both nonsignificant ($\beta = -0.16$) for low project uncertainty
651 and $\beta = 0.14$ for high project uncertainty. Similarly, in Fig. 2 (c), trust had a minor positive
652 effect on participating organizations' relational behavior when comparing high project
653 uncertainty ($\beta = 0.42$, $p < 0.001$) to low uncertainty ($\beta = 0.16$, *n.s.*), in line with H6.

654 ***(Insert Table 6 here)***

655 *(Insert Figure 2 here)*

656 **DISCUSSION AND VALIDATION**

657 By examining the impact of three distinctive governance mechanisms that link
658 participating organizations' relational behavior to their performance outcomes, this study
659 provides significant evidences to support the hypotheses H1a, H2 and H3 by confirming the
660 determinants of contractual term specificity, trust and institutional support in promoting
661 relational behavior, which in turn facilitates team performance of megaproject participants (H7).
662 In addition, it is worth noting that the findings of this study favored a differentiated result for
663 contractual term specificity (H5a) and contractual contingency adaptability (H5b) when the
664 respective effects on participants' relational behavior are moderated by different levels of
665 project uncertainty, supporting H5a but not supporting H5b.

666 **The Effect of Governance Mechanisms on Relational Behavior**

667 Among various forms of governance mechanisms, including contractual term specificity,
668 trust, and institutional support, trust acts as the most effective driver to positively impact project
669 participants' relational behavior, particularly the contract mechanism. This result is similar to
670 pertinent studies in other fields. For example, Wu et al. (2017b) demonstrated that trust is more
671 important than contracts for the performance of cooperative innovation projects in high-tech
672 enterprises. Trust grants information sharing to access the valuable knowledge of project
673 participants, and facilitates the acquisition of novel ideas and insights that lay the groundwork
674 for problem-solving. This is true for both innovation-driven enterprises and megaprojects that
675 demand massive, accurate, and quickly-responding information from various suppliers, and in
676 which the cooperation process among participants is complex. Therefore, as a self-enforcing

677 safeguard, the presence of trust is based on mutual commitment and shared values among
678 contracting partners and it is a more effective and less costly alternative to creating a contract
679 (Dyer and Singh 1998).

680 Another plausible explanation for the greater role of trust is that many studies endorse the
681 importance of *guanxi* (literally, interpersonal relationships or connections) in the context of
682 China. Interpersonal *guanxi* helps determine whether firms gain influence in exchanging
683 relationships (Zhuang et al. 2008). In Chinese culture, trust is based on a high level of *guanxi*,
684 which is the lifeblood of business-making. *Guanxi* is utilitarian in developing a friendship that
685 consists of personal ties or social bonds to share resources in business communities and is
686 described as the informal connection essential to gain approval for or access to key resources
687 in China (Wu et al. 2017a). Therefore, we argue that the nature of megaprojects and Chinese
688 culture make trust more important than contracts to build relational behavior.

689 In addition, the results indicate that institutional support can predict relational behavior
690 (H4). This, in part, supports the work of Zhai (2017) in which institutional support could
691 significantly influence the coordination in megaprojects. Megaprojects need specific
692 governance regimes that can adapt to their societal contexts for efficient supervision and
693 coordination. The administration not only imposes influences through legislation, but also
694 proactively exercises its power on various organizations through its regulatory or administrative
695 control so as to support the smooth implementation of megaprojects. Thus, megaproject
696 participants are more willing to conduct information sharing, behavioral flexibility and
697 solidarity with the intention to develop a political network with the government. A supportive
698 political network might bring participating organizations favorable policy and scarce resources,

699 such as subsidies and tax breaks, and win future business opportunities in tendering other
700 governmental-invested projects.

701 **The Effect of Contractual Term Specificity and Contingency Adaptability on Relational**
702 **Behavior**

703 The role of the contract is divided into two aspects in megaprojects. In one way, the result
704 shows that more specific contractual terms promote better relational behavior of megaproject
705 participants. This finding is consistent with Goo et al. (2009) who provided evidence in favor
706 of using a well-structured agreement in an IT outsourcing engagement. Due to the self-
707 enforcing nature of relational behavior, participating organizations have to rely much more on
708 contractual term specificity to constrain their partners because they are not familiar with each
709 other in the early stage (Luo 2002). A well-structured agreement would supply megaproject
710 engagements with a “safety net” in lieu of exclusive reliance on trust. Thus, specified contracts
711 are regarded as the basis to initiate megaprojects.

712 From another respective, however, our result did not support the significant effect of
713 contractual contingency adaptability on relational behavior. This seems to contradict to the
714 finding of Lui (2009) where the relationship between contingency adaptability and relational
715 performance is significant. One plausible explanation is that unlike normal-sized projects that
716 can be easily planned, it is hard to predict all the contingencies in a megaproject due to highly
717 interdependent works and lack of experience on similar megaprojects (Tanriverdi et al. 2007).
718 In addition, when contingencies occur and lead to changes in the formal contract, it is preferred
719 to be negotiated in a continuously interactive environment, whereas mutual adjustment and
720 reciprocal on contract changes can be more effective, rather than in an environment where

721 contract changes settled by a standardized approach or by any specified plans, procedures, and
722 schedules prescribed in a megaproject contract.

723 In addition, the findings provide an in-depth understanding about the relationship between
724 the two types of contractual mechanisms and trust by showing that contractual term
725 specification has a significant complementary relationship with trust to enhance the relational
726 behavior of megaproject participants. This is because explicit clauses that help develop social
727 elements in relational exchanges include a higher level of trust that is usually associated with
728 hierarchies (Stinchcombe and Heimer 1985). Yang et al. (2011) also emphasized that a
729 specified contract combined with trust significantly reinforces the long-term orientation. Thus,
730 this research provides strong evidence that specified formal contracts can be utilized to develop
731 both trust and relational behavior. However, contractual contingency adaptability was found to
732 be neither substitutes nor complements with trust.

733 Another difference between these two roles of the contract is that the effect of contractual
734 term specificity on relational behavior is weakened by uncertainty. This is consistent with
735 previous studies that argued that formal controls may not be suitable in high uncertainty and
736 equivocality projects because they impose constraints on the professionals involved and limit
737 their freedom and innovation capacity (Hope and Fraser 2003). Moreover, a high level of
738 technology and environmental uncertainty makes it difficult to pin down the terms and clauses,
739 thus weakening the safeguard effect of contractual term specificity.

740 **MANAGERIAL IMPLICATIONS**

741 The findings of the current study clarify the research and offer three effective implications
742 for both project participants and policy makers seeking to promote the adoption of relational

743 behavior in megaprojects through appropriate governance mechanisms.

744 First, participating organizations need to develop a well-structured contract between
745 contracting parties at the outset with a high proportion of clauses representing contractual term
746 specificity and with a medium proportion reflecting contractual contingency adaptability. A
747 lack of term specificity leads to erroneous conclusions pertaining to the contract's value in
748 interacting with trust and promoting relational behavior. Therefore, each party's rights and
749 obligations should be detailed in writing and unambiguously specified to safeguard exchange
750 hazards with the intention to promote relational behavior. In terms of contractual contingency
751 adaptability, the parties concerned should not have excessive processes and methods for various
752 contingencies and contract changes prescribed in the megaproject contract. Such complex
753 clauses highlighting contingency adaptability will increase transaction cost but add no
754 significant value to relationship management. When confronting different scales of
755 megaprojects, project managers should adjust both contractual term specificity and contractual
756 contingency adaptability according to the level of project uncertainty. For a high degree of
757 megaproject uncertainty, managers can relatively increase the degree of contingency
758 adaptability, such as to set an emergency response clause for quick and efficient onsite decision,
759 as well as decrease the focus on term specificity for promoting the implementation of relational
760 behavior. Comparatively, more term specificity and less contingency adaptability should be set
761 for a megaproject with certain scope and standard, so parties can exhibit their behavior in a
762 more regulated manner.

763 Second, megaproject participants must attach both the importance of trust and contractual
764 term specificity because they are mutually complementary to enhance relational behavior.

765 Cultivating mutual trust of megaproject participants cannot be ignored while spending efforts
766 in drafting contracts with their business partners. Trust-building tools, such as relationship
767 workshops, are encouraged to be used in megaprojects so as to facilitate open communication,
768 build relationships, achieve mutual understanding, and to generate innovative programs that
769 promote coordination (Chen and Manley 2014). For instance, a trust-bond activity can be
770 arranged to precede or accompany the contract negotiation process so as to obtain the mutual
771 trust. Then both parties are more engaged and efficient to straightforwardly focus on reviewing
772 contractual terms rather than wasting time on suspicious doubts, so negotiation time and efforts
773 can be saved. Through the reciprocal process of fulfilling one contractual term and entering
774 another, the mutual trust is further enhanced to cultivate the friendly environment not only
775 benefiting the contract negotiation but also creating the harmonized relationship between both
776 parties.

777 Third, government officials should endeavor to support the implementation of
778 megaprojects in transition economies like China, where successful megaproject management
779 often leverages the government's power to exert its influence on coordination and control. For
780 example, megaprojects adopt a special leadership committee to integrate all project participants
781 to provide vision, governance, and leadership (Chen and Manley 2014), and the officials of
782 Chinese central and local governments are typically delegated as major leaders in providing
783 strong support for the megaprojects, and, thereby, promote project participants' solidarity,
784 flexibility, and information sharing. Further, enhancing relational behavior within a
785 megaproject, project participants are expected to build social capital with the government to
786 win benefits in the long-run.

787 **CONCLUSIONS**

788 High levels of relational behavior between project participating organizations are vital for
789 the success of relationship management in megaprojects. Focusing on the governance
790 perspective, this study developed a theoretical model showing the relationships between
791 contract, trust, and institutional support, and the association between relational behavior and
792 team performance. Then, a sample of 202 managers of consultants and contractors in Chinese
793 megaprojects were collected and analyzed by hierarchical moderated regression analyses.

794 Three main findings were discussed. First, three subcategories of governance
795 mechanisms—contractual term specificity, trust, and institutional support—are all significant
796 in improving relational behavior and among them, trust is most effective, indicating that
797 informal mechanisms like trust are relatively better facilitators of relational behavior than
798 formal mechanisms, such as contract. Second, regarding the interaction of contract and trust on
799 relational behavior, it is confirmed that contractual term specificity and trust are complements
800 rather than substitutes, while contractual term specificity and trust are neither pure
801 complements nor substitutes. Third, the moderating effect of project uncertainty was
802 particularly important, exhibiting mixed effects—positively moderating both the relationships
803 between trust and relational behavior, and between contractual contingency adaptability and
804 relational behavior—yet negatively moderating the relationship between contractual term
805 specificity and relational behavior. The findings of the present study offer three key insights for
806 stakeholders seeking to use appropriate governance mechanisms to promote the adoption of
807 relational behavior in megaprojects, namely developing a well-structured contract for
808 megaproject implementation, attaching importance of both trust and contractual term

809 specificity, and calling for more institutional support for megaproject relationship management.

810 This paper contributes to the theory of megaprojects inter-organizational relationship in
811 three aspects. First, the study contextualizes multiple theories in megaprojects to examine the
812 characterization of relational behavior and identifies three key paths influencing relational
813 behavior via reinforcing contractual governance, increasing mutual trust, and offering
814 institutional support. These paths switch on or off depending on the megaproject uncertainty.
815 As the three paths reveal different aspects of project governance, understanding their roles is
816 significant to improve relationship management in megaprojects.

817 Second, the current study provides new insights into contractual governance theory by
818 expanding the boundary of studying contractual governance as a unidimensional construct. This
819 study examines two differential roles—both term specificity and contingency adaptability, in
820 facilitating relational behavior among megaproject participants. The results imply that
821 contractual term specificity intensifies inter-organizational relational behavior, whereas the
822 effect of contractual contingency adaptability is not significant. Besides, it is also confirmed
823 that term specificity and trust are mutually complemented in megaprojects, contributing to the
824 long-standing debate on the topic of “substitutes versus complements” for the relationship
825 between contractual governance and relational governance.

826 Last, this study demonstrates the facilitating role of the government through its
827 institutional support for relational behavior in megaprojects. Previous studies normally assume
828 full enforcement of contractual mechanism and relational mechanisms on inter-organizational
829 relationships but ignore the role of the government under different institutional environments,
830 especially in transition economies. Researchers have called for more assessments of the

831 institutional support provided to megaproject development (Grewal and Dharwadkar 2002),
832 though empirical evidence is still scarce. This study presents an initial attempt to assess and
833 confirm that the institutional support has profound effects on strengthening the inter-
834 organizational relationship among megaproject participants.

835 Despite these theoretical contributions mentioned above, the interpretation of the
836 findings should be made carefully due to three limitations that must be addressed in future
837 endeavors. The first limitation is the use of a one-time survey of megaproject participants while
838 ignoring the dynamic process of relational behavior that changes over time, during which
839 participating organizations may adjust their governance strategies and collaborative decisions.
840 Besides, a self-reporting survey was employed to collect behavior information from one
841 contracting party, which is inevitably subject to the bias perceived by one side. Future research
842 could take a longitudinal perspective to examine how governance mechanisms and relational
843 behavior evolve and change over time, and consider to gather matched-dyad data from paired
844 informants, such as collecting information from both clients and contractors in the same
845 megaproject.

846 The second limitation is that the study mainly considers the interaction between
847 contractual mechanisms and trust, without considering other moderating effects (i.e., project
848 uncertainty and institutional support). Further studies are recommended to extend the
849 inclusiveness of the governance model that incorporate more interaction effects and potential
850 moderators in megaprojects. The third limitation is that the empirical data in this study were all
851 collected from megaprojects in China, so the application of the findings to other countries
852 should be performed with caution and appropriate adjustments. For instance, China's culture of

853 *guanxi* fosters the popularization of network-centered rather than market-centered strategies in
854 business operations (Peng 2003). In contrast, in most developed countries, the contract is a
855 more effective governance mechanism for promoting inter-organizational exchange. A wider
856 scope of data collection across different countries and regions could provide valuable
857 information that would expand the generalization of the research results.

