

Journal of Construction Engineering and Management

Key Relational Contracting Practices Affecting the Performance of Public Construction Projects in China

--Manuscript Draft--

Manuscript Number:	COENG-2054R3
Full Title:	Key Relational Contracting Practices Affecting the Performance of Public Construction Projects in China
Manuscript Region of Origin:	CHINA
Article Type:	Technical Paper
Manuscript Classifications:	2.03000: Project Delivery; 2.07000: Procurement; 2.10000: Partnering
Keywords:	Relational Contracting, Public Construction Projects, Strategy, Beijing, Hong Kong
Abstract:	<p>Relational contracting (RC) is based on the recognition of mutual benefits and win-win scenarios that are achieved through more cooperative relationships among the contracting parties in a project. While RC principles are less difficult to apply in private sector projects, it has not been established if public sector projects can enjoy the full benefits of RC. This study aims to investigate the effective RC practices that are found in China's public construction projects. The specific objectives are to: (1) evaluate project performance levels in terms of cost, time, quality and client satisfaction; (2) investigate the extent to which RC practices were adopted; and (3) identify the RC practices that lead to better performance. Due to the large geographical area of China, the surveys conducted were confined to Beijing and Hong Kong. A structured questionnaire was designed to collect qualitative data. The results show that: (1) public construction projects achieved significant success in quality performance and client satisfaction but not in budget and schedule performance; and (2) RC practices were adopted to varying extents in public projects. The findings contribute to knowledge by identifying the specific RC practices that could boost project performance significantly. Another contribution to knowledge is the discovery that the Relational Contract Theory is applicable to public projects notwithstanding the need to keep relations at arm's length. A framework to manage public projects using the RC approach is recommended for adoption in Hong Kong and other countries that adopt project management style along PMI's framework. A different framework is recommended for adoption in Beijing and places that have a centrally planned and controlled economic system so as to help public projects achieve better project performance.</p>
Corresponding Author:	Florence Yean Yng Ling, Ph.D. National University of Singapore Singapore, Singapore SINGAPORE
Corresponding Author E-Mail:	bdglyy@nus.edu.sg
Order of Authors:	<p>Florence Yean Yng Ling, Ph.D.</p> <p>Yongjian Ke, Ph.D.</p> <p>Mohan M. Kumaraswamy, Ph.D.</p> <p>ShouQing Wang, Ph.D.</p>
Suggested Reviewers:	
Opposed Reviewers:	
Additional Information:	
Question	Response
<i>Journal of Construction Engineering and Management Preview is ASCE's initiative to publish author manuscripts online within 72 hours of acceptance and before the final, copyedited version of record is published in print and online. Note: Once</i>	Opt-In (<i>post my uncopyedited manuscript online</i>)

<p>the manuscript is posted online, it is considered published. Edits will ONLY be allowed when the corresponding author receives a proof of the composed and copyedited version of the manuscript. Your uncopyedited manuscript will be posted online unless you click the Opt-Out button below. For more information & policy: http://pubs.asce.org/journals/pap/</p>	
<p>Is the article being considered for more than one journal?The Journal of Construction Engineering and Management does not review manuscripts that are being submitted simultaneously to another organization or ASCE journal for publication.</p>	No.
<p>Is this article already published? Material that has been previously published cannot be considered for publication by ASCE. A manuscript that has been published in a conference proceedings may be reviewed for publication only if it has been significantly revised. If you answer YES, please provide further explanation in your cover letter.</p>	No.
<p>Have all the authors contributed to the study and approved the final version?All authors must have contributed to the study, seen the final draft of the manuscript, and accept responsibility for its contents. It is unethical to list someone as a coauthor who does not want to be associated with the study and who has never seen the manuscript.</p>	Yes.
<p>Was an earlier version of the paper previously considered and declined by ASCE?Declined manuscripts are sent through the review process again. If your manuscript has been submitted to us before under a different title, please provide that title in the space provided below. It is our policy to inform an editor that a manuscript has been previously reviewed, even when it has been reviewed by a different Division, Institute, or Council within ASCE.</p>	No.
<p>Do your table titles/figure captions cite other sources?If you used a figure/table from another source, written permission for print and online use must be attached in PDF format. Permission letters must state that permission is granted in both forms of media. If you used data from another source to create your own figure/table, the data is adapted and therefore obtaining permission is not required.</p>	No.
<p>Does your paper exceed 10,000 words? If YES, please provide justification in your cover letter. If you need help estimating word length, see our sizing worksheet at</p>	No.

<p>this link: Sizing Worksheet</p>	
<p>Estimates for color figures in the printed journal begin at \$924. Cost increases depend on the number and size of figures. Do you intend for any figure to be printed in color? If YES, how many and which ones? Please provide a total count and also list them by figure number.</p>	<p>No.</p>
<p>Is this manuscript a companion to one already submitted/or being submitted? If yes, please note whether this is part I, II, or III. Please make sure all related papers are uploaded on the same day and provide the date of submission, title, and authors of each.</p>	<p>No.</p>
<p>Is this manuscript part of a Special Issue? If yes, please provide the Special Issue title and name of the guest editor.</p>	<p>No.</p>
<p>To read ASCE's Data Sharing Policy, please click on the "Instructions" link associated with this question. According to this policy, you are required to report on any materials sharing restrictions in your cover letter. Are you restricted from sharing your data & materials? If yes, did you report on these in your cover letter?</p>	<p>No.</p>
<p>The journal now requires a clear explanation of the primary contributions this research makes to the Body of Knowledge. These claims need to be present in the Abstract and Conclusion of the manuscript and function as a summary of the unique value the work contributes to the construction engineering and management global community. Please include the statements in this box as well as in the manuscript.</p>	<p>The findings contribute to knowledge by identifying the specific RC practices that could boost project performance significantly. Another contribution to knowledge is the discovery that the Relational Contract Theory is applicable to public projects notwithstanding the need to keep relations at arm's length. A framework to manage public projects using the RC approach is recommended for adoption in Hong Kong and other countries that adopt project management style along PMI's framework. A different framework is recommended for adoption in Beijing and places that have a centrally planned and controlled economic system so as to help public projects achieve better project performance.</p>

Dear Editor

I am pleased to resubmit the paper for your consideration for publication. We have taken in the additional comments of reviewers and editor.

Yours sincerely,
Florence Yean Yng LING

Associate Professor, Dept. of Building, National Univ. of Singapore,
4 Architecture Dr., Singapore 117566.
e-mail: bdglyy@nus.edu.sg

1 **Key Relational Contracting Practices Affecting the Performance of Public**
2 **Construction Projects in China**

3
4 Florence Y.Y. Ling¹, Yongjian Ke², Mohan M. Kumaraswamy, M.ASCE³, and
5 ShouQing Wang⁴

6
7 **Abstract**

8 Relational contracting (RC) is based on the recognition of mutual benefits and
9 win-win scenarios that are achieved through more cooperative relationships among
10 the contracting parties in a project. While RC principles are less difficult to apply in
11 private sector projects, it has not been established if public sector projects can enjoy
12 the full benefits of RC. This study aims to investigate the effective RC practices that
13 are found in China's public construction projects. The specific objectives are to: (1)
14 evaluate project performance levels in terms of cost, time, quality and client

1 Corresponding author, Associate Professor, Department of Building, National University of Singapore,
4 Architecture Drive, Singapore 117566, Email: bdglyy@nus.edu.sg

2 Lecturer, School of Architecture and Built Environment, The University of Newcastle, NSW 2308
Australia, Email: keyongjian@gmail.com

3 Professor, Department of Civil Engineering, The University of Hong Kong, Pokfulam Road, Hong
Kong, China, Email: mohan@hku.hk

4 Professor, Department of Construction Management, Tsinghua University, Beijing 100084, China,
Email: sqwang@tsinghua.edu.cn

15 satisfaction; (2) investigate the extent to which RC practices were adopted; and (3)
16 identify the RC practices that lead to better performance. Due to the large
17 geographical area of China, the surveys conducted were confined to Beijing and
18 Hong Kong. A structured questionnaire was designed to collect qualitative data. The
19 results show that: (1) public construction projects achieved significant success in
20 quality performance and client satisfaction but not in budget and schedule
21 performance; and (2) RC practices were adopted to varying extents in public projects.
22 The findings contribute to knowledge by identifying the specific RC practices that
23 could boost project performance significantly. Another contribution to knowledge is
24 the discovery that the Relational Contract Theory is applicable to public projects
25 notwithstanding the need to keep relations at arm's length. A framework to manage
26 public projects using the RC approach is recommended for adoption in Hong Kong
27 and other countries that adopt project management style along PMI's framework. A
28 different framework is recommended for adoption in Beijing and places that have a
29 centrally planned and controlled economic system so as to help public projects
30 achieve better project performance.

31

32 **Subject headings:** Relational Contracting, Public Construction Projects, Strategy,
33 Beijing, Hong Kong

34

35 **Introduction**

36

37 Relationships among contracting parties include formal transactions and relational
38 links. Formal contracts spell out the rights, responsibilities, and liabilities of the parties
39 concerned. In a formal contract, parties act in an atomized manner, looking out for
40 their own personal interests (Williamson, 1975). Relational contracting (RC) is based
41 on the recognition of mutual benefits and win-win scenarios that are achieved through
42 more cooperative approaches, such as partnering, alliancing, joint venturing,
43 long-term contracting, joint risk-sharing mechanisms, integrated project delivery, and
44 other collaborative working arrangements (Rahman and Kumaraswamy, 2004a; AIA,
45 2007). While RC principles are less difficult to apply in projects initiated by the private
46 sector (Kumaraswamy, 2010), the gap in knowledge is that it is not known if public
47 sector projects can also enjoy the full benefits of RC, such as risk and cost reduction,
48 and better project performance (Akintoye and Main, 2007).

49

50 The term “RC practices” in this paper refers to “relational practices” or practices
51 based on good relationship management, which are RC-type or RC-based, even
52 though the actual contracts may not have incorporated any formal RC approaches.

53

54 China is a legitimate geographical region to investigate, as seen in many previous
55 studies (examples are: Lu et al., 2008; Tai et al, 2009; Chan et al., 2009a; Zhao et al.,
56 2011). Due to its strong economic growth and need for national development, there
57 are many opportunities for architectural, engineering and construction (A/E/C) firms to
58 operate in China's construction industry. However, the Chinese market is full of pitfalls
59 as well. It is fragmented, heterogeneous, risky and highly competitive (Chen and
60 Messner, 2009). To perform well in the Chinese market, knowledge of the types of RC
61 practices that lead to project success may be important. Hence, the aim of this study
62 is to investigate effective RC practices in China's public construction projects. The
63 specific objectives are to: (1) evaluate public project performance levels in terms of
64 cost, time, quality, and client satisfaction; (2) investigate the extent to which RC
65 practices are adopted; and (3) identify the RC practices that lead to better
66 performance of public projects in China.

67

68 Due to China's large geographical area, the scope of this study is confined to public
69 construction projects in Beijing and Hong Kong. The capital city of Beijing was chosen
70 for study as it has a significant number of completed public projects for the 2008
71 Olympics and also because it is representative of how a centrally planned economy

72 operates. Hong Kong, a former British colony and now a Special Administrative
73 Region, was chosen for study because its construction practices are closer to those of
74 A/E/C firms that operate in free market economies. The geographic specific findings
75 of Beijing and Hong Kong could be applied to centrally planned economies and free
76 market economies, respectively, in the context of the broader global community. The
77 contrast between practices in Beijing and Hong Kong helps A/E/C firms that are
78 currently operating in a free market economy and planning to enter a centrally
79 planned market to better understand the differences between the RC practices in
80 different markets. Particular attention could be paid to the key RC practices identified
81 in this study to help them achieve better project outcomes.

82

83 In the next section, a literature review of project performance and RC practices is
84 presented and the knowledge gaps are identified. The research design and data
85 analysis method are then explained, followed by the presentation of the
86 characteristics of the sample. Next, the extent to which RC practices are adopted in
87 Beijing and Hong Kong are compared and discussed, and key RC practices that lead
88 to better project performance are identified. The last section summarizes the findings
89 and offers recommendations to the construction engineering and management
90 community.

91

92 **Literature Review**

93

94 ***Operationalizing Project Performance***

95

96 Project outcomes are multi-faceted. These include the traditional triple project
97 outcomes (time, cost, and quality), safety performance, environmental performance,
98 stakeholder satisfaction, and profitability. For this study, project outcome is viewed
99 from the perspective of project delivery and organizational level competency. For
100 project delivery competency, this research adopts the traditional triple project
101 outcomes as the performance metrics, following Konchar and Sanvido (1998). For
102 organizational level competency, service quality is operationalized as client
103 satisfaction with the project, following Ling et al. (2004).

104

105 ***RC Practices Affecting Project Performance***

106

107 Different aspects of RC have been covered in previous studies. These include drivers
108 (Chan et al., 2003), obstacles (Glagola and Sheedy, 2002), success factors (Chan et
109 al., 2004), components like trust (Wong et al., 2005), culture (Ang and Ofori, 2001),

110 communication (Bayliss et al., 2004), and performance index (Yeung et al., 2007).
111 This study postulates that there are certain RC practices that significantly affect the
112 performance of public construction projects in China. RC practices were identified
113 from the literature review and summarized in Table 1. For brevity, these practices are
114 coded as “a”, “b” and “c” for client, contractor, and consultant, respectively, followed
115 by a reference number. These RC practices are divided into three categories: (1)
116 individual organizational features and practices adopted by each contracting party
117 (coded as a-#, b-# and c-#); (2) practices adopted in tandem by two of the contracting
118 parties (coded as ab-#, ac-# and bc-#); and (3) practices adopted by all the major
119 contracting parties in unison (code: abc-#). “#” represents the reference number of
120 the RC practice.

121

122 <Insert Table 1 here.>

123

124 ***Knowledge Gaps***

125

126 The Relational Contract Theory views contracts more as relations rather than as
127 discrete transactions and thus, all transactions involve a wider social and economic
128 context (Macneil, 1974). The theory states that individual transactions lie on a

129 spectrum ranging from “discrete” through to “relational”. The theory challenges the
130 traditional premise that all contracts are mere transactions, and emphasizes the role
131 of norms in determining the manner in which commercial exchanges operate in
132 practice. These norms are further operationalized into RC approaches/practices.

133

134 The brief literature review revealed that previous studies on RC approaches did not
135 differentiate between public and private construction projects. Whether RC principles
136 could be applied successfully and specifically to public construction projects remains
137 unclear.

138

139 Public projects merit an in-depth study because public clients are usually not in the
140 position to offer future relationship incentives since most projects must be procured
141 through the competitive bidding process, and government regulations traditionally
142 discourage close relationships between public clients and private contracting parties
143 (Rahman and Kumaraswamy, 2004b). Yet, public projects are highly visible and need
144 to achieve the triple project goals because taxpayers’ money is involved.

145

146 The link between the adoption of RC practices and project outcomes is also not
147 known. This study therefore aims to fill the gap by investigating the relevance of the

148 Relational Contract Theory to public contracts through exploring RC practices that
149 may boost the performance of public projects in China significantly.

150

151 **Research Method**

152

153 A large study had been conducted on RC practices and the drivers of and barriers to
154 relational contracts, as well as how these affect the performance of public
155 construction projects in China, Australia, and Singapore. This paper reports a part of
156 the study, focusing on RC practices and project outcomes in China.

157

158 ***Research Design***

159

160 The questionnaire-survey is the adopted choice of research design for this study. The
161 survey was conducted between June and November 2011 in Beijing and Hong Kong.
162 The objectives of the survey that are relevant to this paper are twofold: (1) to evaluate
163 the performance outcomes of completed public construction projects; and (2) to
164 determine the extent to which RC practices were present, observed, practiced or
165 emphasized in these projects.

166

167 The unit of analysis in this study is a completed public sector project, regardless of
168 the extent to which RC approaches were adopted. The target population is thus
169 completed public projects in China, and the sampling frame is hence completed
170 public projects in Beijing and Hong Kong. In order to collect the data, multiple
171 stakeholders comprising public sector clients and consultants, private sector
172 consultants (e.g. architects, engineers, quantity surveyors, and project managers),
173 and contractors, who had been involved in public construction projects in Beijing and
174 Hong Kong, were approached. However, due to the lack of a national registry of
175 officials/firms involved in public construction projects, the contact details of public
176 officials were obtained from government directories. Questionnaires were then sent to
177 all of them because the number is not large. The contact details of private consultants
178 and contractors were derived from the respective professional and trade institutions,
179 and randomly selected. As this group may contain those who have not handled public
180 projects before, the questionnaire clearly stated that only those who had completed
181 public projects should fill up the questionnaire.

182

183 Data were collected using a specially designed structured questionnaire. Section A of
184 the questionnaire requested information on the completed public sector project and
185 the project's performance level in four areas: cost (Y1); time (Y2); quality (Y3); and

186 client satisfaction (Y4). Y1 and Y2 were measured more objectively as percentage of
187 time and cost over/under run. Y3 measured quality of output, stated as product/output
188 quality of the facility/project. Y4 measured quality of service, stated as client
189 satisfaction with the contracting parties' service quality. Service quality measures the
190 transformation process (i.e. the service) from resources to the constructed facility. Y3
191 and Y4 were relatively subjective and thus rated on a five-point Likert scale (1 = Very
192 dissatisfied, 3 = Neutral, 5 = Very satisfied). In Section B, respondents were asked to
193 indicate the extent to which RC practices were adopted on a five-point Likert scale (1
194 = Very low, 3 = Neutral, 5 = Very high). Respondents were also given the opportunity
195 to provide other suggestions and demographic characteristics of themselves and their
196 companies. The questionnaire was pilot tested and then translated into Chinese.

197

198 ***Data Analysis Method***

199

200 The data were analyzed using SPSS software. The main statistical methods used
201 were descriptive statistics, one-way ANOVA, one-sample *t* test and Pearson's
202 correlation analysis. The Confidence Interval (CI) was set at 0.95. One-way ANOVA
203 was conducted to check if there is any significant difference in the extent to which RC
204 practices were adopted in Beijing and Hong Kong. The one-sample *t* test procedure

205 was performed on the four performance metrics (Y1 to Y4) and the RC practices to
206 determine if the projects achieved significantly good performance and if the practices
207 were adopted to a significant extent, respectively. To check whether a greater
208 adoption of RC practices led to better project outcomes, Pearson's correlation
209 analysis was conducted. Each pair of variables in the Pearson's correlation analysis
210 comprised one of the four performance metrics and one of the RC practices.

211

212 **Characteristics of the sample**

213

214 Survey questionnaires were sent to 259 and 645 samples in Beijing and Hong Kong,
215 respectively. 59 and 51 valid questionnaires were returned in Beijing and Hong Kong,
216 representing response rates of 22.78% and 7.91%, respectively. Many more samples
217 were identified in Hong Kong than in Beijing because Hong Kong has more easily
218 available published information of names of public officials and private contractors
219 and consultants. However, this collection comprised a mix of private firms that had
220 and did not have experience in public projects. As the questionnaire instructed those
221 without experience in public sector projects not to reply, even though more
222 questionnaires were sent out in Hong Kong, the fact that there are fewer public sector
223 projects in Hong Kong compared to Beijing explains the lower response rate in Hong

224 Kong.

225

226 As regards sample validity, it is observed that more than 30 sets of valid project data
227 were received. The general convention is that when $n > 30$, the central limit theorem
228 holds true. Moreover, questionnaires were sent to all the public offices that manage
229 public construction projects in Beijing and Hong Kong. No public office had been
230 deliberately left out. Cronbach's alpha values of three categories of RC practices in
231 Beijing and Hong Kong ranged from 0.832 to 0.938, suggesting that the RC practices
232 under each category have a high internal consistency (Nunnally, 1978). It is therefore
233 concluded that these data are reliable and further statistical analyses may be
234 conducted (Nunnally, 1978).

235

236 The characteristics of the respondents are given in Table 2. All the respondents have
237 extensive construction experience in various types of public construction projects.
238 The Beijing and Hong Kong respondents had an average of 11 and 22 years of
239 experience, respectively. The respondents' firms engage an average of 19,934 and
240 3,097 employees in Beijing and Hong Kong, respectively. In the light of the rich
241 experience of the respondents as shown in Table 2, these respondents should be in a
242 position to accurately assess the extent to which RC practices were present,

243 observed, practiced or emphasized in the project.

244

245 <Insert Table 2 here.>

246

247 **Result 1: Performance of Public Projects in Beijing and Hong Kong**

248

249 The first objective of this study is to evaluate project performance levels based on
250 cost, time, quality, and client satisfaction. The *t* test results in Table 3 show that public
251 construction projects in Beijing achieved significantly good performance in client
252 satisfaction (3.32, $p=0.000$) and quality (3.19, $p=0.002$), but had significantly poor
253 cost performance (10.42% cost overrun, $p=0.006$) and marginally failed in time
254 performance (8.41% schedule overrun, $p=0.062$). Public construction projects in
255 Hong Kong also achieved significantly good performance in client satisfaction (3.88,
256 $p=0.000$) and quality (3.98, $p=0.000$), but their mean scores are significantly higher
257 than those in Beijing. Similar to Beijing, the results show that public projects in Hong
258 Kong had significantly poor cost performance (12.50%, $p=0.000$) and time
259 performance (17.78%, $p=0.000$).

