

# Joint risk management through transactionally efficient relational contracting

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The appropriate contracting method and the contract documents for any construction project depend on the nature of the project, but 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 interests and conflicting agendas. The attitudes of the contracting parties and the co-operative relationships among the project participants are important for successful project delivery. These are examined in the light of transaction cost economics and relational contracting (RC) principles. It is found that RC may well be a useful route towards reduced transaction costs, while also fostering co-operative relationships and better teamwork that in turn facilitate joint risk management (JRM). The usefulness of the latter is reinforced by relevant observations from a recent Hong Kong-based survey, followed by a case study in Mainland China. A basic model is conceptualized for improved project delivery via JRM. This is also seen to be reinforceable by further transactional efficiencies that can be achieved through other RC-based approaches, such as partnering or alliancing.

*Keywords:* Co-operative teamwork, joint risk management, project delivery, relational contracting, transaction cost economics

## Introduction

Liabilities and responsibilities of each contracting party are allocated through the conditions of contract. It has been postulated that inappropriate and unclear risk allocation among the contracting parties generates avoidable construction claims and disputes (ACEC/AGC, 1992; McGowan, 1992; Fisk, 1997; Kumaraswamy, 1997). According to this school of thought, one of the main areas where risk management can be applied is in developing clearer and more appropriate conditions of contract. A clear definition of the risks and their proper allocation provides incentives for the efficient management of risks during the construction process.

However, contract language alone is insufficient to specify risk apportionment clearly between the contracting parties. Different groups of contracting parties, and also people within the same group, inter-

pret contract clauses in different ways (Hartman *et al.*, 1997). A clear 'meeting of minds' of the different contracting parties appears necessary. Furthermore, since all possible risks are difficult to foresee at the outset, unforeseen risks would need to be dealt with, using a joint risk management (JRM) strategy that continues into the post-contract stage. Given the nature of today's construction industry as a very high risk, complex, multiparty business, conflicts between the diverse participants need to be minimized through better relationships and co-operative teamwork (Dissanayaka and Kumaraswamy, 1999), where the motivation and attitudes of the project participants are critical.

Transaction cost economics (TCE) and relational contracting (RC) approaches may be mobilized as a potential route towards improving such relationships, teamworking and the proposed JRM. The TCE approach provides a useful framework for analysing the inevitable differences in interest between different contracting parties who are members of the project

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coalition (Winch, 1989). On the other hand, RC encourages long term provisions and mutual future planning, and introduces a degree of flexibility into the contract by considering a contract to be a relationship among the parties (Macneil, 1980).

The purpose of this paper is to examine and integrate these approaches, and to provide a conceptual overview of the resultant recommended strategy in the first instance. First, this would demonstrate how transactionally efficient RC can be a likely means for improving JRM at the post-contact stage. This conceptual overview will then be reinforced by relevant observations on the perceived desirability of JRM, based on a recent survey. A conceptual model, of which the present study is a part, is formulated to demonstrate the envisaged synergies from the integrated approaches. Finally, relevant observations from a case study of a project in Mainland China illustrate (a) some advantages of these relational approaches and (b) effects of motivation and attitudes of the project participants – in construction contracts.

### **Relevant transaction cost economics fundamentals**

Transaction cost economics considers the transaction as the basic unit of analysis in the study of economic organization, and any problem that can be posed directly or indirectly as a contracting problem is usefully investigated in transaction cost economics terms (Williamson, 1987). TCE also considers contracts as ‘governance structures’, that is, as frameworks for conducting transactions in a changing world. These structures may be of several different degrees of formality and flexibility, the optimal choice of which depends mainly on ‘bounded rationality’ and ‘opportunism’ (Williamson, 1996). Bounded rationality means that a party to a transaction cannot always plan and monitor perfectly because of the lack of information needed at the planning stage, and in the face of uncertainty and complexity. This may give rise to opportunism. Parties therefore need protecting from each other because promises do not guarantee performance. TCE suggests providing the necessary measures in the contract to counter opportunism.

Construction projects involve many complex processes and numerous uncertainties. In order to achieve transient market benefits in the face of these uncertainties and complexities, contracts may need adapting from time to time. Different types of contract are therefore required to support efficient trading relations, where the type of contract is contingent upon the characteristics of the transaction. Thus, before entering into a contract, the contracting parties need

first to determine precisely: (1) their requirements and objectives; (2) the characteristics of the proposed transaction(s); and (3) the factors that cause transactional difficulties. Then the parties need to select the best suited project procurement systems, including contract types containing necessary mechanisms for addressing disagreements towards negotiation, organizational arrangements (governance structures), proper selection strategies and risk management, that will minimize total costs of making their transaction(s).

A transaction occurs when a good or service is transferred across a technologically separable interface (Williamson, 1987). The main contention is that, in addition to the cost of production, there are also transaction costs (TCs) between the parties (Winch, 1989). TCs include the cost of ‘effort to identify, explicate and mitigate contractual hazards’ (Williamson, 1996). TCs in construction include: costs of negotiation and writing contingent contracts; costs of monitoring contractual performance; costs of enforcing contractual promises; and costs associated with breaches of contractual promises. In each case these costs may include the costs of acquiring and processing of information, legal costs, organizational costs, and costs associated with inefficient pricing and production behaviour (Joskow, 1985). In this sense, although initially the main construction contract is a single transaction, usually it must incorporate a series of repeated transactions like claims, variation orders and disputes. Therefore, a reduction in number of claims, variation orders and disputes, together with their smoother and earlier settlement, may be treated as reduced TCs.

### **Relevant relational contracting fundamentals**

Relational (or relationship) contracting (RC) is based on a recognition of mutual benefits and win-win scenarios through more co-operative relationships between the parties. RC principles embrace and underpin various approaches, such as partnering, alliancing, joint venturing, and other collaborative working arrangements and better risk sharing mechanisms (Alsagoff and McDermott, 1994; Jones, 2000). At the core of RC, the legal mechanisms offered by specific contracts are not strictly followed, but the parties themselves govern the transaction within mutually accepted social guidelines (Macaulay, 1963). It implies that businessmen operate within a dynamic standpoint, continually pulled in various directions by contractual (legal), economic and behavioural forces. These are particularly so in complex, lengthy and evolving transactions, as seen in construction projects, where the circumstances underlying the contract may change over time.

RC considers contracts as the 'ongoing dynamic state' of relations among the contracting parties (Macneil, 1974), in the process of projecting 'exchange' into the future (Macneil, 1980). However, no real life human co-operation will be found entirely transactional; it will involve at least some whole personal relations, some diffuse communication and some non-economic personal satisfaction. Nor will contractual relations be found entirely lacking in transactional discreteness, if such lack of discreteness is indeed humanly possible. Accordingly, Macneil (1978) classified contracts into three types: classical, neoclassical, and relational. Classical contracting covers all future contingencies, and transactions tend to be self-liquidating. Neoclassical contracting involves trilateral governance, where third-party 'assistance' is employed in resolving disputes and evaluating performance. Relational contracting provides the means to sustain ongoing relations in long and complex contracts by adjustment processes of a more thoroughly transaction-specific, ongoing administrative kind. This may or may not include an original agreement, and even if it does, this may not necessarily make a great difference.

RC considers contracts as promises to do something in the future (Macneil, 1974). However, not all the events and information needed can be presentiated (discerned or perceived, and thereby quantified: hence the 'bounded rationality' of TCE) at the time of contracting, and mutual future planning is required. This may well give rise to opportunism (strategic behaviour by an economic agent (Campbell, 1997)), translating into a behavioural risk of encountering actions that benefit one party at the expense of other(s) (Lyons and Mehta, 1997). Self-interested trust (SIT) and socially oriented trust (SOT) work as safeguards against this risk. SIT is forward looking in expecting direct rewards from co-operation in the form of continuing business. SOT is backward looking, and based on a history of working relationships and social relations that creates shared values, moral positions and friendships and that discourages opportunism, even if the probability of future trade is low.

However, SIT is seen as developing from the strategic interaction of self-interested economic agents, and is maintained as long as it serves their interest. The possibility of defection is restrained by any sanction or retaliation that might be deployed against them. By contrast, SOT is seen as goodwill trust, and in particular as counter-posed to rationality, self-interest, and contract. In today's complex business relationships, like construction projects, the most effective approaches to developing 'business trust' are based in between these two extremes of egoism and altruism (Deakin *et al.*, 1997). They are communities of shared ethical values, shared principles of fairness and conver-

gent mutual expectations about informal obligations. These results are achieved through motivation and individual attitudes that considerably influence the project outcomes, and are critical to the relationships of the contracting parties (Drexler and Larson, 2000). Such trust can sustain cooperative behaviour and the envisaged JRM in the face of complexity and unforeseen problems. Results from recent studies (discussed later) show that such motivation and attitude are present in the industry.

Present-day organizations display an acute awareness of the costly hazards of opportunism and of the difficulties of organizing exchange when the legal system is perceived to provide inadequate support for, and protection of, their interests (Lyons and Mehta, 1997). More informal RC arrangements supply a reasonably efficient solution where recurrent transactions (e.g. claims, variation orders) require investments of specific assets, and are accompanied by a high level of uncertainty. However, although non-legal enforcement mechanisms clearly play a major role in relational contracting, legal mechanisms may also play a part in such exchange arrangements. Equally, more formal contractual arrangements (i.e. classical and neoclassical) are available with an armoury of supportive non-legal mechanisms. This is seen in the present construction industry in practicing RC (e.g. through partnering): project partners work as a team on the basis of a 'charter' that is not legally binding, and the original contract will take precedence if there is any problem.

Partnering is a good example of practicing RC principles. Thompson and Sanders (1998) observed that benefits from partnering (i.e. RC) increase with a migration of teamwork attitude from competition to co-operation, through to collaboration and finally to coalescence. Rahman *et al.* (2001) argued that more relational and performance oriented contractor selection would encourage an amicable RC environment and more collaborative teamwork. Ho (2000) depicted cost savings of 11–38% on similar office building construction in Hong Kong when the contractor was brought into the team at the very outset of a project. It is expected that extending the RC approaches to subcontractors and suppliers through the supply chain, and ensuring their participation at early stages of projects, can further increase benefits, as identified by Kumaraswamy and Mathews (2000) in a case of subcontractor selection in the UK. In fact, RC approaches are expected to work in almost any environment, if applied properly. However, this requires transforming traditional relationships towards a shared culture that transcends organizational boundaries (CII, 1996). What is critical is the motivation and attitude of the project participants.

RC offers a cost-effective means of enforcing 'good' (but apparently unprofitable) behaviour when transactions are associated with exposure to opportunism, but a fully contingent contract is too costly (if not impossible) to specify. RC is characterized by the substitution of the legal requirements and its accompanying formal documents by informal agreements such as verbal promises, letters of intent, or 'gentlemen's agreements'. To be both desirable and feasible, this mode of governance first calls upon all parties to recognize the positive gains to be had from maintaining the business relation. Second, it calls on the parties to find the means of transcending the anonymity associated with market transactions. Thus, disagreements often are negotiated towards a solution that does not jeopardize the relationship among the contracting parties. Such objectives and approaches also provide an ideal framework for the joint management of risks that cannot be foreseen or clearly allocated to one party at the outset.

### Matching contract types to mapped transaction characteristics

The principal dimensions for describing transactions are asset specificity (or specific investment), frequency and uncertainty (Williamson, 1987). Specific investment describes expenditure on plant and machinery, time or effort that has a reduced value if used for any other purpose (Lyons and Mehta, 1997). High frequency (i.e. repeated transactions) makes it worthwhile setting up special arrangements. The third characteristic is uncertainty. A higher degree of uncertainty requires greater contract flexibility for adaptation to new conditions or arrangements.

Williamson (1987) looked upon uncertainty as a post-contract adaptive, sequential decision requirement, and concentrated on degree of specific investment and frequency of transacting. Specific investment classes are non-specific (e.g. purchasing standard equipment, material, etc.), mixed (purchasing customized equipment, material, etc.) and highly specific or idiosyncratic (e.g. constructing a plant). The frequency classes are one-off, occasional and recurrent. The difference between one-off and occasional transactions is imperceptible, because few transactions have an isolated and discrete character. Accordingly he considered only occasional and recurrent frequencies, and found an efficient match of governance structures with Macneil's (1974, 1978) contractual classification. This is illustrated in Table 1.

If there is no specific investment, there is less incentive for continuity in a business relationship. Therefore it would not matter much if problems were ultimately resolved by court action, or even by just the threat of

litigation (Lyons and Mehta, 1997). As a consequence, it is appropriate for traders to rely on the classical contract to cover the discrete exchange. However, if specific investments are at stake, continuity becomes more important. Under these conditions, the recurrent transactions (e.g. claims, variations, disputes) justify considerable effort in developing a sustainable relational contract. This is not possible for a transaction that is to be repeated only occasionally, and where there is a need for access to an arbitration procedure to sort out disputes. Under these conditions, the neoclassical contract is the most appropriate. If idiosyncratic investments and the potential cost of opportunism become very large, then market transactions are likely to become internalized within the firm. This mode of governance is seen in alliancing projects in Australia, particularly of the Australian National Museum project (Walker *et al.*, 2000).

### Relevant observations from a survey on construction risk allocation

TCE considers that the underlying behaviour of a particular transaction is always expected to be opportunistic (and therefore somewhat 'negative'). This problem can be mitigated by the appropriate choice of contractual form (or overall governance structure), which depends on the characteristics of each transaction and not the transactors, whereas RC assumes contracts to be a relation among the parties, where behaviour of the parties gives rise to prescriptive norms and to standards of proper conduct. These prescriptive norms 'connote both actual behaviour and principles of right action' (Macneil, 1980), suggesting the need for proactive (and therefore 'positive') behaviour. It therefore appears useful to address both the nature of the transaction (in terms of uncertainty or risk) and that of the transactors (i.e. parties, in terms of their attitude and willingness for collaborative risk management), in choosing an optimal contractual form. Duties and responsibilities of contracting parties should be allocated clearly in this optimal contractual form, along with necessary provision for flexibility in filling the gaps (i.e. efficient management of risks as they occur during the construction process).

A recent Hong Kong-based survey assessed, from 47 responsive questionnaire returns, perceptions on (1) present risk allocation, and (2) how the risks should be allocated (i.e. preferred allocation, including an option for JRM), in conventional construction contracts. For the first question, the respondents specified a percentage (say  $X$ , from 0 to 100) of a particular risk that is perceived presently to lie with the contractor. This implied that  $(100-X)$  percentage of

**Table 1** Optimal contractual form

		Investment characteristics		
		Non-specific	Mixed	Idiosyncratic
Frequency	Occasional	Classical contracting	Neoclassical contracting	Neoclassical contracting
	Recurrent	Classical contracting	Relational contracting	Relational contracting

Source: Williamson (1987, p. 79).

that risk presently lies with the employer. The response required to the second question was the percentages of a particular risk that should ideally be borne (a) by the employer, (b) by the contractor and (c) the percentage earmarked for joint management at the post-contract stage (totalling 100). The second question was not asked on the basis of any particular contract conditions. This survey was not specifically designed to match the purposes of this paper. Also the results are not directly relevant to improved risk management. Therefore, most of the detailed analyses are not presented here. However, relevant observations from the survey are summarized and discussed below. This is primarily to illustrate the perceived needs for JRM that are sought to be achieved through transactionally efficient RC.

The survey results show marked divergences in the two interpretations of present and preferred risk allocation, both between and within the different project participant groups (employers, contractors and consultants). This is in general conformity with previous findings (Hartman *et al.*, 1997). However, extreme divergence within the same contracting groups has also been observed. These diverse perceptions of different groups are a source of potential conflicts during project execution. Divergence in the same group may arise from diverse (bitter or pleasant) personal experiences, which may have shaped attitudes and may therefore evoke different behaviour patterns. This highlights a need for co-operative learning, and developing a culture of RC within the organizations before embarking on such approaches with others. Better inter-group and intra-group understanding is also necessary. Conflicts between the diverse participants need to be addressed through a reshaping of attitudes involving enlightened training programmes and a consequent reconciliation of divergent perceptions and attitudes. These should then contribute to better relationships and co-operative teamwork that in turn generate an environment for JRM.

It has been observed also that considerable percentages of most of the 41 risks cited in the survey questionnaire are perceived to need JRM. The respondents generally preferred reduced risk liabilities of either one or both of the contracting parties, instead of allocating

more risks on the other party. This is a very relevant and important finding, as JRM at the post-contract stage needs non-adversarial teamwork, where better relations, mutual understanding, strong co-operation among the contracting parties and an appreciation of the situation are preconditions.

Table 2 shows the average perceptions of JRM based on the groupings of the respondents on 'working organizations' and 'nature of present job'. Within specific groupings under 'working organizations', contractors suggested that 11–60% of 28 risks are suitable for JRM. By contrast, owners recommended more than 10% of 27 risks as suitable for JRM, but for two of these risks the range they considered suitable exceeded 50%. This may indicate a new development compared with previous observations that employers are risk evasive (Ahmed *et al.*, 1999). Moreover, in each of the percentage range slots from 20–50%, owners recommended a greater number of risks for JRM than contractors. This may mean that owners are more

**Table 2** Average perceptions on joint risk management (JRM) based on groupings of 'working organizations' and 'nature of present job'

	Percentage of risk that should be jointly managed	Number of risks(out of 41, used in the survey) in each category <sup>a</sup>						
		Total (47)	Working organizations			Nature of present job		
			CSL (14)	CTR (8)	OWN (15)	ACA (10)	ENG (18)	MGR (19)
0	0	0	7	1	0	0	1	
1–10	12	15	6	13	4	18	10	
11–20	13	13	17	8	20	12	12	
2–30	10	9	5	8	13	6	8	
31–40	6	3	4	6	3	5	7	
41–50		1	1	3	1		1	
51–60			1	1			2	
Over 60								
Total No.	41	41	41	41	41	41	41	

<sup>a</sup>Figures in parentheses ( ) indicate the numbers of respondents in each group. CSL, consultants; CTR, contractors; OWN, owners; ACA, academics; ENG, engineering; and MGR, managerial.

ready (than contractors) to approach JRM. It is also very important in the context that any arrangement for collaborative teamwork is expected to be client-led, as they are the initiators and main beneficiaries of the project and the most important stakeholders in the project teams. They also have effective control over the governance structure/contractual form, selection process, contract content and project organization.

Within the groupings under 'nature of present job', the respondents who were engineers believed that 11–40 % of 23 risk items need JRM. The managerial respondents recommended 11–60 % of 30 risk items for JRM. This is important as the managers are expected to drive and motivate the project team comprising various professionals towards better performance in terms of cost, programme and quality, and in achieving owner satisfaction without disrupting relationships between the contracting parties. The academics appear to have the greatest enthusiasm for teamwork based JRM, as they recommend the highest number of risks (37 out of 41) at a level of more than 10%.

In the total sample, 16 risk items are seen to be suitable for JRM at a level of 21–40 %, and the percentages recommended for JRM for these 16 risk items under different contract conditions are compared in Table 3. Higher percentages recommended for JRM, irrespective of contract categories, may relate to the reality that some of the risks cannot be foreseen at the planning or design stages, while other risks are unique or project specific, and some risks, in any case, need the combined efforts of more than one contracting party for their efficient management. This may also reflect the present need of the industry to move towards more collaborative and teamwork based approaches to address construction risks effectively. As any collaborative teamwork needs better understanding and good relationships among the project participants, this may also reinforce the need for a paradigm shift away from the present confrontational culture and adversarial attitudes of the stakeholders. Moreover, this may also indicate that present project participants are quite receptive to calls (through different government reports worldwide) for more co-operative (and less adversarial) working arrangements to address the situational demands.

### Proposed models

The above observations from both the theoretical analyses and the survey led to the formulation of the following frameworks for construction process improvements. These are represented here as two conceptual models, since it is envisaged that they

**Table 3** Comparing average perceptions on risk items ranked as most suitable for joint risk management (JRM) in general

Risk items	Percentage of risks suitable for JRM <sup>a</sup>			
	Total (47)	FIDIC (25)	HKGCC (8)	General (9)
Union strife	23	19	40	35
Change in scope of work	23	11	25	14
Conflicts in documents	24	21	24	40
Third party delays	24	20	57	18
Economic disaster	25	17	38	35
Unforeseen site conditions	26	15	46	15
Physical impossibility	27	20	57	31
Change order evaluation and negotiation	28	24	27	33
Buildability/constructability	30	23	41	42
Environmental hazards (project area only)	30	19	35	48
Acts of God	31	18	60	45
Environmental control (as impacting on project)	32	17	36	59
Public disorder	32	22	75	37
Delays in resolving disputes	35	30	55	25
Delays in resolving contractual issues	39	31	55	38
Cost of legal process	40	38	35	44

<sup>a</sup>Figures in parentheses ( ) indicate the number of responses. Five responses were based on some other different contract conditions and those are not compared here as a separate category. FIDIC, Fédération Internationale des Ingénieurs-Conseils (International Federation of Consulting Engineers); HKGCC, The General Conditions of Contract for Civil Engineering Works in Hong Kong; and General, not according to any particular conditions of contract.

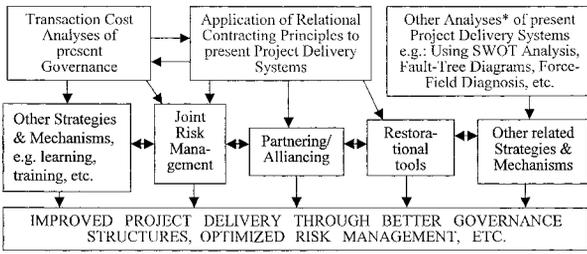
would be later tested and expanded into working models:

1. a conceptual model of strategy development for improving project delivery systems themselves as shown in Figure 1, and
2. a conceptual model of the envisaged operational improvements as shown in Figure 2 that should flow from the former.

The bottom line of considerably enhanced productivity levels should in fact 'drive' the push for improved project delivery systems, given the increasing worldwide demands for dramatic stepwise gains in construction industry performance levels.

### Observations from a case study

In order to assess the effectiveness of using transactionally efficient RC for JRM and for a detailed study



**Figure 1** Conceptual model of strategy development for improving project delivery systems (\*note that ‘other analyses’ are not discussed specifically in the present paper)

of a real-life project, a case study was carried out on one of the largest joint venture projects in Mainland China. In terms of contractual background, it was noted that recent Chinese business practices seem to incorporate significant elements of neoclassical contracting in general. However, ‘trust’ developed from *guanxi* (relationships) among the parties probably plays the most important role in businesses that originate in the expansive family (social) tie network (Wong and Chan, 1999). *Guanxi* works as a lubricant to ‘oil the wheels of transactions’. