

# Reconstructing Cultures for Relational Contracting

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**Abstract:** Although previous research has pointed to potential performance gains through relational contracting (RC), reservations remain as to its value and viability. Even those who wish to use RC need guidelines for introducing it, especially where it clashes with prevalent project cultures. A study was launched from Hong Kong to identify the critical factors which promote RC and team building in the context of specific cultures. This paper consolidates the perceptions of 60 respondents to a questionnaire survey in Singapore, in relation to the hypothesized 24 factors facilitating RC, and 28 factors impeding/deterring RC. It indicates the evident readiness of the Singaporean contracting industry to embrace collaborative working practices. On the whole: (1) all the 24 factors facilitating RC, and 23 of the 28 factors deterring RC, are significant; (2) these two sets of factors could be represented by six and seven “broad factors,” respectively; and (3) except in a few cases, respondents from large and medium companies, as well as with and without experience in RC, have similar perceptions of the importance of different factors. It was perceived that trust should be at the core of RC approaches to construction procurement, but also seen that the current level of trust is low. Identifying the principal “facilitators” and “impediments”/deterrents to RC, provides pointers to building relationally integrated teams to boost performance to much higher levels, as are now expected from the industry. The literature indicates that the outcome of the survey in Singapore reflects the trends in many countries that are moving toward RC. This research model and approach may be conveniently replicated in other contractual regimes, in order to reinforce these observations.

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## Introduction

Industry reports in many countries, e.g., the United Kingdom (Egan 1998) and Hong Kong (CIRC 2001) advocate a move toward nonadversarial procurement routes in order to improve performance and benefit the client, as well as the whole supply chain by, amongst other things, slashing transaction costs (Rahman and Kumaraswamy 2002). Ironically, in some previously nonadversarial regimes like Japan there is a move away from long-term collaborative relationships toward more competition (Hughes and Maeda 2002). This reflects the increasing tension, if not disparities, between (1) many reports highlighting the benefits of relational contracting (RC) (Australian Constructors Association 1999; Jones 2002), and (2) proponents of the perceived need for perpetuating a reliance on arms-length/discrete

relations, e.g., to purportedly ensure compliance with public sector regulations, other requirements and avoid collusion/corruption.

Transaction cost economics (TCE) may assist in explaining some of these disparities. TCE attempts to harmonize different contracting scenarios and related conflicts or problems. Such problems can be usefully approached in transaction cost economizing terms (Williamson 1985). According to TCE principles, the execution of contracts also requires consideration of the roles of social and economic institutions embracing the contract/transaction or “exchange,” and more importantly the roles played by the organizations and people involved in exchange (Coase 1988). RC on the other hand is seen as a safeguarding mechanism designed to facilitate exchanges, smoothen transactional friction and make provisions for “incomplete contract” in complex scenarios (Macneil 1974), such as in construction. In order to invoke RC and create this credible commitment, by definition there would need to be the possibility of continuing the relationship beyond the current transactions. TCE supplements RC by proposing that this relationship continue at least up until the completion of the contract, allowing flexibility in contracts for future adjustments and harmonizing the relationships among contractual parties, in order to “get works done” (Williamson 1985).

Lingard et al. (1998) believe that contractual relationships and their transaction costs have a direct bearing on the value of production. Thus, it is essential for the industry players to develop a more efficient working relationship with each other, in order to minimize the totality of transaction and production costs (Walker and Chau 1999), and to maximize value.

The broad aim of this paper is to report on the perceived po-

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tential for developing a RC culture, based on a relevant cross section of views from Singaporean construction contractors. A specific objective is to identify potential factors that (1) facilitate and (2) impede/deter RC. The active participation of many multinational contractors in the cosmopolitan environment of Singapore makes it a good test bed for this investigation. Further, similarities with the precursor international literature review and surveys indicate that the findings are very relevant to construction scenarios in many countries.

## Relational Contracting Concepts

### *Fundamentals of Relational Contracting*

According to RC, a “contract” may be treated as a “present promise” of doing something in the future, that has dynamic ongoing states of interrelated past, present and future (Macneil 1974). Contract is a projection of exchange into the future and involves present communication of a commitment to a future event. But present promise affects the future by limiting choices that would be available during contract execution. Moreover, all future events cannot be perceived or quantified due to uncertainty and complexity. Therefore, contracts should be flexible in order to adjust for future events and effectively address the uncertainties as and when they arise (Macneil 1974, 1980). RC defines the working relationship among the parties who do not always follow the legal mechanism offered by the written contracts. The parties themselves govern the transactions within mutually acceptable social guidelines. The relationship itself develops obligations between the parties (Macaulay 1963).

Construction project teams comprise various hierarchically and interlinked parties, such as clients/owners, architects, engineers, quantity surveyors, main/general contractors, subcontractors, specialist contractors, and suppliers. They possess diversified skills and knowledge, and professional and organizational culture. As a result, complex relationships exist within project teams that, if not managed effectively, can adversely affect a project’s performance (Walker 1989). RC is an approach, although not so new, to managing such complex relationships between the players in construction contracts/teams. The foundation of RC is recognition of mutual benefits and “win-win” scenarios through more cooperative relationships between the contracting parties.

### *Relational Contracting in Construction*

RC principles underpin partnering, alliancing, joint venturing, relationship contracting, other collaborative working arrangements, and improved risk sharing arrangements (Rahman and Kumaraswamy 2002). As practiced in the construction industry in its myriad forms, the core of RC is to establish the working relationships between the parties through a mutually developed, formal strategy of commitment and communication aimed at win-win outcomes for all parties. This has been reflected in defining “partnering” by the Construction Industry Institute (CII 1996). Research invoked by the “rethinking construction” report on the United Kingdom industry (Egan 1998) also concentrated on collaboration between contracting parties—through motivation, commitment and incentives—in the form of partnerships and alliances (Bresnen and Marshall 2000). Although “alliances” in construction may vary from partnering arrangements to “strategic commercial relationships,” these are based on a mechanism that can improve interorganizational relations and project performance (Holt et al. 2000). On the other hand, partnering may be regarded

as a “strategic arrangement” between clients and contractors over a series of projects, or only a short term single project, with the aim of lowering costs and improving efficiency (Harris and McCaffer 2001).

RC aims at generating an organizational environment of trust, open communication and employee involvement (Sanders and Moore 1992). This is achieved through the rapid creation of a project culture, to fulfill the function, which is served by a corporate culture in longer lasting organizations (Chan et al. 2003). Although the benefits of partnering are numerous, the successful implementation of a partnering process is hard work. Changing old habits and building trust do not magically happen (Cowan et al. 1992; Rahman and Kumaraswamy 2004). RC is not a “one-size-fits-all” guaranteed fix, but rather a philosophy that must be tailored for each situation to which it is applied. Companies considering RC should assess their business objectives, analyze the role of RC in helping them to achieve those objectives and determine the appropriate style of collaboration to implement. Once the culture of trust and cooperation is developed, transactional activities can be more cost efficient.

### *Knowledge Gap and Present Initiative*

RC literature to date has focused primarily on the benefits and critical success factors of various forms of collaborative working arrangements, especially partnering in the engineering and construction industries (Crane et al. 1997; Chan et al. 2004). Partnering has worked well in the construction industries of different countries. Also, much of the partnering literature is concerned with discussing partnering from a general perspective, with little attempt being made to explore how partnering relationships were actually forged, how the appropriate mind sets and culture may be created and the barriers to be overcome *en route*. The theoretical basis for partnering and alliancing, e.g., in reducing transaction costs and increasing efficiencies, has been justified through the previous conceptualizations that are described in more detail by Rahman and Kumaraswamy (2002). Complementing these conceptualizations with an empirical approach, the factors facilitating and impeding such a RC culture in the Singaporean context are explored in an example “case,” which provides useful findings for wider consideration.

## Research Methods and Approach

The questionnaire was developed in Hong Kong following an initial study that included a literature review and Hong Kong-based surveys (Rahman 2003; Rahman et al. 2003). It was then supplemented by a further literature review in Singapore before focusing on the contracting industry in this city state. Traditionally, the Singapore construction industry has also suffered from cost overruns, program delays and poor productivity, as was recognized by the Construction 21 (1999) report. In spite of the recommendations for a more integrated procurement approach like design and build, the industry has not yet shifted much from the traditional approach. The general view is that the design-bid-build approach provides a measure of protection to less informed developers and other clients, who lack faith in the professionalism of their contractors.

The questionnaire requested the respondents to indicate on a seven-point scale the degree of importance assigned to the factors affecting both the development of RC culture and the team building process in the industry. The questionnaire was in five sections, of which the first sought general information about the respon-

dents, whereas Sections 2 and 3 elicited perceptions on “factors facilitating RC” and “factors impeding/deterring RC,” respectively. The 24 factors suggested in Section 2 and the 28 factors suggested in Section 3 were derived on the basis of extensive review of the international literature, together with Hong Kong-based surveys and interviews (Rahman and Kumaraswamy 2002; Rahman 2003; Rahman et al. 2003).

The Appendix contains the first two pages of the four page questionnaire and these include the above-mentioned Sections 1, 2 and 3. For example, Section 2 lists 24 possible factors facilitating RC, but provision was also made to add other factors that the respondents may deem important. Respondents rated each factor on a scale from 0 to 6, varying from lowest to highest importance. The responses to Sections 4 and 5—on factors facilitating and deterring the building of integrated teams—are presented and analyzed in the companion paper (Kumaraswamy et al. 2005) that focuses on team building.

The questionnaire was mailed for detailed data collection in Singapore. The target group of big and medium sized contractors was selected based on random sampling from the contractors’ registry of the Building and Construction Authority (BCA) (<http://www.bca.gov.sg>). The sample was broadly categorized into four main groups of contractors according to their financial grade under the BCA contractors’ registry. The selected groups were: A1 contractors—unlimited tendering limit, minimum \$15 M paid-up capital; A2 contractors—\$65 M tendering limit, minimum \$6.5 M paid-up capital; B1 contractors—\$30 M tendering limit, minimum \$3 M paid-up capital; and B2 contractors—\$10 M tendering limit, minimum \$1 million paid-up capital. A total of 200 questionnaires were issued to these four groups of contractors to gather the required data for analysis.

The mail and self-administered questionnaire data collection method was employed in this research. A covering letter explaining the purpose of the research was written to seek the understanding and cooperation of potential respondents. In order to secure a better response rate, a summary of the survey findings was offered to those interested. In addition, self-addressed and stamped envelopes were provided for the convenience of the respondents. The survey was carried out toward the end of 2003.

Data processing included statistical *t* tests of means. The respondents were partitioned into two sets of groups based on their firm size and prior experience. ANOVA tests were carried out to detect any differences in the respondents’ perceptions of the relative importance of the various factors in facilitating RC. These ANOVA tests were designed to distinguish between (1) medium and big contractors and (2) contractors with and without prior experience in RC.

In addition, factor analysis was conducted on the significant variables to group them into broader factor categories (or components) for ease of interpretation and application. Space limitations in this paper necessitate limiting the focus to factors facilitating and impeding/deterring RC. Factors facilitating and impeding/deterring the building of integrated teams (as solicited in Sections 4 and 5 of the questionnaire) are being reported in a companion paper (Kumaraswamy et al. 2005).

## Profile of Respondents

Of the 200 questionnaires mailed to the various participants, a total of 60 (30%) were returned as per Table 1. All the returned questionnaires were usable. The response rate for A2 contractors was exceptionally good at 73.7%. B1 and B2 contractors had the

**Table 1.** Respondent Profile

Financial categories of contractors	Mailed	Returned	
		Number	Percentage (%)
A1	36	10	27.8
A2	19	14	73.7
B1	75	18	24.0
B2	70	17	24.3
Unknown		1	
Total	200	60	30

lowest response rates of approximately 24%. This could be due to their unfamiliarity with RC concepts.

The response profile indicates a relatively similar distribution of respondents among the four grades of contractors. This is useful for reducing distortion/bias. Only one returned questionnaire did not state the financial grade of the company. The response rate was better than expected. This could be due to the heightening interest in RC and the awareness of its potential benefits for the local industry. Thirteen respondents also requested a copy of the survey findings.

The targeted respondents were the senior management of the organization. Twenty-four percent of the respondents fall into the category of top management. Another 17 and 59% of respondents belong to the “middle management” and “professionals” categories, respectively. It was not considered suitable to carry out ANOVA among these unevenly distributed groups of respondents, as well as based on their diverse total length of experience (see Table 2). Some middle management respondents had less total experience than some of the professionals respondents. Moreover, respondents within the professionals group also had experience ranging from 2 to 20 years. Nevertheless, all the responses are consistent in general, as discussed in later sections: all the 24 factors of Section 2, and 23 among 28 factors of Section 3 are statistically significant at 95% confidence level (Tables 5 and 6).

From Table 2, all respondents undertake general building construction. Fourteen of them are involved in civil engineering construction and an additional 3 of them engage in other construction related trades and supply of building materials. A general coverage of contractors who undertake building construction can be therefore assumed. The respondents’ experience profile provides a further indication of the reliability of their responses, as shown in Table 3.