260

261 <Insert Table 3 here.>

262

263 Poor cost performance could have arose because of the prevalent practice of under
264 bidding, hidden costs which surface only at the later stage, (Ling et al., 2006a) and
265 inability to respond adequately to perceived change orders (Ling et al., 2008). Poor
266 time performance may be due to Chinese clients changing the project scope and
267 issuing too many change orders (Ling et al., 2006a). While changes were ordered on
268 site, sometimes, the client's top management may not approve them, giving rise to
269 abortive work and further delays (Ling et al, 2006a). Project delays may also come
270 about because of holdups in getting approvals (Ling et al, 2008).

271

272 **Result 2: RC Practices Adopted in Beijing and Hong Kong**

273

274 The second objective of this study is to investigate the extent to which RC practices
275 were adopted in Beijing and Hong Kong using *t* test of the mean. The *t* test results in
276 Tables 4 and 5 show that there are RC practices that had been adopted to a
277 significant extent in Beijing and Hong Kong's public projects. The finding suggests
278 that Macneil's (1974) Relational Contract Theory is applicable to public projects
279 although these generally comprise discrete transactions with little opportunity for
280 future exchanges.

281

282 ANOVA results in Table 3 show that 13 practices were adopted to significantly
283 different extents in Beijing and Hong Kong. Among these, 10 RC practices were used
284 more frequently in Hong Kong, while only three practices were adopted more
285 frequently in Beijing, indicating that RC concepts are generally more acceptable to
286 contracting parties in public construction projects in Hong Kong. The implication is
287 that A/E/C firms planning to penetrate a different type of market (e.g. centrally
288 controlled economies versus free market economies) should pay particular attention
289 to these 13 RC practices in order to gain an advantage over local firms.

290

291 Public clients in Beijing adopted the following RC practices to a significantly lower
292 extent compared to Hong Kong clients – strengthening their financial capacity (a-6);
293 acquiring knowledge of project processes (a-8); committing to other parties on a
294 long-term basis (a-9); and adopting a positive attitude toward continuous
295 improvement (a-16). The results echoed Sachs et al.'s (2007) finding that some local
296 governments in mainland China lack the relevant experience and knowledge in
297 construction, or focus too much on short-term objectives. Public organizations are
298 usually restrained by an inertia that may stem from beliefs such as “that is not our
299 responsibility”, “there is no need to change current practices that are already good

300 enough (or even better than others)", or a "not invented here" syndrome
301 (Palaneeswaran and Kumaraswamy, 2000). This inertia is more evident in Beijing
302 than in Hong Kong, as the long-standing bureaucratic culture in mainland China has
303 often been criticized for its lack of openness and flexibility (Piotrowski et al., 2009). In
304 addition, unlike local governments in mainland China which suffer from a lack of funds,
305 the Hong Kong government has adequate financial reserves and enjoys a budget
306 surplus (Chan et al., 2009a).

307

308 Table 3 shows that compared to Hong Kong, contractors in Beijing had significantly
309 fewer opportunities to provide specific inputs on construction methods and materials
310 before they were formally appointed (b-13). This may be due to the Hong Kong
311 government's more positive attitude toward promoting integration in the construction
312 industry by encouraging contractors to give their feedback before they are formally
313 appointed.

314

315 Contracting parties in public construction projects in Beijing have lower levels of
316 long-term commitment to other parties (a-9, b-9 & c-9) than those in Hong Kong. The
317 Beijing government has been investing heavily in infrastructure development and thus
318 the market for public construction projects in Beijing is huge (BMBS, 2011). This

319 market situation of high construction demand causes private firms in Beijing to
320 disregard the need to have any long-term commitments with other parties.

321

322 Compared to those in Hong Kong, contractors and consultants in Beijing are less
323 familiar with each other (bc-1) and less likely to share information (bc-6). As Beijing's
324 construction market is six times larger than Hong Kong's in terms of gross value of
325 construction work (BMBS, 2011; CSD, 2011), it is therefore less likely for contractors
326 and consultants in Beijing to have prior relationships. This lack of familiarity between
327 contractors and consultants in Beijing may cause them to adopt a more adversarial
328 stance with each other than those in Hong Kong, which could lead to lower
329 enthusiasm to share project information.

330

331 Table 3 shows that "Clarity of division of responsibilities among contracting parties"
332 (abc-1) was rated significantly higher in Hong Kong than in Beijing. As public
333 construction projects in Hong Kong adopt standard conditions of contract, the division
334 of responsibilities is clearer than in Beijing, where in-house or bespoke contracts are
335 preferred (Lu, 2005).

336

337 "Level of reciprocation/face-saving gestures between the client and contractor" (ab-8),

338 “Collective/combined responsibility by a pre-selected group comprising one person
339 from each major party” (abc-4) and “Effectiveness of team-building events used in the
340 project” (abc-13) were rated significantly higher in Beijing than in Hong Kong. This
341 may be attributed to the “*guanxi*” that exists in Chinese culture. Private participants in
342 Beijing have to spend much more time and effort to cultivate *guanxi* with public clients
343 than those in Hong Kong (Sachs et al., 2007). There are hence many entertainment
344 activities that need to be carried out in order to cultivate and maintain good
345 relationships with public clients in Beijing. In Hong Kong, this is not so pronounced
346 because the government departments are inherited from the British, and these have
347 well-defined responsibilities and codes of conduct. They are usually not allowed to
348 participate in team-building events with private firms and cannot receive nor
349 reciprocate favors.

350

351 **Result 3: RC Practices Affecting Project Outcomes**

352

353 The third objective of this study is to identify RC practices that lead to better project
354 performance. Tables 4 and 5 list the RC practices in Beijing and Hong Kong,
355 respectively, that are significantly correlated with performance metrics (Y1 to Y4) in
356 an ascending order based on mean ratings. The mean ratings measure the extent to

357 which the RC practices were adopted. Significant negative correlations with Y1 and
358 Y2 and significant positive correlations with Y3 and Y4 suggest that when the RC
359 practice is adopted to a larger extent, the project performance is also significantly
360 better. Overall, 32 and 56 out of a total of 88 practices are significantly correlated with
361 performance outcomes of public construction projects in Beijing and Hong Kong,
362 respectively. The result indicates that RC principles have greater impact on the
363 outcomes of public construction projects in Hong Kong than in Beijing.

364

365 <Insert Tables 4 and 5 here.>

366

367 Key RC practices are defined in this study as those significantly correlated with
368 project performance but not adopted to a significant extent. As shown in Tables 4 and
369 5, there were eight and 11 of these key RC practices in Beijing and Hong Kong,
370 respectively. These RC practices are further depicted in Figure 1. The discussions in
371 the following sub-sections focus on these key RC practices.

372

373 <Insert Figure 1 here.>

374

375 RC practices affecting project performance significantly are depicted in Figures 2 and

376 3 for Beijing and Hong Kong, respectively. It is suggested that contracting parties
377 adopt these RC practices to a greater extent in future projects so as to achieve better
378 project performance. In terms of generalizing the findings to the broader global
379 community, Figure 2 is important for firms when investing in a centrally controlled
380 economy like China, while Figure 3 is useful for adoption in a free market economy.

381

382 <Insert Figures 2 and 3 here.>

383

384 ***Cost Performance (Y1)***

385

386 Table 4 shows that the cost performance of public construction projects in Beijing is
387 significantly correlated with five RC practices. On the other hand, there are 16 RC
388 practices that are significantly correlated with the cost performance of public
389 construction projects in Hong Kong (see Table 5). Among them, clients' attitude
390 toward continuous improvement (a-16) and consultants' top management support for
391 RC practices (c-15) are significantly correlated with cost performance in both Beijing
392 and Hong Kong. The findings agree with Black et al. (2000) that a positive attitude
393 toward, and support for, RC practices, especially from senior management, is
394 important.

395

396 Among the five RC practices in Beijing that are significantly correlated with cost
397 performance, only one – client’s knowledge level of project processes (a-8) – was not
398 adopted to a significant extent and hence needs to be highlighted. Clients’ lack of
399 knowledge of project processes could lead to an inadequate brief and feasibility study
400 or an inaccurate pre-tender estimate, which may eventually result in cost overrun
401 (Ling and Leong, 2002). It is therefore recommended that public sector organizations
402 capture the knowledge and information on project processes, products, and
403 technology after a project is completed so that better project outcomes can be
404 attained in future projects (Love et al., 2010). For the “one-off” type of client who
405 develops only one project in a long while, it may not be worthwhile to acquire in-depth
406 construction knowledge. In this instance, choosing a reputable and knowledgeable
407 consultant is suggested.

408

409 Four RC practices in Hong Kong, i.e. “Clearly defined equitable risk-sharing
410 arrangement among contracting parties” (abc-6), “Ongoing social relationships
411 between clients and contractors” (ab-7), “Ongoing social relationships between
412 clients and consultants” (ac-7), and “Consultants’ previous experience in relational
413 contracting approaches” (c-10), were not adopted to a significant extent yet had

414 significant correlation with cost performance. This indicates that the RC practices
415 need more attention.

416

417 The respondents in Hong Kong regarded the practice “Clearly defined equitable
418 risk-sharing arrangement among contracting parties” (abc-6) as a key RC practice
419 affecting cost and time performance, and this supports the view of Rahman and
420 Kumaraswamy (2002). Yet, this practice was not adopted to a significant extent
421 because the public sector’s standard conditions of contract drafted by public bodies
422 may be biased toward the public client.

423

424 Table 5 shows “Ongoing social relationships (e.g. “guanxi” and social ties outside of
425 the project)” between clients and contractors/consultants (ab-7 and ac-7) are key RC
426 practices because they were significantly correlated with cost performance, but not
427 adopted to a significant extent. These mutual ongoing social relationships outside of
428 the project between clients and other contracting parties do not commonly exist in
429 public construction projects in Hong Kong. One explanation could be that the
430 procurement procedures in public construction projects in Hong Kong are subject to
431 strict regulations, and competitive bidding is almost always required (Rahman and
432 Kumaraswamy, 2004b). However, this study found that closer ongoing social

433 relationships among contracting parties are significantly correlated with cost (Y1) and
434 time performance (Y2), and client satisfaction (Y4). This could be attributed to the
435 trust and friendship that are present in ongoing relationships, causing contracting
436 parties to be more willing to compromise should problems arise and thus achieve
437 better outcomes (Castro et al., 2009). The implication is that past and current
438 relationships may be taken into account in the selection of contractors and
439 consultants.

440

441 Table 5 shows that consultants' previous experience in RC approaches (c-10) is
442 significantly correlated with cost performance (Y1) and client satisfaction (Y4), but not
443 adopted to a significant extent in Hong Kong. As explained in the introduction, it is still
444 not known if public sector projects can enjoy the full benefits of RC. It is
445 understandable that consultants lack experience in RC approaches.

446

447 ***Time Performance (Y2)***

448

449 Significant negative correlation was observed between schedule overrun of public
450 construction projects in Beijing and eight RC practices (see Table 4), while 14 RC
451 practices are significantly and negatively correlated with time performance in Hong

452 Kong (see Table 5). There is no common practice in the two lists. In Beijing,
453 contractors were involved in five out of eight RC practices, while in Hong Kong, 13 out
454 of 14 practices relate to clients.

455

456 Table 4 shows that the eight RC practices that significantly affect time performance
457 are all significantly adopted in past public construction projects in Beijing. This may be
458 attributed to the Chinese government's strong emphasis on the timely completion of
459 public projects (Liu et al., 2010). It could also be observed in Table 3 that time overrun
460 in Beijing's public construction projects was not significant ($t=1.904$, $p=0.062$), which
461 is consistent with the findings here.

462

463 Among the 14 RC practices that are significantly correlated with time performance in
464 Hong Kong, five practices were not adopted to a significant extent in past projects.
465 These are: "Clearly defined equitable risk-sharing arrangement among contracting
466 parties" (abc-6), "Effectiveness of team-building events used in the project" (abc-13),
467 "Ongoing social relationships between clients and contractors" (ab-7), "Client has
468 organizational culture that fits relational contracting practices" (a-5), and "Previous
469 experience in RC approaches" (a-10). Practices abc-6 and ab-7 had significant
470 correlation with both time performance (Y2) and cost performance (Y1) and have

471 been discussed in the previous section.

472

473 “Effectiveness of team-building events used in the project” (abc-13) was not
474 significantly observed in past public construction projects in Hong Kong. However, as
475 shown in Table 5, significant correlations were found with time performance (Y2) and
476 client satisfaction (Y4). In Hong Kong, officials in public departments that are modeled
477 after the British system are not allowed to participate in team-building events at an
478 inter-personal level. Therefore, contracting parties would rely more on contractual
479 arrangements to guard against trouble, and this rigidity may increase the time needed
480 to execute a project and lead to delays. As team building in the early phases of a
481 project was found to influence participants’ behavior and increase project knowledge
482 (Kadefors, 2004), making more effort in team building is recommended (Diallo and
483 Thuillier, 2005).

484

485 The results show that clients’ “organizational culture fits RC practices” (a-5) and
486 “previous experience in RC approaches” (a-10) were not adopted to a significant
487 extent, yet had significant correlation with time performance (Y2). This agrees with
488 Chan and Kumaraswamy’s (1997) finding that client-initiated variation is one of the
489 principal and common causes of delays in Hong Kong, especially when introduced

490 mid-stream. Clients' lack of an appropriate organizational culture that fits RC
491 practices is the main reason for ineffective project partnering (Ng et al., 2002), and is
492 more critical for public clients (Palaneeswaran and Kumaraswamy, 2000).

493

494 ***Quality Performance (Y3)***

495

496 Quality performance of public construction projects in Beijing is significantly
497 correlated with 13 RC practices. Five out of the 13 practices were not adopted to a
498 significant extent in past public construction projects. On the other hand, 19 RC
499 practices have significant correlation with quality performance in Hong Kong, and two
500 of these were not adopted to a significant extent.

501

502 Contractors' top management support for RC practices (b-15) was significantly
503 correlated with quality performance in both Beijing and Hong Kong. It is the senior
504 management's responsibility to set policies, control resources and train staff. RC is
505 therefore unlikely to succeed without the backing of top management (Akintoye and
506 Main, 2007).

507

508 Five out of the 13 RC practices that are significantly correlated with quality

509 performance in Beijing were not adopted to a significant extent. These include:
510 clients' level of innovation/creativity (a-1) and investment in development of
511 collaborative working skills (a-17), consultants' investment in development of
512 collaborative working skills (c-17), contractors' level of innovation/creativity (b-1), and
513 ongoing social relationships between contractors and consultants (bc-7).

514

515 As clients are responsible for the preparation of clear and unambiguous specifications
516 (Jha and Iyer, 2006), they play an important role in helping the project to achieve the
517 desired quality level and need to be competent in defining the level of expected
518 quality. This may explain why clients' level of innovation/creativity (a-1) and
519 investment in development of collaborative working skills (a-17) had significant
520 correlation with quality performance. However, public clients in Beijing are usually
521 infrequent clients or "one-off" clients (Ke et al., 2011), who are unable to be innovative
522 and are not motivated to develop collaborative working skills because they do not
523 have a demand for construction products on a regular basis.

524

525 Consultants' investment in the development of collaborative working skills (c-17) was
526 not significantly adopted in Beijing, yet had significant impact on quality performance.
527 Zhao et al. (2011) also found that modern project management tools and techniques

528 have not been extensively adopted by consultants in China's construction industry.
529 Under such an environment, it is understandable that consultants do not invest much
530 in the development of collaborative working skills in Beijing. As consultants are
531 important links between clients and contractors, a higher level of collaborative
532 working skills of consultants would increase the interaction among project participants,
533 improve mutual understanding and information sharing, and thereafter boost quality
534 performance (Jha and Iyer, 2006).

535

536 Contractors' level of innovation/creativity (b-1) showed a significant correlation with
537 quality performance, perhaps due to its impact on the contractors' operations and
538 output (Yasamis et al., 2002). Consistent with the low contribution rate of science and
539 technology to China's construction industry (Lu et al., 2008), contractors in Beijing
540 may be unwilling to invest in innovation because of the uncertain outcome.

541

542 Ongoing social relationships between contractors and consultants (bc-7) engender
543 good communication, thereby facilitating proper monitoring and timely feedback,
544 which enhance project quality. Ongoing social relationships also enable instances of
545 poor workmanship or improper usage of resources to be reported promptly, and this
546 aids in achieving the desired quality level (Jha and Iyer, 2006).

547

548 In Hong Kong, consultants' readiness to compromise on unclear issues (c-11) and the
549 level of reciprocation/face-saving gestures between clients and consultants (ac-8) are
550 key RC practices that are significantly correlated with quality performance (Y3) and
551 client satisfaction (Y4). Currently the Hong Kong government uses a two-envelope
552 system (i.e. technical aspects of the proposal in one envelope and consulting fees in
553 the other) for consultant selection (Baark and Wai, 2000). It is therefore difficult for the
554 client to make a reciprocation /face-saving gesture and directly employ a consultant.
555 Meanwhile, the readiness to compromise on unclear issues is perceived to be an
556 important factor in implementing RC principles (Rahman and Kumaraswamy, 2004a).
557 This is more so for consultants, as they prepare specifications and drawings that are
558 usually far from perfect, and so, compromises on unclear issues need to be made by
559 consultants in order to improve quality performance.

560

561 ***Client Satisfaction (Y4)***

562

563 Table 4 shows that client satisfaction is significantly correlated with 11 RC practices in
564 Beijing. As shown in Table 5, 39 RC practices have significant correlation with client
565 satisfaction in Hong Kong. The large difference between the numbers of correlated

566 practices in these two cities may to some extent reflect the greater emphasis and
567 expectation of collaborative behaviors in Hong Kong. Six RC practices were common
568 to both Beijing and Hong Kong. These include three individual features and practices
569 adopted by contractors, and three mutual practices among contracting parties. The
570 former are: “Level of innovation/creativity” (b-1), “Knowledge level of project
571 processes” (b-8), and “Long-term commitment level” (b-9). The latter are: “Sharing of
572 project information between contractor and consultant” (bc-6), “Ongoing social
573 relationships between clients and consultants” (ac-7), and “Level of inter-personal
574 relations/cultural harmony between clients and contractors” (ab-5).

575

576 In Beijing, three out of the six RC practices affecting client satisfaction (b-1, bc-6, ac-7)
577 were not adopted to a significant extent. b-1 has been discussed in the previous
578 section.

579

580 The sharing of project information between contractors and consultants (bc-6) would
581 enable contractors to better understand the design and consultants to promptly
582 identify potential conflicts, leading to higher client satisfaction. However, each party in
583 mainland China tends to treat information as confidential rather than something to be
584 shared. This is to prevent its own interests from being compromised as there is

585 conflict of interests among the participants, especially between contractors and
586 consultants (Tai et al., 2009).

587

588 The reason why “Ongoing social relationship between clients and consultants” (ac-7)
589 was not significantly adopted in Beijing may be attributed to the current procurement
590 system, which was discussed above. It is worth noting that there is a significant
591 negative correlation between Beijing’s client satisfaction and the ongoing
592 relationships between clients and consultants, which is a direct contrast to Hong Kong.
593 Zuo and Ma (2007) found that one of the major issues in China’s consultancy industry
594 is that the responsibilities of consultants are usually not clearly defined. Due to the
595 ongoing social relationships between clients and consultants, they may have signed a
596 loose contract where the responsibilities of consultants are not clearly spelt out.
597 Clients could thereafter be less satisfied.

598

599 Table 5 shows that eight RC practices that significantly affect client satisfaction were
600 not significantly adopted in Hong Kong. They comprise two individual features and
601 practices of consultants, four mutual practices, and two joint practices. The two
602 individual features and practices of consultants are: “Previous experience in RC
603 approaches” (c-10) and “Readiness to compromise on unclear issues” (c-11). The

604 four mutual practices are: “Ongoing social relationships” among contracting parties
605 (ab-7, ac-7 & bc-7) and “Level of reciprocation/face-saving gestures between clients
606 and consultants” (ac-8). The two joint practices are: “Collective/combined
607 responsibility by a pre-selected group comprising one person from each major party”
608 (abc-4) and “Effectiveness of team-building events used in the project” (abc-13).
609 Among them, practices c-10, c-11, ab-7, ac-7, ac-8, and abc-13 have significant
610 correlation with other performance indexes, which has been discussed above.

611

612 Ongoing social relationships among contracting parties (ab-7, ac-7 & bc-7) were
613 found to be significantly correlated with client satisfaction in Hong Kong. This is
614 consistent with Castro et al.’s (2009) finding that construction companies form
615 coalitions principally on the basis of past or current relationships.

616

617 “Collective/combined responsibility by a pre-selected group comprising one person
618 from each major party” (abc-4) is currently not a common behavior in Hong Kong. An
619 independent facilitator is sometimes appointed to chair a few workshops and assist in
620 fostering confidence among the contracting parties (Chan et al., 2009b). However, the
621 facilitator would not be involved throughout the whole life of the project. Therefore, a
622 joint group comprising at least one person from each party is not commonly available.

