Incorporating Contractual Incentives to Facilitate Relational Contracting

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Abstract: Construction projects are undertaken by many parties, all with their own goals and motivations which may not always be aligned. Furthermore, they are governed by contracts, which do not necessarily produce win-win outcomes. The aims of this study are (1) to compare the views of contractors, clients, and consultants on factors facilitating and deterring relational contracting (RC); and (2) to investigate the use of contractual incentives to increase the effectiveness of RC. Structured questionnaires were sent by post to randomly selected construction industry players in Singapore to find out factors that enable RC and the barriers that impede the formation of RC. The results show that RC can be facilitated by having top management support, alignment of project objectives, relationship building, and most importantly, appropriate contractual incentives. In most instances, contractors gave a lower level of importance to many of the factors than clients and consultants. It is concluded that more contractual incentives should be provided in contracts in order to evoke the desired relational approaches.

DOI: 10.1061/(ASCE)1052-3928(2006)132:1(57)

CE Database subject headings: Construction industry; Contracts; Contract management; Singapore.

Introduction

A contract is a voluntary agreement between two or more parties, and the purpose of a contract is to set out the rights, responsibilities, and liabilities of the parties (Robinson et al. 1996). The contract allocates risk among the parties. Contracts may be formal and written, with fairly explicit proscribed and prescribed behaviors and understanding.

Years of legal analysis and substantial experience have gone into drafting and fine-tuning the standard forms of contract that are commercially available. Nonetheless, they are not perfect for every project nor every party. Different groups of contracting parties, and also people within the same group, interpret contract clauses in different ways (Hartman et al., 1997; Rahman and Kumaraswamy 2002b). For that reason, many contracts are custom-made to suit individuals and projects. The contractual interrelationship between parties to a construction project will often determine what remedies are available as well as allocation of responsibility and liability.

Traditional contracts feature "sharp in" and "sharp out" participation of the parties involved in an economic exchange (Macneil 1974). They do not support contractual incentives and/or flexibilities that are required in ever-changing construction scenarios, and in the face of uncertainty and complexity (Rahman and Kumaraswamy 2002a). Relational contracting (RC) principles may be mobilized to offer contractual incentives/flexibilities, improve relationships among contracting parties, and lubricate any transactional frictions. RC is based on recognition of mutual benefits and win-win scenarios through more cooperative relationships between contracting parties, and underpins various approaches, such as partnering, alliancing, joint venturing, long term contracting, and other collaborative working arrangements and better risk sharing mechanisms (Rahman and Kumaraswamy 2004a). RC allows mutual future planning and considers contracts to be relationships among the parties, in the process of projecting exchange into the future (Macneil 1974).

The aims of this study are (1) to compare the views of contractors, clients, and consultants on factors facilitating and deterring RC; and (2) to investigate the use of conditions of contract and contractual incentives to increase the effectiveness of RC. The detailed method of implementing RC is, however, outside the scope of this study. Admittedly, there are other methods to induce less adversarial relationships, such as relationship management and supply chain management. However, these are outside the scope of this paper.

The first objective is important because by knowing where their views differ, recommendations on how RC usage in the construction industry may be increased could be made. These recommendations will help to create harmonious working relationships among the contracting parties, thereby bringing about project success. The second objective adds to knowledge by identifying contractual and excontractual practices to increase the effectiveness of RC. This will provide more avenues to bolster RC usage, and thereby contribute to better relationships in the construction contracting environment. Relationship improvement is important to

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Note. Discussion open until June 1, 2006. Separate discussions must be submitted for individual papers. To extend the closing date by one month, a written request must be filed with the ASCE Managing Editor. The manuscript for this paper was submitted for review and possible publication on February 8, 2005; approved on July 5, 2005. This paper is part of the ***Journal of Professional Issues in Engineering Education and Practice***, Vol. 132, No. 1, January 1, 2006. ©ASCE, ISSN 1052-3928/2006/1-57–66/$25.00.

prevent disputes from occurring. This is because disputes cost money and waste time.

Literature Review

The appropriate contracting method and the contract documents for any construction project are claimed to largely depend on the nature of the project. However, an appropriate contracting method coupled with clear and equitable contract documents do not by themselves ensure project success where people work together in the face of uncertainty and complexity with diverse interest and conflicting agendas (Rahman and Kumaraswamy 2002a). Such a traditional contract can lead to self-serving behaviors, adversarial relationships, and confrontational interactions.

The traditional design-bid-build contract is highly specified. This induces contractors to adopt a critical and intolerant attitude towards clients and consultants. Contractors are also less likely to listen and respond to client needs once the contract is let. On the other hand, clients and consultants adopt a distrusting attitude and are suspicious towards contractors. These opportunistic attitudes and behaviors run contrary to common perceptions of how a trustworthy person acts, and therefore hinder the development of trust. Notwithstanding this, the absence of opportunistic attitudes and behaviors may provide a context for trust to develop, but do not in itself foster trust.

The underlying problem in most construction projects is that of failing to place RC in the center of project management (Rahman and Kumaraswamy 2004a). Rahman and Kumaraswamy (2002a) showed that RC is a better route for improving the cooperative relationship among the project participants in the face of uncertainty and complexity in the construction industry.

Rahman (2003) has identified many factors that facilitate RC and other factors that impede the formation of RC. These factors were subject to factor analysis and four main components surfaced are (Kumaraswamy et al. 2005):

- Top management and client support for RC;
- Alignment of team objectives;
- Relationship building culture among team members; and
- Appropriate contractual incentives.

These are now briefly reviewed.

Top Management and Client Support for RC

Commitment refers to the willingness of trading partners to exert effort on behalf of the relationship (Mohr and Spekman 1994). In order to be successful, support and commitment from top management must exist in RC-based approaches (Cheng and Li 2004). Without the support of top management, complementary resources (including knowledge, technology, information, specific skills, and capital) of different parties cannot be effectively shared.

Support for RC from clients is important because they initiate projects, effectively control the project organization, prepare the contract conditions, and select other project team members. Therefore clients should lead and lay the basis for any cooperation and motivate others; and overcome any shortfalls by continuous learning, even from other project partners (Rahman and Kumaraswamy 2004b).

Alignment of Team Objectives

Two of the key aspects of RC approaches are dedication to common goals/vision and an understanding of each other's individual expectations and values (Crowley and Karim 1995). In this respect, RC postulates that economic "exchanges" occur in "mutual reciprocity" (Macneil 1974). However, not every partner is equally suitable for such exercises, nor is the lowest-bid tender evaluation the appropriate method for selecting such partners. Evidently, this points to the client's overall project planning, including the stages for mobilizing different project partners, related coordination plans, and requirement for devising compatible rules and regulations (Rahman and Kumaraswamy 2004a).

The criteria for selecting partners in RC approaches must reflect the client's business objectives and comprise both "hard" and "soft" qualities, although the bid price remains an inevitable factor (Bayramoglu 2001). Clients, along with the partners thus selected, will then be able to agree on and satisfactorily accomplish their mutual objectives, and devise common performance appraisal plans (Bayliss et al. 2004; Rahman and Kumaraswamy 2005).

Relationship Building Culture among Team Members

Mutual trust and open communication are two critical factors for RC approaches (Rahman and Kumaraswamy 2004b). Parties in exchange relationship should have the confidence that others are reliable in fulfilling their obligations. It is essential to "open" the boundaries of the relationship because it can relieve stress, enhance adaptability, smooth information exchange, encourage joint problem solving, maintain transparency, and provide better outcomes (Chan et al. 2004).

Chan et al. (2003) found that many parties do not trust others due to past experience and fear of the unknown and change (Chan et al. 2003). They may have met some other organizations that are not equally committed. Also, many organizations are reluctant to change into the integrating culture.

One of the ways to overcome these barriers is training. A demonstration of the underlying principles, along with related benefits that have been documented with RC approaches, can motivate people to attain mutual trust (Glagola and Sheedy 2002). A change in the associated rules and regulations in public sector organizations is evident, in order not only to accommodate RC approaches but also to synchronize the cultural settings of different project partners during their selection (Rahman and Kumaraswamy 2004a), and also to accommodate them in joint planning and goal setting (Mohr and Spekman 1994).

Appropriate Contractual Incentives

The literature suggests that one of the most critical operational arrangements in RC approaches is dispute resolution mechanism (e.g., Glagola and Sheedy 2002; Chan et al. 2003). Conflicting issues are common in interorganizational relationships, due to differential expectations and goals of contracting parties. Conflict resolution techniques such as coercion and confrontation are seen to be nonproductive: they may not offer a win-win situation and may lead to litigation instead (Mohr and Spekman 1994).

RC offers joint problem solving, and extensive use of renegotiations in resolving conflicts in "exchange" relationships, by contracting parties themselves, and without resorting to any third party (Goetz and Scott 1981; Macneil 1974). Such incentives provide mutually acceptable solutions to contracting parties (Chan et al. 2004). Although different project based approaches in construction may have their own mutually agreed mechanisms, the basis of dispute resolution practices seems quite standard: conflicts are to be resolved at the lowest possible level. The trust,

better communication, and informal working relationships encouraged by the approach itself have shown themselves to be instrumental in achieving rapid and fair dispute resolution (Bayramoglu 2001).

RC offers effective contractual incentives of mutual future planning, risk sharing, and consequent reward (Goetz and Scott 1981; Bayramoglu 2001). RC also advocates unambiguous contract language in clearly and equitably allocating all foreseeable risks, and projecting unforeseen risks into the future to be jointly planned and managed by the project team, and any savings or additional profit to be shared among the partners (Rahman and Kumaraswamy 2002a). Although monetary incentive is seen as the most common form of "reward" in construction (Bayramoglu 2001; Bayliss et al. 2004), it may involve nonmonetary personal satisfaction as well (Macneil 1974). The target is to motivate the partners by designing appropriate schemes in the contract, to maintain their commitment to accomplish the "exchange."