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863 **SUPPLEMENTAL DATA**

864 Appendixes S1 and S2, and Tables S1 and S2, are available online in the ASCE
865 Library (www.ascelibrary.org).

866 **REFERENCE**

- 867 Ahola, T., Ruuska, I., Artto, K., and Kujala, J. (2014). "What is project governance and what are its
868 origins?" *International Journal of Project Management*, 32(8), 1321-1332.
- 869 Aiken, L. S., West, S. G., and Reno, R. R. (1991). *Multiple regression: Testing and interpreting*
870 *interactions*, Sage, Thousand Oaks, California.
- 871 Anderson, E., and Weitz, B. (1989). "Determinants of Continuity in Conventional Industrial Channel
872 Dyads." *Marketing Science*, 8(4), 310-323.
- 873 Armstrong, J. S., and Overton, T. S. (1977). "Estimating nonresponse bias in mail surveys." *Journal of*
874 *marketing research*, 396-402.
- 875 Arranz, N., and Arroyabe, J. C. F. D. (2012). "Effect of Formal Contracts, Relational Norms and Trust
876 on Performance of Joint Research and Development Projects." *British Journal of Management*,
877 23(4), 575-588.
- 878 Beatty, J. F., and Samuelson, S. S. (1990). "Business Law and the Legal Environment, Standard Edition,
879 6th Edition." 9(2), 175-184.
- 880 Bowman, C., and Ambrosini, V. (2000). "Value Creation Versus Value Capture: Towards a Coherent
881 Definition of Value in Strategy." *British Journal of Management*, 11(1), 1-15.
- 882 Burkert, M., Ivens, B. S., and Shan, J. (2012). "Governance mechanisms in domestic and international
883 buyer-supplier relationships: An empirical study." *Industrial Marketing Management*, 41(3),

- 884 544-556.
- 885 Buvik, M. P., and Rolfsen, M. (2015). "Prior ties and trust development in project teams"CA case study
886 from the construction industry." *International Journal of Project Management*, 33(7), 1484-
887 1494.
- 888 Cai, S., Yang, Z., and Hu, Z. (2009). "Exploring the governance mechanisms of quasi-integration in
889 buyer–supplier relationships." *Journal of Business Research*, 62(6), 660-666.
- 890 Caniëls, M. C. J., and Gelderman, C. J. (2010). "The Safeguarding Effect of Governance Mechanisms in
891 Inter - firm Exchange: The Decisive Role of Mutual Opportunism." *British Journal of*
892 *Management*, 21(1), 239–254.
- 893 Cannon, J. P., Achrol, R. S., and Gundlach, G. T. (2000). "Contracts, norms, and plural form governance."
894 *Journal of the Academy of Marketing Science*, 28(2), 180-194.
- 895 Cao, Z., and Lumineau, F. (2015). "Revisiting the interplay between contractual and relational
896 governance: A qualitative and meta-analytic investigation." *Journal of Operations Management*,
897 33, 15-42.
- 898 Carr, A. S., and Kaynak, H. (2007). "Communication methods, information sharing, supplier
899 development and performance: An empirical study of their relationships." *International Journal*
900 *of Operations & Production Management*, 27(4), 346-370.
- 901 Carr, A. S., and Pearson, J. N. (1999). "Strategically managed buyer–supplier relationships and
902 performance outcomes." *Journal of Operations Management*, 17(5), 497-519.
- 903 Carson, S. J., Madhok, A., and Wu, T. (2006). "Uncertainty, opportunism, and governance: The effects
904 of volatility and ambiguity on formal and relational contracting." *Academy of Management*
905 *Journal*, 49(5), 1058-1077.
- 906 Che, K. I. C. I., Costello, S. B., and Wilkinson, S. (2015). "Establishment of Quantitative Measures for
907 Team Integration Assessment in Alliance Projects." *Journal of Management in Engineering*,
908 31(5), 04014075.
- 909 Chen, C., Zhu, X., Ao, J., and Cai, L. (2013). "Governance Mechanisms and New Venture Performance
910 in China." *Systems Research & Behavioral Science*, 30(3), 383–397.
- 911 Chen, I. J., Paulraj, A., and Lado, A. A. (2004). "Strategic purchasing, supply management, and firm
912 performance." *Journal of Operations Management*, 22(5), 505-523.
- 913 Chen, L., and Manley, K. (2014). "Validation of an instrument to measure governance and performance
914 on collaborative infrastructure projects." *Journal of Construction Engineering and Management*,
915 140(5), 04014006.
- 916 Chen, P., and Partington, D. (2004). "An interpretive comparison of Chinese and Western conceptions of
917 relationships in construction project management work." *International Journal of Project*
918 *Management*, 22(5), 397-406.
- 919 Chi, C. S. F., and Javernick - Will, A. N. (2011). "Institutional effects on project arrangement: high -
920 speed rail projects in China and Taiwan." *Construction Management & Economics*, 29(6), 595-
921 611.
- 922 Chi, C. S., Ruuska, I., Levitt, R., Ahola, T., and Artto, K. (2011). "A Relational Governance Approach
923 for Megaprojects: Case Studies of Beijing T3 and Bird’s Nest Projects in China." *Proceeding*
924 *of EPOC 2011 Conference*.
- 925 Claro, D. P., Hagelaar, G., and Omta, O. (2003). "The determinants of relational governance and
926 performance: how to manage business relationships?" *Industrial Marketing Management*, 32(8),
927 703-716.

- 928 Crosno, J. L., and Dahlstrom, R. (2008). "A meta-analytic review of opportunism in exchange
929 relationships." *Journal of the Academy of Marketing Science*, 36(2), 191-201.
- 930 Das, T. K., and Teng, B. S. (2001). "Relational Risk and Its Personal Correlates in Strategic Alliances."
931 *J. Bus. Psychol.*, 15(3), 449-465.
- 932 Davies, H., and Walters, P. (2004). "Emergent patterns of strategy, environment and performance in a
933 transition economy." *Strategic Management Journal*, 25(4), 347-364.
- 934 Dess, G. G., and Beard, D. W. (1984). "Dimensions of Organizational Task Environments."
935 *Administrative Science Quarterly*, 29(1), 52-73.
- 936 Dooley, K. J., and Ven, A. H. V. D. (1999). "Explaining Complex Organizational Dynamics."
937 *Organization Science*, 10(3), 358-372.
- 938 Doz, Y. L. (1996). "The Evolution of Cooperation in Strategic Alliances: Initial Conditions or Learning
939 Processes?" *Strategic Management Journal*, 17(S1), 55-83.
- 940 Dwyer, F. R., Schurr, P. H., and Oh, S. (1987). "Developing Buyer-Seller Relationships." *Journal of*
941 *Marketing*, 51(2), 11-27.
- 942 Dyer, J. H., and Singh, H. (1998). "The relational view: Cooperative strategy and sources of
943 interorganizational competitive advantage." *Academy of management review*, 23(4), 660-679.
- 944 Eisenhardt, K. M. (1985). "Control: Organizational and Economic Approaches." *Management Science*,
945 31(2), 134-149.
- 946 Flyvbjerg, B. (2011). "Over budget, over time, over and over again: managing major projects. The Oxford
947 Handbook of Project Management." *Oxford University Press*.
- 948 Flyvbjerg, B. (2014). "What you should know about megaprojects and why: an overview." *Project*
949 *Management Journal*, 45(2), 6-19.
- 950 Fryxell, G. E., Dooley, R. S., and Vryza, M. (2002). "After the ink dries: The interaction of trust and
951 control in US - based international joint ventures." *Journal of Management Studies*, 39(6), 865-
952 886.
- 953 Goo, J., Kishore, R., Rao, H. R., and Nam, K. (2009). "The role of service level agreements in relational
954 management of information technology outsourcing: an empirical study." *MIS Quarterly*, 119-
955 145.
- 956 Grewal, R., and Dharwadkar, R. (2002). "The role of the institutional environment in marketing
957 channels." *Journal of Marketing*, 66(3), 82-97.
- 958 Griffith, D. A., and Myers, M. B. (2005). "The performance implications of strategic fit of relational
959 norm governance strategies in global supply chain relationships." *Journal of International*
960 *Business Studies*, 36(3), 254-269.
- 961 Griffith, D. A., Harvey, M. G., and Lusch, R. F. (2006). "Social exchange in supply chain relationships:
962 The resulting benefits of procedural and distributive justice." *Journal of operations*
963 *management*, 24(2), 85-98.
- 964 Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2014). *A primer on partial least squares*
965 *structural equation modeling (PLS-SEM)*, Sage Publications, Thousand Oaks, California.
- 966 Hair, J. F., Ringle, C. M., and Sarstedt, M. (2011). "PLS-SEM: Indeed a silver bullet." *Journal of*
967 *Marketing theory and Practice*, 19(2), 139-152.
- 968 Hanisch, B., and Wald, A. (2011). "A project management research framework integrating multiple
969 theoretical perspectives and influencing factors." *Project Management Journal*, 42(3), 4-22.
- 970 Heide, J. B. (1994). "Interorganizational governance in marketing channels." *The Journal of Marketing*,
971 71-85.