623

624 **Conclusions**

625

626 This study investigated RC practices that are adopted in public construction projects
627 in China. Using a structured questionnaire, data were collected from experienced
628 contracting parties who had been personally involved in public construction projects
629 in Beijing and Hong Kong. The statistical analysis revealed that public construction
630 projects in both cities had achieved significantly good quality performance and client
631 satisfaction but not in budget and schedule performance. However, public
632 construction projects in Hong Kong achieved significantly better performance in
633 owner satisfaction and quality than those in Beijing.

634

635 The main findings (see Tables 4 and 5) are: 32 and 56 RC practices are significantly
636 correlated with the performance outcomes of public construction projects in Beijing
637 and Hong Kong, respectively; and eight and 11 of these RC practices in Beijing and
638 Hong Kong, respectively, are key practices as they are not adopted to a significant
639 extent but are significantly correlated with performance outcomes. The unique value
640 of the findings to the construction engineering and management community is the
641 identification of a list of key RC practices which could be adopted as they lead to

642 better project outcomes. Some of these key RC practices are: having collective
643 responsibility comprising one person from each major contracting party; sharing risks
644 equitably among contracting parties; organizing effective team-building events;
645 sharing project information among contracting parties; developing collaborative
646 working skills; and compromising on unclear issues.

647

648 Another main finding is that 13 practices were adopted to significantly different
649 extents in Hong Kong and Beijing. To generalize the findings to the broader global
650 community, to a limited extent, the findings from Hong Kong may be applicable to
651 countries that adopt the open market economy, while those from Beijing may be
652 implemented by countries that adopt a planned economy. Hong Kong's open market
653 is indicated by its global competitiveness rank of 11 out of 142 countries, which is
654 comparable to the US and UK's rankings of 5th and 10th respectively, and ahead of
655 Australia's 20th placing (World Economic Forum, 2011). As for Beijing, its planned
656 economy is also known as authoritarian capitalism (McGregor, 2012) where the state
657 directs and controls a large share of the country's economic output. The central
658 planning extends to allocation of workload through administrative orders (Zhang,
659 2003). The implications of the findings for the global communities that adopt project
660 management style along PMI's (2008) framework are: they should have better

661 division of responsibilities among contracting parties; share more project information;
662 and have long-term commitment to the project. On the other hand, in planned
663 economies, RC practices that are adopted to a significantly larger extent are having
664 combined responsibility comprising one person from each major contracting party,
665 and organizing effective team-building events.

666

667 The results show that public projects in China had adopted many RC practices
668 among contracting parties to a significant extent, such as alignment of objectives,
669 joint coordination and monitoring of plans, and joint problem solving. The findings
670 contribute to the body of knowledge by showing that the Relational Contract Theory is
671 valid for public projects even though they are procured through open bidding, and
672 hence do not lend themselves to future relationships. The implication is that A/E/C
673 firms should approach public projects with a relational mindset and not view them as
674 discrete transactions just because the public sector uses open bidding. Another
675 contribution to knowledge is that the relational approach is shown to be important as it
676 leads to better project outcomes.

677

678 One limitation faced in this study is that correlation does not mean causation.
679 Therefore the results should be interpreted carefully. Correlation statistics should not

680 be taken as conclusive evidence that those RC practices are definitely the most
681 appropriate ones to be adopted. Secondly, the findings are not easily generalized to
682 different regions in China, as the public projects that were used to inform this
683 research were from Beijing and Hong Kong only. Finally, the population size could not
684 be estimated, and hence the significance of the sample could not be determined
685 mathematically. In future studies, data from other regions in China could be
686 collected, with the population defined more clearly.

687

688 **Acknowledgements**

689

690 The research is made possible by Singapore Ministry of Education's Academic
691 Research Fund Tier 2 funding support (Grant number: MOE2009-T2-2-067) for the
692 project entitled 'Boosting public construction project outcomes through relational
693 transactions'. Prof Patrick Zou and Ning Yan's contribution to the questionnaire
694 design is acknowledged with grateful thanks. Special gratitude is extended to those
695 industry practitioners who have kindly participated in the surveys reported in this paper

696

697 **References**

698

699 Ahsan, K. and Gunawan, I. (2010) Analysis of cost and schedule performance of
700 international development projects. *International Journal of Project Management*,
701 28(1): 68–78.

702 Akintoye, A. and Main, J. (2007) Collaborative relationships in construction: the UK
703 contractors' perception. *Engineering, Construction and Architectural*
704 *Management*, 14(6): 597-617.

705 American Institute of Architects (2007) *Integrated Project Delivery: A Guide* (Version
706 1). <http://www.aia.org/contractdocs/AIAS077630>. Last visited: 28 March, 2012.

707 Ang, Y.K. and Ofori, G. (2001) Chinese culture and successful implementation of
708 partnering in Singapore's construction industry. *Construction Management and*
709 *Economics*, 19(6): 619-632.

710 Anvuur, A.M. and Kumaraswamy, M.M. (2007) Conceptual model of partnering and
711 alliancing. *Journal of Construction Engineering and Management*, 133(3),
712 225-234.

713 Baark, E. and Wai, M.K. (2000) *Development of the Engineering Consultancy*
714 *Industry in Hong Kong. Working Papers in the Social Sciences, No. 47, The*
715 *Hong Kong University of Science and Technology, 27 October 2000.*

716 Bayliss, R., Cheung, S.O., Suen, H.C.H. and Wong, S.P. (2004) Effective partnering
717 tools in construction: a case study on MTRC TKE contract 604 in Hong Kong.

718 International Journal of Project Management, 22(3): 253-263.

719 Beijing Municipal Bureau of Statistics (2011) Beijing Statistical Yearbook 2011.
720 Beijing, China, December 2011.

721 Black, C., Akintoye, A. and Fitzgerald, E. (2000) An analysis of success factors and
722 benefits of partnering in construction. International Journal of Project
723 Management, 18(6): 423-434.

724 Castro, I., Galan, J.L. and Casanueva, C. (2009) Antecedents of construction projects
725 coalitions: a study of the Spanish construction industry. Construction
726 Management and Economics, 27(9): 809-822.

727 Census and Statistics Department (2011) Hong Kong Annual Digest of Statistics
728 2011. Hong Kong, November, 2011.

729 Chan, A.P.C., Chan, D.W.M. and Ho, K.S.K. (2003) An empirical study of the benefits
730 of construction partnering in Hong Kong. Construction Management and
731 Economics, 21(5): 523-533.

732 Chan, A.P.C., Chan, D.W.M., Chiang, Y.H., Tang, B.S., Chan, E.H.W. and Ho, K.S.K.
733 (2004) Exploring Critical Success Factors for Partnering in Construction Projects.
734 Journal of Construction Engineering and Management, 130(2): 188-198.

735 Chan, A.P.C., Chan, D.W.M., Fan, L.C.N., Lam, P.T.I. and Yeung, J.F.Y. (2006)
736 Partnering for construction excellence – a reality or myth? Build and

- 737 Environment, 41(12): 1924-1933.
- 738 Chan, A.P.C, Lam, P.T.I., Chan, D.W.M., Cheung, E. and Ke, Y.J. (2009a) Drivers for
739 Adopting Public Private Partnerships – Empirical Comparison between China
740 and Hong Kong Special Administrative Region. Journal of Construction
741 Engineering and Management, 135(11): 1115-1124
- 742 Chan, A.P.C., Chan, D.W.M and Yeung, J.F.Y. (2009b) Relationship Contracting for
743 Construction Excellence: Principles, Practices and Case Studies. Taylor &
744 Francis, 2009
- 745 Chan, D.W.M. and Kumaraswamy, M.M. (1997) A comparative study of causes of
746 time overruns in Hong Kong construction projects. International Journal of
747 Project Management, 15(1): 55-63.
- 748 Chen, C.T. and Chen, T.T. (2007) Critical success factors for construction partnering
749 in Taiwan. International Journal of Project Management, 25(5): 475-484.
- 750 Chen, C. and Messner, J.I. (2009) Entry Mode Taxonomy for International
751 Construction Markets. Journal of Management in Engineering, 25(1): 3-11.
- 752 Cheng, E.W.L., Li, H. and Love, P.E.D. (2000) Establishment of critical success
753 factors for construction partnering. Journal of Management in Engineering, 16(2):
754 84-92.
- 755 Cheng, E.W.L. and Li, H. (2001) Development of a conceptual model of construction

756 partnering. *Engineering, Construction and Architectural Management*, 8(4):
757 292-303.

758 Cheng, E.W.L. and Li, H. (2002) Construction partnering process and associated
759 critical success factors: quantitative investigation. *Journal of Management in*
760 *Engineering*, 18(4): 194-202.

761 Diallo, A. and Thuillier D. (2005) The success of international development projects,
762 trust and communication: an African perspective. *International Journal of Project*
763 *Management*, 23(3): 237-252.

764 Doloi, H. (2009) Relational partnerships: the importance of communication, trust and
765 confidence and joint risk management in achieving project success.
766 *Construction Management and Economics*, 27(11): 1099-1109.

767 Dyer, J. H. (1996) Specialized supplier networks as a source of competitive
768 advantage: evidence from the auto industry. *Strategic Management Journal*,
769 17(4): 271-292.

770 Glagola, C.R. and Sheedy, W.M. (2002) Partnering on Defense Contracts. *Journal of*
771 *Construction Engineering and Management*, 128(2): 127-138.

772 Gulati, R. and Gargiulo, M. (1999) Where do inter-organizational networks come from?
773 *American Journal of Sociology*, 104(5): 1439-1493.

774 Halman J.I.M. and Braks B.F.M. (1999) Project alliancing in the offshore industry.

775 International Journal of Project Management, 17(2): 71-76.

776 Hastings, C. (1995) Building the culture of organizational networking: managing
777 projects in the new organization. International Journal of Project Management,
778 13(4): 259-263.

779 Jha, K.N. and Iyer, K.C. (2006) Critical Factors Affecting Quality Performance in
780 Construction Projects. Total Quality Management and Business Excellence,
781 17(9): 1155-1170.

782 Kadefors, A. (2004) Trust in project relationships – inside the black box. International
783 Journal of Project Management, 22(3): 175-182.

784 Ke, Y.J., Ling, F.Y.Y., Kumaraswamy, M.M., Wang, S.Q., Zou, P.X.W. and Ning, Y.
785 (2011) Are Relational Contracting Principles Applicable to Public Construction
786 Projects? Proceedings of RICS COBRA 2011, Sep 12-13, 2011, p.p. 1364-1374.

787 Konchar, M. and Sanvido, V. (1998) Comparison of US project delivery systems.
788 Journal of Construction Engineering and Management, 124(6): 435–444.

789 Kumaraswamy, M.M., Rahman, M.M., Ling, Y.Y. and Phng, S.T. (2005a)
790 Reconstructing cultures for relational contracting. Journal of Construction
791 Engineering and Management, 131(10): 1065-1075.

792 Kumaraswamy, M.M., Ling, Y.Y., Rahman, M.M. and Phng, S.T. (2005b)
793 Constructing relationally integrated teams. Journal of Construction Engineering

794 and Management, 131(10): 1076-1086.

795 Kumaraswamy, M.M., Anvuur, A.M. and Smyth, H.J. (2010) Pursuing “relational
796 integration” and “overall value” through “RIVANS”. Facilities, 28(13/14):
797 673-686.

798 Ling, Y.Y. and Leong, E.F.K. (2002) Performance of design-build projects in terms of
799 cost, quality and time: views of clients, architects and contractors in Singapore.
800 The Australian Journal of Construction Economics and Building, 2(1): 37-46.

801 Ling, F.Y.Y., Chan, S.L., Chong, E. and Ee, L.P. (2004) Predicting performance of DB
802 and DBB projects. Journal of Construction Engineering and Management,
803 130(1): 75–83.

804 Ling, F.Y.Y., Ibbs, C.W. and Hoo, W.Y. (2006a) Determinants of international
805 architectural, engineering and construction firms’ project success in China.
806 Journal of Construction Engineering and Management, 132(2): 206-214.

807 Ling, F.Y.Y., Rahman, M.M. and Ng, T.L. (2006b) Incorporating contractual incentives
808 to facilitate relational contracting. Journal of Professional Issues in Engineering
809 Education and Practice, 132(1): 57-66.

810 Ling, F.Y.Y., Low, S.P., Wang, S.Q. and Temitope, K.E. (2008) Models for predicting
811 project performance in China using project management practices adopted by
812 foreign AEC firms. Journal of Construction Engineering and Management,

813 134(12): 983-990.

814 Liu, Y.W., Zhao, G.F. and Wang, S.Q. (2010) Many Hands, Much Politics, Multiple
815 Risks – The Case of the 2008 Beijing Olympics Stadium. Australian Journal of
816 Public Administration, 69(S1): 85-98.

817 Love, P.E.D., Mistry, D. and Davis, P.R. (2010) Price competitive alliance projects:
818 identification of success factors for public clients. Journal of Construction
819 Engineering and Management, 136(9): 947-956.

820 Lu, T.Y. (2005) The Study on the Construction Contract of Mainland China: With
821 Discussion on the Status of Laws and Dispute Resolution in Taiwan.
822 Department of Law, Soochow University, Master Thesis, 2005

823 Lu, W.S., Shen, L.Y. and Yam, M.C.H. (2008) Critical Success Factors for
824 Competitiveness of Contractors: China Study. Journal of Construction
825 Engineering and Management, 134(12): 972-982.

826 Macneil, I.R. (1974) The Many Futures of Contract. Southern California Law Review,
827 47(3): 691-816.

828 Maurer, I. and Ebers, M. (2006) Dynamics of social capital and their performance
829 implications: lessons from biotechnology start-ups. Administrative Science
830 Quarterly, 51(2): 262-292.

831 McGregor, J. (2012) No Ancient Wisdom, No Followers: The Challenges of Chinese

832 Authoritarian Capitalism. Prospecta Press, Westport, CT.

833 Ng, S.T., Rose, T.M., Mak, M. and Eng, S. (2002) Problematic issues associated with
834 project partnering – the contractor perspective. *International Journal of Project
835 Management*, 20(6): 437-449.

836 Nunnally, J.C. (1978) *Psychometric Theory*, 2nd Ed. New York: McGraw-Hill.

837 Oliver, C. (1990) Determinants of inter-organizational relationships: integration and
838 future directions. *Academy of Management Review*, 15(2): 241-265.

839 Ott, R.L. and Longnecker, M. (2001) *An introduction to statistical methods and data
840 analysis*. Pacific Grove: Duxbury.

841 Palaneeswaran, E. and Kumaraswamy, M.M. (2000) Benchmarking contractor
842 selection practices in public-sector construction – a proposed model.
843 *Engineering, Construction and Architectural Management*, 7(3): 285-299.

844 Pervan, S.J., Bove, L.L., Johnson, L.W. and Lin, C.H. (2011) Effect of reciprocity on
845 well-being in interpersonal marketing relationships: an interview study.
846 *International Journal of Management*, 28(1): 185-197.

847 Piotrowski, S. J., Zhang, Y., Lin, W. and Yu, W. (2009) Key Issues for Implementation
848 of Chinese Open Government Information Regulations. *Public Administration
849 Review*, 69 (S1): 129–135.

850 PMI (2008) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*,

851 4th ed. Project Management Institute: Newton Square, PA.

852 Powell, W.W. (1990) Neither market nor hierarchy: network forms of organization.
853 Research in Organizational Behavior, 12: 295-336.

854 Rahman, M.M. and Kumaraswamy, M.M. (2002) Joint risk management through
855 transactionally efficient relational contracting. Construction Management and
856 Economics, 20(1): 45-54.

857 Rahman, M.M. and Kumaraswamy, M.M. (2004a) Contracting relationship trends and
858 transitions. Journal of Management in Engineering, 20(4): 147-161.

859 Rahman, M.M. and Kumaraswamy, M.M. (2004b) Potential for implementing
860 relational contracting and joint risk management. Journal of Management in
861 Engineering, 20(4): 178-189.

862 Rahman, M.M. and Kumaraswamy, M.M. (2005) Relational selection for collaborative
863 working arrangements. Journal of Construction Engineering and Management,
864 131(10): 1087-1098.

865 Rahman, M.M. and Kumaraswamy, M.M. (2008) Relational Contracting and
866 Teambuilding: Assessing Potential Contractual and Non-Contractual Incentives.
867 Journal of Management in Engineering, 24(1): 48–63.

868 Sachs, T., Tiong, R.L.K. and Wang, S.Q. (2007) Analysis of political risks and
869 opportunities in public private partnerships (PPP) in China and selected Asian

870 countries: Survey results. *Chinese Management Studies*, 1(2): 126-148.

871 Tai, S., Wang, Y. and Anumba, C.J. (2009) A survey on communications in
872 large-scale construction projects in China. *Engineering, Construction and*
873 *Architectural Management*, 16(2): 136-149.

874 Uzzi, B. and Lancaster, R. (2003) Relational embeddedness and learning: the case of
875 bank loan managers and their clients. *Management Science*, 49(4): 383-399.

876 Williamson, O.E. (1975) *Markets and hierarchies: analysis and antitrust implications.*
877 New York: Free Press.

878 Wong, P.S.P., Cheung, S.O. and Ho, P.K.M. (2005) Contractor as Trust Initiator in
879 Construction Partnering – Prisoner’s Dilemma Perspective. *Journal of*
880 *Construction Engineering and Management*, 131(10): 1045-1053.

881 World Economic Forum (2011) *The Global Competitiveness Index 2011 – 2012*
882 *Rankings.* Downloaded on Dec 5, 2012 from:
883 [http://www3.weforum.org/docs/WEF_GCR_CompetitivenessIndexRanking_201](http://www3.weforum.org/docs/WEF_GCR_CompetitivenessIndexRanking_2011-12.pdf)
884 [1-12.pdf](http://www3.weforum.org/docs/WEF_GCR_CompetitivenessIndexRanking_2011-12.pdf)

885 Xu, T., Smith, N.J. and Bower, D. A. (2005) Forms of collaboration and project
886 delivery in Chinese construction markets: probable emergence of strategic
887 alliances and Design/Build. *Journal of Management in Engineering*, 21(3):
888 100-109.

889 Yasamis, F., Arditi, D. and Mohammadi, J. (2002) Assessing contractor quality
890 performance. *Construction Management and Economics*, 20(3): 211-223.

891 Yeung, J.F.Y., Chan, A.P.C., Chan, D.W.M. and Li, L.K. (2007) Development of a
892 partnering performance index (PPI) for construction projects in Hong Kong: a
893 Delphi study. *Construction Management and Economics*, 25(12): 1219-1237.

894 Zaheer, A. and Soda, G. (2009) Network evolution: the origins of structural holes.
895 *Administrative Science Quarterly*, 54(1): 1-31.

896 Zhang, S. (2003) Construction Industry and Enterprises in China: A comprehensive
897 review. *Proceedings of the CIB TG 23 International Conference, Hong Kong,*
898 *China*, pp. 1-12.

899 Zhao, Z.Y., Zuo, J. and Zillante, G. (2011) Situation and Competitiveness of Foreign
900 Project Management Consultancy Enterprises in China. *Journal of Management*
901 *in Engineering*, 27(4): 200-209.

902 Zuo, J. and Ma, T. (2007) The Project Management Consultant in Chinese
903 Construction Industry – The Roles and Responsibilities. *Proceedings of*
904 *Australian Institute of Project Management National Conference 2007, Hobart*
905 *Tasmania, October 7 – 10, 2007.*

906

Table 1: Features and Practices Identified

	RC Practices	Code	Authors who investigated
Individual features & practices	Level of innovation/creativity	a-1, b-1, c-1	Chan et al., 2004; Cheng et al., 2000
	Commitment of resources to the project	a-2, b-2, c-2	Cheng et al., 2000; Chen and Chen, 2007
	Effort in implementing relational contracting practices	a-3, b-3, c-3	Black et al., 2000; Chen and Chen, 2007
	Acceptance of relational contracting practices	a-4, b-4, c-4	Black et al., 2000; Kumaraswamy et al., 2005b
	Organizational culture fit to relational contracting practices	a-5, b-5, c-5	Rahman and Kumaraswamy, 2004a, 2004b
	Financial capacity	a-6, b-6, c-6	Black et al., 2000; Chen and Chen, 2007
	Flexibility when situations change	a-7, b-7, c-7	Chen and Chen, 2007; Ling et al., 2006b
	Knowledge level of project processes	a-8, b-8, c-8	Cheng et al., 2000; Love et al., 2010
	Long-term commitment level	a-9, b-9, c-9	Cheng et al., 2000
	Previous experience in relational contracting approaches	a-10, b-10, c-10	Kumaraswamy et al., 2005a, b;
	Readiness to compromise on unclear issues	a-11, b-11, c-11	Rahman and Kumaraswamy, 2004a, b
	Reputation in the industry	a-12, b-12, c-12	Powell, 1990; Gulati and Gargiulo, 1999
	Specific inputs on construction methods, materials, etc, before they were formally appointed	a-13, b-13, c-13	Bayliss et al., 2004; Rahman and Kumaraswamy, 2004b
	Team working attitude	a-14, b-14, c-14	Black et al., 2000; Chen and Chen, 2007
	Top management support for relational contracting practices	a-15, b-15, c-15	Black et al., 2000, Akintoye and Main, 2007

	Attitude toward continuous improvement	a-16, b-16, c-16	Black et al., 2000; Chen and Chen, 2007
	Investment in development of collaborative working skills	a-17, b-17, c-17	Hastings, 1995; Dyer, 1996
Mutual practices between two members	Familiarity/previous relationships	ab-1, ac-1, bc-1	Gulati, 1999; Zaheer and Soda, 2009
	Mutual trust	ab-2, ac-2, bc-2	Xu et al., 2005; Kumaraswamy, et al., 2005b
	Mutual understanding	ab-3, ac-3, bc-3	Black, 2000; Love et al., 2010
	Open and effective communication	ab-4, ac-4, bc-4	Chen and Chen, 2007; Doloi, 2009
	Level of inter-personal relations/cultural harmony (individual level)	ab-5, ac-5, bc-5	Kumaraswamy et al., 2005a; Rahman and Kumaraswamy, 2008
	Sharing of project information	ab-6, ac-6, bc-6	Uzzi and Lancaster, 2003; Maurer and Ebers 2006
	Ongoing social relationships (e.g. "guanxi", social ties, and kinship outside of this project)	ab-7, ac-7, bc-7	Gulati and Gargiulo, 1999; Castro et al., 2009
	Level of reciprocation/face-saving gestures	ab-8, ac-8, bc-8	Oliver, 1990; Pervan et al., 2011
Joint practices among all members	Clarity of division of responsibilities among contracting parties	abc-1	Anvuur and Kumaraswamy, 2007; Halman and Braks, 1999
	Acceptance of performance appraisal mechanism for the project	abc-2	Rahman and Kumaraswamy, 2004a, b
	Alignment of objectives of different contracting parties	abc-3	Cheng et al. 2000; Rahman and Kumaraswamy, 2008
	Collective/combined responsibility by a pre-selected group comprising one person from each major party	abc-4	Chan et al., 2004; Halman and Braks, 1999
	Joint coordination and monitoring plans among contracting parties	abc-5	Chan et al., 2004; Yeung et al., 2007
	Clearly defined equitable risk-sharing arrangement among contracting parties	abc-6	Rahman and Kumaraswamy, 2002; Ling et al., 2006b
	Flexible/adjustable contracts to address uncertainties	abc-7	Rahman and Kumaraswamy, 2005
	Commitment level of contracting parties to joint problem solving	abc-8	Chan et al., 2004; Chen and Chen, 2007

	Presence of conducive learning climate/environment	abc-9	Chan et al., 2004; Chan et al., 2006
	Acceptance of dispute resolution mechanism for the project	abc-10	Rahman and Kumaraswamy, 2004a, 2004b
	Clarity of contract conditions (e.g. scope of contract, duties & responsibilities)	abc-11	Wong and Cheung, 2005
	Real gain-share/pain-share among contracting parties	abc-12	Black et al., 2000; Ling et al., 2006b
	Effectiveness of team-building events used in the project	abc-13	Cheng and Li, 2001, 2002

Note: a, b, and c in code column refer to client, contractor, and consultant, respectively.

Table 2: Characteristics of Respondents

Characteristic		Beijing		Hong Kong	
		No.	%	No.	%
Experience in construction industry	< 5 years	8	14	3	6
	5-9 years	14	24	4	8
	10-14 years	22	38	6	12
	≥ 15 years	14	24	37	74
	Average	11		22	
	Min	2		3	
	Max	30		56	
Organization type	Government	10	18	15	29
	Engineering firm	1	2	3	6
	Architectural firm	10	18	0	0
	Quantity surveying firm	5	9	3	6
	Contractor	32	57	27	53
	Others	4	7	3	6
Ownership of organization	Public	30	52	23	45
	Private	13	22	27	53
	Joint Venture	15	26	1	2
	Average of public percentage	45		50	
Size of total workforce	< 100	12	21	2	4
	100-999	23	40	17	35
	≥ 1000	22	39	30	61
	Average	19934		3097	
	Min	25		10	
	Max	160000		50000	

Table 3: Extent of Differences between Beijing and Hong Kong

Code	Beijing			Hong Kong			ANOVA	
	Mean	T	Sig.	Mean	T	Sig.	F	Sig.
Cost (Y1)	10.42%	2.866	0.006	12.50%	4.535	0.000	0.198	0.657
Time (Y2)	8.41%	1.904	0.062	17.78%	5.213	0.000	2.721	0.102
Quality (Y3)	3.19	3.296	0.002	3.98	11.364	0.000	62.222	0.000
Client Satisfaction (Y4)	3.32	3.777	0.000	3.88	9.656	0.000	20.087	0.000
a-6	3.56	3.795	0.000	4.28	9.456	0.000	12.839	0.001
a-8	3.16	1.219	0.228	3.87	7.258	0.000	15.415	0.000
a-9	3.07	0.482	0.632	3.77	5.468	0.000	11.303	0.001
a-16	3.32	2.746	0.008	3.87	6.317	0.000	9.387	0.003
b-9	3.45	4.259	0.000	3.90	7.019	0.000	7.587	0.007
b-13	3.44	3.605	0.001	3.88	5.831	0.000	5.315	0.023
c-9	3.26	2.668	0.010	3.63	4.555	0.000	4.838	0.030
ab-8	3.69	5.680	0.000	3.24	1.900	0.063	6.232	0.014
bc-1	3.04	0.256	0.799	3.56	4.288	0.000	7.113	0.009
bc-6	3.13	1.044	0.301	3.53	3.400	0.001	4.334	0.040
abc-1	3.29	2.664	0.010	3.92	8.267	0.000	15.995	0.000
abc-4	3.66	7.519	0.000	3.14	1.188	0.241	12.777	0.001
abc-13	3.43	4.236	0.000	3.06	0.375	0.709	4.145	0.044

Table 4: Correlation of RC Practices to Project Performance in Beijing

RC Practices	Mean	Cost (Y1)		Time (Y2)		Quality (Y3)		Satisfaction (Y4)	
		Corr.	Sig.	Corr.	Sig.	Corr.	Sig.	Corr.	Sig.
bc-7	2.93					0.316	0.019		
a-1	2.96					0.267	0.047		
a-17	3.05					0.299	0.026		
bc-6	3.13							0.295	0.029
c-17	3.16					0.275	0.041		
a-8	3.16	-0.290	0.035						
b-1	3.18					0.386	0.003	0.358	0.007
ac-7	3.25							-0.271	0.043
abc-10	3.27*			-0.280	0.040				
abc-1	3.29*							0.358	0.006
a-16	3.32*	-0.273	0.048						
bc-5	3.33*			0.371	0.007			0.299	0.026
c-2	3.33*			-0.290	0.037				
bc-3	3.36*							0.305	0.022
a-5	3.36*					0.290	0.030		
bc-8	3.41*							0.310	0.023
a-14	3.43*			-0.382	0.005				
b-13	3.44*					0.267	0.048		
b-9	3.45*					0.325	0.015	0.280	0.037
abc-11	3.47*	-0.309	0.022						
ab-5	3.48*							0.348	0.009
ac-5	3.50*					0.306	0.022		
b-5	3.61*			-0.287	0.039				
c-15	3.63*	-0.277	0.045						
a-12	3.68*	-0.341	0.015						
b-6	3.72*					0.274	0.045		
b-4	3.73*							0.294	0.028
b-8	3.75*							0.270	0.044
b-2	3.77*					0.416	0.001		
b-15	3.82*			-0.422	0.002	0.331	0.013		
c-12	3.82*			-0.386	0.005	0.307	0.020		
b-12	3.98*			-0.308	0.026				
Total		5		8		13		11	

Note: * significant at $p < 0.050$ based on *t* test of the mean results

Table 5: Correlation of RC Practices to Project Performance in Hong Kong

RC Practices	Mean	Cost (Y1)		Time (Y2)		Quality (Y3)		Satisfaction (Y4)	
		Corr.	Sig.	Corr.	Sig.	Corr.	Sig.	Corr.	Sig.
abc-6	2.82	-0.300	0.038	-0.349	0.015				
ab-7	3.00	-0.398	0.006	-0.318	0.031			0.386	0.006
abc-13	3.06			-0.347	0.016			0.351	0.011
ac-7	3.12	-0.435	0.005					0.372	0.014
a-10	3.13			-0.374	0.012				
bc-7	3.14							0.316	0.039
abc-4	3.14							0.375	0.007
c-11	3.20					0.385	0.014	0.329	0.038
ac-8	3.20					0.332	0.028	0.323	0.032
a-5	3.21			-0.376	0.012				
c-10	3.25	-0.431	0.007					0.348	0.028
c-5	3.30*	-0.367	0.023	-0.415	0.010				
abc-10	3.31*	-0.312	0.031						
a-4	3.32*							0.295	0.044
bc-2	3.37*							0.305	0.047
a-17	3.40*							0.311	0.033
ab-2	3.43*							0.305	0.033
ab-6	3.43*							0.295	0.039
abc-2	3.44*					0.317	0.025		
b-11	3.45*					0.359	0.011	0.324	0.023
ab-3	3.45*							0.342	0.016
ab-5	3.47*			-0.317	0.032			0.352	0.013
c-4	3.50*	-0.323	0.048			0.331	0.037	0.349	0.027
abc-3	3.50*	-0.421	0.003	-0.409	0.004			0.311	0.028
b-1	3.51*							0.417	0.003
c-1	3.51*					0.345	0.027		
a-14	3.52*					0.367	0.012		
b-17	3.53*					0.300	0.036	0.292	0.042
c-2	3.53*							0.325	0.040
c-16	3.53*	-0.443	0.005			0.456	0.003	0.507	0.001
ab-1	3.53*			-0.328	0.026				
bc-6	3.53*					0.355	0.019	0.437	0.003
b-10	3.55*							0.309	0.031
c-13	3.60*							0.326	0.040
ab-4	3.61*					0.291	0.042		
c-9	3.63*	-0.322	0.048			0.315	0.048	0.392	0.012
c-14	3.65*	-0.499	0.001			0.418	0.007	0.403	0.010
bc-4	3.65*							0.358	0.018
b-5	3.67*							0.318	0.026
a-15	3.68*							0.347	0.017

RC Practices	Mean	Cost (Y1)		Time (Y2)		Quality (Y3)		Satisfaction (Y4)	
		Corr.	Sig.	Corr.	Sig.	Corr.	Sig.	Corr.	Sig.
c-15	3.70*	-0.354	0.029			0.333	0.036	0.371	0.018
ac-1	3.73*			-0.387	0.012				
abc-11	3.76*			-0.320	0.027				
a-9	3.77*	-0.339	0.025						
b-16	3.80*							0.412	0.003
a-8	3.87*			-0.320	0.034				
a-16	3.87*	-0.362	0.016	-0.343	0.023	0.383	0.008	0.383	0.008
b-9	3.90*							0.316	0.027
abc-1	3.92*					0.332	0.017		
b-12	3.96*					0.360	0.011	0.406	0.004
c-12	3.97*	-0.414	0.010						
a-12	4.02*			-0.382	0.010				
b-8	4.02*							0.444	0.001
b-14	4.02*	-0.310	0.036			0.490	0.000	0.452	0.001
b-15	4.02*					0.333	0.019	0.377	0.008
b-2	4.06*							0.294	0.041
Total		16		14		19		39	

Note: * significant at $p < 0.050$ based on *t* test of the mean results

Figure 1

[Click here to download Figure: Figure 1.pdf](#)

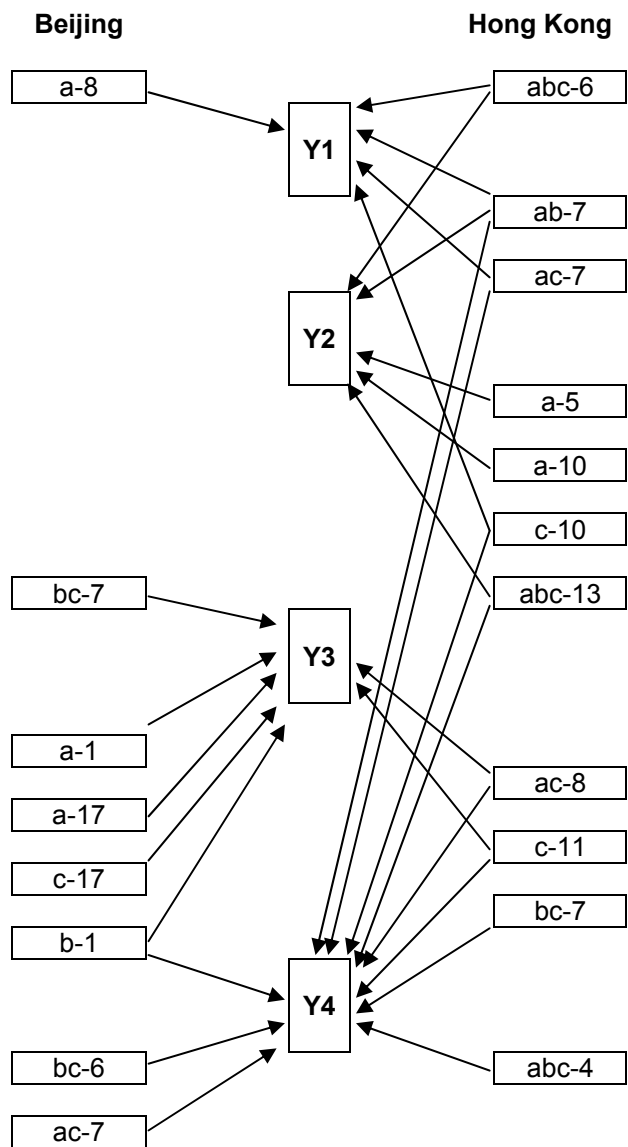


Figure 1: RC practices that need more emphasis
Note: Refer to Table 1 for descriptions of the codes

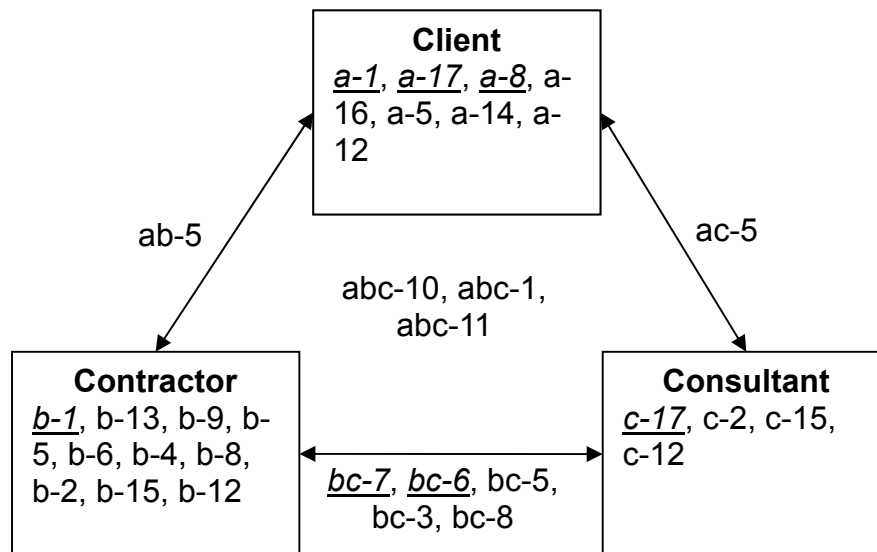


Figure 2: Framework to Better Manage Public Projects in Beijing

Notes: 1) Refer to Table 1 for descriptions of the codes;

2) Italicized and underlined items are key RC practices identified in Table 4

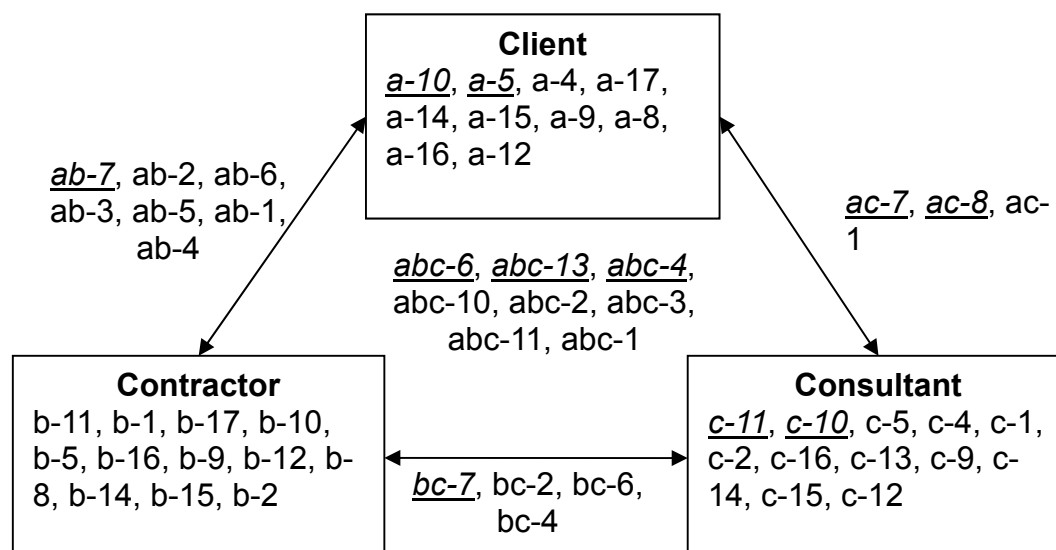


Figure 3: Framework to Better Manage Public Projects in Hong Kong

Notes: 1) Refer to Table 1 for descriptions of the codes;

2) Italicized and underlined items are key RC practices identified in Table 5

AMERICAN SOCIETY OF CIVIL ENGINEERS COPYRIGHT TRANSFER AGREEMENT

Publication Title: Journal of Construction Engineering and Management

Manuscript/Chapter Title: Key Relational Contracting Practices Affecting Performance of

Author(s) - Names and addresses of all authors Public Construction Projects in China

Florence Y.Y. Ling and Yongjian Ke, Department of Building, National

University of Singapore; Mohan M. Kumaraswamy, Department of Civil

Engineering, The University of Hong Kong; Shouling Wang, Department of Construction

The author(s) warrants that the above-cited manuscript is the original work of the author(s) and has never been published in its present form. Management, Tsinghua University

The undersigned, with the consent of all authors, hereby transfers, to the extent that there is copyright to be transferred, the exclusive copyright interest in the above-cited manuscript (subsequently called the "work") in this and all subsequent editions of the work, and in derivatives, translations, or ancillaries, in English and in foreign translations, in all formats and media of expression now known or later developed, including electronic, to the American Society of Civil Engineers subject to the following.

- The undersigned author and all coauthors retain the right to revise, adapt, prepare derivative works, present orally, or distribute the work provided that all such use is for the personal noncommercial benefit of the author(s) and is consistent with any prior contractual agreement between the undersigned and/or coauthors and their employer(s).
- In all instances where the work is prepared as a "work made for hire" for an employer, the employer(s) of the author(s) retain(s) the right to revise, adapt, prepare derivative works, publish, reprint, reproduce, and distribute the work provided that such use is for the promotion of its business enterprise and does not imply the endorsement of ASCE.
- No proprietary right other than copyright is claimed by ASCE.
- An author who is a U.S. Government employee and prepared the above-cited work does not own copyright in it. If at least one of the authors is not in this category, that author should sign below. If **all** the authors are in this category, check this box and sign here: _____ . Please return this form by mail.

SIGN HERE FOR COPYRIGHT TRANSFER [Individual Author or Employer's Authorized Agent (work made for hire)]

LING YEAN YNG
Print Author's Name

Lingyeand
Signature of Author (in ink)

Date: 31/08/2012

Print Agent's Name & Title

Signature of Agency Rep (in ink)

Note: If the manuscript is not accepted by ASCE or is withdrawn prior to acceptance by ASCE, this transfer will be null and void.

ASCE Worksheet for Sizing Technical Papers & Notes

*****Please complete and save this form then email it with each manuscript submission.*****

Note: The worksheet is designed to automatically calculate the total number of printed pages when published in ASCE tw format.

Journal Name:	Journal of Construction Engineering and Management	Manuscript # (if known):	Ms. No. COENG-
Author Full Name:	Yongjian Ke, Mohan M. Kumaraswamy	Author Email:	bdglyy@nus.edu

The maximum length of a technical paper is 10,000 words and word-equivalents or 8 printed pages. A technical note should not exceed 3,500 word-equivalents in length or 4 printed pages. Approximate the length by using the form below to calculate the total number of words in the text to the total number of word-equivalents of the figures and tables to obtain a grand total of words for the paper/note to fit ASCE format. Over must be approved by the editor; however, valuable overlength contributions are not intended to be discouraged by this procedure.

1. Estimating Length of Text

A. Fill in the four numbers (highlighted in green) in the column to the right to obtain the total length of text.

NOTE: Equations take up a lot of space. Most computer programs don't count the amount of space around display equations. Plan on counting 3 lines of text for every simple equation (single line) and 5 lines for every complicated equation (numerator and denominator).

Estimating Length of Text	
Count # of words in 3 lines of text:	27
Divided by 3	3
Average # of words per line	9
Count # of text lines per page	13
# of words per page	117.00
Count # of pages (don't add references & abstract)	36
Title & Abstract	500
Total # refs	81
Length of Text is	6675
	498
	7173
	6

2. Estimating Length of Tables

A. First count the longest line in each column across adding two characters between each column and one character between each word to obtain total characters.

1-column table = up to 60 characters wide	2-column table = 61 to 120 characters wide
---	--

B. Then count the number of text lines (include footnote & titles)

1-column table = up to 60 characters wide by: 17 lines (or less) = 158 word equiv. up to 34 lines = 315 word equiv. up to 51 lines = 473 word equiv. up to 68 text lines = 630 word equiv.	2-column table = 61 to 120 characters wide by: 17 lines (or less) = 315 word equiv. up to 34 lines = 630 word equiv. up to 51 lines = 945 word equiv. up to 68 text lines = 1260 word equiv.
---	---

C. Total Characters wide by Total Text lines = word equiv. as shown in the table above. **Add word equivalents** for each table in the column labeled "Word Equivalents."

3. Estimating Length of Figures

A. First reduce the figures to final size for publication.

Figure type size can't be smaller than 6 point (2mm).

B. Use ruler and measure figure to fit 1 or 2 column wide format.

1-column fig. = up to 3.5 in.(88.9mm)	2-col. fig. = 3.5 to 7 in.(88.9 to 177.8 mm) wide
---------------------------------------	---

C. Then use a ruler to check the height of each figure (including title & caption).

1-column fig. = up to 3.5 in.(88.9mm) wide by: up to 2.5 in.(63.5mm) high = 158 word equiv. up to 5 in.(127mm) high = 315 word equiv. up to 7 in.(177.8mm) high = 473 word equiv. up to 9 in.(228.6mm) high = 630 word equiv.	2-column fig. = 3.5 to 7 in.(88.9 to 177.8 mm) wide by: up to 2.5 in.(63.5mm) high = 315 word equiv. up to 5 in.(127mm) high = 630 word equiv. up to 7 in.(177.8mm) high = 945 word equiv. up to 9 in.(228.6mm) high = 1260 word equiv.
--	--

D. Total Characters wide by Total Text lines = word equiv. as shown in the table above. **Add word equivalents** for each table in the column labeled "Word Equivalents."

Total Tables/Figures:	2837
Total Words of Text:	7173

(word equivalents)

Estimating Length of Tables & Figures		
Tables	Word Equivalents	Figures
Table 1	945	Figure 1
2	315	2
3	315	3
4	315	4
5	473	5
6	0	6
7	0	7
8	0	8
9	0	9
10	0	10
11	0	11
12	0	12
13	0	13
14	0	14
15	0	15
		16
		17
		18
		19
		20 and 21

Please double-up tables/figures if additional space is needed (ex. 20+21).

Total words and word equivalents:	10010
printed pages:	8

Ref.: Ms. No. COENG-2054R2

Key Relational Contracting Practices Affecting the Performance of Public Construction Projects in China

Note: When referencing line numbers, please refer to the “tracked change” version of the revised manuscript.

No.	Comments	Responses
1	<p>In their revision, the authors should review all comments and information that encompass statistical significance and concisely reorganize them in a short statement to be included in the "characteristics of the sample" section. The authors have addressed the majority of the reviewer's comments, except for the one about the statistical significance. More discussion on the statistical significance and validity of the sample is required. Is the sample statistically significant or not? The reviewer acknowledges the authors' response; however, the population size could be estimated to address this point.</p>	<p>We agree with the handling editor and Reviewer #6 that it is desirable to know if the sample is statistical significant or not. This could have been done through estimating the confidence interval for the proportion of public projects was calculated using the equation below.</p> $z_{\alpha/2} = \frac{L\sqrt{n}}{0.5}$ <p>Where: $z_{\alpha/2}$ is the number for which $P(Z > z_{\alpha/2}) = \alpha/2$. L is the distance of extension on each side of the sample proportion n is the sample size.</p> <p>Unfortunately, we could not estimate L because the population size could not be estimated. This is because the population is defined as “completed public projects in China” (see lines xx – xx), without defining the start and end dates, and the minimum project values. The questionnaire also did not ask respondents to state the start and end dates of their projects.</p> <p>Notwithstanding this, we suggest that the samples are valid for these reasons.</p> <p>The first is the general convention that when $n > 30$, the central limit theorem holds true. The second reason is that questionnaires were sent to all the public offices in Beijing and Hong Kong that manage public construction projects. No public office had been deliberately left out. Thirdly, high Cronbach’s alpha values of 0.832 to 0.938 were obtained, suggesting high internal consistency. See lines xx – xx.</p> <p>We have now also added another limitation of study: The population size could not be estimated, and hence the significance of the sample could not be determined mathematically. See lines xx – xx.</p>

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

No.	Comments	Responses
2	Also, some discussion should be provided to explain the significantly different response rates among the Beijing and the Hong Kong samples.	A statement was added in the "characteristics of the sample" section in lines 222-229: Many more samples were identified in Hong Kong than in Beijing because Hong Kong has more easily available published information of names of public officials and private contractors and consultants. However, this collection comprised a mix of private firms that had and did not have experience in public projects. As the questionnaire instructed those without experience in public sector projects not to reply, even though more questionnaires were sent out in Hong Kong, the fact that there are fewer public sector projects in Hong Kong compared to Beijing explains the lower response rate in Hong Kong.
3	In addition, the reviewer strongly recommends revisiting the whole manuscript to enhance the conciseness of the writing. The paper could be significantly shortened without compromising its message.	We have gone through the whole manuscript and deleted some paragraphs without compromising its message. These include the following: lines ***_*** .

1 15 satisfaction; (2) investigate the extent to which RC practices were adopted; and (3)
2
3
4 16 identify the RC practices that lead to better performance. Due to the large
5
6
7 17 geographical area of China, the surveys conducted were confined to Beijing and
8
9
10 18 Hong Kong. A structured questionnaire was designed to collect qualitative data. The
11
12
13 19 results show that: (1) public construction projects achieved significant success in
14
15
16 20 quality performance and client satisfaction but not in budget and schedule
17
18
19 21 performance; and (2) RC practices were adopted to varying extents in public projects.
20
21
22 22 The findings contribute to knowledge by identifying the specific RC practices that
23
24
25 23 could boost project performance significantly. Another contribution to knowledge is
26
27
28 24 the discovery that the Relational Contract Theory is applicable to public projects
29
30
31 25 notwithstanding the need to keep relations at arm's length. A framework to manage
32
33
34 26 public projects using the RC approach is recommended for adoption in Hong Kong
35
36
37 27 and other countries that adopt project management style along PMI's framework. A
38
39
40 28 different framework is recommended for adoption in Beijing and places that have a
41
42
43 29 centrally planned and controlled economic system so as to help public projects
44
45
46 30 achieve better project performance.
47
48
49
50

51 31
52
53
54 32 **Subject headings:** Relational Contracting, Public Construction Projects, Strategy,
55
56
57 33 Beijing, Hong Kong
58
59
60
61
62
63
64
65

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

Introduction

Relationships among contracting parties include formal transactions and relational links. Formal contracts spell out the rights, responsibilities, and liabilities of the parties concerned. In a formal contract, parties act in an atomized manner, looking out for their own personal interests (Williamson, 1975). Relational contracting (RC) is based on the recognition of mutual benefits and win-win scenarios that are achieved through more cooperative approaches, such as partnering, alliancing, joint venturing, long-term contracting, joint risk-sharing mechanisms, integrated project delivery, and other collaborative working arrangements (Rahman and Kumaraswamy, 2004a; AIA, 2007). While RC principles are less difficult to apply in projects initiated by the private sector (Kumaraswamy, 2010), the gap in knowledge is that it is not known if public sector projects can also enjoy the full benefits of RC, such as risk and cost reduction, and better project performance (Akintoye and Main, 2007).

The term “RC practices” in this paper refers to “relational practices” or practices based on good relationship management, which are RC-type or RC-based, even though the actual contracts may not have incorporated any formal RC approaches.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71

53
China is a legitimate geographical region to investigate, as seen in many previous studies (examples are: Lu et al., 2008; Tai et al, 2009; Chan et al., 2009a; Zhao et al., 2011). Due to its strong economic growth and need for national development, there are many opportunities for architectural, engineering and construction (A/E/C) firms to operate in China's construction industry. However, the Chinese market is full of pitfalls as well. It is fragmented, heterogeneous, risky and highly competitive (Chen and Messner, 2009). To perform well in the Chinese market, knowledge of the types of RC practices that lead to project success may be important. Hence, the aim of this study is to investigate effective RC practices in China's public construction projects. The specific objectives are to: (1) evaluate public project performance levels in terms of cost, time, quality, and client satisfaction; (2) investigate the extent to which RC practices are adopted; and (3) identify the RC practices that lead to better performance of public projects in China.

67
Due to China's large geographical area, the scope of this study is confined to public construction projects in Beijing and Hong Kong. The capital city of Beijing was chosen for study as it has a significant number of completed public projects for the 2008 Olympics and also because it is representative of how a centrally planned

1 72 economy operates. Hong Kong, a former British colony and now a Special
2
3
4 73 Administrative Region, was chosen for study because its construction practices are
5
6
7 74 closer to those of A/E/C firms that operate in free market economies. The geographic
8
9
10 75 specific findings of Beijing and Hong Kong could be applied to centrally planned
11
12
13 76 economies and free market economies, respectively, in the context of the broader
14
15
16 77 global community. The contrast between practices in Beijing and Hong Kong helps
17
18
19 78 A/E/C firms that are currently operating in a free market economy and planning to
20
21
22 79 enter a centrally planned market to better understand the differences between the
23
24
25 80 RC practices in different markets. Particular attention could be paid to the key RC
26
27
28 81 practices identified in this study to help them achieve better project outcomes.
29
30

31
32
33 82
34
35

36 83 In the next section, a literature review of project performance and RC practices is
37
38
39 84 presented and the knowledge gaps are identified. The research design and data
40
41
42 85 analysis method are then explained, followed by the presentation of the
43
44
45 86 characteristics of the sample. Next, the extent to which RC practices are adopted in
46
47
48 87 Beijing and Hong Kong are compared and discussed, and key RC practices that lead
49
50
51 88 to better project performance are identified. The last section summarizes the findings
52
53
54 89 and offers recommendations to the construction engineering and management
55
56
57 90 community.
58
59
60
61
62
63
64
65

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

91

92 **Literature Review**

93

94 ***Operationalizing Project Performance***

95

96 Project outcomes are multi-faceted. These include the traditional triple project
97 outcomes (time, cost, and quality), safety performance, environmental performance,
98 stakeholder satisfaction, and profitability. For this study, project outcome is viewed
99 from the perspective of project delivery and organizational level competency. For
100 project delivery competency, this research adopts the traditional triple project
101 outcomes as the performance metrics, following Konchar and Sanvido (1998). For
102 organizational level competency, service quality is operationalized as client
103 satisfaction with the project, following Ling et al. (2004).

104

105 ***RC Practices Affecting Project Performance***

106

107 Different aspects of RC have been covered in previous studies. These include
108 drivers (Chan et al., 2003), obstacles (Glagola and Sheedy, 2002), success factors
109 (Chan et al., 2004), components like trust (Wong et al., 2005), culture (Ang and Ofori,

1 110 2001), communication (Bayliss et al., 2004), and performance index (Yeung et al.,
2
3
4 111 2007). This study postulates that there are certain RC practices that significantly
5
6
7 112 affect the performance of public construction projects in China. RC practices were
8
9
10 113 identified from the literature review and summarized in Table 1. For brevity, these
11
12
13 114 practices are coded as “a”, “b” and “c” for client, contractor, and consultant,
14
15
16 115 respectively, followed by a reference number. These RC practices are divided into
17
18
19
20 116 three categories: (1) individual organizational features and practices adopted by
21
22
23 117 each contracting party (coded as a-#, b-# and c-#); (2) practices adopted in tandem
24
25
26 118 by two of the contracting parties (coded as ab-#, ac-# and bc-#); and (3) practices
27
28
29 119 adopted by all the major contracting parties in unison (code: abc-#). “#” represents
30
31
32 120 the reference number of the RC practice.
33
34
35

36 121
37
38
39 122 <Insert Table 1 here.>
40
41

42 123
43
44

45 124 ***Knowledge Gaps***

46
47
48 125
49
50

51 126 The Relational Contract Theory views contracts more as relations rather than as
52
53
54
55 127 discrete transactions and thus, all transactions involve a wider social and economic
56
57
58 128 context (Macneil, 1974). The theory states that individual transactions lie on a
59
60
61
62
63
64
65

1 129 spectrum ranging from “discrete” through to “relational”. The theory challenges the
2
3
4 130 traditional premise that all contracts are mere transactions, and emphasizes the role
5
6
7 131 of norms in determining the manner in which commercial exchanges operate in
8
9
10 132 practice. These norms are further operationalized into RC approaches/practices.

13 133

16 134 The brief literature review revealed that previous studies on RC approaches did not
17
18
19
20 135 differentiate between public and private construction projects. Whether RC principles
21
22
23 136 could be applied successfully and specifically to public construction projects remains
24
25
26 137 unclear.

29 138

32 139 Public projects merit an in-depth study because public clients are usually not in the
33
34
35
36 140 position to offer future relationship incentives since most projects must be procured
37
38
39 141 through the competitive bidding process, and government regulations traditionally
40
41
42 142 discourage close relationships between public clients and private contracting parties
43
44
45 143 (Rahman and Kumaraswamy, 2004b). Yet, public projects are highly visible and need
46
47
48 144 to achieve the triple project goals because taxpayers’ money is involved.

52 145

55 146 The link between the adoption of RC practices and project outcomes is also not
56
57
58 147 known. This study therefore aims to fill the gap by investigating the relevance of the

1 148 Relational Contract Theory to public contracts through exploring RC practices that
2
3
4 149 may boost the performance of public projects in China significantly.
5
6

7 150
8
9

10 151 **Research Method**
11
12

13 152
14
15

16 153 A large study had been conducted on RC practices and the drivers of and barriers to
17
18
19
20 154 relational contracts, as well as how these affect the performance of public
21
22
23 155 construction projects in China, Australia, and Singapore. This paper reports a part of
24
25
26 156 the study, focusing on RC practices and project outcomes in China.
27
28

29 157
30
31

32 158 ***Research Design***
33
34

35 159
36
37

38
39 160 The questionnaire-survey is the adopted choice of research design for this study.
40
41
42 161 The survey was conducted between June and November 2011 in Beijing and Hong
43
44
45 162 Kong. The objectives of the survey that are relevant to this paper are twofold: (1) to
46
47
48 163 evaluate the performance outcomes of completed public construction projects; and
49
50
51 164 (2) to determine the extent to which RC practices were present, observed, practiced
52
53
54
55 165 or emphasized in these projects.
56
57

58 166
59
60
61
62
63
64
65

1 167 The unit of analysis in this study is a completed public sector project, regardless of
2
3
4 168 the extent to which RC approaches were adopted. The target population is thus
5
6
7 169 completed public projects in China, and the sampling frame is hence completed
8
9
10 170 public projects in Beijing and Hong Kong. In order to collect the data, multiple
11
12
13 171 stakeholders comprising public sector clients and consultants, private sector
14
15
16 172 consultants (e.g. architects, engineers, quantity surveyors, and project managers),
17
18
19
20 173 and contractors, who had been involved in public construction projects in Beijing and
21
22
23 174 Hong Kong, were approached. However, due to the lack of a national registry of
24
25
26 175 officials/firms involved in public construction projects, the contact details of public
27
28
29 176 officials were obtained from government directories. Questionnaires were then sent
30
31
32 177 to all of them because the number is not large. The contact details of private
33
34
35 178 consultants and contractors were derived from the respective professional and trade
36
37
38
39 179 institutions, and randomly selected. As this group may contain those who have not
40
41
42 180 handled public projects before, the questionnaire clearly stated that only those who
43
44
45 181 had completed public projects should fill up the questionnaire.

46
47
48 182
49
50
51 183 Data were collected using a specially designed structured questionnaire. Section A of
52
53
54
55 184 the questionnaire requested information on the completed public sector project and
56
57
58 185 the project's performance level in four areas: cost (Y1); time (Y2); quality (Y3); and
59
60
61
62
63
64
65

1 186 client satisfaction (Y4). Y1 and Y2 were measured more objectively as percentage of
2
3
4 187 time and cost over/under run. Y3 measured quality of output, stated as
5
6
7 188 product/output quality of the facility/project. Y4 measured quality of service, stated as
8
9
10 189 client satisfaction with the contracting parties' service quality. Service quality
11
12
13 190 measures the transformation process (i.e. the service) from resources to the
14
15
16 191 constructed facility. Y3 and Y4 were relatively subjective and thus rated on a five-
17
18
19
20 192 point Likert scale (1 = Very dissatisfied, 3 = Neutral, 5 = Very satisfied). In Section B,
21
22
23 193 respondents were asked to indicate the extent to which RC practices were adopted
24
25
26 194 on a five-point Likert scale (1 = Very low, 3 = Neutral, 5 = Very high). Respondents
27
28
29 195 were also given the opportunity to provide other suggestions and demographic
30
31
32 196 characteristics of themselves and their companies. The questionnaire was pilot
33
34
35
36 197 tested and then translated into Chinese.

37
38
39 198

40 41 42 199 ***Data Analysis Method***

43
44
45 200

46
47
48 201 The data were analyzed using SPSS software. The main statistical methods used
49
50
51 202 were descriptive statistics, one-way ANOVA, one-sample *t* test and Pearson's
52
53
54 203 correlation analysis. The Confidence Interval (CI) was set at 0.95. One-way ANOVA
55
56
57
58 204 was conducted to check if there is any significant difference in the extent to which
59
60
61
62
63
64
65

1 205 RC practices were adopted in Beijing and Hong Kong. The one-sample *t* test
2
3
4 206 procedure was performed on the four performance metrics (Y1 to Y4) and the RC
5
6
7 207 practices to determine if the projects achieved significantly good performance and if
8
9
10 208 the practices were adopted to a significant extent, respectively. To check whether a
11
12
13 209 greater adoption of RC practices led to better project outcomes, Pearson's
14
15
16 210 correlation analysis was conducted. Each pair of variables in the Pearson's
17
18
19
20 211 correlation analysis comprised one of the four performance metrics and one of the
21
22
23 212 RC practices.

24
25
26 213

27 28 29 214 **Characteristics of the sample**

30
31
32 215

33
34
35 216 Survey questionnaires were sent to 259 and 645 samples in Beijing and Hong Kong,
36
37
38
39 217 respectively. 59 and 51 valid questionnaires were returned in Beijing and Hong Kong,
40
41
42 218 representing response rates of 22.78% and 7.91%, respectively. Many more
43
44
45 219 samples were identified in Hong Kong than in Beijing because Hong Kong has more
46
47
48 220 easily available published information of names of public officials and private
49
50
51 221 contractors and consultants. However, this collection comprised a mix of private firms
52
53
54 222 that had and did not have experience in public projects. As the questionnaire
55
56
57 223 instructed those without experience in public sector projects not to reply, even though
58
59
60
61
62
63
64
65

1 224 more questionnaires were sent out in Hong Kong, the fact that there are fewer public
2
3
4 225 sector projects in Hong Kong compared to Beijing explains the lower response rate
5
6
7 226 in Hong Kong.

10 227

13 228 As regards sample validity, it is observed that more than 30 sets of valid project data
14
15
16
17 229 were received. The general convention is that when $n > 30$, the central limit theorem
18
19
20 230 holds true. Moreover, questionnaires were sent to all the public offices that manage
21
22
23 231 public construction projects in Beijing and Hong Kong. No public office had been
24
25
26 232 deliberately left out. Cronbach's alpha values of three categories of RC practices in
27
28
29 233 Beijing and Hong Kong ranged from 0.832 to 0.938, suggesting that the RC practices
30
31
32 234 under each category have a high internal consistency (Nunnally, 1978). It is therefore
33
34
35
36 235 concluded that these data are reliable and further statistical analyses may be
37
38
39 236 conducted (Nunnally, 1978).

42 237

45 238 The characteristics of the respondents are given in Table 2. All the respondents have
46
47
48 239 extensive construction experience in various types of public construction projects.

51 240 The Beijing and Hong Kong respondents had an average of 11 and 22 years of
52
53
54
55 241 experience, respectively. The respondents' firms engage an average of 19,934 and
56
57
58 242 3,097 employees in Beijing and Hong Kong, respectively. In the light of the rich

1 243 experience of the respondents as shown in Table 2, these respondents should be in
2
3
4 244 a position to accurately assess the extent to which RC practices were present,
5
6
7 245 observed, practiced or emphasized in the project.
8
9

10 246

11
12
13 247 <Insert Table 2 here.>
14
15

16 248

17
18
19
20 249 **Result 1: Performance of Public Projects in Beijing and Hong Kong**
21
22

23 250

24
25
26 251 The first objective of this study is to evaluate project performance levels based on
27
28
29 252 cost, time, quality, and client satisfaction. The *t* test results in Table 3 show that
30
31
32 253 public construction projects in Beijing achieved significantly good performance in
33
34
35 254 client satisfaction (3.32, $p=0.000$) and quality (3.19, $p=0.002$), but had significantly
36
37
38
39 255 poor cost performance (10.42% cost overrun, $p=0.006$) and marginally failed in time
40
41
42 256 performance (8.41% schedule overrun, $p=0.062$). Public construction projects in
43
44
45 257 Hong Kong also achieved significantly good performance in client satisfaction (3.88,
46
47
48 258 $p=0.000$) and quality (3.98, $p=0.000$), but their mean scores are significantly higher
49
50
51 259 than those in Beijing. Similar to Beijing, the results show that public projects in Hong
52
53
54
55 260 Kong had significantly poor cost performance (12.50%, $p=0.000$) and time
56
57
58 261 performance (17.78%, $p=0.000$).
59
60
61
62
63
64
65

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

<Insert Table 3 here.>

Poor cost performance could have arose because of the prevalent practice of under bidding, hidden costs which surface only at the later stage, (Ling et al., 2006a) and inability to respond adequately to perceived change orders (Ling et al., 2008). Poor time performance may be due to Chinese clients changing the project scope and issuing too many change orders (Ling et al., 2006a). While changes were ordered on site, sometimes, the client's top management may not approve them, giving rise to abortive work and further delays (Ling et al, 2006a). Project delays may also come about because of holdups in getting approvals (Ling et al, 2008).

Result 2: RC Practices Adopted in Beijing and Hong Kong

The second objective of this study is to investigate the extent to which RC practices were adopted in Beijing and Hong Kong using *t* test of the mean. The *t* test results in Tables 4 and 5 show that there are RC practices that had been adopted to a significant extent in Beijing and Hong Kong's public projects. The finding suggests that Macneil's (1974) Relational Contract Theory is applicable to public projects

1 281 although these generally comprise discrete transactions with little opportunity for
2
3
4 282 future exchanges.
5
6
7 283
8
9
10 284 ANOVA results in Table 3 show that 13 practices were adopted to significantly
11
12
13 285 different extents in Beijing and Hong Kong. Among these, 10 RC practices were used
14
15
16 286 more frequently in Hong Kong, while only three practices were adopted more
17
18
19
20 287 frequently in Beijing, indicating that RC concepts are generally more acceptable to
21
22
23 288 contracting parties in public construction projects in Hong Kong. The implication is
24
25
26 289 that A/E/C firms planning to penetrate a different type of market (e.g. centrally
27
28
29 290 controlled economies versus free market economies) should pay particular attention
30
31
32 291 to these 13 RC practices in order to gain an advantage over local firms.
33
34
35
36 292
37
38
39 293 Public clients in Beijing adopted the following RC practices to a significantly lower
40
41
42 294 extent compared to Hong Kong clients – strengthening their financial capacity (a-6);
43
44
45 295 acquiring knowledge of project processes (a-8); committing to other parties on a
46
47
48 296 long-term basis (a-9); and adopting a positive attitude toward continuous
49
50
51 297 improvement (a-16). The results echoed Sachs et al.'s (2007) finding that some local
52
53
54
55 298 governments in mainland China lack the relevant experience and knowledge in
56
57
58 299 construction, or focus too much on short-term objectives. Public organizations are
59
60
61
62
63
64
65

1 300 usually restrained by an inertia that may stem from beliefs such as “that is not our
2
3
4 301 responsibility”, “there is no need to change current practices that are already good
5
6
7 302 enough (or even better than others)”, or a “not invented here” syndrome
8
9
10 303 (Palaneeswaran and Kumaraswamy, 2000). This inertia is more evident in Beijing
11
12
13 304 than in Hong Kong, as the long-standing bureaucratic culture in mainland China has
14
15
16 305 often been criticized for its lack of openness and flexibility (Piotrowski et al., 2009). In
17
18
19 306 addition, unlike local governments in mainland China which suffer from a lack of
20
21
22 307 funds, the Hong Kong government has adequate financial reserves and enjoys a
23
24
25
26 308 budget surplus (Chan et al., 2009a).

27
28
29 309
30
31
32 310 Table 3 shows that compared to Hong Kong, contractors in Beijing had significantly
33
34
35 311 fewer opportunities to provide specific inputs on construction methods and materials
36
37
38 312 before they were formally appointed (b-13). This may be due to the Hong Kong
39
40
41 313 government’s more positive attitude toward promoting integration in the construction
42
43
44 314 industry by encouraging contractors to give their feedback before they are formally
45
46
47 315 appointed.

48
49 316
50
51
52
53
54 317 Contracting parties in public construction projects in Beijing have lower levels of
55
56
57 318 long-term commitment to other parties (a-9, b-9 & c-9) than those in Hong Kong. The

1 319 Beijing government has been investing heavily in infrastructure development and
2
3
4 320 thus the market for public construction projects in Beijing is huge (BMBS, 2011). This
5
6
7 321 market situation of high construction demand causes private firms in Beijing to
8
9
10 322 disregard the need to have any long-term commitments with other parties.

13
14 323

16 324 Compared to those in Hong Kong, contractors and consultants in Beijing are less
17
18
19
20 325 familiar with each other (bc-1) and less likely to share information (bc-6). As Beijing's
21
22
23 326 construction market is six times larger than Hong Kong's in terms of gross value of
24
25
26 327 construction work (BMBS, 2011; CSD, 2011), it is therefore less likely for contractors
27
28
29 328 and consultants in Beijing to have prior relationships. This lack of familiarity between
30
31
32 329 contractors and consultants in Beijing may cause them to adopt a more adversarial
33
34
35
36 330 stance with each other than those in Hong Kong, which could lead to lower
37
38
39 331 enthusiasm to share project information.

40
41
42 332

45 333 Table 3 shows that "Clarity of division of responsibilities among contracting parties"
46
47
48 334 (abc-1) was rated significantly higher in Hong Kong than in Beijing. As public
49
50
51 335 construction projects in Hong Kong adopt standard conditions of contract, the
52
53
54
55 336 division of responsibilities is clearer than in Beijing, where in-house or bespoke
56
57
58 337 contracts are preferred (Lu, 2005).

1 338
2
3
4 339 “Level of reciprocation/face-saving gestures between the client and contractor” (ab-
5
6
7 340 8), “Collective/combined responsibility by a pre-selected group comprising one
8
9
10 341 person from each major party” (abc-4) and “Effectiveness of team-building events
11
12
13 342 used in the project” (abc-13) were rated significantly higher in Beijing than in Hong
14
15
16 343 Kong. This may be attributed to the “guanxi” that exists in Chinese culture. Private
17
18
19
20 344 participants in Beijing have to spend much more time and effort to cultivate *guanxi*
21
22
23 345 with public clients than those in Hong Kong (Sachs et al., 2007). There are hence
24
25
26 346 many entertainment activities that need to be carried out in order to cultivate and
27
28
29 347 maintain good relationships with public clients in Beijing. In Hong Kong, this is not so
30
31
32 348 pronounced because the government departments are inherited from the British, and
33
34
35 349 these have well-defined responsibilities and codes of conduct. They are usually not
36
37
38
39 350 allowed to participate in team-building events with private firms and cannot receive
40
41
42 351 nor reciprocate favors.

43
44
45 352

46 47 48 353 **Result 3: RC Practices Affecting Project Outcomes**

49
50
51 354

52
53
54
55 355 The third objective of this study is to identify RC practices that lead to better project
56
57
58 356 performance. Tables 4 and 5 list the RC practices in Beijing and Hong Kong,
59
60
61
62
63
64
65

1 357 respectively, that are significantly correlated with performance metrics (Y1 to Y4) in
2
3
4 358 an ascending order based on mean ratings. The mean ratings measure the extent to
5
6
7 359 which the RC practices were adopted. Significant negative correlations with Y1 and
8
9
10 360 Y2 and significant positive correlations with Y3 and Y4 suggest that when the RC
11
12
13 361 practice is adopted to a larger extent, the project performance is also significantly
14
15
16 362 better. Overall, 32 and 56 out of a total of 88 practices are significantly correlated
17
18
19
20 363 with performance outcomes of public construction projects in Beijing and Hong Kong,
21
22
23 364 respectively. The result indicates that RC principles have greater impact on the
24
25
26 365 outcomes of public construction projects in Hong Kong than in Beijing.

27
28
29 366
30
31

32 367 <Insert Tables 4 and 5 here.>
33
34
35

36 368
37
38

39 369 Key RC practices are defined in this study as those significantly correlated with
40
41
42 370 project performance but not adopted to a significant extent. As shown in Tables 4
43
44
45 371 and 5, there were eight and 11 of these key RC practices in Beijing and Hong Kong,
46
47
48 372 respectively. These RC practices are further depicted in Figure 1. The discussions in
49
50
51 373 the following sub-sections focus on these key RC practices.

52 374
53
54
55

56 375 <Insert Figure 1 here.>
57
58
59
60
61
62
63
64
65

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

376 RC practices affecting project performance significantly are depicted in Figures 2
377 and 3 for Beijing and Hong Kong, respectively. It is suggested that contracting parties
378 adopt these RC practices to a greater extent in future projects so as to achieve
379 better project performance. In terms of generalizing the findings to the broader global
380 community, Figure 2 is important for firms when investing in a centrally controlled
381 economy like China, while Figure 3 is useful for adoption in a free market economy.
382

383
384 <Insert Figures 2 and 3 here.>

385
386 **Cost Performance (Y1)**

387
388 Table 4 shows that the cost performance of public construction projects in Beijing is
389 significantly correlated with five RC practices. On the other hand, there are 16 RC
390 practices that are significantly correlated with the cost performance of public
391 construction projects in Hong Kong (see Table 5). Among them, clients' attitude
392 toward continuous improvement (a-16) and consultants' top management support for
393 RC practices (c-15) are significantly correlated with cost performance in both Beijing
394 and Hong Kong. The findings agree with Black et al. (2000) that a positive attitude

1 395 toward, and support for, RC practices, especially from senior management, is
2
3
4 396 important.

5
6
7 397
8
9
10 398 Among the five RC practices in Beijing that are significantly correlated with cost
11
12
13 399 performance, only one – client’s knowledge level of project processes (a-8) – was
14
15
16 400 not adopted to a significant extent and hence needs to be highlighted. Clients’ lack of
17
18
19
20 401 knowledge of project processes could lead to an inadequate brief and feasibility
21
22
23 402 study or an inaccurate pre-tender estimate, which may eventually result in cost
24
25
26 403 overrun (Ling and Leong, 2002). It is therefore recommended that public sector
27
28
29 404 organizations capture the knowledge and information on project processes, products,
30
31
32
33 405 and technology after a project is completed so that better project outcomes can be
34
35
36 406 attained in future projects (Love et al., 2010). For the “one-off” type of client who
37
38
39 407 develops only one project in a long while, it may not be worthwhile to acquire in-
40
41
42 408 depth construction knowledge. In this instance, choosing a reputable and
43
44
45 409 knowledgeable consultant is suggested.

46
47
48 410
49
50
51 411 Four RC practices in Hong Kong, i.e. “Clearly defined equitable risk-sharing
52
53
54
55 412 arrangement among contracting parties” (abc-6), “Ongoing social relationships
56
57
58 413 between clients and contractors” (ab-7), “Ongoing social relationships between
59
60
61
62
63
64
65

1 414 clients and consultants” (ac-7), and “Consultants’ previous experience in relational
2
3
4 415 contracting approaches” (c-10), were not adopted to a significant extent yet had
5
6
7 416 significant correlation with cost performance. This indicates that the RC practices
8
9
10 417 need more attention.

13 418

16 419 The respondents in Hong Kong regarded the practice “Clearly defined equitable risk-
18
19
20 420 sharing arrangement among contracting parties” (abc-6) as a key RC practice
21
22
23 421 affecting cost and time performance, and this supports the view of Rahman and
24
25
26 422 Kumaraswamy (2002). Yet, this practice was not adopted to a significant extent
27
28
29 423 because the public sector’s standard conditions of contract drafted by public bodies
30
31
32 424 may be biased toward the public client.

36 425

39 426 Table 5 shows “Ongoing social relationships (e.g. “guanxi” and social ties outside of
40
41
42 427 the project)” between clients and contractors/consultants (ab-7 and ac-7) are key RC
43
44
45 428 practices because they were significantly correlated with cost performance, but not
46
47
48 429 adopted to a significant extent. These mutual ongoing social relationships outside of
49
50
51
52 430 the project between clients and other contracting parties do not commonly exist in
53
54
55 431 public construction projects in Hong Kong. One explanation could be that the
56
57
58 432 procurement procedures in public construction projects in Hong Kong are subject to

1 433 strict regulations, and competitive bidding is almost always required (Rahman and
2
3
4 434 Kumaraswamy, 2004b). However, this study found that closer ongoing social
5
6
7 435 relationships among contracting parties are significantly correlated with cost (Y1) and
8
9
10 436 time performance (Y2), and client satisfaction (Y4). This could be attributed to the
11
12
13 437 trust and friendship that are present in ongoing relationships, causing contracting
14
15
16 438 parties to be more willing to compromise should problems arise and thus achieve
17
18
19
20 439 better outcomes (Castro et al., 2009). The implication is that past and current
21
22
23 440 relationships may be taken into account in the selection of contractors and
24
25
26 441 consultants.

27
28
29 442
30
31
32 443 Table 5 shows that consultants' previous experience in RC approaches (c-10) is
33
34
35 444 significantly correlated with cost performance (Y1) and client satisfaction (Y4), but
36
37
38
39 445 not adopted to a significant extent in Hong Kong. As explained in the introduction, it
40
41
42 446 is still not known if public sector projects can enjoy the full benefits of RC. It is
43
44
45 447 understandable that consultants lack experience in RC approaches.

46
47
48 448
49
50

51 ***Time Performance (Y2)***

52 449
53
54
55 450
56

57
58 451 Significant negative correlation was observed between schedule overrun of public
59
60
61
62
63
64
65

1 452 construction projects in Beijing and eight RC practices (see Table 4), while 14 RC
2
3
4 453 practices are significantly and negatively correlated with time performance in Hong
5
6
7 454 Kong (see Table 5). There is no common practice in the two lists. In Beijing,
8
9
10 455 contractors were involved in five out of eight RC practices, while in Hong Kong, 13
11
12
13
14 456 out of 14 practices relate to clients.

15
16
17 457
18
19
20 458 Table 4 shows that the eight RC practices that significantly affect time performance
21
22
23 459 are all significantly adopted in past public construction projects in Beijing. This may
24
25
26 460 be attributed to the Chinese government's strong emphasis on the timely completion
27
28
29 461 of public projects (Liu et al., 2010). It could also be observed in Table 3 that time
30
31
32
33 462 overrun in Beijing's public construction projects was not significant ($t=1.904$,
34
35
36 463 $p=0.062$), which is consistent with the findings here.

37
38
39 464
40
41
42 465 Among the 14 RC practices that are significantly correlated with time performance in
43
44
45 466 Hong Kong, five practices were not adopted to a significant extent in past projects.
46
47
48 467 These are: "Clearly defined equitable risk-sharing arrangement among contracting
49
50
51
52 468 parties" (abc-6), "Effectiveness of team-building events used in the project" (abc-13),
53
54
55 469 "Ongoing social relationships between clients and contractors" (ab-7), "Client has
56
57
58 470 organizational culture that fits relational contracting practices" (a-5), and "Previous
59
60
61
62
63
64
65

1 471 experience in RC approaches” (a-10). Practices abc-6 and ab-7 had significant
2
3
4 472 correlation with both time performance (Y2) and cost performance (Y1) and have
5
6
7 473 been discussed in the previous section.
8
9

10 474
11
12

13 475 “Effectiveness of team-building events used in the project” (abc-13) was not
14
15
16 476 significantly observed in past public construction projects in Hong Kong. However, as
17
18
19
20 477 shown in Table 5, significant correlations were found with time performance (Y2) and
21
22
23 478 client satisfaction (Y4). In Hong Kong, officials in public departments that are
24
25
26 479 modeled after the British system are not allowed to participate in team-building
27
28
29 480 events at an inter-personal level. Therefore, contracting parties would rely more on
30
31
32 481 contractual arrangements to guard against trouble, and this rigidity may increase the
33
34
35
36 482 time needed to execute a project and lead to delays. As team building in the early
37
38
39 483 phases of a project was found to influence participants’ behavior and increase
40
41
42 484 project knowledge (Kadefors, 2004), making more effort in team building is
43
44
45 485 recommended (Diallo and Thuillier, 2005).
46
47

48 486
49
50

51 487 The results show that clients’ “organizational culture fits RC practices” (a-5) and
52
53
54
55 488 “previous experience in RC approaches” (a-10) were not adopted to a significant
56
57
58 489 extent, yet had significant correlation with time performance (Y2). This agrees with
59
60
61
62
63
64
65

1 490 Chan and Kumaraswamy's (1997) finding that client-initiated variation is one of the
2
3
4 491 principal and common causes of delays in Hong Kong, especially when introduced
5
6
7 492 mid-stream. Clients' lack of an appropriate organizational culture that fits RC
8
9
10 493 practices is the main reason for ineffective project partnering (Ng et al., 2002), and is
11
12
13
14 494 more critical for public clients (Palaneeswaran and Kumaraswamy, 2000).
15
16
17 495

18
19
20 496 ***Quality Performance (Y3)***
21
22

23 497
24
25
26 498 Quality performance of public construction projects in Beijing is significantly
27
28
29 499 correlated with 13 RC practices. Five out of the 13 practices were not adopted to a
30
31
32 500 significant extent in past public construction projects. On the other hand, 19 RC
33
34
35
36 501 practices have significant correlation with quality performance in Hong Kong, and
37
38
39 502 two of these were not adopted to a significant extent.
40
41

42 503
43
44
45 504 Contractors' top management support for RC practices (b-15) was significantly
46
47
48 505 correlated with quality performance in both Beijing and Hong Kong. It is the senior
49
50
51 506 management's responsibility to set policies, control resources and train staff. RC is
52
53
54
55 507 therefore unlikely to succeed without the backing of top management (Akintoye and
56
57
58 508 Main, 2007).
59
60
61
62
63
64
65

1 509
2
3
4 510 Five out of the 13 RC practices that are significantly correlated with quality
5
6
7 511 performance in Beijing were not adopted to a significant extent. These include:
8
9
10 512 clients' level of innovation/creativity (a-1) and investment in development of
11
12
13 513 collaborative working skills (a-17), consultants' investment in development of
14
15
16 514 collaborative working skills (c-17), contractors' level of innovation/creativity (b-1), and
17
18
19
20 515 ongoing social relationships between contractors and consultants (bc-7).
21
22

23 516

24
25
26 517 As clients are responsible for the preparation of clear and unambiguous
27
28
29 518 specifications (Jha and Iyer, 2006), they play an important role in helping the project
30
31
32 519 to achieve the desired quality level and need to be competent in defining the level of
33
34
35
36 520 expected quality. This may explain why clients' level of innovation/creativity (a-1) and
37
38
39 521 investment in development of collaborative working skills (a-17) had significant
40
41
42 522 correlation with quality performance. However, public clients in Beijing are usually
43
44
45 523 infrequent clients or "one-off" clients (Ke et al., 2011), who are unable to be
46
47
48 524 innovative and are not motivated to develop collaborative working skills because
49
50
51 525 they do not have a demand for construction products on a regular basis.
52
53

54 526

55
56
57
58 527 Consultants' investment in the development of collaborative working skills (c-17) was
59
60
61
62
63
64
65

1 528 not significantly adopted in Beijing, yet had significant impact on quality performance.
2
3
4 529 Zhao et al. (2011) also found that modern project management tools and techniques
5
6
7 530 have not been extensively adopted by consultants in China's construction industry.
8
9
10 531 Under such an environment, it is understandable that consultants do not invest much
11
12
13 532 in the development of collaborative working skills in Beijing. As consultants are
14
15
16 533 important links between clients and contractors, a higher level of collaborative
17
18
19
20 534 working skills of consultants would increase the interaction among project
21
22
23 535 participants, improve mutual understanding and information sharing, and thereafter
24
25
26 536 boost quality performance (Jha and Iyer, 2006).

27
28
29 537
30
31
32 538 Contractors' level of innovation/creativity (b-1) showed a significant correlation with
33
34
35 539 quality performance, perhaps due to its impact on the contractors' operations and
36
37
38
39 540 output (Yasamis et al., 2002). Consistent with the low contribution rate of science
40
41
42 541 and technology to China's construction industry (Lu et al., 2008), contractors in
43
44
45 542 Beijing may be unwilling to invest in innovation because of the uncertain outcome.

46
47
48 543
49
50
51 544 Ongoing social relationships between contractors and consultants (bc-7) engender
52
53
54
55 545 good communication, thereby facilitating proper monitoring and timely feedback,
56
57
58 546 which enhance project quality. Ongoing social relationships also enable instances of
59
60
61
62
63
64
65

1 547 poor workmanship or improper usage of resources to be reported promptly, and this
2
3
4 548 aids in achieving the desired quality level (Jha and Iyer, 2006).
5
6
7 549
8
9
10 550 In Hong Kong, consultants' readiness to compromise on unclear issues (c-11) and
11
12
13 551 the level of reciprocation/face-saving gestures between clients and consultants (ac-8)
14
15
16 552 are key RC practices that are significantly correlated with quality performance (Y3)
17
18
19 553 and client satisfaction (Y4). Currently the Hong Kong government uses a two-
20
21
22
23 554 envelope system (i.e. technical aspects of the proposal in one envelope and
24
25
26 555 consulting fees in the other) for consultant selection (Baark and Wai, 2000). It is
27
28
29 556 therefore difficult for the client to make a reciprocation /face-saving gesture and
30
31
32
33 557 directly employ a consultant. Meanwhile, the readiness to compromise on unclear
34
35
36 558 issues is perceived to be an important factor in implementing RC principles (Rahman
37
38
39 559 and Kumaraswamy, 2004a). This is more so for consultants, as they prepare
40
41
42 560 specifications and drawings that are usually far from perfect, and so, compromises
43
44
45 561 on unclear issues need to be made by consultants in order to improve quality
46
47
48
49 562 performance.

50
51
52 563

53
54
55 564 ***Client Satisfaction (Y4)***

56
57
58 565

1 566 Table 4 shows that client satisfaction is significantly correlated with 11 RC practices
2
3
4 567 in Beijing. As shown in Table 5, 39 RC practices have significant correlation with
5
6
7 568 client satisfaction in Hong Kong. The large difference between the numbers of
8
9
10 569 correlated practices in these two cities may to some extent reflect the greater
11
12
13 570 emphasis and expectation of collaborative behaviors in Hong Kong. Six RC practices
14
15
16 571 were common to both Beijing and Hong Kong. These include three individual
17
18
19 572 features and practices adopted by contractors, and three mutual practices among
20
21
22 573 contracting parties. The former are: “Level of innovation/creativity” (b-1), “Knowledge
23
24
25 574 level of project processes” (b-8), and “Long-term commitment level” (b-9). The latter
26
27
28 575 are: “Sharing of project information between contractor and consultant” (bc-6),
29
30
31 576 “Ongoing social relationships between clients and consultants” (ac-7), and “Level of
32
33
34 577 inter-personal relations/cultural harmony between clients and contractors” (ab-5).
35
36
37
38
39 578
40
41
42 579 In Beijing, three out of the six RC practices affecting client satisfaction (b-1, bc-6, ac-
43
44
45 580 7) were not adopted to a significant extent. b-1 has been discussed in the previous
46
47
48 581 section.

50
51 582
52
53
54 583 The sharing of project information between contractors and consultants (bc-6) would
55
56
57 584 enable contractors to better understand the design and consultants to promptly
58
59
60
61
62
63
64
65

1 585 identify potential conflicts, leading to higher client satisfaction. However, each party
2
3
4 586 in mainland China tends to treat information as confidential rather than something to
5
6
7 587 be shared. This is to prevent its own interests from being compromised as there is
8
9
10 588 conflict of interests among the participants, especially between contractors and
11
12
13
14 589 consultants (Tai et al., 2009).

15
16
17 590

18
19
20 591 The reason why “Ongoing social relationship between clients and consultants” (ac-7)
21
22
23 592 was not significantly adopted in Beijing may be attributed to the current procurement
24
25
26 593 system, which was discussed above. It is worth noting that there is a significant
27
28
29 594 negative correlation between Beijing’s client satisfaction and the ongoing
30
31
32 595 relationships between clients and consultants, which is a direct contrast to Hong
33
34
35 596 Kong. Zuo and Ma (2007) found that one of the major issues in China’s consultancy
36
37
38
39 597 industry is that the responsibilities of consultants are usually not clearly defined. Due
40
41
42 598 to the ongoing social relationships between clients and consultants, they may have
43
44
45 599 signed a loose contract where the responsibilities of consultants are not clearly spelt
46
47
48 600 out. Clients could thereafter be less satisfied.

49
50
51 601

52
53
54
55 602 Table 5 shows that eight RC practices that significantly affect client satisfaction were
56
57
58 603 not significantly adopted in Hong Kong. They comprise two individual features and

59
60
61
62
63
64
65

1 604 practices of consultants, four mutual practices, and two joint practices. The two
2
3
4 605 individual features and practices of consultants are: "Previous experience in RC
5
6
7 606 approaches" (c-10) and "Readiness to compromise on unclear issues" (c-11). The
8
9
10 607 four mutual practices are: "Ongoing social relationships" among contracting parties
11
12
13 608 (ab-7, ac-7 & bc-7) and "Level of reciprocation/face-saving gestures between clients
14
15
16 609 and consultants" (ac-8). The two joint practices are: "Collective/combined
17
18
19
20 610 responsibility by a pre-selected group comprising one person from each major party"
21
22
23 611 (abc-4) and "Effectiveness of team-building events used in the project" (abc-13).
24
25
26 612 Among them, practices c-10, c-11, ab-7, ac-7, ac-8, and abc-13 have significant
27
28
29 613 correlation with other performance indexes, which has been discussed above.
30
31
32
33 614
34
35
36 615 Ongoing social relationships among contracting parties (ab-7, ac-7 & bc-7) were
37
38
39 616 found to be significantly correlated with client satisfaction in Hong Kong. This is
40
41
42 617 consistent with Castro et al.'s (2009) finding that construction companies form
43
44
45 618 coalitions principally on the basis of past or current relationships.
46
47
48
49 619
50
51
52 620 "Collective/combined responsibility by a pre-selected group comprising one person
53
54
55 621 from each major party" (abc-4) is currently not a common behavior in Hong Kong. An
56
57
58 622 independent facilitator is sometimes appointed to chair a few workshops and assist
59
60
61
62
63
64
65

1 623 in fostering confidence among the contracting parties (Chan et al., 2009b). However,
2
3
4 624 the facilitator would not be involved throughout the whole life of the project.
5
6
7 625 Therefore, a joint group comprising at least one person from each party is not
8
9
10 626 commonly available.

13
14 627

16 628 **Conclusions**

18
19
20 629

21
22
23 630 This study investigated RC practices that are adopted in public construction projects
24
25
26 631 in China. Using a structured questionnaire, data were collected from experienced
27
28
29 632 contracting parties who had been personally involved in public construction projects
30
31
32 633 in Beijing and Hong Kong. The statistical analysis revealed that public construction
33
34
35
36 634 projects in both cities had achieved significantly good quality performance and client
37
38
39 635 satisfaction but not in budget and schedule performance. However, public
40
41
42 636 construction projects in Hong Kong achieved significantly better performance in
43
44
45 637 owner satisfaction and quality than those in Beijing.

46
47
48 638

49
50
51 639 The main findings (see Tables 4 and 5) are: 32 and 56 RC practices are significantly
52
53
54
55 640 correlated with the performance outcomes of public construction projects in Beijing
56
57
58 641 and Hong Kong, respectively; and eight and 11 of these RC practices in Beijing and

59
60
61
62
63
64
65

1 642 Hong Kong, respectively, are key practices as they are not adopted to a significant
2
3
4 643 extent but are significantly correlated with performance outcomes. The unique value
5
6
7 644 of the findings to the construction engineering and management community is the
8
9
10 645 identification of a list of key RC practices which could be adopted as they lead to
11
12
13 646 better project outcomes. Some of these key RC practices are: having collective
14
15
16 647 responsibility comprising one person from each major contracting party; sharing risks
17
18
19
20 648 equitably among contracting parties; organizing effective team-building events;
21
22
23 649 sharing project information among contracting parties; developing collaborative
24
25
26 650 working skills; and compromising on unclear issues.

27
28
29 651
30
31
32 652 Another main finding is that 13 practices were adopted to significantly different
33
34
35
36 653 extents in Hong Kong and Beijing. To generalize the findings to the broader global
37
38
39 654 community, to a limited extent, the findings from Hong Kong may be applicable to
40
41
42 655 countries that adopt the open market economy, while those from Beijing may be
43
44
45 656 implemented by countries that adopt a planned economy. Hong Kong's open market
46
47
48 657 is indicated by its global competitiveness rank of 11 out of 142 countries, which is
49
50
51
52 658 comparable to the US and UK's rankings of 5th and 10th respectively, and ahead of
53
54
55 659 Australia's 20th placing (World Economic Forum, 2011). As for Beijing, its planned
56
57
58 660 economy is also known as authoritarian capitalism (McGregor, 2012) where the state

1 661 directs and controls a large share of the country's economic output. The central
2
3
4 662 planning extends to allocation of workload through administrative orders (Zhang,
5
6
7 663 2003). The implications of the findings for the global communities that adopt project
8
9
10 664 management style along PMI's (2008) framework are: they should have better
11
12
13 665 division of responsibilities among contracting parties; share more project information;
14
15
16 666 and have long-term commitment to the project. On the other hand, in planned
17
18
19
20 667 economies, RC practices that are adopted to a significantly larger extent are having
21
22
23 668 combined responsibility comprising one person from each major contracting party,
24
25
26 669 and organizing effective team-building events.

27
28
29 670
30
31
32 671 The results show that public projects in China had adopted many RC practices
33
34
35 672 among contracting parties to a significant extent, such as alignment of objectives,
36
37
38
39 673 joint coordination and monitoring of plans, and joint problem solving. The findings
40
41
42 674 contribute to the body of knowledge by showing that the Relational Contract Theory
43
44
45 675 is valid for public projects even though they are procured through open bidding, and
46
47
48 676 hence do not lend themselves to future relationships. The implication is that A/E/C
49
50
51 677 firms should approach public projects with a relational mindset and not view them as
52
53
54 678 discrete transactions just because the public sector uses open bidding. Another
55
56
57 679 contribution to knowledge is that the relational approach is shown to be important as
58
59
60
61
62
63
64
65

1 680 it leads to better project outcomes.
2
3

4 681
5
6

7 682 One limitation faced in this study is that correlation does not mean causation.
8
9

10 683 Therefore the results should be interpreted carefully. Correlation statistics should not
11
12

13 684 be taken as conclusive evidence that those RC practices are definitely the most
14
15

16 685 appropriate ones to be adopted. Secondly, the findings are not easily generalized to
17
18

19 686 different regions in China, as the public projects that were used to inform this
20
21

22 687 research were from Beijing and Hong Kong only. Finally, the population size could
23
24

25 688 not be estimated, and hence the significance of the sample could not be determined
26
27

28 689 mathematically. In future studies, data from other regions in China could be
29
30

31 690 collected, with the population defined more clearly.
32
33
34
35

36 691
37
38

39 692 **Acknowledgements** 40 41

42 693
43
44

45 694 The research is made possible by Singapore Ministry of Education's Academic
46
47

48 695 Research Fund Tier 2 funding support (Grant number: MOE2009-T2-2-067) for the
49
50

51 696 project entitled 'Boosting public construction project outcomes through relational
52
53

54 697 transactions'. Prof Patrick Zou and Ning Yan's contribution to the questionnaire
55
56

57 698 design is acknowledged with grateful thanks. Special gratitude is extended to those
58
59
60
61
62
63
64
65

1 699 industry practitioners who have kindly participated in the surveys reported in this
2
3
4 700 paper
5
6
7 701
8
9
10 702 **References**
11
12
13 703
14
15
16 704 Ahsan, K. and Gunawan, I. (2010) Analysis of cost and schedule performance of
17
18
19
20 705 international development projects. *International Journal of Project*
21
22
23 706 *Management*, 28(1): 68–78.
24
25
26 707 Akintoye, A. and Main, J. (2007) Collaborative relationships in construction: the UK
27
28
29 708 contractors' perception. *Engineering, Construction and Architectural*
30
31
32 709 *Management*, 14(6): 597-617.
33
34
35 710 American Institute of Architects (2007) *Integrated Project Delivery: A Guide* (Version
36
37
38
39 711 1). <http://www.aia.org/contractdocs/AIAS077630>. Last visited: 28 March, 2012.
40
41
42 712 Ang, Y.K. and Ofori, G. (2001) Chinese culture and successful implementation of
43
44
45 713 partnering in Singapore's construction industry. *Construction Management and*
46
47
48 714 *Economics*, 19(6): 619-632.
49
50
51 715 Anvuur, A.M. and Kumaraswamy, M.M. (2007) Conceptual model of partnering and
52
53
54
55 716 alliancing. *Journal of Construction Engineering and Management*, 133(3), 225-
56
57
58 717 234.
59
60
61
62
63
64
65

- 1 718 Baark, E. and Wai, M.K. (2000) Development of the Engineering Consultancy
2
3
4 719 Industry in Hong Kong. Working Papers in the Social Sciences, No. 47, The
5
6
7 720 Hong Kong University of Science and Technology, 27 October 2000.
8
9
10 721 Bayliss, R., Cheung, S.O., Suen, H.C.H. and Wong, S.P. (2004) Effective partnering
11
12
13 722 tools in construction: a case study on MTRC TKE contract 604 in Hong Kong.
14
15
16 723 International Journal of Project Management, 22(3): 253-263.
17
18
19 724 Beijing Municipal Bureau of Statistics (2011) Beijing Statistical Yearbook 2011.
20
21
22
23 725 Beijing, China, December 2011.
24
25
26 726 Black, C., Akintoye, A. and Fitzgerald, E. (2000) An analysis of success factors and
27
28
29 727 benefits of partnering in construction. International Journal of Project
30
31
32 728 Management, 18(6): 423-434.
33
34
35 729 Castro, I., Galan, J.L. and Casanueva, C. (2009) Antecedents of construction
36
37
38
39 730 projects coalitions: a study of the Spanish construction industry. Construction
40
41
42 731 Management and Economics, 27(9): 809-822.
43
44
45 732 Census and Statistics Department (2011) Hong Kong Annual Digest of Statistics
46
47
48 733 2011. Hong Kong, November, 2011.
49
50
51 734 Chan, A.P.C., Chan, D.W.M. and Ho, K.S.K. (2003) An empirical study of the
52
53
54
55 735 benefits of construction partnering in Hong Kong. Construction Management
56
57
58 736 and Economics, 21(5): 523-533.
59
60
61
62
63
64
65

- 1 737 Chan, A.P.C., Chan, D.W.M., Chiang, Y.H., Tang, B.S., Chan, E.H.W. and Ho, K.S.K.
2
3
4 738 (2004) Exploring Critical Success Factors for Partnering in Construction
5
6
7 739 Projects. Journal of Construction Engineering and Management, 130(2): 188-
8
9
10 740 198.
- 11
12
13 741 Chan, A.P.C., Chan, D.W.M., Fan, L.C.N., Lam, P.T.I. and Yeung, J.F.Y. (2006)
14
15
16 742 Partnering for construction excellence – a reality or myth? Build and
17
18
19 743 Environment, 41(12): 1924-1933.
- 20
21
22
23 744 Chan, A.P.C., Lam, P.T.I., Chan, D.W.M., Cheung, E. and Ke, Y.J. (2009a) Drivers
24
25
26 745 for Adopting Public Private Partnerships – Empirical Comparison between
27
28
29 746 China and Hong Kong Special Administrative Region. Journal of Construction
30
31
32 747 Engineering and Management, 135(11): 1115-1124
- 33
34
35
36 748 Chan, A.P.C., Chan, D.W.M and Yeung, J.F.Y. (2009b) Relationship Contracting for
37
38
39 749 Construction Excellence: Principles, Practices and Case Studies. Taylor &
40
41
42 750 Francis, 2009
- 43
44
45 751 Chan, D.W.M. and Kumaraswamy, M.M. (1997) A comparative study of causes of
46
47
48 752 time overruns in Hong Kong construction projects. International Journal of
49
50
51 753 Project Management, 15(1): 55-63.
- 52
53
54
55 754 Chen, C.T. and Chen, T.T. (2007) Critical success factors for construction partnering
56
57
58 755 in Taiwan. International Journal of Project Management, 25(5): 475-484.
- 59
60
61
62
63
64
65

1 756 Chen, C. and Messner, J.I. (2009) Entry Mode Taxonomy for International
2
3
4 757 Construction Markets. *Journal of Management in Engineering*, 25(1): 3-11.
5
6
7 758 Cheng, E.W.L., Li, H. and Love, P.E.D. (2000) Establishment of critical success
8
9
10 759 factors for construction partnering. *Journal of Management in Engineering*,
11
12
13 760 16(2): 84-92.
14
15
16 761 Cheng, E.W.L. and Li, H. (2001) Development of a conceptual model of construction
17
18
19 762 partnering. *Engineering, Construction and Architectural Management*, 8(4): 292-
20
21
22 763 303.
23
24
25
26 764 Cheng, E.W.L. and Li, H. (2002) Construction partnering process and associated
27
28
29 765 critical success factors: quantitative investigation. *Journal of Management in*
30
31
32 766 *Engineering*, 18(4): 194-202.
33
34
35
36 767 Diallo, A. and Thuillier D. (2005) The success of international development projects,
37
38
39 768 trust and communication: an African perspective. *International Journal of*
40
41
42 769 *Project Management*, 23(3): 237-252.
43
44
45 770 Doloi, H. (2009) Relational partnerships: the importance of communication, trust and
46
47
48 771 confidence and joint risk management in achieving project success.
49
50
51 772 *Construction Management and Economics*, 27(11): 1099-1109.
52
53
54
55 773 Dyer, J. H. (1996) Specialized supplier networks as a source of competitive
56
57
58 774 advantage: evidence from the auto industry. *Strategic Management Journal*,
59
60
61
62
63
64
65

- 1 775 17(4): 271-292.
2
3
- 4 776 Glagola, C.R. and Sheedy, W.M. (2002) Partnering on Defense Contracts. Journal of
5
6
7 777 Construction Engineering and Management, 128(2): 127-138.
8
9
- 10 778 Gulati, R. and Gargiulo, M. (1999) Where do inter-organizational networks come
11
12
13 779 from? American Journal of Sociology, 104(5): 1439-1493.
14
15
- 16 780 Halman J.I.M. and Braks B.F.M. (1999) Project alliancing in the offshore industry.
17
18
19 781 International Journal of Project Management, 17(2): 71-76.
20
21
22
- 23 782 Hastings, C. (1995) Building the culture of organizational networking: managing
24
25
26 783 projects in the new organization. International Journal of Project Management,
27
28
29 784 13(4): 259-263.
30
31
- 32 785 Jha, K.N. and Iyer, K.C. (2006) Critical Factors Affecting Quality Performance in
33
34
35 786 Construction Projects. Total Quality Management and Business Excellence,
36
37
38 787 17(9): 1155-1170.
39
40
41
- 42 788 Kadefors, A. (2004) Trust in project relationships – inside the black box. International
43
44
45 789 Journal of Project Management, 22(3): 175-182.
46
47
- 48 790 Ke, Y.J., Ling, F.Y.Y., Kumaraswamy, M.M., Wang, S.Q., Zou, P.X.W. and Ning, Y.
49
50
51 791 (2011) Are Relational Contracting Principles Applicable to Public Construction
52
53
54 792 Projects? Proceedings of RICS COBRA 2011, Sep 12-13, 2011, p.p. 1364-1374.
55
56
57
- 58 793 Konchar, M. and Sanvido, V. (1998) Comparison of US project delivery systems.
59
60
61
62
63
64
65

- 1 794 Journal of Construction Engineering and Management, 124(6): 435–444.
2
3
- 4 795 Kumaraswamy, M.M., Rahman, M.M., Ling, Y.Y. and Phng, S.T. (2005a)
5
6
- 7 796 Reconstructing cultures for relational contracting. Journal of Construction
8
9
- 10 797 Engineering and Management, 131(10): 1065-1075.
11
12
- 13 798 Kumaraswamy, M.M., Ling, Y.Y., Rahman, M.M. and Phng, S.T. (2005b)
14
15
- 16 799 Constructing relationally integrated teams. Journal of Construction Engineering
17
18
- 19
20 800 and Management, 131(10): 1076-1086.
21
22
- 23 801 Kumaraswamy, M.M., Anvuur, A.M. and Smyth, H.J. (2010) Pursuing “relational
24
25
- 26 802 integration” and “overall value” through “RIVANS”. Facilities, 28(13/14): 673-686.
27
28
- 29 803 Ling, Y.Y. and Leong, E.F.K. (2002) Performance of design-build projects in terms of
30
31
- 32 804 cost, quality and time: views of clients, architects and contractors in Singapore.
33
34
- 35 805 The Australian Journal of Construction Economics and Building, 2(1): 37-46.
36
37
- 38
39 806 Ling, F.Y.Y., Chan, S.L., Chong, E. and Ee, L.P. (2004) Predicting performance of
40
41
- 42 807 DB and DBB projects. Journal of Construction Engineering and Management,
43
44
- 45 808 130(1): 75–83.
46
47
- 48 809 Ling, F.Y.Y., Ibbs, C.W. and Hoo, W.Y. (2006a) Determinants of international
49
50
- 51 810 architectural, engineering and construction firms’ project success in China.
52
53
- 54 811 Journal of Construction Engineering and Management, 132(2): 206-214.
55
56
- 57
58 812 Ling, F.Y.Y., Rahman, M.M. and Ng, T.L. (2006b) Incorporating contractual
59
60
61
62
63
64
65

1 813 incentives to facilitate relational contracting. Journal of Professional Issues in
2
3
4 814 Engineering Education and Practice, 132(1): 57-66.
5
6
7 815 Ling, F.Y.Y., Low, S.P., Wang, S.Q. and Temitope, K.E. (2008) Models for predicting
8
9
10 816 project performance in China using project management practices adopted by
11
12
13 817 foreign AEC firms. Journal of Construction Engineering and Management,
14
15
16 818 134(12): 983-990.
17
18
19
20 819 Liu, Y.W., Zhao, G.F. and Wang, S.Q. (2010) Many Hands, Much Politics, Multiple
21
22
23 820 Risks – The Case of the 2008 Beijing Olympics Stadium. Australian Journal of
24
25
26 821 Public Administration, 69(S1): 85-98.
27
28
29
30 822 Love, P.E.D., Mistry, D. and Davis, P.R. (2010) Price competitive alliance projects:
31
32
33 823 identification of success factors for public clients. Journal of Construction
34
35
36 824 Engineering and Management, 136(9): 947-956.
37
38
39 825 Lu, T.Y. (2005) The Study on the Construction Contract of Mainland China: With
40
41
42 826 Discussion on the Status of Laws and Dispute Resolution in Taiwan.
43
44
45 827 Department of Law, Soochow University, Master Thesis, 2005
46
47
48 828 Lu, W.S., Shen, L.Y. and Yam, M.C.H. (2008) Critical Success Factors for
49
50
51 829 Competitiveness of Contractors: China Study. Journal of Construction
52
53
54 830 Engineering and Management, 134(12): 972-982.
55
56
57
58 831 Macneil, I.R. (1974) The Many Futures of Contract. Southern California Law Review,
59
60
61
62
63
64
65

- 1 832 47(3): 691-816.
2
3
- 4 833 Maurer, I. and Ebers, M. (2006) Dynamics of social capital and their performance
5
6
7 834 implications: lessons from biotechnology start-ups. *Administrative Science*
8
9
10 835 *Quarterly*, 51(2): 262-292.
11
12
- 13 836 McGregor, J. (2012) *No Ancient Wisdom, No Followers: The Challenges of Chinese*
14
15
16 837 *Authoritarian Capitalism*. Prospecta Press, Westport, CT.
17
18
- 19 838 Ng, S.T., Rose, T.M., Mak, M. and Eng, S. (2002) Problematic issues associated with
20
21
22 839 project partnering – the contractor perspective. *International Journal of Project*
23
24
25 840 *Management*, 20(6): 437-449.
26
27
- 28 841 Nunnally, J.C. (1978) *Psychometric Theory*, 2nd Ed. New York: McGraw-Hill.
29
30
31 842 Oliver, C. (1990) Determinants of inter-organizational relationships: integration and
32
33
34 843 future directions. *Academy of Management Review*, 15(2): 241-265.
35
36
37 844 Ott, R.L. and Longnecker, M. (2001) *An introduction to statistical methods and data*
38
39
40 845 *analysis*. Pacific Grove: Duxbury.
41
42
43 846 Palaneeswaran, E. and Kumaraswamy, M.M. (2000) Benchmarking contractor
44
45
46 847 selection practices in public-sector construction – a proposed model.
47
48
49 848 *Engineering, Construction and Architectural Management*, 7(3): 285-299.
50
51
52 849 Pervan, S.J., Bove, L.L., Johnson, L.W. and Lin, C.H. (2011) Effect of reciprocity on
53
54
55 850 well-being in interpersonal marketing relationships: an interview study.
56
57
58
59
60
61
62
63
64
65

1 851 International Journal of Management, 28(1): 185-197.
2
3
4 852 Piotrowski, S. J., Zhang, Y., Lin, W. and Yu, W. (2009) Key Issues for
5
6
7 853 Implementation of Chinese Open Government Information Regulations. Public
8
9
10 854 Administration Review, 69 (S1): 129–135.
11
12
13 855 PMI (2008) A Guide to the Project Management Body of Knowledge (PMBOK®
14
15
16 856 Guide), 4th ed. Project Management Institute: Newton Square, PA.
17
18
19
20 857 Powell, W.W. (1990) Neither market nor hierarchy: network forms of organization.
21
22
23 858 Research in Organizational Behavior, 12: 295-336.
24
25
26 859 Rahman, M.M. and Kumaraswamy, M.M. (2002) Joint risk management through
27
28
29 860 transactionally efficient relational contracting. Construction Management and
30
31
32 861 Economics, 20(1): 45-54.
33
34
35
36 862 Rahman, M.M. and Kumaraswamy, M.M. (2004a) Contracting relationship trends
37
38
39 863 and transitions. Journal of Management in Engineering, 20(4): 147-161.
40
41
42 864 Rahman, M.M. and Kumaraswamy, M.M. (2004b) Potential for implementing
43
44
45 865 relational contracting and joint risk management. Journal of Management in
46
47
48 866 Engineering, 20(4): 178-189.
49
50
51
52 867 Rahman, M.M. and Kumaraswamy, M.M. (2005) Relational selection for
53
54
55 868 collaborative working arrangements. Journal of Construction Engineering and
56
57
58 869 Management, 131(10): 1087-1098.
59
60
61
62
63
64
65

- 1 870 Rahman, M.M. and Kumaraswamy, M.M. (2008) Relational Contracting and
2
3
4 871 Teambuilding: Assessing Potential Contractual and Non-Contractual Incentives.
5
6
7 872 Journal of Management in Engineering, 24(1): 48–63.
8
9
10 873 Sachs, T., Tiong, R.L.K. and Wang, S.Q. (2007) Analysis of political risks and
11
12
13 874 opportunities in public private partnerships (PPP) in China and selected Asian
14
15
16 875 countries: Survey results. Chinese Management Studies, 1(2): 126-148.
17
18
19
20 876 Tai, S., Wang, Y. and Anumba, C.J. (2009) A survey on communications in large-
21
22
23 877 scale construction projects in China. Engineering, Construction and
24
25
26 878 Architectural Management, 16(2): 136-149.
27
28
29 879 Uzzi, B. and Lancaster, R. (2003) Relational embeddedness and learning: the case
30
31
32 880 of bank loan managers and their clients. Management Science, 49(4): 383-399.
33
34
35
36 881 Williamson, O.E. (1975) Markets and hierarchies: analysis and antitrust implications.
37
38
39 882 New York: Free Press.
40
41
42 883 Wong, P.S.P., Cheung, S.O. and Ho, P.K.M. (2005) Contractor as Trust Initiator in
43
44
45 884 Construction Partnering – Prisoner’s Dilemma Perspective. Journal of
46
47
48 885 Construction Engineering and Management, 131(10): 1045-1053.
49
50
51
52 886 World Economic Forum (2011) The Global Competitiveness Index 2011 – 2012
53
54
55 887 Rankings. Downloaded on Dec 5, 2012 from:
56
57
58 888 http://www3.weforum.org/docs/WEF_GCR_CompetitivenessIndexRanking_201
59
60
61
62
63
64
65

1 889 1-12.pdf
2
3
4 890 Xu, T., Smith, N.J. and Bower, D. A. (2005) Forms of collaboration and project
5
6
7 891 delivery in Chinese construction markets: probable emergence of strategic
8
9
10 892 alliances and Design/Build. *Journal of Management in Engineering*, 21(3): 100-
11
12
13 893 109.
14
15
16 894 Yasamis, F., Arditi, D. and Mohammadi, J. (2002) Assessing contractor quality
17
18
19 895 performance. *Construction Management and Economics*, 20(3): 211-223.
20
21
22
23 896 Yeung, J.F.Y., Chan, A.P.C., Chan, D.W.M. and Li, L.K. (2007) Development of a
24
25
26 897 partnering performance index (PPI) for construction projects in Hong Kong: a
27
28
29 898 Delphi study. *Construction Management and Economics*, 25(12): 1219-1237.
30
31
32
33 899 Zaheer, A. and Soda, G. (2009) Network evolution: the origins of structural holes.
34
35
36 900 *Administrative Science Quarterly*, 54(1): 1-31.
37
38
39 901 Zhang, S. (2003) Construction Industry and Enterprises in China: A comprehensive
40
41
42 902 review. *Proceedings of the CIB TG 23 International Conference, Hong Kong,*
43
44
45 903 *China*, pp. 1-12.
46
47
48 904 Zhao, Z.Y., Zuo, J. and Zillante, G. (2011) Situation and Competitiveness of Foreign
49
50
51 905 Project Management Consultancy Enterprises in China. *Journal of Management*
52
53
54 906 *in Engineering*, 27(4): 200-209.
55
56
57
58 907 Zuo, J. and Ma, T. (2007) The Project Management Consultant in Chinese
59
60
61
62
63
64
65

1 908 Construction Industry – The Roles and Responsibilities. Proceedings of
2
3
4 909 Australian Institute of Project Management National Conference 2007, Hobart
5
6
7 910 Tasmania, October 7 – 10, 2007.
8
9

10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

Table 1: Features and Practices Identified

	RC Practices	Code	Authors who investigated
Individual features & practices	Level of innovation/creativity	a-1, b-1, c-1	Chan et al., 2004; Cheng et al., 2000
	Commitment of resources to the project	a-2, b-2, c-2	Cheng et al., 2000; Chen and Chen, 2007
	Effort in implementing relational contracting practices	a-3, b-3, c-3	Black et al., 2000; Chen and Chen, 2007
	Acceptance of relational contracting practices	a-4, b-4, c-4	Black et al., 2000; Kumaraswamy et al., 2005b
	Organizational culture fit to relational contracting practices	a-5, b-5, c-5	Rahman and Kumaraswamy, 2004a, 2004b
	Financial capacity	a-6, b-6, c-6	Black et al., 2000; Chen and Chen, 2007
	Flexibility when situations change	a-7, b-7, c-7	Chen and Chen, 2007; Ling et al., 2006b
	Knowledge level of project processes	a-8, b-8, c-8	Cheng et al., 2000; Love et al., 2010
	Long-term commitment level	a-9, b-9, c-9	Cheng et al., 2000
	Previous experience in relational contracting approaches	a-10, b-10, c-10	Kumaraswamy et al., 2005a, b;
	Readiness to compromise on unclear issues	a-11, b-11, c-11	Rahman and Kumaraswamy, 2004a, b
	Reputation in the industry	a-12, b-12, c-12	Powell, 1990; Gulati and Gargiulo, 1999
	Specific inputs on construction methods, materials, etc, before they were formally appointed	a-13, b-13, c-13	Bayliss et al., 2004; Rahman and Kumaraswamy, 2004b
	Team working attitude	a-14, b-14, c-14	Black et al., 2000; Chen and Chen, 2007
Top management support for relational contracting practices	a-15, b-15, c-15	Black et al., 2000, Akintoye and Main, 2007	

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

	Attitude toward continuous improvement	a-16, b-16, c-16	Black et al., 2000; Chen and Chen, 2007
	Investment in development of collaborative working skills	a-17, b-17, c-17	Hastings, 1995; Dyer, 1996
Mutual practices between two members	Familiarity/previous relationships	ab-1, ac-1, bc-1	Gulati, 1999; Zaheer and Soda, 2009
	Mutual trust	ab-2, ac-2, bc-2	Xu et al., 2005; Kumaraswamy, et al., 2005b
	Mutual understanding	ab-3, ac-3, bc-3	Black, 2000; Love et al., 2010
	Open and effective communication	ab-4, ac-4, bc-4	Chen and Chen, 2007; Doloï, 2009
	Level of inter-personal relations/cultural harmony (individual level)	ab-5, ac-5, bc-5	Kumaraswamy et al., 2005a; Rahman and Kumaraswamy, 2008
	Sharing of project information	ab-6, ac-6, bc-6	Uzzi and Lancaster, 2003; Maurer and Ebers 2006
	Ongoing social relationships (e.g. "guanxi", social ties, and kinship outside of this project)	ab-7, ac-7, bc-7	Gulati and Gargiulo, 1999; Castro et al., 2009
	Level of reciprocation/face-saving gestures	ab-8, ac-8, bc-8	Oliver, 1990; Pervan et al., 2011
Joint practices among all members	Clarity of division of responsibilities among contracting parties	abc-1	Anvuur and Kumaraswamy, 2007; Halman and Braks, 1999
	Acceptance of performance appraisal mechanism for the project	abc-2	Rahman and Kumaraswamy, 2004a, b
	Alignment of objectives of different contracting parties	abc-3	Cheng et al. 2000; Rahman and Kumaraswamy, 2008
	Collective/combined responsibility by a pre-selected group comprising one person from each major party	abc-4	Chan et al., 2004; Halman and Braks, 1999
	Joint coordination and monitoring plans among contracting parties	abc-5	Chan et al., 2004; Yeung et al., 2007
	Clearly defined equitable risk-sharing arrangement among contracting parties	abc-6	Rahman and Kumaraswamy, 2002; Ling et al., 2006b
	Flexible/adjustable contracts to address uncertainties	abc-7	Rahman and Kumaraswamy, 2005
	Commitment level of contracting parties to joint problem solving	abc-8	Chan et al., 2004; Chen and Chen, 2007

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

	Presence of conducive learning climate/environment	abc-9	Chan et al., 2004; Chan et al., 2006
	Acceptance of dispute resolution mechanism for the project	abc-10	Rahman and Kumaraswamy, 2004a, 2004b
	Clarity of contract conditions (e.g. scope of contract, duties & responsibilities)	abc-11	Wong and Cheung, 2005
	Real gain-share/pain-share among contracting parties	abc-12	Black et al., 2000; Ling et al., 2006b
	Effectiveness of team-building events used in the project	abc-13	Cheng and Li, 2001, 2002

Note: a, b, and c in code column refer to client, contractor, and consultant, respectively.

Table 2: Characteristics of Respondents

Characteristic		Beijing		Hong Kong	
		No.	%	No.	%
Experience in construction industry	< 5 years	8	14	3	6
	5-9 years	14	24	4	8
	10-14 years	22	38	6	12
	≥ 15 years	14	24	37	74
	Average	11		22	
	Min	2		3	
	Max	30		56	
Organization type	Government	10	18	15	29
	Engineering firm	1	2	3	6
	Architectural firm	10	18	0	0
	Quantity surveying firm	5	9	3	6
	Contractor	32	57	27	53
	Others	4	7	3	6
Ownership of organization	Public	30	52	23	45
	Private	13	22	27	53
	Joint Venture	15	26	1	2
	Average of public percentage	45		50	
Size of total workforce	< 100	12	21	2	4
	100-999	23	40	17	35
	≥ 1000	22	39	30	61
	Average	19934		3097	
	Min	25		10	
	Max	160000		50000	

Table 3: Extent of Differences between Beijing and Hong Kong

Code	Beijing			Hong Kong			ANOVA	
	Mean	T	Sig.	Mean	T	Sig.	F	Sig.
Cost (Y1)	10.42%	2.866	0.006	12.50%	4.535	0.000	0.198	0.657
Time (Y2)	8.41%	1.904	0.062	17.78%	5.213	0.000	2.721	0.102
Quality (Y3)	3.19	3.296	0.002	3.98	11.364	0.000	62.222	0.000
Client Satisfaction (Y4)	3.32	3.777	0.000	3.88	9.656	0.000	20.087	0.000
a-6	3.56	3.795	0.000	4.28	9.456	0.000	12.839	0.001
a-8	3.16	1.219	0.228	3.87	7.258	0.000	15.415	0.000
a-9	3.07	0.482	0.632	3.77	5.468	0.000	11.303	0.001
a-16	3.32	2.746	0.008	3.87	6.317	0.000	9.387	0.003
b-9	3.45	4.259	0.000	3.90	7.019	0.000	7.587	0.007
b-13	3.44	3.605	0.001	3.88	5.831	0.000	5.315	0.023
c-9	3.26	2.668	0.010	3.63	4.555	0.000	4.838	0.030
ab-8	3.69	5.680	0.000	3.24	1.900	0.063	6.232	0.014
bc-1	3.04	0.256	0.799	3.56	4.288	0.000	7.113	0.009
bc-6	3.13	1.044	0.301	3.53	3.400	0.001	4.334	0.040
abc-1	3.29	2.664	0.010	3.92	8.267	0.000	15.995	0.000
abc-4	3.66	7.519	0.000	3.14	1.188	0.241	12.777	0.001
abc-13	3.43	4.236	0.000	3.06	0.375	0.709	4.145	0.044

Table 4: Correlation of RC Practices to Project Performance in Beijing

RC Practices	Mean	Cost (Y1)		Time (Y2)		Quality (Y3)		Satisfaction (Y4)	
		Corr.	Sig.	Corr.	Sig.	Corr.	Sig.	Corr.	Sig.
bc-7	2.93					0.316	0.019		
a-1	2.96					0.267	0.047		
a-17	3.05					0.299	0.026		
bc-6	3.13							0.295	0.029
c-17	3.16					0.275	0.041		
a-8	3.16	-0.290	0.035						
b-1	3.18					0.386	0.003	0.358	0.007
ac-7	3.25							-0.271	0.043
abc-10	3.27*			-0.280	0.040				
abc-1	3.29*							0.358	0.006
a-16	3.32*	-0.273	0.048						
bc-5	3.33*			0.371	0.007			0.299	0.026
c-2	3.33*			-0.290	0.037				
bc-3	3.36*							0.305	0.022
a-5	3.36*					0.290	0.030		
bc-8	3.41*							0.310	0.023
a-14	3.43*			-0.382	0.005				
b-13	3.44*					0.267	0.048		
b-9	3.45*					0.325	0.015	0.280	0.037
abc-11	3.47*	-0.309	0.022						
ab-5	3.48*							0.348	0.009
ac-5	3.50*					0.306	0.022		
b-5	3.61*			-0.287	0.039				
c-15	3.63*	-0.277	0.045						
a-12	3.68*	-0.341	0.015						
b-6	3.72*					0.274	0.045		
b-4	3.73*							0.294	0.028
b-8	3.75*							0.270	0.044
b-2	3.77*					0.416	0.001		
b-15	3.82*			-0.422	0.002	0.331	0.013		
c-12	3.82*			-0.386	0.005	0.307	0.020		
b-12	3.98*			-0.308	0.026				
Total		5		8		13		11	

Note: * significant at p<0.050 based on t test of the mean results

Table 5: Correlation of RC Practices to Project Performance in Hong Kong

RC Practices	Mean	Cost (Y1)		Time (Y2)		Quality (Y3)		Satisfaction (Y4)	
		Corr.	Sig.	Corr.	Sig.	Corr.	Sig.	Corr.	Sig.
abc-6	2.82	-0.300	0.038	-0.349	0.015				
ab-7	3.00	-0.398	0.006	-0.318	0.031			0.386	0.006
abc-13	3.06			-0.347	0.016			0.351	0.011
ac-7	3.12	-0.435	0.005					0.372	0.014
a-10	3.13			-0.374	0.012				
bc-7	3.14							0.316	0.039
abc-4	3.14							0.375	0.007
c-11	3.20					0.385	0.014	0.329	0.038
ac-8	3.20					0.332	0.028	0.323	0.032
a-5	3.21			-0.376	0.012				
c-10	3.25	-0.431	0.007					0.348	0.028
c-5	3.30*	-0.367	0.023	-0.415	0.010				
abc-10	3.31*	-0.312	0.031						
a-4	3.32*							0.295	0.044
bc-2	3.37*							0.305	0.047
a-17	3.40*							0.311	0.033
ab-2	3.43*							0.305	0.033
ab-6	3.43*							0.295	0.039
abc-2	3.44*					0.317	0.025		
b-11	3.45*					0.359	0.011	0.324	0.023
ab-3	3.45*							0.342	0.016
ab-5	3.47*			-0.317	0.032			0.352	0.013
c-4	3.50*	-0.323	0.048			0.331	0.037	0.349	0.027
abc-3	3.50*	-0.421	0.003	-0.409	0.004			0.311	0.028
b-1	3.51*							0.417	0.003
c-1	3.51*					0.345	0.027		
a-14	3.52*					0.367	0.012		
b-17	3.53*					0.300	0.036	0.292	0.042
c-2	3.53*							0.325	0.040
c-16	3.53*	-0.443	0.005			0.456	0.003	0.507	0.001
ab-1	3.53*			-0.328	0.026				
bc-6	3.53*					0.355	0.019	0.437	0.003
b-10	3.55*							0.309	0.031
c-13	3.60*							0.326	0.040
ab-4	3.61*					0.291	0.042		
c-9	3.63*	-0.322	0.048			0.315	0.048	0.392	0.012
c-14	3.65*	-0.499	0.001			0.418	0.007	0.403	0.010
bc-4	3.65*							0.358	0.018
b-5	3.67*							0.318	0.026

RC Practices	Mean	Cost (Y1)		Time (Y2)		Quality (Y3)		Satisfaction (Y4)	
		Corr.	Sig.	Corr.	Sig.	Corr.	Sig.	Corr.	Sig.
a-15	3.68*							0.347	0.017
c-15	3.70*	-0.354	0.029			0.333	0.036	0.371	0.018
ac-1	3.73*			-0.387	0.012				
abc-11	3.76*			-0.320	0.027				
a-9	3.77*	-0.339	0.025						
b-16	3.80*							0.412	0.003
a-8	3.87*			-0.320	0.034				
a-16	3.87*	-0.362	0.016	-0.343	0.023	0.383	0.008	0.383	0.008
b-9	3.90*							0.316	0.027
abc-1	3.92*					0.332	0.017		
b-12	3.96*					0.360	0.011	0.406	0.004
c-12	3.97*	-0.414	0.010						
a-12	4.02*			-0.382	0.010				
b-8	4.02*							0.444	0.001
b-14	4.02*	-0.310	0.036			0.490	0.000	0.452	0.001
b-15	4.02*					0.333	0.019	0.377	0.008
b-2	4.06*							0.294	0.041
Total		16		14		19		39	

Note: * significant at $p < 0.050$ based on *t* test of the mean results