Research Method

A questionnaire was developed in Hong Kong on the basis of a recent study on "revitalized procurement strategies" that included an extensive literature review: (1) both on (a) "contract theory"—in the context of mainstream "socio-economic" (i.e., transaction cost economics) and "socio-legal" (i.e., relational contracting—RC) approaches, and (b) practice of various kinds of contracting approaches in construction; and also (2) Hong Kong based surveys and interviews on risk allocation, and collaborative working arrangements, including assessing the potential for implementing RC and various teambuilding protocols, such as joint risk management (Rahman and Kumaraswamy 2002a; Rahman 2003; Rahman and Kumaraswamy 2004a,b, 2005). This present study specifically targets the building of an RC culture in construction, through identifying various RC-based contractual and noncontractual incentives. Twenty-four enabling and 28 deterring factors were distilled and consolidated from the above previous studies and tuned to fit the specific purposes of the present study. These can be broadly classified into four main factors. The first is the need for strong support from top management and client for RC (Harback et al. 1994; Cheng and Li 2004). Without the support, individual team members may not be empowered to adopt such an attitude. The second factor is the need for team objectives to be aligned for RC to be implemented (Thompson and Sanders 1998). 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. The third factor concerns the presence or absence of relationship building culture among team members (Walker and Chau 1999; Hughes and Maeda 2002). It deals with behavioral aspects of RC such as trust, open communication, and teamworking spirit. Finally, the formulation of contractual incentives will facilitate RC (Macneil 1974; Goetz and Scott 1981). The conditions of contract must allow for risk-reward plans, fair risk allocation, and dispute resolution. The fieldwork was undertaken to determine how these may be integrated into contracts to evoke the desired relational approaches.

After the questionnaire was developed in Hong Kong, it was refined for use in Singapore through further literature review of Singapore related works (Construction 21 1999; Ling et al. 2000; Ang and Ofori 2001; Dulaimi et al. 2002; Ofori 2002). The questionnaire could be applicable to both Hong Kong and Singapore because both places share many similar characteristics, such as being small in size, having an open market economy, and projects having adversarial relationships, cost overruns, program delays, and poor productivity (Construction 21 1999).

Table 1. Response Rates

Category	Mailed out	Number responded	Percentage
Contractors	200	60	30
Consultants	100	22	22
Clients	100	14	14
Total	400	96	24

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 several sections, of which the first sought general information about the respondents, while 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 2003). Respondents rated each factor on a scale from 0 to 6, varying from lowest to highest importance.

In this study, the population frames comprised clients, consultants, and contractors. The public sector clients were identified from the Singapore Government Telephone Directory. The private sector property developers were based on the members of the Real Estate Developers Association of Singapore (REDAS). The consultants who were surveyed comprised architects, civil engineers, mechanical and electrical (M & E) engineers, and quantity surveyors. Samples were randomly selected from the listings provided by their respective professional institutions. Large and medium sized contractors were selected from the Building and Construction Authority's list of registered contractors.

Four-hundred samples, comprising 200 contractors, 100 consultants, and 100 clients, were randomly selected. 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 at the end of 2003.

Profile of Respondents

Of the 400 questionnaires mailed out, a total of 96 (24%) were returned (Table 1). All the returned questionnaires were usable. The response rate for contractors at 30% is much better than the client response at 14%.

Table 2 shows the profile of respondents. A majority of the respondents are professionals who are hands-on in the projects, and thus know the intricacies in relationships and contracting. On average, respondents had worked in the industry for 11.5 years. Their views were therefore developed through many years of site experience.

Overall, a significant 48% of respondents did not have any experience in RC (Table 2), indicating that the application of RC is still relatively limited in the Singapore construction industry.

Table 2. Profile of Respondents

Profile	Overall number	%	Contractors number	%	Consultants number	%	Clients number	%
Designation								
Top management	15	15.6	12	20.0	3	13.6	0	0
Middle management	19	19.8	9	15.0	3	13.6	7	50.0
Professionals	53	55.2	30	50.0	16	72.7	7	50.0
Unknown	9	9.4	9	15.0	0	0	0	0
Experience in construction								
1–5 years	22	22.9	12	20.0	8	36.4	2	14.3
6–10 years	28	29.2	19	31.7	7	31.8	2	14.3
11–15 years	18	18.7	10	16.7	6	27.3	2	14.3
>15 years	28	29.2	19	31.7	1	4.5	8	57.1
Experience in RC (years)								
Nil	46	47.9	38	63.3	6	27.3	2	14.3
1–3 years	25	26.0	13	21.7	6	27.3	6	42.9
4–6 years	18	18.7	6	10.0	6	27.3	6	42.9
7–9 years	4	4.2	2	3.3	2	9.1	0	0
⩾10 years	3	3.1	1	1.7	2	9.1	0	0
Experience in RC (number of projects)								
Nil	46	47.9	38	63.3	6	27.3	2	14.3
1 project	17	17.7	10	16.7	3	13.6	4	28.6
2 projects	12	12.5	3	5.0	4	18.2	5	35.7
3 projects	10	10.4	4	6.7	5	22.7	1	7.1
4 projects	6	6.2	3	5.0	2	9.1	1	7.1
⩾5 projects	5	5.2	2	3.3	2	9.1	1	7.1

Note: Rounding off error may have occurred in calculating percentages.

The majority of contractors (63%) did not have any experience in RC while the majority of clients and consultants had participated in at least one project involving RC. Hence RC approaches can be taken to be a relatively new collaborative working style among contractors in Singapore. One limitation of this study is the relatively high percentage of respondents without RC experience. Analysis of variance (ANOVA) was therefore conducted to find out if there is significant difference between the responses of those with and without RC experience. The results show no significant difference, at $p<0.05$. In addition, the respondents are very experienced, and they would know what would work if RC had been adopted in their projects.

Statistical Analysis

Data processing using the *Statistical Package for Social Sciences* software (*SPSS*) was carried out. The responses from clients ($n=14$) and consultants ($n=22$) were amalgamated because the sample sizes were relatively small, and the ANOVA showed no significant differences between the ratings given by clients and consultants at $p=0.05$. These two groups are hereinafter referred to as the "clients and consultants."

Statistical *t*-tests of the mean were undertaken to ascertain whether each enabler and barrier is significantly important at $p<0.05$. One-sample *t*-test was conducted for the overall sample ($n=96$), clients and consultants ($n=36$), and contractors only ($n=60$). ANOVA was carried out to ascertain whether the two groups of respondents (Group 1=contractors; Group 2=clients and consultants) had different views on the relative importance of the various factors at $p<0.05$. The purpose of the ANOVA was to detect any differences in the respondents' perceptions of the relative importance of the various factors in facilitating and inhibiting RC.

Results

t-test results (Table 3) show that contractors and clients and consultants regarded all 24 factors facilitating RC as significantly important, at $p<0.05$. This means that all 24 factors identified in the questionnaire will significantly facilitate RC.

Even though the two groups of respondents agreed that the 24 factors are important in facilitating RC, there was not much agreement on the degree of importance. In only five instances (21%) did the two groups of respondents have significant agreement on the importance level of the factors. This significant difference is a cause for concern as it shows that there is no alignment of thinking and actions as regards RC. This is discussed in the next section.

t-test results (Table 4) also show that clients and consultants agreed that all 28 factors inhibit RC significantly. Among the contractors, they agreed with 23 of the inhibitors and did not feel that the following would inhibit RC:

- Lack of scope for innovation (b10);
- Incompatible public sector rules and regulations (b28);
- Bureaucratic client organization (b27);
- Exclusion of consultants from risk-reward plan (b20); and

Table 3. Factors Facilitating RC: Comparison of Contractors' Responses to Clients+Consultants

Code	Variable	Respondent	Mean	*T* value	Significance	*F* value	Significance
Top management and client support for RC							
a01	Enlightened and enthusiastic client	Contractor	3.633	4.382	0.000		
		Client and consultant	4.611	7.889	0.000		
		Overall	4.000	7.850	0.000	15.986	0.000
a02	Knowledgeable client (about project processes)	Contractor	3.450	2.721	0.004		
		Client and consultant	4.472	9.709	0.000		
		Overall	3.833	6.512	0.000	17.565	0.000
a03	Client's top management support	Contractor	3.900	7.068	0.000		
		Client and consultant	4.944	11.213	0.000		
		Overall	4.292	11.268	0.000	24.212	0.000
a04	Top management support of all contracting parties	Contractor	4.283	11.487	0.000		
		Client and consultant	5.028	12.934	0.000		
		Overall	4.563	15.941	0.000	15.596	0.000
a09	Combined responsibility of all contracting parties	Contractor	4.627	15.088	0.000		
		Client and consultant	4.944	11.856	0.000		
		Overall	4.747	18.949	0.000	2.841	0.095[a]
a11	Long-term commitment to each other: all parties	Contractor	3.333	2.173	0.017		
		Client and consultant	4.306	7.182	0.000		
		Overall	3.698	5.511	0.000	15.997	0.000
a12	Adequate resources of all contracting parties	Contractor	4.083	8.569	0.000		
		Client and consultant	4.528	8.475	0.000		
		Overall	4.250	11.820	0.000	4.282	0.041
a18	Learning climate/environment in project team organization	Contractor	3.550	4.682	0.000		
		Client and consultant	4.139	7.344	0.000		
		Overall	3.771	7.894	0.000	9.266	0.003
a19	Positive attitude toward continuous improvement	Contractor	3.517	3.813	0.000		
		Client and consultant	4.667	11.602	0.000		
		Overall	3.948	8.238	0.000	30.743	0.000
Alignment of team objectives							
a14	Mutually agreed perfor client and consultantmance appraisal mechanisms	Contractor	3.300	2.461	0.008		
		Client and consultant	4.222	7.643	0.000		
		Overall	3.646	6.049	0.000	21.207	0.000
a15	Alignment of project objectives of different parties	Contractor	3.917	7.991	0.000		
		Client and consultant	4.528	8.919	0.000		
		Overall	4.146	11.411	0.000	9.453	0.003
a16	Alignment of commercial objectives of different parties	Contractor	4.017	9.449	0.000		
		Client and consultant	4.472	8.371	0.000		
		Overall	4.188	12.328	0.000	5.490	0.021
a17	Alignment of mutual project and commercial objectives	Contractor	4.000	10.204	0.000		
		Client and consultant	4.472	9.390	0.000		
		Overall	4.177	13.437	0.000	7.259	0.008
Relationship building culture among team members							
a05	Experience in RC approaches (e.g., partnering, alliancing)	Contractor	4.183	10.497	0.000		
		Client and consultant	4.250	8.919	0.000		
		Overall	4.208	13.809	0.000	0.135	0.714[a]
a06	Open communication among all contracting parties	Contractor	5.083	10.497	0.000		
		Client and consultant	5.000	15.136	0.000		
		Overall	5.052	24.356	0.000	0.227	0.635[a]
a07	Mutual trust among all client and consultant contracting parties	Contractor	5.533	21.120	0.000		
		Client and consultant	5.083	13.336	0.000		
		Overall	5.365	24.316	0.000	5.234	0.024
a08	Effective coordination among all contracting parties	Contractor	4.767	15.376	0.000		
		Client and consultant	4.722	9.299	0.000		
		Overall	4.750	17.616	0.000	0.046	0.830[a]
a10	Teamworking and "can do" spirit of all contracting parties	Contractor	4.933	21.843	0.000		
		Client and consultant	4.778	11.117	0.000		