- 972 Heide, J. B., and John, G. (1992). "Do norms matter in marketing relationships?" *The Journal of*
973 *Marketing*, 56(2), 32-44.
- 974 Hellman, J., and Schankerman, M. (2000). "Intervention, Corruption and Capture: The Nexus between
975 Enterprises and the State." *Economics of Transition*, 8(3), 545-576.
- 976 Henisz, W. J., Levitt, R. E., and Scott, W. R. (2012). "Toward a unified theory of project governance:
977 economic, sociological and psychological supports for relational contracting." *Engineering*
978 *Project Organization Journal*, 2(1-2), 37-55.
- 979 Hewett, K., and Bearden, W. O. (2001). "Dependence, trust, and relational behavior on the part of foreign
980 subsidiary marketing operations: Implications for managing global marketing operations."
981 *Journal of marketing*, 65(4), 51-66.
- 982 Hinds, P. J., and Mortensen, M. (2005). "Understanding Conflict in Geographically Distributed Teams:
983 The Moderating Effects of Shared Identity, Shared Context, and Spontaneous Communication."
984 *Organization Science*, 16(3), 290-307.
- 985 Hope, J., and Fraser, R. (2003). *Beyond Budgeting: How Managers Can Break Free from the Annual*
986 *Performance Trap*, Harvard Business Press.
- 987 Hoppner, J. J., and Griffith, D. A. (2011). "The role of reciprocity in clarifying the performance payoff
988 of relational behavior." *Journal of Marketing Research*, 48(5), 920-928.
- 989 Jap, S. D., and Anderson, E. (2003). "Safeguarding interorganizational performance and continuity under
990 ex post opportunism." *Management Science*, 49(12), 1684-1701.
- 991 Jap, S. D., and Ganesan, S. (2000). "Control mechanisms and the relationship life cycle: Implications for
992 safeguarding specific investments and developing commitment." *Journal of marketing research*,
993 37(2), 227-245.
- 994 Jayaraman, V., Narayanan, S., Luo, Y., and Swaminathan, J. M. (2013). "Offshoring Business Process
995 Services and Governance Control Mechanisms: An Examination of Service Providers from
996 India." *Production & Operations Management*, 22(2), 314-334.
- 997 Jiang, W., and Lu, Y. (2017). "Influence of initial trust on control from client perspective: Construction
998 industry in China." *Engineering Construction & Architectural Management*, 24(2), 326-345.
- 999 Jiang, W., Lu, Y., and Le, Y. (2016). "Trust and Project Success: A Twofold Perspective between Owners
1000 and Contractors." *Journal of Management in Engineering*, 32(6), 04016022.
- 1001 Jiang, X., Li, M., Gao, S., Bao, Y., and Jiang, F. (2013). "Managing knowledge leakage in strategic
1002 alliances: The effects of trust and formal contracts." *Industrial Marketing Management*, 42(6),
1003 983-991.
- 1004 Johnston, D. A., McCutcheon, D. M., Stuart, F. I., and Kerwood, H. (2004). "Effects of supplier trust on
1005 performance of cooperative supplier relationships." *Journal of operations Management*, 22(1),
1006 23-38.
- 1007 Katsikeas, C. S., Skarmeas, D., and Bello, D. C. (2009). "Developing Successful Trust-Based
1008 International Exchange Relationships." *Journal of International Business Studies*, 40(1), 132-
1009 155.
- 1010 Ke, Y., Ling, F. Y., and Zou, P. X. (2013). Effects of contract strategy on interpersonal relations and
1011 project outcomes of public-sector construction contracts in Australia. *Journal of Management*
1012 *in Engineering*, 31(4), 04014062.
- 1013 Khalfan, M. M. A., Mcdermott, P., and Swan, W. (2007). "Building trust in construction projects." *Supply*
1014 *Chain Management*, 12(6), 385-391.
- 1015 Koolwijk, J. S. J., van Oel, C. J., Wamelink, J. W. F., and Vrijhoef, R. (2018). "Collaboration and

- 1016 Integration in Project-Based Supply Chains in the Construction Industry." *Journal of*
 1017 *Management in Engineering*, 34(3), 04018001.
- 1018 Koufteros, X. A., Vonderembse, M. A., and Doll, W. J. (2002). "Integrated product development practices
 1019 and competitive capabilities: the effects of uncertainty, equivocality, and platform strategy."
 1020 *Journal of Operations Management*, 20(4), 331-355.
- 1021 Lau, E., and Rowlinson, S. (2009). "Interpersonal trust and inter - firm trust in construction projects."
 1022 *Construction Management and Economics*, 27(6), 539-554.
- 1023 Le, Y., Shan, M., Chan, A. P., and Hu, Y. (2014). "Investigating the causal relationships between causes
 1024 of and vulnerabilities to corruption in the Chinese public construction sector." *Journal of*
 1025 *construction engineering and management*, 140(9), 05014007.
- 1026 Levinthal, D. A., and Fichman, M. (1988). "Dynamics of Interorganizational Attachments: Auditor-
 1027 Client Relationships." *Administrative Science Quarterly*, 33(3), 345-369.
- 1028 Li, H., and Atuahene-Gima, K. (2001). "Product innovation strategy and the performance of new
 1029 technology ventures in China." *Academy of Management Journal*, 44(6), 1123-1134.
- 1030 Li, J. J., Poppo, L., and Zhou, K. Z. (2010). "Relational mechanisms, formal contracts, and local
 1031 knowledge acquisition by international subsidiaries." *Strategic Management Journal*, 31(4),
 1032 349-370.
- 1033 Li, Y., Lu, Y., Ma, L., and Kwak, Y. H. (2018). "Evolutionary Governance for Mega-Event Projects
 1034 (MEPs): A Case Study of the World Expo 2010 in China." *Project Management Journal*, 49(1),
 1035 57-78.
- 1036 Ling, F. Y. Y., Chan, S. L., Chong, E., and Ee, L. P. (2004). "Predicting Performance of Design-Build and
 1037 Design-Bid-Build Projects." *Journal of Construction Engineering & Management*, 130(1), 75-
 1038 83.
- 1039 Liu, Y., Luo, Y., and Liu, T. (2009). "Governing buyer-supplier relationships through transactional and
 1040 relational mechanisms: Evidence from China." *Journal of Operations Management*, 27(4), 294-
 1041 309.
- 1042 Lu, P., Guo, S., Qian, L., He, P., and Xu, X. (2015). "The effectiveness of contractual and relational
 1043 governances in construction projects in China." *International Journal of Project Management*,
 1044 33(1), 212-222.
- 1045 Lu, P., Qian, L., Chu, Z., and Xu, X. (2016). "Role of Opportunism and Trust in Construction Projects:
 1046 Empirical Evidence from China." *Journal of Management in Engineering*, 32(2), 05015007.
- 1047 Lu, S., and Yan, H. (2007). "A model for evaluating the applicability of partnering in construction."
 1048 *International Journal of Project Management*, 25(2), 164-170.
- 1049 Lui, S. S. (2009). "The roles of competence trust, formal contract, and time horizon in interorganizational
 1050 learning." *Organization Studies*, 30(4), 333-353.
- 1051 Lui, S. S., Wong, Y. Y., and Liu, W. (2009). "Asset specificity roles in interfirm cooperation: Reducing
 1052 opportunistic behavior or increasing cooperative behavior?" *Journal of Business research*,
 1053 62(11), 1214-1219.
- 1054 Lumineau, F., Fréchet, M., and Puthod, D. (2011). "An organizational learning perspective on the
 1055 contracting process." *Strategic Organization*, 9(1), 8-32.
- 1056 Luo, Y. (2002). "Contract, cooperation, and performance in international joint ventures." *Strategic*
 1057 *management journal*, 23(10), 903-919.
- 1058 Lusch, R. F., and Brown, J. R. (1996). "Interdependency, contracting, and relational behavior in
 1059 marketing channels." *The Journal of Marketing*, 60(4), 19-38.

- 1060 Macneil, I. R. (1980). "Power, contract, and the economic model." *Journal of Economic Issues*, 14(4),
1061 909-923.
- 1062 Malhotra, D., and Lumineau, F. (2011). "Trust and collaboration in the aftermath of conflict: The effects
1063 of contract structure." *Academy of Management Journal*, 54(5), 981-998.
- 1064 Malhotra, D., and Murnighan, J. K. (2002). "The Effects of Contracts on Interpersonal Trust."
1065 *Administrative Science Quarterly*, 47(3), 534-559.
- 1066 Memon, S. A., Hadikusumo, B., and Sunindijo, R. Y. (2014). "Using Social Interaction Theory to
1067 Promote Successful Relational Contracting between Clients and Contractors in Construction."
1068 *Journal of Management in Engineering*, 31(6), 04014095.
- 1069 Meng, X. (2012). "The effect of relationship management on project performance in construction."
1070 *International journal of project management*, 30(2), 188-198.
- 1071 Möller, K., and Svahn, S. (2004). "Crossing East-West boundaries: Knowledge sharing in intercultural
1072 business networks." *Industrial Marketing Management*, 33(3), 219-228.
- 1073 Molm, L. D., Schaefer, D. R., and Collett, J. L. (2009). "Fragile and Resilient Trust: Risk and Uncertainty
1074 in Negotiated and Reciprocal Exchange." *Sociological Theory*, 27(1), 1–32.
- 1075 Morgan, R. M., and Hunt, S. D. (1994). "The Commitment-Trust Theory of Relationship Marketing."
1076 *Journal of Marketing*, 58(3), 20-38.
- 1077 Morris, P. W., and Hough, G. H. (1987). *The anatomy of major projects: A study of the reality of project
1078 management*, Wiley, Chichester.
- 1079 Myers, P. S. (2007). *Strategic and operational autonomy in the governance of multiparty ventures*,
1080 Harvard University, Cambridge, MA.
- 1081 Nachtsheim, and Chris (2004). *Applied linear regression models*, McGraw-Hill/Irwin.
- 1082 Ni, G., Cui, Q., Sang, L., Wang, W., and Xia, D. (2017). "Knowledge-Sharing Culture, Project-Team
1083 Interaction, and Knowledge-Sharing Performance among Project Members." *Journal of
1084 Management in Engineering*, 34(2), 04017065.
- 1085 Ning, Y., and Ling, F. Y. Y. (2013). "Comparative study of drivers of and barriers to relational transactions
1086 faced by public clients, private contractors and consultants in public projects." *Habitat
1087 International*, 40, 91-99.
- 1088 Ning, Y., and Ling, F. Y. Y. (2014). "Boosting public construction project outcomes through relational
1089 transactions." *Journal of Construction Engineering and Management*, 140(1), 04013037.
- 1090 Nyaga, G. N., Whipple, J. M., and Lynch, D. F. (2010). "Examining supply chain relationships: do buyer
1091 and supplier perspectives on collaborative relationships differ?" *Journal of Operations
1092 Management*, 28(2), 101-114.
- 1093 Olsen, B. E., Haugland, S. A., Karlsen, E., and Husøy, G. J. (2005). "Governance of complex
1094 procurements in the oil and gas industry." *Journal of Purchasing & Supply Management*, 11(1),
1095 1-13.
- 1096 Osipova, E. (2015). "Establishing Cooperative Relationships and Joint Risk Management in Construction
1097 Projects: Agency Theory Perspective." *Journal of Management in Engineering*, 31(6).
1098 05014026
- 1099 Park, H., Kim, K., Kim, Y. W., and Kim, H. (2017). "Stakeholder management in long-term complex
1100 megaconstruction projects: The Saemangeum Project." *Journal of Management in Engineering*,
1101 33(4), 05017002.
- 1102 Paulraj, A., Lado, A. A., and Chen, I. J. (2008). "Inter-organizational communication as a relational
1103 competency: Antecedents and performance outcomes in collaborative buyer-supplier