On average, respondents have worked in the industry for a period of 12 years. Seventy-nine percent of the respondents had worked in the industry for at least 6 years. Their views are devel-

**Table 2.** Contractors’ Workheads

Workheads	Number
CW01 only	44
CW01 and CW02 only	12
CW01, CW02, and CR06	1
CW01, CW02, CR05, CR09, and CR13	1
CW01, CR06, and SY06	1
Total	59

Note: One respondent did not provide information. Legend: CW01 =general building; CW02=civil engineering; CR05=fencing and iron-works; CR06=interior decoration; CR09=repairs and redecorations; CR13=waterproofing installation; and SY06=finishing and building products.

**Table 3.** Years of Experience in Construction Industry

Years of experience	Number	Percentage (%)
1–5	12	21
6–10	19	33
11–15	10	17
16–20	8	14
21–25	5	8
26 and higher	4	7
Total	58	100

Note: Two respondents did not provide information.

oped through many years of hands-on experience and they are more sensitive to industry changes. They can be expected to have developed a more holistic view of the procurement processes involved in construction projects. Their opinions are valued in this study because, given the above-mentioned profiles, they can be taken to represent the current sentiment of construction professionals in Singapore.

Thirty-eight of the respondents did not have any experience in RC as shown in Table 4. This represented a significant 63% of the sample. Thus, it shows that the application of RC is still relatively limited in the local industry. This is consistent with the survey findings that 86% of respondents with RC experience do not have more than 6 years of experience (see Table 4). Hence, RC approaches can be taken to be a relatively new collaborative working style among Singapore contractors.

In summary, this survey provided the basic data required for this study. Respondents represent contractors from A1, A2, B1, and B2 financial categories. Many of them are experienced professionals holding senior posts. It can be concluded that the data collected are reliable. Despite RC approaches providing scope for relatively novel working arrangements, 37% of the respondents in this study have some RC experience. This further enhances the quality of data collected.

## Data Analysis and Discussion

### Factors Facilitating Relational Contracting

Table 5 shows the results of a one-sample *t* test conducted by using the SPSS (Chicago, Ill.) statistical package in analyzing the responses to Section 2 of the questionnaire and taking a test value of 3 as corresponding to average importance. It is seen that apart from all the means being above 3, all the 24 factors in Section 2 have significance levels which are less than 0.05. Therefore, the null hypothesis is rejected. This indicates that all the factors identified are of more than average importance in facilitating RC.

The four most important factors were perceived to be mutual trust among all contracting parties (factor 2.7), open communication among all contracting parties (2.6), teamworking and “can do” spirit of all contracting parties (2.10) and effective coordina-

**Table 4.** Years of Experience in Relational Contracting Approaches

Years of experience	Number	Percentage (%)
1–3	13	59
4–6	6	27
7–9	2	9
10 and higher	1	5
Total	22	100

**Table 5.** One-Sample *t*-Test of Factors Facilitating Relational Contracting

Rank	Factor <sup>a</sup>	Test value=3			
		Mean	Standard deviation	<i>t</i>	Significance level (1-tailed)
17	2.1	3.63	1.119	4.382	0.0000
20	2.2	3.45	1.281	2.721	0.0043
15	2.3	3.90	0.986	7.068	0.0000
7	2.4	4.28	0.865	11.487	0.0000
9	2.5	4.18	0.873	10.497	0.0000
2	2.6	5.08	0.850	18.995	0.0000
1	2.7	5.53	0.929	21.120	0.0000
4	2.8	4.77	0.890	15.376	0.0000
5	2.9	4.63	0.828	15.088	0.0000
3	2.10	4.93	0.686	21.843	0.0000
22	2.11	3.33	1.188	2.173	0.0169
11	2.12	4.08	0.979	8.569	0.0000
10	2.13	4.12	0.739	11.711	0.0000
24	2.14	3.30	0.944	2.461	0.0084
14	2.15	3.92	0.889	7.991	0.0000
12	2.16	4.02	0.833	9.449	0.0000
13	2.17	4.00	0.759	10.204	0.0000
18	2.18	3.55	0.910	4.682	0.0000
19	2.19	3.52	1.049	3.813	0.0002
6	2.20	4.47	0.929	12.227	0.0000
8	2.21	4.27	0.918	10.687	0.0000
23	2.22	3.31	0.749	3.130	0.0014
21	2.23	3.41	0.790	3.953	0.0001
16	2.24	3.83	0.592	10.782	0.0000

<sup>a</sup>See the Appendix.

tion among all contracting parties (2.8) This is similar to findings by Cheng and Li (2001) except that “teamworking spirit” was replaced by “top management support” in their “top” few results. In this study, top management support was rated seventh, indicating that the divergence was not large.

Trust is a key element of successful partnering (Cowan et al. 1992). Unfortunately, the project environment conducive to trust would be adversely affected by bitter experiences of previous adversarial relationships, disputes, and litigation (Harback et al. 1994; Lazar 1997). Overall, the survey findings concur with the conclusions of Black et al. (2000) that mutual trust is the most important factor that facilitates project partnering whereas a long-term perspective is one of the least critical factors.

### Factors Impeding/Detering Relational Contracting

Table 6 indicates that 23 of the 28 factors have significance levels of less than 0.05. Therefore, the null hypothesis is rejected. However, the null hypothesis is not rejected for factors 3.10, 3.20, 3.23, 3.27, and 3.28, since these five factors have a significance level of greater than 0.05. The implication here is that the respondents agreed that 23 factors identified are important in impeding/detering the adoption of RC in the industry.

Respondents strongly agreed that the lack of trust/reliability among all contracting parties (factor 3.12) is the biggest barrier to the development of RC followed by the lack of confidence (3.19) and lack of teamworking attitude (3.11) among all contracting parties. Only three factors have a mean of less than 3 indicating that the respondents agreed on average that those three do not

**Table 6.** One-Sample *t*-Test of Factors Impeding/Deterring Relational Contracting

Rank	Factor <sup>a</sup>	Test value=3			
		Mean	Standard Deviation	<i>t</i>	Significance level (1-tailed)
16	3.1	3.70	1.280	4.238	0.0000
19	3.2	3.52	1.017	3.936	0.0001
7	3.3	4.22	0.761	12.381	0.0000
12	3.4	3.93	0.899	8.038	0.0000
22	3.5	3.37	1.073	2.647	0.0052
18	3.6	3.55	0.649	6.564	0.0000
4	3.7	4.35	0.954	10.966	0.0000
15	3.8	3.73	1.103	5.152	0.0000
9	3.9	4.10	1.003	8.492	0.0000
25	3.10	3.07	1.023	0.505	0.3078
3	3.11	4.75	0.795	17.060	0.0000
1	3.12	5.40	1.012	18.374	0.0000
21	3.13	3.40	0.807	3.841	0.0002
17	3.14	3.68	0.676	7.827	0.0000
13	3.15	3.92	0.671	10.578	0.0000
8	3.16	4.18	1.228	7.464	0.0000
6	3.17	4.23	0.963	9.919	0.0000
5	3.18	4.28	0.958	10.373	0.0000
2	3.19	4.82	1.000	14.074	0.0000
24	3.20	3.13	1.016	1.016	0.1568
20	3.21	3.52	0.833	4.802	0.0000
23	3.22	3.35	0.799	3.394	0.0006
26	3.23	2.72	0.940	-2.334	0.9943
11	3.24	3.98	0.813	9.371	0.0000
14	3.25	3.83	0.557	11.580	0.0000
10	3.26	4.00	0.689	11.244	0.0000
27	3.27	2.68	1.295	-1.894	0.9842
28	3.28	2.48	1.372	-2.918	0.9988