Table 3. (*Continued.*)

Code	Variable	Respondent	Mean	*T* value	Significance	*F* value	Significance
		Overall	4.875	23.021	0.000	0.854	0.358[a]
Appropriate contractual incentives							
a13	Mutually agreed issue resolution mechanisms	Contractor	4.117	11.711	0.000		
		Client and consultant	4.556	9.935	0.000		
		Overall	4.281	14.903	0.000	6.459	0.013
a20	Clearly defined risk allocation/sharing arrangements	Contractor	4.467	12.227	0.000		
		Client and consultant	4.972	11.513	0.000		
		Overall	4.656	16.344	0.000	6.149	0.015
a21	Equitable risk allocation/sharing arrangements	Contractor	4.267	10.687	0.000		
		Client and consultant	4.889	11.575	0.000		
		Overall	4.500	14.935	0.000	9.831	0.002
a24	Inclusion of all key parties in risk-reward plans	Contractor	3.831	10.782	0.000		
		Client and consultant	4.306	6.449	0.000		
		Overall	4.011	10.883	0.000	6.522	0.012
a22	Flexible/adjustable contracts to address uncertainties	Contractor	3.305	3.130	0.001		
		Client and consultant	4.444	8.680	0.000		
		Overall	3.737	7.091	0.000	40.049	0.000
a23	Encouraging and motivating risk-reward plans	Contractor	3.407	3.953	0.000		
		Client and consultant	4.500	8.315	0.000		
		Overall	3.821	7.610	0.000	32.174	0.000

[a]Not significant at 0.05 level.

- Unrelated/separate risk-reward plans for different parties (b23).

Among the 28 barriers, the two groups rated in the same way for nine items only. In the next section, the implication of the differences in perception on the importance of the other 19 barriers is discussed.

Discussion

Top Management and Client Support for RC

From Tables 3 and 4 it can be seen from the *t*-test results that contractors and clients and consultants agreed with all the factors facilitating and inhibiting RC under the component "Top management and client support for RC." The ANOVA results show that in almost all the instances, clients and consultants indicated a significantly higher level of importance than contractors.

Contractors attributed a significantly lower level of importance to the role of commitment in facilitating RC. Top management support from clients (a03) and all contracting parties (a04 and b07), and long term commitment to each other (a11) were rated relatively lower by contractors compared to clients and consultants. This may be because contractors are weary that nonbinding arrangements would not benefit them as they may be unenforceable. A very strong impetus seems necessary to transform such a cultural setting towards embracing RC approaches and one of the best ways is to "legalize" it through the introduction of RC elements in the conditions of contract. With express contract conditions, contractors can see their entitlement to the benefits of RC and will be more committed to it. With more commitment, more benefits are derived and this is a positive self-reinforcing and sustainable system.

Clients and consultants gave organizational learning a higher level of importance in promoting RC than contractors. These include having a learning climate (a18) and a positive attitude towards continuous improvement (a19). This may be because clients and consultants are higher up in the value chain and any learning and improvements made to the design will bring about a better facility. Design-bid-build contractors on the other hand may have felt that their job is to "build according to the design" only. Conditions of contract may be amended to actively encourage contractors to submit alternative proposals (obtained through their desire for continuous improvement) and allow them to have a share of the cost savings. Alternatively, contractors can be mobilized at earlier project stages (Rahman and Kumaraswamy 2004b). Members of such an extended but integrated project team will then be able to provide their inputs to develop a buildable and economical design, decide on and prepare detailed operational/delivery arrangements, harmoniously work together to deliver a successful project, and harvest win-win outcomes for all parties (Bayramoglu 2001; Rahman and Kumaraswamy 2005).

Alignment of Team Objectives

From Table 3 it can be seen from the *t*-test results that contractors and clients and consultants agreed with all the factors facilitating RC under the category "Alignment of team objectives." Alignment of objectives brings about win-win outcomes because of dedication to common goals.

Among the barriers to successful RC, Table 4 shows that contractors indicated that lack of scope for innovation (b10) and incompatible public sector rules (b28) would not significantly impede RC while clients and consultants felt otherwise. Contractors may have felt that incompatible rules and regulations in the public sector would not significantly impede RC because they have internalized public sector's arms length working ethos.

Table 3 shows that contractors assigned a lower level of importance to alignment of project objectives and commercial objectives (a15, a16, a17) of different parties compared to clients and consultants. The result should be read with caution as the respondent firms are not necessarily working together on projects. The aggregated results may show some misalignment, but this

Table 4. Factors Impeding RC: Comparison of Contractors' Responses to Clients+Consultants

Code	Variable	Respondent	Mean	*T* value	Significance	*F* value	Significance
Lack of top management and client support for RC							
b07	Lack of commitment: top management of all contracting parties	Contractor	4.350	10.966	0.000		
		Client and consultant	4.972	12.192	0.000		
		Overall	4.583	15.486	0.000	9.453	0.003
b08	Lack of client's initiatives	Contractor	3.733	5.152	0.000		
		Client and consultant	4.500	8.120	0.000		
		Overall	4.021	8.618	0.000	10.835	0.001
b09	Lack of contractor's capability	Contractor	4.100	8.492	0.000		
		Client and consultant	4.472	8.837	0.000		
		Overall	4.240	11.989	0.000	3.105	0.081[a]
b18	Unwilling/unenthusiastic participation in RC approaches	Contractor	4.283	10.373	0.000		
		Client and consultant	4.667	9.860	0.000		
		Overall	4.427	14.095	0.000	3.446	0.067[a]
Lack of alignment of team objectives							
b01	Inappropriate project planning	Contractor	3.700	4.238	0.000		
		Client and consultant	4.444	7.829	0.000		
		Overall	3.979	7.586	0.000	8.403	0.005
b04	"Price' only" selection methods	Contractor	3.933	8.038	0.000		
		Client and consultant	4.028	6.169	0.000		
		Overall	3.969	10.161	0.000	0.228	0.634[a]
b10	Lack/absence of scope for innovations	Contractor	3.067	0.505	0.308[a]		
		Client and consultant	4.139	7.113	0.000		
		Overall	3.469	4.088	0.000	25.857	0.000
b16	Separate coordination and monitoring plans	Contractor	4.183	7.464	0.000		
		Client and consultant	4.139	6.902	0.000		
		Overall	4.167	10.032	0.000	0.034	0.854[a]
b25	Commercial pressures of contracting parties	Contractor	3.833	11.580	0.000		
		Client and consultant	4.472	9.390	0.000		
		Overall	4.073	13.398	0.000	17.509	0.000
b26	Win-lose environment among contracting parties	Contractor	4.000	11.244	0.000		
		Client and consultant	4.750	9.731	0.000		
		Overall	4.281	13.561	0.000	17.305	0.000
b28	Incompatible public sector rules and regulations	Contractor	2.483	–2.918	0.999[a]		
		Client and consultant	4.250	8.919	0.000		
		Overall	3.146	0.970	0.167[a]	48.633	0.000
Lack of relationship building culture among team members							
b11	Lack of teamworking attitude among all contracting parties	Contractor	4.750	17.060	0.000		
		Client and consultant	4.417	7.878	0.000		
		Overall	4.625	17.296	0.000	3.013	0.086[a]
b12	Lack of trust/reliability among all contracting parties	Contractor	5.400	18.374	0.000		
		Client and consultant	4.889	11.244	0.000		
		Overall	5.208	20.899	0.000	5.758	0.018
b13	Interpersonal/cultural clash (individual level)	Contractor	3.400	3.841	0.000		
		Client and consultant	4.306	7.554	0.000		
		Overall	3.740	7.266	0.000	22.809	0.000
b14	Incompatible organization cultures (corporate level)	Contractor	3.683	7.827	0.000		
		Client and consultant	4.333	7.303	0.000		
		Overall	3.927	9.993	0.000	12.954	0.001
b17	Lack of experience in RC approaches (e.g., partnering)	Contractor	4.233	9.919	0.000		
		Client and consultant	4.500	8.753	0.000		
		Overall	4.333	13.180	0.000	1.640	0.204[a]
b19	Lack of confidence among all contracting parties	Contractor	4.817	14.074	0.000		
		Client and consultant	4.556	9.935	0.000		
		Overall	4.719	17.168	0.000	1.604	0.208[a]

Table 4. (*Continued.*)

Code	Variable	Respondent	Mean	*T* value	Significance	*F* value	Significance
b27	Bureaucratic client organization	Contractor	2.683	−1.894	0.984[a]		
		Client and consultant	4.528	8.687	0.000		
		Overall	3.375	2.445	0.008	52.156	0.000
Inadequate contractual incentives							
b02	Inappropriate procurement/contract strategy	Contractor	3.517	3.936	0.000		
		Client and consultant	4.333	8.367	0.000		
		Overall	3.823	7.562	0.000	15.170	0.000
b03	Improper/inappropriate risk allocation/sharing	Contractor	4.217	12.391	0.000		
		Client and consultant	4.444	7.653	0.000		
		Overall	4.302	13.882	0.000	1.388	0.242[a]
b05	Ambiguous/unclear contract clauses/documents	Contrator	3.367	2.647	0.005		
		Client and consultant	4.639	10.935	0.000		
		Overall	3.844	6.996	0.000	35.570	0.000
b06	Absence of risk-reward plan	Contractor	3.550	6.564	0.000		
	Client and consultant	Client and consultant	4.333	9.282	0.000		
		Overall	3.844	10.021	0.000	25.522	0.000
b15	Inappropriate issue resolution mechanisms	Contractor	3.917	10.578	0.000		
		Client and consultant	4.222	8.167	0.000		
		Overall	4.031	13.055	0.000	3.603	0.061[a]
b20	Exclusion of consultants in risk-reward plan	Contractor	3.133	1.016	0.157[a]		
		Client and consultant	4.083	6.343	0.000		
		Overall	3.490	4.304	0.000	19.541	0.000
b21	Exclusion of major subcontractors in risk-reward plan	Contractor	3.517	4.802	0.000		
		Client and consultant	4.056	7.364	0.000		
		Overall	3.719	8.011	0.000	9.185	0.003
b22	Exclusion of major suppliers in risk-reward plan	Contractor	3.350	3.394	0.001		
		Client and consultant	3.944	7.166	0.000		
		Overall	3.573	6.660	0.000	12.553	0.001
b23	Unrelated/separate risk-reward plans for different parties	Contractor	2.717	−2.334	0.994[a]		
		Client and consultant	4.139	7.882	0.000		
		Overall	3.250	2.144	0.018	54.505	0.000
b24	Potential legal liabilities (in resolving noncontractual issues)	Contractor	3.983	9.371	0.000		
		Client and consultant	4.361	8.776	0.000		
		Overall	4.125	12.618	0.000	4.356	0.040

[a]Not significant at 0.05 level.

does not prove there is misalignment on projects they are actually working (although there probably are). It is noted that with or without alignment of objectives, there are liability concerns which project participants need to shoulder in accordance with the provisions of the contract. Contractors seem less willing to compromise their profit making goals in order to have alignment of project objectives.

Relationship Building Culture among Team Members

From Tables 3 and 4 it can be seen from the *t*-test results that contractors and clients and consultants agreed with all the factors facilitating and impeding RC under the category "Relationship building culture among team members," except for item b27. Contractors felt that bureaucratic client organization (b27) is not an important barrier to RC. One possible reason is that in a traditional design-bid-build system, contractors deal mainly with consultants and do not normally communicate with clients directly. These contractors may also have undertaken more projects with public sector clients (since these clients generate more than 50% of construction demand), and are used to inflexible legally binding arrangements. On the other hand, consultants felt that this is an important barrier as they have to work closely with clients to ensure that their requirements are met.

It is interesting to note that on the issue of mutual trust, contractors assigned significantly higher importance than clients and consultants. For example, contractors felt the acute importance of mutual trust in facilitating RC (a07), and the lack of trust among contracting parties impeding RC (b12). Apart from confirming the most important element of RC (Rahman and Kumaraswamy 2004b), contractors' concerns may imply their expectations of trust and trustworthy behaviors from other contracting parties. This may also reflect their own practice with their subcontractors and suppliers (a considerable segment of the construction supply chain), where they perhaps rely more on trust than contracts (Macaulay 1963). Consultants' lower level of trust is understandable because they must avoid professional liabilities. However, it is important and timely that consultants in general, and clients in particular, also become trustworthy; and also use such momentum

in spreading RC. An additional factor is that contractors face the greatest uncertainty levels in most projects, hence trust helps bring stability and lowers perceived risk.

Contractual Incentives

Table 3 shows that all the factors identified under "appropriate contractual incentives" are significantly important in facilitating RC but the two groups of respondents did not accord a similar level of importance to these factors. As regards the barriers, the *t*-test results show the parties agreed to eight of them. Contractors did not agree that exclusion of consultants in risk-reward plans (b20) and unrelated risk-reward plans for different parties (b23) would significantly impede RC.

The results show that clients and consultants and contractors agreed that inappropriate contract strategy (b02) and potential legal liabilities in resolving noncontractual issues (b24) impede RC, but with clients and consultants accorded higher level of importance. This highlights clients and consultants' realization of their own responsibility for appropriate project planning which should incorporate effective mechanisms for resolving noncontractual issues.

Risk-Reward Plans

Clients and consultants accorded a higher level of importance to factors relating to risk-reward plans. Compared to contractors, they felt that it is more important to have encouraging and motivating plans (a23, b06) and include all key parties in the plan (a24) to facilitate RC. Similarly, they felt that excluding consultants (b20), subcontractors (b21), and suppliers (b22) would more severely impede RC compared to the contractors' perspective. This may be because consultants, subcontractors, and suppliers are frequently ignored in RC approaches (e.g., in partnering) and therefore do not effectively contribute to such approaches. Sze et al. (2003) found that consultants and subcontractors perceive that they need to spend more resources in RC approaches, without getting a proportionate share of benefits. Such practice may deter wider implementation of RC approaches. It is therefore recommended that all relevant stakeholders-clients, consultants, contractors, subcontractors, and suppliers be included in the risk-reward plans.

Risk Allocation

Again, clients and consultants felt that it was more important to have clearly defined (a20) and equitable (a21) risk allocation and sharing arrangements to facilitate RC than contractors. This may be because clients and consultants themselves are sometimes guilty of amending standard conditions of contracts to transfer more risks to contractors. They are aware of the consequences of excessive use of exculpatory clauses, and also the use of ambiguous terms in allocating risks, that may lead to higher markups (Zaghloul and Hartman 2003). Such consciousness of Singaporean consultants and clients on risk allocation and risk sharing concur with the basic proposition of RC (Goetz and Scott 1981; Bayramoglu 2001).

Dispute Resolution

Contracts need to adequately define the scope of work, the price to be paid for it, and the other terms under which the contract is to be performed, settled, and disputed (Robinson et al. 1996). Unfortunately, many formal contracts give rise to adversarial relationships because they are essentially defensive rather than enabling.

The results show that clients and consultants and contractors agreed to having flexible contracts to address uncertainties (a22), but with the former giving this factor higher importance. This concurs with previous observation that efficient management of unforeseen risks needs flexible contracts and joint efforts of major contracting parties (Rahman and Kumaraswamy 2004b). Clients and consultants also accorded a higher level of importance to ambiguous contract clauses impeding RC (b05). The higher importance indicated by clients and consultants is encouraging in that they may try to avoid using such clauses.

Clients and consultants also assigned a higher level of importance to having mutually agreed dispute resolution mechanisms (a13) than contractors. This may be because contracting parties in RC-based approaches expect a mutually satisfactory solution, through a method on which they can rely on. This is also in agreement with the RC literature, in that contracting parties agree on a future settlement mechanism (Goetz and Scott 1981) for recurrent transactions, for example, claims and variation orders (Rahman and Kumaraswamy 2002a).

Conclusion

This paper reports the outcomes of a survey on various contractual and noncontractual incentives that are based on RC principles. This study does not suggest that RC is the only way to reduce adversarial behavior, nor does it attempt to identify the various means and ways of mitigating adversarial behavior. The study identifies RC as one of the approaches that not only reduces adversarial behavior, but also enhances team performance and ensures improved project delivery.

Stakeholders in a construction project team should not only optimize the utilization of their own resources, but also maintain harmonious relationships with business partners, provided this yields added value to clients. In this context, various factors and strategies were assessed in Singapore's construction industry in order to identify their usability and to provide any suitable contractual incentives for designing appropriate RC-based collaborative working arrangements.

Data were collected from a cross section of contractors, clients, and consultants to find out important factors that facilitate RC and significant barriers that deter RC. The majority of contractor respondents did not have RC experience while many consultants and clients did have some RC experience. The study compared and contrasted the views of contractors (Group 1) with that of clients and consultants (Group 2).

In terms of factors facilitating RC, 24 factors were found to be significant, although the two groups significantly disagreed on the relative importance levels of 19 factors. Twenty-seven factors were found to impede RC, and again, the two groups did not accord a similar level of importance to 19 potential barriers.

In conclusion, the findings support the core conceptualization of RC, in that construction contracts must provide motivating incentives, and need to be flexible or armored with appropriate adjustment mechanisms at the postcontract stage, in order to get things done in the face of uncertainty, and overcome any complexity. The overall results represent Singapore's construction industry, which adopts a primarily design-bid-build procurement system and where RC is not widely used, especially in the public sector. As the public sector creates more than half of construction demand in Singapore, the need for arms length relationships may impede the development of RC in Singapore. The big difference between clients and consultants and contractors' views indicate

that more contractual incentives need to be integrated into contracts, to persuade contractors to adopt RC approaches.

The ANOVA results have shown that clients and consultants ascribed greater importance to RC factors than contractors. It could be implied that contractors benefit from adversarial approaches via claims, for example, ambiguous contract clauses are helpful for making claims. There is therefore a need for further research to find out the type of incentives that will tip the balance. An incremental testing of incentives needs to be formulated and intensively monitored, perhaps through action research.

Acknowledgments

The writers thank M. M. Kumaraswamy for the permission to use the questionnaire conceived by him and his team in Hong Kong. S. T. Phng's collation of contractor respondents' data is acknowledged with thanks.

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