- 1104 relationships." *Journal of operations management*, 26(1), 45-64.
- 1105 Peng, M. W. (2003). "Institutional transitions and strategic choices." *Academy of management review*,
1106 28(2), 275-296.
- 1107 Phelps, A. F., and Reddy, M. "The influence of boundary objects on group collaboration in construction
1108 project teams." *Proc., International ACM Siggroup Conference on Supporting Group Work*,
1109 125-128.
- 1110 Pinto, J. K., Slevin, D. P., and English, B. (2009). "Trust in projects: An empirical assessment of
1111 owner/contractor relationships." *International Journal of Project Management*, 27(6), 638-648.
- 1112 Pistor, K., Raiser, M., and Gelfer, S. (2000). "Law and Finance in Transition Economies." *Economics of
1113 Transition*, 8(2), 325-368.
- 1114 Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P. (2003). "Common method biases in
1115 behavioral research: a critical review of the literature and recommended remedies." *Journal of
1116 applied psychology*, 88(5), 879.
- 1117 Poppo, L., and Zenger, T. (2002). "Do formal contracts and relational governance function as substitutes
1118 or complements?" *Strategic management journal*, 23(8), 707-725.
- 1119 Rahman, M., and Alhassan, A. (2012). "A contractor's perception on early contractor involvement." *Built
1120 Environment Project & Asset Management*, 2(2), 217-233.
- 1121 Sallinen, L., Ruuska, I., and Ahola, T. (2013). "How governmental stakeholders influence large projects:
1122 the case of nuclear power plant projects." *International Journal of Managing Projects in
1123 Business*, 6(1), 51-68.
- 1124 Schepker, D. J., Oh, W. Y., Martynov, A., and Poppo, L. (2014). "The many futures of contracts : moving
1125 beyond structure and safeguarding to coordination and adaptation." *Journal of Management*,
1126 40(1), 193-225.
- 1127 Schilke, O., and Cook, K. S. (2015). "Sources of alliance partner trustworthiness: Integrating calculative
1128 and relational perspectives." *Strategic Management Journal*, 36(2), 276-297.
- 1129 Sezen, B., and Yilmaz, C. (2007). "Relative effects of dependence and trust on flexibility, information
1130 exchange, and solidarity in marketing channels." *Journal of Business & Industrial Marketing*,
1131 22(1), 41-51.
- 1132 Shiu, E., Jiang, Z., and Zaefarian, G. (2014). "Antecedents of behavioural commitment in inter-
1133 organizational relationships: a field study of the UK construction industry." *Construction
1134 Management and Economics*, 32(9), 888-903.
- 1135 Singh, A., and Teng, J. T. (2016). "Enhancing supply chain outcomes through Information Technology
1136 and Trust." *Comput. Human Behav.*, 54, 290-300.
- 1137 Stinchcombe, A. L., and Heimer, C. A. (1985). *Organization theory and project management :
1138 administering uncertainty in Norwegian offshore oil*, Oxford University Press, USA.
- 1139 Tanriverdi, H., Konana, P., and Ge, L. (2007). "The Choice of Sourcing Mechanisms for Business
1140 Processes." *Information Systems Research*, 18(3), 280-299.
- 1141 Tatikonda, M. V., and Montoya-Weiss, M. M. (2001). "Integrating Operations and Marketing
1142 Perspectives of Product Innovation: The Influence of Organizational Process Factors and
1143 Capabilities on Development Performance." *Management Science*, 47(1), 151-172.
- 1144 Tatikonda, M. V., and Rosenthal, S. R. (2000). "Technology novelty, project complexity, and product
1145 development project execution success: a deeper look at task uncertainty in product innovation."
1146 *IEEE Transactions on Engineering Management*, 47(1), 74-87.
- 1147 Wang, L., Yeung, J. H. Y., and Zhang, M. (2011). "The impact of trust and contract on innovation

- 1148 performance: The moderating role of environmental uncertainty." *International Journal of*
 1149 *Production Economics*, 134(1), 114-122.
- 1150 Wang, Q., Bradford, K., Xu, J., and Weitz, B. (2008). "Creativity in buyer–seller relationships: The role
 1151 of governance ☆." *International Journal of Research in Marketing*, 25(2), 109-118.
- 1152 Weitz, B. A., and Jap, S. D. (1995). "Relationship marketing and distribution channels." *Journal of the*
 1153 *Academy of Marketing Science*, 23(4), 305-320.
- 1154 Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*,
 1155 Free Press, New York.
- 1156 Winch, G. (1989). "The construction firm and the construction project: a transaction cost approach."
 1157 *Construction Management and Economics*, 7(4), 331-345.
- 1158 Wu, G., Zhao, X., and Zuo, J. (2017a). "Relationship between Project's Added Value and the Trust–
 1159 Conflict Interaction among Project Teams." *Journal of Management in Engineering*,
 1160 33(4):04017011.
- 1161 Wu, A., Wang, Z., and Chen, S. (2017b). "Impact of specific investments, governance mechanisms and
 1162 behaviors on the performance of cooperative innovation projects." *International Journal of*
 1163 *Project Management*, 35(3), 504-515.
- 1164 Wuyts, S., and Geyskens, I. (2005). "The formation of buyer-supplier relationships: detailed contract
 1165 drafting and close partner selection." *Journal of Marketing*, 69(4), 103-117.
- 1166 Xin, K. R., and Pearce, J. L. (1996). "Guanxi: Connections as Substitutes for Formal Institutional
 1167 Support." *Academy of Management Journal*, 39(6), 1641-1658.
- 1168 Xue, J., Yuan, H., and Shi, B. (2016). "Impact of contextual variables on effectiveness of partnership
 1169 governance mechanisms in megaprojects: Case of Guanxi." *Journal of Management in*
 1170 *Engineering*, 33(1), 04016034.
- 1171 Yan, T., and Dooley, K. J. (2013). "Communication intensity, goal congruence, and uncertainty in
 1172 buyer–Csupplier new product development." *Journal of Operations Management*, 31(7), 523-
 1173 542.
- 1174 Yang, J., Shen, G. Q., Ho, M., Drew, D. S., and Xue, X. (2011). "Stakeholder management in construction:
 1175 An empirical study to address research gaps in previous studies." *International Journal of*
 1176 *Project Management*, 29(7), 900-910.
- 1177 Zhai, Z., Ahola, T., Le, Y., Xie, J. X. (2017). "Governmental Governance of Megaprojects: The Case of
 1178 EXPO 2010 Shanghai." *Project Management Journal*, 48(1), 37-50.
- 1179 Zhang, Q., and Zhou, K. Z. (2013). "Governing interfirm knowledge transfer in the Chinese market: The
 1180 interplay of formal and informal mechanisms." *Industrial Marketing Management*, 42(5), 783-
 1181 791.
- 1182 Zhang, S. B., Fu, Y. F., Gao, Y., and Zheng, X. D. (2016). "Influence of trust and contract on dispute
 1183 negotiation behavioral strategy in construction subcontracting." *Journal of Management in*
 1184 *Engineering*, 32(4), 04016001.
- 1185 Zhang, Z., Wan, D., Jia, M., and Gu, L. (2009). "Prior ties, shared values and cooperation in public-
 1186 private partnerships." *Management and Organization Review*, 5(3), 353-374.
- 1187 Zheng, X., Lu, Y., Le, Y., Li, Y., and Fang, J. (2017). Formation of Interorganizational Relational
 1188 Behavior in Megaprojects: Perspective of the Extended Theory of Planned Behavior. *Journal of*
 1189 *Management in Engineering*, 34(1), 04017052.
- 1190 Zhou, X., Li, Q., Zhao, W., and Cai, H. (2003). "Embeddedness and contractual relationships in China's
 1191 transitional economy." *Am. Sociol. Rev.*, 75-102.

- 1192 Zhuang, G., Xi, Y., and ElAnsary, A. (2008). "The Impact of Interpersonal Guanxi on Exercise of Power
1193 in a Chinese Marketing Channel." *Journal of Marketing Channels*, 15(2-3), 185-210.