<sup>a</sup>See the Appendix.

play a crucial role as a deterrent of relational contracting. They are: unrelated/separate risk-reward plans for different parties (factor 3.23), bureaucratic client organization (3.27) and incompatible public sector rules and regulations (3.28).

Alsagoff and McDermott (1994) noted that RC has become a preferred procurement route even in public sector contracts in Japan. Public accountability in that country is not measured solely on the economic benefits of short term competition but instead on the quality of both the product and the construction process. The survey results reveal that Singapore may be moving toward that direction as well. The United Kingdom experience also indicates that the HM Treasury has come out strongly in favor of partnering-type relational arrangements after noting the demonstrated benefits in terms of value for the taxpayers' money.

On the other hand, the finding (from Singapore, the United Kingdom, and Japan) that a bureaucratic client organization is not a deterrent to the adoption of RC contradicts previous observations by Larson and Drexler (1997), whereby bureaucratic organizations were found to impede the effectiveness of partnering, because they were more difficult to transform into an integrative-type culture. The latter was also noted in an earlier study of the Hong Kong construction industry, where some restrictive rules and regulations in the public sector were seen to deter public officials from developing trusting relationships with other con-

tracting parties in general (Rahman and Kumaraswamy 2004). It is noted that such trust and an "integrated culture" is ultimately needed in order to foster any meaningful RC.

### **Differences in Ratings by Respondents of Different Sizes**

The surrogate measure for respondents' size of firm is their financial category classification. Fifty-nine respondents provided their financial grades. They were partitioned into two groups. The first group was comprised of 24 respondents with A1 and A2 financial grades as in Table 1. These are considered big firms. The second group consisted of 35 B1 and B2 contractors. These are medium sized firms. ANOVA was carried out using SPSS to assess any significant differences between these groups. The test results are provided in Tables 7 and 8.

From Table 7, it is seen that 23 out of 24 factors have significance levels greater than 0.05. The decision here is to accept the null hypothesis  $H_0$ . This means that for these 23 factors, there are no differences in opinions between the two groups of respondents, on their perceptions of relative importance of factors facilitating RC. On the other hand, the alternative hypothesis  $H_1$  is accepted for the factor 2.6 of "open communication among all contracting parties" which indicates that the two groups of respondents have different opinions on its relative importance.

Examining the means in Table 7, the B1 and B2 contractors viewed open communication (2.6) more importantly in facilitating RC (5.26 out of 6.00) than the A1 and A2 contractors (4.79). Usually larger companies have a broad range of resources that can be used to benefit the partnering relationship. Medium size companies do not have as much resources. Thus they tend to rely on the larger company's pool of resources. This may shift the equilibrium of power and the larger company may influence, if not control the decisions of the smaller companies (Kanter 1989). Consequently, the whole alliance may fail to achieve its purpose. Thus, there was a stronger expressed need for open communication in the case of smaller contractors which can translate into sharing of information and the development of trust.

Table 8 shows that large and medium sized contractors' ratings differed in three areas (factors 3.4, 3.11, and 3.18). The importance of "price only" selection methods (3.4) is emphasized more by the smaller contractors as a possible barrier to the development of RC. These contractors tend to have relatively less resources, and this may have increased their sensitivity to competition in the tendering environment (Dulaimi and Hong 2002). They are less able to compete with the bigger players if price is the overriding priority in tender selection.

The medium sized contractors also place more emphasis, than their bigger counterparts, on the lack of teamworking attitude among all contracting parties (factor 3.11) and unwilling or unenthusiastic participation in RC approaches (3.18) in deterring RC. This can be explained by the fact that the medium size contractors are relatively new to partnering-type arrangements because joint venture and partnering arrangements in Singapore have usually involved the big players. As such, the medium sized contractors have yet to change their mindsets or "culture" toward teamworking and cooperative thinking.

### **Respondents With and Without Relational Contracting Experience**

Among the 60 respondents, 22 and 38 "have" and "do not have" experience in RC approaches respectively. ANOVA was carried

**Table 7.** Different Views on Factors Facilitating Relational Contracting: Based on Financial Grading and Relational Contracting Experience

Number	Mean		<i>F</i>	Significance level	Mean		<i>F</i>	Significance level
	A1 and A2	B1 and B2			No experience	With experience		
2.1	3.58	3.60	0.003	0.954	3.66	3.59	0.049	0.825
2.2	3.25	3.51	0.635	0.429	3.45	3.45	0.000	0.984
2.3	4.00	3.77	0.813	0.371	3.97	3.77	0.574	0.452
2.4	4.21	4.29	0.118	0.732	4.39	4.09	1.739	0.192
2.5	4.13	4.20	0.103	0.749	4.26	4.05	0.864	0.356
2.6	4.79	5.26	4.550	<b>0.037<sup>a</sup></b>	5.16	4.95	0.796	0.376
2.7	5.38	5.66	1.305	0.258	5.50	5.59	0.131	0.718
2.8	4.71	4.80	0.146	0.703	4.79	4.73	0.067	0.797
2.9	4.63	4.63	0.000	0.987	4.57	4.73	0.509	0.479
2.10	4.88	4.97	0.273	0.603	5.03	4.77	1.936	0.169
2.11	3.29	3.34	0.026	0.873	3.42	3.18	0.560	0.457
2.12	4.08	4.09	0.000	0.993	4.18	3.91	1.102	0.298
2.13	3.92	4.26	3.083	0.085	4.21	3.95	1.693	0.198
2.14	3.38	3.23	0.336	0.564	3.37	3.18	0.540	0.465
2.15	3.79	3.97	0.584	0.448	4.03	3.73	1.594	0.212
2.16	4.04	3.97	0.100	0.753	4.08	3.91	0.575	0.452
2.17	3.96	4.00	0.043	0.837	4.08	3.86	1.123	0.294
2.18	3.58	3.49	0.166	0.685	3.47	3.68	0.726	0.398
2.19	3.46	3.49	0.010	0.919	3.71	3.18	3.698	0.059
2.20	4.42	4.49	0.076	0.783	4.37	4.64	1.162	0.286
2.21	4.38	4.17	0.692	0.409	4.18	4.41	0.834	0.365
2.22	3.13	3.37	1.568	0.216	3.32	3.27	0.064	0.800
2.23	3.22	3.49	1.714	0.196	3.43	3.36	0.103	0.750
2.24	3.74	3.86	0.578	0.450	3.86	3.77	0.331	0.568

<sup>a</sup>Factors with a significance level lower than 0.05.

out to test any significance in their perception on RC. The results are also shown in Tables 7 and 8. The null hypothesis is supported, since as per Table 7 all the variables identified have a significance of greater than 0.05. This suggests that construction professionals, irrespective of whether they have any RC experience, generally have similar opinions regarding the importance of factors facilitating the RC processes.