List of tables

Table 1. Illustrations of main dimensions of key literature on governance mechanisms

Table 2. Measurements of constructs

Table 3. Demographics of surveyed projects and respondents

Table 4. Descriptive statistics and correlations

Table 5. Factor loading of each items, AVE and CR of each construct

Table 6. Standardized regression results

TABLE 1. Illustrations of main dimensions of key literature on governance mechanisms

Type of formal governance mechanism	Type of informal governance mechanism	Key literature
<ul style="list-style-type: none"> • Ex ante contracts • Ex post control 	<ul style="list-style-type: none"> • Trust 	Zhang and Zhou (2013)
<ul style="list-style-type: none"> • Formal contract 	<ul style="list-style-type: none"> • Relational norms, • Trust 	Arranz and Arroyabe (2012)
<ul style="list-style-type: none"> • Explicit contracts • Relationship-specific investments 	<ul style="list-style-type: none"> • Social norms • Trust 	Burkert et al. (2012)
<ul style="list-style-type: none"> • Contracts • Structural mechanisms (contracts) • Administrative mechanism (effective allocation and demarcation of responsibilities) 	<ul style="list-style-type: none"> • Trust • Relational mechanism (collaboration and information sharing) 	Chen et al. (2013) Jayaraman et al. (2013)
<ul style="list-style-type: none"> • Contract 	<ul style="list-style-type: none"> • Trust 	Malhotra and Lumineau (2011)
<ul style="list-style-type: none"> • Contractual safeguards 	<ul style="list-style-type: none"> • Trustworthiness 	Schilke and Cook (2015)
<ul style="list-style-type: none"> • Contract • Formal control • Administrative control, through explicit contractual agreements; a dominant power position 	<ul style="list-style-type: none"> • Trust • Social control • A dominant power position • Social/relational control 	Jiang et al. (2013) Jin et al. (2014) Caniëls and Gelderman (2010)
<ul style="list-style-type: none"> • Incentives, • Authority 	<ul style="list-style-type: none"> • Trust 	Olsen et al. (2005)
<ul style="list-style-type: none"> • Contract • Power 	<ul style="list-style-type: none"> • Trust 	Wang et al. (2008)
<ul style="list-style-type: none"> • Formal contracts 	<ul style="list-style-type: none"> • Brokered access, • Shared goals, • Trust 	Li et al. (2010)
None	<ul style="list-style-type: none"> • Relational governance (institutional support from the government) 	Chi and Javernick - Will (2011)
None	<ul style="list-style-type: none"> • Governmental governance (institutional support from the government) 	Zhai (2017)

TABLE 2. Measurements of constructs

Constructs	Description of measurement items	Key sources
Contractual term specificity (TS)	TS1 — Governed by written contracts primarily; TS2 — Detailed obligations and rights; TS3 — Detailed rewards and punishments.	Fryxell et al. (2002); Jap and Ganesan (2000)
Contractual contingency adaptability (CA)	CA1 — Detailed approaches for unexpected situations; CA2 — Detailed approaches for conflicts.	Goo et al. (2009); Luo (2002)
Trust (TR)	TR1 — Trustworthy of other participants; TR2 — Ability of other participants to perform tasks; TR3 — Keeping promises; TR4 — Good reputation of other participants; TR5 — Believing provided information of other participants.	Lu et al. (2015)
Institutional support (IS)	IS1 — Building harmonious relationship among multiple stakeholders by the government; IS2 — Implementing policies and programs by the government.	Li and Atuahene-Gima (2001)
Relational behavior (RB)	1) Solidarity (RBS) RBS1 — Addressing problems jointly; RBS2 — Helping others; RBS3 — Committing to improving project relationship. 2) Flexibility (RBF) RBF1 — Flexible to changes; RBF2 — Flexible to conflicts. 3) Information sharing (RBI) RBI1 — Providing proprietary information; RBI2 — Updating information to other participants; RBI3 — Providing information frequently.	Hoppner and Griffith (2011)
Team performance (TP)	TP1 — Satisfied with the time performance; TP2 — Satisfied with the quality performance; TP3 — Satisfied with the cost performance; TP4 — Building long-term partnership; TP5 — Collaborating joint projects in the future.	Lu et al. (2015)
Project uncertainty (PU)	PU1 — Environmental uncertainty; PU2 — Task uncertainty; PU3 — Technological innovation.	Yan and Dooley (2013)

TABLE 3. Demographics of surveyed projects and respondents

Variable	Category	Number	Percentage
Types of respondent firms	Designer	106	52.48%
	Contractor	96	47.52%
Positions of respondents	Project directors	36	17.82%
	Project/team managers	77	38.12%
	Department/operation managers	89	44.06%
Project type	Transportation hub	99	49.01%
	Road	12	5.94%
	Bridge	10	4.95%
	Tunnel	9	4.46%
	Railway	6	2.97%
	Highway	2	0.99%
	Airport	13	6.44%
	Skyscraper	11	5.45%
	Dam	32	15.84%
	Public building (such as event facilities)	8	3.96%
Project location	North China	11	5.45%
	Northeast China	1	0.50%
	East China	98	48.51%
	South Central China	72	35.64%
	Southwest China	17	8.42%
	Northwest China	3	1.49%

TABLE 4. Descriptive statistics and correlations

Variables	1	2	3	4	5	6	7	8	9	10
1. Contractual term specificity	1									
2. Contractual contingency adaptability	0.70**	1								
3. Trust	0.49**	0.48**	1							
4. Institutional support	0.30**	0.17*	0.23**	1						
5. Relational behavior	0.45**	0.35**	0.48**	0.35**	1					
6. Project uncertainty	0.15*	0.10	0.31**	0.14	0.16*	1				
7. Team performance	0.27**	0.22**	0.35**	0.27**	0.57**	-0.06	1			
8. Project duration	0.01	-0.00	0.21**	-0.08	0.06	-0.01	0.11	1		
9. Project delivery method	0.14*	0.06	0.00	0.01	-0.05	-0.02	-0.15*	-0.05	1	
10. Prior collaborative experience	0.11	0.06	0.03	0.17*	0.06	0.03	0.15*	0.18*	0.10	1
Mean	4.04	3.78	3.91	4.16	3.83	3.55	3.87	1.53	1.29	0.71
Standard Deviation(S.D.)	0.53	0.68	0.52	0.57	0.36	0.64	0.42	0.50	0.79	0.45

Note: Sample size =202.

*Significance at $p < 0.05$ level.

**Significance at $p < 0.01$ level.

TABLE 5. Factor loading of each items, AVE and CR of each construct

Construct/item	Loading	<i>t</i> -value	AVE	CR
Contractual term specificity (TS)			0.66	0.85
TS1	0.84	27.71		
TS2	0.84	27.70		
TS3	0.74	14.87		
Contractual contingency adaptability (CA)			0.84	0.91
CA1	0.94	63.46		
CA2	0.89	30.62		
Trust (TR)			0.53	0.85
TR1	0.69	13.34		
TR2	0.71	16.17		
TR3	0.76	20.84		
TR4	0.66	12.19		
TR5	0.82	32.46		
Institutional support (IS)			0.71	0.83
IS1	0.88	20.11		
IS2	0.80	12.31		
Solidarity (RBS)			0.65	0.85
RBS1	0.85	35.60		
RBS2	0.71	15.05		
RBS3	0.85	42.29		
Flexibility (RBF)			0.86	0.92
RBF1	0.92	67.04		
RBF2	0.93	96.60		
Information exchange (RBI)			0.66	0.85
RBI1	0.76	19.87		
RBI2	0.87	43.34		
RBI3	0.81	23.68		
Team performance (TP)			0.61	0.88
TP1	0.84	35.07		
TP2	0.78	25.40		
TP3	0.73	21.78		
TP4	0.79	24.93		
TP5	0.75	20.48		

Construct/item	Loading	<i>t</i> -value	AVE	CR
Project Uncertainty (PU)			0.60	0.82
PU1	0.68	3.10		
PU2	0.85	4.58		
PU3	0.78	4.12		

Note: CR = composite reliability; AVE = average variance extracted.

TABLE 6. Standardized regression results ^a

	Model 1 ^b	Model 2	Model 3	Model 4
	β	β	β	β
Control variables				
<i>Project duration</i>	0.05	0.00	0.01	
<i>Project delivery method</i>	-0.05	-0.09	-0.09	
<i>Prior collaborative experience</i>	0.06	-0.01	-0.01	
Independent variables				
<i>Contractual term specificity (X1)</i>		0.25**	0.23**	
<i>Contractual contingency adaptability (X2)</i>		-0.01	-0.01	
<i>Trust (X3)</i>		0.31***	0.29***	
<i>Institutional support (X4)</i>		0.20***	0.19***	
<i>Relational behavior</i>				0.57***
Moderating variable				
<i>Project uncertainty (X5)</i>		-0.01	0.04	
Interaction terms				
<i>X1*X3</i>			0.19*	
<i>X2*X3</i>			-0.09	
<i>X1*X5</i>			-0.35***	
<i>X2*X5</i>			0.18 ⁺	
<i>X3*X5</i>			0.13 ⁺	
<i>R²</i>	0.01	0.33	0.38	0.32
<i>F-value</i>	0.57	11.95***	8.99***	93.54***
<i>ΔR^2</i>		0.32***	0.05**	

Note: N = 202

*** $p < 0.001$;

** $p < 0.01$;

* $p < 0.05$;

⁺ $p < 0.1$ (two-tailed).

^a The entries in the Table are standardized path coefficients.

^b The dependent variable of Model 1 to Model 3 is relational behavior while the dependent variable of Model 4 is team performance.

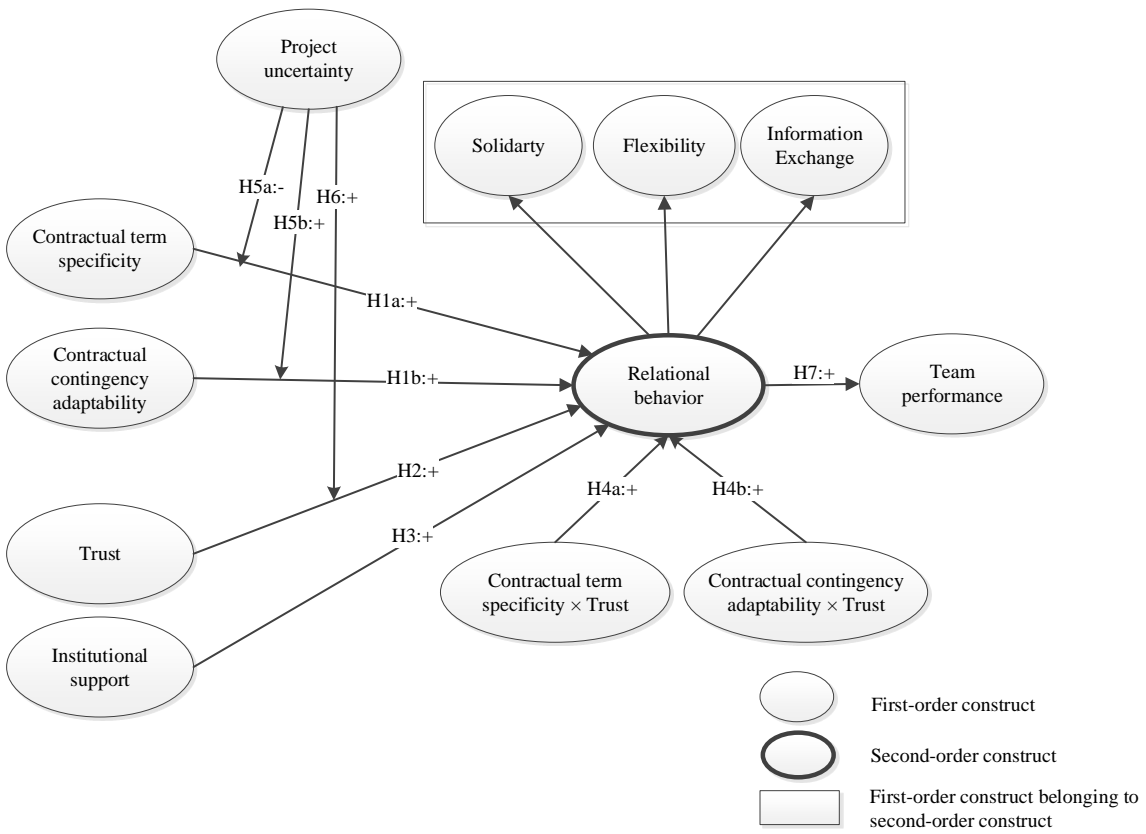


Fig.1. Concept model of the effect of governance mechanisms on relational behavior.

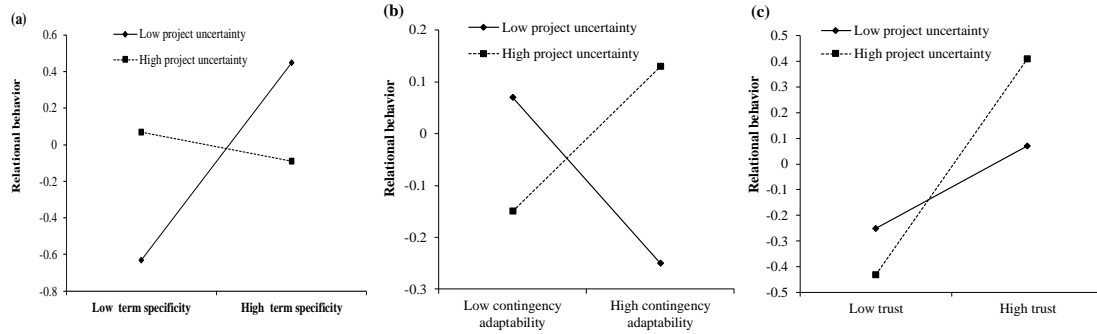


Fig.2. Moderating effects of project uncertainty on the relationship (a) between contractual term specificity and relational behavior; (b) between contractual contingency adaptability and relational behavior; (c) between trust and relational behavior.

Notes: Low and high project uncertainty are equivalent to one standard deviation below and above the means of project uncertainty.