However, respondents with prior experience identified one variable as more important in Table 8 compared to those without experience in RC. The factor which has a significance level less than 0.05 is “potential legal liabilities (in resolving non-contractual issues)” (factor 3.24). It was interesting to note that respondents with RC experience gave a higher level of agreement on potential legal liabilities (in resolving noncontractual issues) (3.24) in inhibiting RC, compared to those with no RC experience. This may be because reputation and trust may not be sufficient for effective collaboration from their past experience. The threat of opportunistic behavior leading to potential legal liabilities is nonetheless still present in partnering (Jeffries and Reed 2000; Elangovan and Shapiro 1998). Partnerships may need to be supported by sanctions or penalties for “deviant” behavior (Grabher 1993).

## Factor Analysis

### General

The factor analysis technique in statistics is used to determine the number of “broader” factors shared in common by variables in the study (Kim and Mueller 1978; Norušis 2002). These common

factors which can account for the correlation among some groups of variables are extracted, thereby reducing a large body of variables to some representative broader factors. These common broader factors are also referred to as “components.” They explain in summary form, most of the variance observed in a much larger number of manifest variables. These components are uncorrelated after the extraction and many methods are available for this extraction.

### Factors Facilitating Relational Contracting

Table 9 shows the factor analysis results for factors facilitating RC. The “rotation procedure” used in this analysis was the orthogonal varimax method (Norušis 2002). Six components emerged from this analysis and together they account for 70% of the total explained variations. The percentage variation explained by the six components are 20, 14, 12, 10, 8, and 6% (as per Table 9). Descriptions and discussions follow.

*Top management and client’s support for RC approaches* (Component/Factor Category 1): This component consists of 8 factors that are mainly related to attributes of clients and top management support. Attributes of clients include their knowledge and enthusiasm for RC. Another aspect is the role of top management support of all the contracting parties. It encompasses their ability to cultivate a learning climate and positive attitudes toward continuous improvement in the project team. This finding concurs with those of Harback et al. (1994) finding that partnering needs to incorporate total quality management (TQM) with its focus on continuous improvement and active learning in order to bring about significant benefits. Top management must also en-

**Table 8.** Different Views on Factors Impeding/Deterring Relational Contracting: Based on their Financial Grading and Relational Contracting Experience

Number	Mean		F	Significance level	Mean		F	Significance level
	A1 and A2	B1 and B2			No experience	With experience		
3.1	3.54	3.74	0.362	0.550	3.84	3.45	1.284	0.262
3.2	3.25	3.63	2.208	0.143	3.68	3.23	2.905	0.094
3.3	4.33	4.11	1.184	0.281	4.11	4.41	2.268	0.138
3.4	3.63	4.09	4.267	<b>0.043<sup>a</sup></b>	3.97	3.86	0.206	0.652
3.5	3.38	3.29	0.106	0.745	3.42	3.27	0.263	0.610
3.6	3.42	3.63	1.518	0.223	3.61	3.45	0.748	0.391
3.7	4.21	4.40	0.592	0.445	4.50	4.09	2.635	0.110
3.8	3.54	3.80	0.826	0.367	3.74	3.73	0.001	0.974
3.9	3.96	4.14	0.500	0.482	4.24	3.86	1.959	0.167
3.10	2.92	3.14	0.691	0.409	2.97	3.23	0.854	0.359
3.11	4.38	5.00	10.024	<b>0.002<sup>a</sup></b>	4.87	4.55	2.355	0.130
3.12	5.25	5.51	0.957	0.332	5.26	5.64	1.925	0.171
3.13	3.25	3.49	1.211	0.276	3.34	3.50	0.529	0.470
3.14	3.54	3.77	1.640	0.206	3.66	3.73	0.145	0.705
3.15	3.92	3.89	0.031	0.862	3.92	3.91	0.004	0.948
3.16	4.04	4.26	0.430	0.515	4.11	4.32	0.415	0.522
3.17	4.25	4.23	0.007	0.934	4.21	4.27	0.057	0.812
3.18	3.92	4.51	5.967	<b>0.018<sup>a</sup></b>	4.32	4.23	0.117	0.733
3.19	4.83	4.80	0.015	0.902	4.79	4.86	0.075	0.785
3.20	3.17	3.06	0.170	0.682	3.16	3.09	0.060	0.808
3.21	3.38	3.57	0.820	0.369	3.45	3.64	0.713	0.402
3.22	3.33	3.31	0.008	0.927	3.24	3.55	2.119	0.151
3.23	2.83	2.57	1.213	0.275	2.79	2.59	0.617	0.435
3.24	4.13	3.86	1.577	0.214	3.79	4.32	6.438	<b>0.014<sup>a</sup></b>
3.25	3.88	3.80	0.250	0.619	3.76	3.95	1.661	0.203
3.26	4.00	3.97	0.025	0.876	3.97	4.05	0.149	0.701
3.27	2.83	2.51	0.897	0.348	2.63	2.77	0.163	0.688
3.28	2.67	2.29	1.149	0.288	2.53	2.41	0.100	0.753

<sup>a</sup>Factors with a significance level lower than 0.05.

sure that mutually agreed performance appraisal mechanisms are in place and responsibility is shared among all the contracting parties.

*Alignment of various team objectives* (Component 2): This component contains 4 factors that emphasize the alignment of project and commercial objectives of different parties. This is favorable to building a long-term commitment among the team members, since the adversarial positions of the parties are addressed at the outset.

*Trust, open communication and teamworking culture* (Component 3): This component covers 5 factors that focus mainly on such behavioral aspects in partnering. Project team commitment in terms of trust, open communication, and teamworking spirit is important in facilitating RC. This component is consistent with the findings of Cheung et al. (2003) and Li et al. (2000) that behavioral or attitudinal attributes are important in facilitating RC.

*Clearly defined and equitable risk allocation* (Component 4): Including all the key parties in the risk-reward plan will help to ensure that clearly defined and equitable risk allocation is enabled. This will reduce the possibility of disputes and potential legal liabilities.

*RC experience and adequate resources* (Component 5): This component consists of just 2 factors which focus on the contributions of past RC experience and adequate resources to the project team.

*Flexible contracts* (Component 6): This component empha-

sizes the importance of flexibility in contracts when uncertainties are encountered. Risk-reward plans can also be drafted such that they encourage and motivate the contracting parties to perform well.

In summary, it may also be noted that all six components (factor categories) identified from the previous factor analysis reflect the importance of "culture related factors" in facilitating RC. Although a strong "core cultural element" is clearly evident in five of the previous components, the "RC experience" element in Component 5 can also be seen to contribute to the prevalent culture.

### Factors Impeding/Deterring Relational Contracting

Table 10 shows the factor analysis results on factors impeding RC. Seven components emerged from this analysis and together they account for 71% of the total explained variations. The percentage variations explained by the seven components are 14, 12, 10, 10, 8, and 7%; and they are discussed in the following.

*Unenthusiastic participation in RC approaches* (Component 1): This component consists of 6 factors that focus mainly on the willingness of industry players to adopt RC. Unenthusiastic participation in RC approaches stems from the lack of trust, teamworking attitude, and RC experience, which can again be related to culture.

*Inappropriate contract strategy and project planning* (Component 2): This component covers 3 factors. Inappropriate procure-

**Table 9.** Factor Analysis of Factors Facilitating Relational Contracting (RC)

Label	$h^2$	Factor loading	Component (eigenvalue/percentage)	
2.1	0.778	0.825	Top management and client's support for RC approaches (4.878/20%)	
2.2	0.717	0.727		
2.3	0.741	0.789		
2.4	0.707	0.739		
2.9	0.665	0.523		
2.14	0.626	0.537		
2.18	0.369	0.522		
2.19	0.623	0.639		
2.11	0.648	0.621		Alignment of various team objectives (3.422/14%)
2.15	0.807	0.812		
2.16	0.778	0.785		
2.17	0.780	0.773		
2.6	0.706	0.703	Trust, open communication and teamworking culture (2.773/12%)	
2.7	0.814	0.757		
2.8	0.739	0.568		
2.10	0.706	0.776		
2.13	0.591	0.460	Clearly defined and equitable risk allocation (2.409/10%)	
2.20	0.784	0.812		
2.21	0.766	0.826		
2.24	0.625	0.464		
2.5	0.730	0.725	RC experience and adequate resources (1.839/8%)	
2.12	0.780	0.767		
2.22	0.721	0.754	Flexible contracts (1.491/6%)	
2.23	0.611	0.456		

ment strategy and poor project planning may deter contracting parties from adopting RC. This problem is further exacerbated by feeding into ambiguous contract clauses.

*Inappropriate risk allocation* (Component 3): This component consists of 3 factors that focus mainly on the sharing of risks among the contracting parties. This is an important but often overlooked concept. An appropriate risk balancing should be sought between the owner, contractor and other project participants, in order to utilize the incentive value of bearing risk while minimizing a contingency charged for accepting the risk (Gordon 1994). The party who is in the best position to control the risk should be able to handle it with confidence. This will prevent the parties from reverting to their traditional win-lose positions which deter them from adopting RC.

*Exclusion of major subcontractors and suppliers in risk-reward plan* (Component 4): This component covers 3 factors which emphasize the exclusion of major subcontractors and suppliers in the risk-reward plan. Optimal issue resolution mechanisms cannot be developed without the participation of all team players.

*Persisting adversarial cultures of contracting parties* (Component 5): This component consists of 3 factors which include commercial pressures faced by contracting parties and potential legal liabilities. Parties enter the project focused on achieving their objectives and maximizing their profit margins, with little or no regard for the impacts on others. This mindset/culture leads to conflicts, litigation, and often a disastrous project (Thompson and Sanders 1998). Such fears also deter moves toward RC.

*Lack of top management commitment* (Component 6): This component contains 3 factors that focus mainly on the absence

**Table 10.** Factor Analysis of Factors Impeding/Deterring Relational Contracting (RC)

Label	$h^2$	Factor loading	Component (eigenvalue/percentage)
3.4	0.713	0.716	Unenthusiastic participation in RC approaches (3.195/14%)
3.11	0.662	0.763	
3.12	0.768	0.731	
3.16	0.635	0.615	
3.17	0.531	0.501	Inappropriate contract strategy and project planning (2.843/12%)
3.18	0.583	0.616	
3.1	0.847	0.898	
3.2	0.776	0.836	
3.5	0.664	0.575	Inappropriate risk allocation (2.321/10%)
3.3	0.771	0.802	
3.19	0.646	0.661	
3.26	0.732	0.776	
3.15	0.664	0.596	Exclusion of major subcontractors and suppliers in the risk reward plan (2.289/10%)
3.21	0.873	0.914	
3.22	0.872	0.902	
3.8	0.705	0.647	Persisting adversarial cultures of contracting parties (2.270/10%)
3.24	0.595	0.676	
3.25	0.736	0.700	
3.6	0.724	0.788	Lack of top management commitment (1.949/8%)
3.7	0.805	0.678	
3.9	0.805	0.616	
3.13	0.755	0.688	Incompatible personalities and corporate cultures (1.703/7%)
3.14	0.709	0.766	

of top management commitment. Contracting parties may not have given serious thought to the potential benefits of RC and how it should be implemented. This is reflected in the lack of an efficient risk-reward plan. Efforts are not expended in improving the contractor's capability to contribute to the project team.

*Incompatible personalities and corporate cultures* (Component 7): This component has 2 factors which emphasize the difficulties of fitting a diverse group of individuals into the same team. If they had previously worked in quite different corporate cultures, this can be a source of cultural clashes and debilitating conflicts that retard moves toward RC.

Again it may be noted in summary, that all 7 components (factor categories), as isolated from the previous factor analysis, can be traced to the imperative for inculcating an appropriate culture in order to remove or reduce impediments and deterrents to RC.

## Conclusions and Conceptualizations of the Way Forward

It appears that appropriate and inappropriate cultures are at the respective roots of all of the six components (factor categories) for facilitating RC; and the seven components impeding/deterring RC, as determined from the foregoing factor analyses. The need for "reconstructing" an appropriate culture is therefore clearly established. Focusing on the factors themselves: (1) all 24 hypothesized factors facilitating RC were found to be significantly important and (2) 23 of the 28 factors hypothesized as impeding/deterring RC were found to be significant.

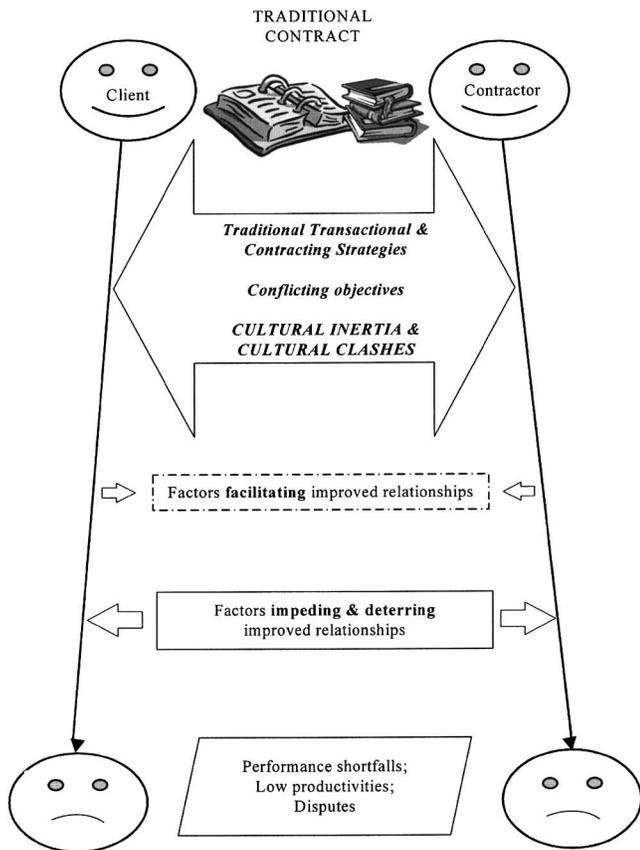


Fig. 1. Potential polarization on nonrelational contracts

Test results revealed some differences in emphasis, e.g., by (a) medium and big contractors and (b) contractors with and without prior experience in RC. The medium size contractors placed more emphasis on open communication, tender selection method, team-working attitude, and willing participation in facilitating RC and team building processes. Big contractors showed a stronger support for the role of facilitator. On the other hand, contractors with prior experience in RC were more concerned with potential legal liabilities, absence of a risk-reward plan, contractual relations and communication between the players in the project team. There is also stronger agreement on barriers to RC as perceived by the medium sized contractors agreement on the impediment of “price only” selection methods, lack of teamworking attitude among all contracting parties and unwilling or unenthusiastic participation in RC approaches. However, except for a few factors, ANOVA tests confirmed that respondents from large and medium companies, as well as “with” and “without” prior experience in RC, have similar perceptions on the importance levels of different individual factors.

A conceptual model of relevant force fields generated by traditional contracting approaches is developed to visualize the eventual polarization of contracting parties as in Fig. 1. If just brought together by a traditional contract, and its attendant adversarial attitudes, the parties are soon pushed apart by pressures from traditional project delivery and contracting strategies, including transactional complexities and cultural clashes. For example, conflicting objectives and operational agendas may arise from rigid lump sum contracts, adversarial formats, and low-price based contractor selection. These pressures are amplified by forces impeding and deterring any possible “relational bonding.”

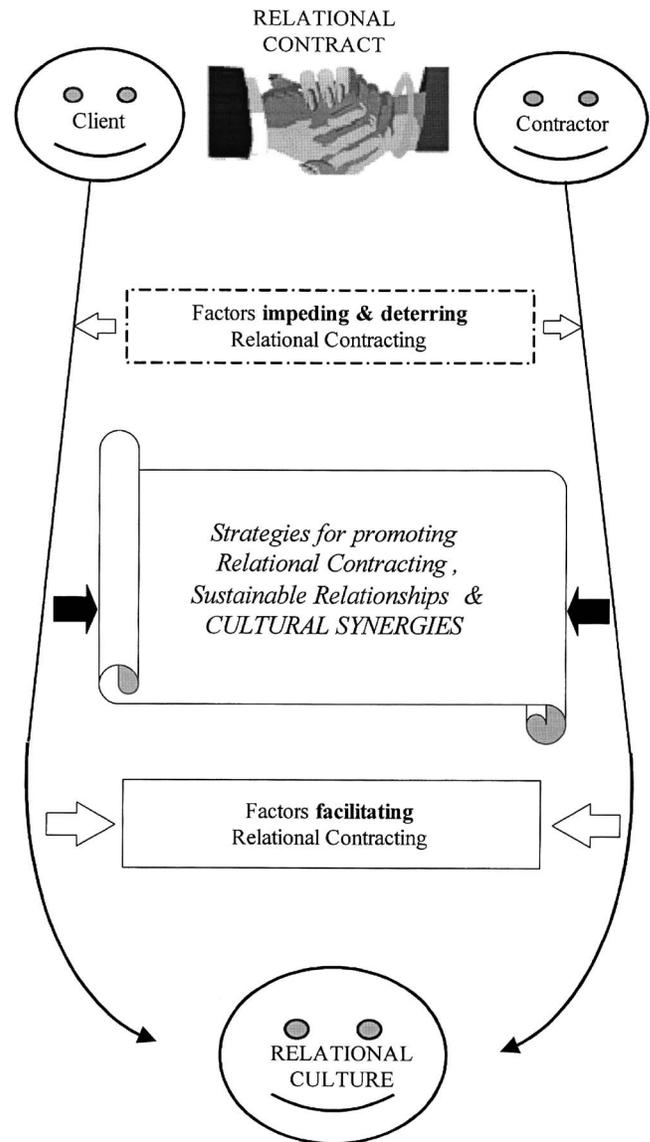


Fig. 2. Potential cultural synergies in relational contracts

Factors that could facilitate better relationships are much weaker in this scenario indicated in Fig. 1. They can thus do little to pull the parties back together, unless they are introduced upfront to counteract the foregoing polarizing forces. This can only be effectively approached by (1) revamping the traditional project delivery and contracting strategies towards RC and (2) thereby aligning objectives and operational agendas, as indicated in Fig. 2.

Approaches to building/rebuilding a RC culture can be reinforced through measures to promote integrated teams. Those team building aspects are addressed in a parallel companion paper (Kumaraswamy 2005), since space precludes proper treatment of the combined issues in one paper. Further, the importance of developing integrated teams merits special treatment, as, e.g., highlighted by high-level initiatives in Hong Kong and the United Kingdom. Hong Kong has been urged toward more integrated teamworking by the recommendations of the Construction Industry Review Committee (CIRC 2001). In the United Kingdom, the “Strategic Forum for Construction” recommended in 2002, that 20% of construction projects by value should be undertaken by integrated teams and supply

chains by the end of 2004; with this to be increased to 50% by 2007.

The present paper fulfills its purpose in collecting and consolidating current perceptions of constructors operating in Singapore, on the forces helping and hindering “relational” approaches and the long called for drastic changes in industry culture. This “cultural revolution” has been seen to be necessary in order to achieve the performance gains that are well beyond the reach of mere “structural” changes, such as in organizational and communication systems (Kumaraswamy et al. 2002). Although the reported set of survey data was collected in Singapore, the research questions and objectives are based on a broad review across many countries, including the United States, Canada, Australia, and the United Kingdom, with the study itself being launched from Hong Kong. It is apparent that the core conclusions and conceptualizations are quite generalizable and can be conveniently extended to other countries as well. Of course these would need adaptations to suit specific conditions that may be elicited from country-specific surveys that could use the same or similar research instruments.

## Acknowledgment

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## Appendix. Survey Questionnaire

### Survey on potential for developing a Relational Contracting (RC) Culture in the construction industry September 2003

#### 1. General Information (requested for survey sample profiling purposes only):

**Name (optional):** ..... **Designation:** .....

**Company name:** .....

**Company type** (please check (X) one):  Construction  Consulting  Public client  Private client  
 Academia  Others (please specify) .....

**You previously worked for** (please check (X) as many as applicable, if any):  
 Construction company  Consulting company  Public client  
 Private client  Academia  None

**Total construction industry experience:** ..... years

**Experience in RC approaches:** (a) ..... years (b) No. of projects .....

#### SECTIONS 2-5 ARE INDEPENDENT (despite apparent but deliberate overlaps in some items)

#### 2. Factors facilitating RC: Please rate each of the following factors by circling the relevant number (if responding on hard copy), or inserting a cross (X) mark in the relevant box (if responding on soft copy).

Factors	Lowest importance = 0, Highest importance = 6					
2.1 Enlightened and enthusiastic client	0	1	2	3	4	5 6
2.2 Knowledgeable client (about project processes)	0	1	2	3	4	5 6
2.3 Client's top management support	0	1	2	3	4	5 6
2.4 Top management support of all contracting parties	0	1	2	3	4	5 6
2.5 Experience in RC approaches (e.g. partnering, alliancing)	0	1	2	3	4	5 6
2.6 Open communication among all contracting parties	0	1	2	3	4	5 6
2.7 Mutual trust among all contracting parties	0	1	2	3	4	5 6
2.8 Effective coordination among all contracting parties	0	1	2	3	4	5 6
2.9 Combined responsibility of all contracting parties	0	1	2	3	4	5 6
2.10 Teamworking & 'can do' spirit of all contracting parties	0	1	2	3	4	5 6
2.11 Long-term commitment to each other: all parties	0	1	2	3	4	5 6
2.12 Adequate resources of all contracting parties	0	1	2	3	4	5 6
2.13 Mutually agreed issue resolution mechanisms	0	1	2	3	4	5 6
2.14 Mutually agreed performance appraisal mechanisms	0	1	2	3	4	5 6
2.15 Alignment of project objectives of different parties	0	1	2	3	4	5 6
2.16 Alignment of commercial objectives of different parties	0	1	2	3	4	5 6
2.17 Alignment of mutual project and commercial objectives	0	1	2	3	4	5 6
2.18 Learning climate/ environment in project team organisation	0	1	2	3	4	5 6
2.19 Positive attitude towards continuous improvement	0	1	2	3	4	5 6
2.20 Clearly defined risk allocation/ sharing arrangements	0	1	2	3	4	5 6
2.21 Equitable risk allocation/ sharing arrangements	0	1	2	3	4	5 6
2.22 Flexible/ adjustable contracts to address uncertainties	0	1	2	3	4	5 6
2.23 Encouraging and motivating risk-reward plans	0	1	2	3	4	5 6
2.24 Inclusion of all key parties in risk-reward plans	0	1	2	3	4	5 6
<b>Others: Please add more factors (from your experience) and rate</b>						
2.24	0	1	2	3	4	5 6
2.25	0	1	2	3	4	5 6

#### 3. Factors impeding/ deterring RC: Please rate each of the following factors by circling the relevant number (if responding on hard copy), or inserting a cross (X) mark in the relevant box (if responding on soft copy).

Factors	Lowest importance = 0, Highest importance = 6					
3.1 Inappropriate project planning	0	1	2	3	4	5 6
3.2 Inappropriate procurement/ contract strategy	0	1	2	3	4	5 6
3.3 Improper/ inappropriate risk allocation/ sharing	0	1	2	3	4	5 6
3.4 'Price' only selection methods	0	1	2	3	4	5 6
3.5 Ambiguous/ unclear contract clauses/ documents	0	1	2	3	4	5 6
3.6 Absence of risk-reward plan	0	1	2	3	4	5 6
3.7 Lack of commitment: top management of all contracting parties	0	1	2	3	4	5 6
3.8 Lack of client's initiatives	0	1	2	3	4	5 6
3.9 Lack of contractor's capability	0	1	2	3	4	5 6
3.10 Lack/ absence of scope for innovations	0	1	2	3	4	5 6
3.11 Lack of teamworking attitude among all contracting parties	0	1	2	3	4	5 6
3.12 Lack of trust/ reliability among all contracting parties	0	1	2	3	4	5 6
3.13 Inter-personal/ cultural clash (individual level)	0	1	2	3	4	5 6
3.14 Incompatible organisational cultures (corporate level)	0	1	2	3	4	5 6
3.15 Inappropriate issue resolution mechanisms	0	1	2	3	4	5 6
3.16 Separate coordination and monitoring plans	0	1	2	3	4	5 6
3.17 Lack of experience in RC approaches (e.g. partnering)	0	1	2	3	4	5 6
3.18 Unwilling/ unenthusiastic participation in RC approaches	0	1	2	3	4	5 6
3.19 Lack of confidence among all contracting parties	0	1	2	3	4	5 6
3.20 Exclusion of consultants in risk-reward plan	0	1	2	3	4	5 6
3.21 Exclusion of major sub-contractors in risk-reward plan	0	1	2	3	4	5 6
3.22 Exclusion of major suppliers in risk-reward plan	0	1	2	3	4	5 6
3.23 Unrelated/ separate risk-reward plans for different parties	0	1	2	3	4	5 6
3.24 Potential legal liabilities (in resolving non-contractual issues)	0	1	2	3	4	5 6
3.25 Commercial pressures of contracting parties	0	1	2	3	4	5 6
3.26 Win-lose environment among contracting parties	0	1	2	3	4	5 6
3.27 Bureaucratic client organisation	0	1	2	3	4	5 6
3.28 Incompatible public sector rules and regulations	0	1	2	3	4	5 6
<b>Others: Please add more factors (from your experience) and rate</b>						
3.29	0	1	2	3	4	5 6
3.30	0	1	2	3	4	5 6

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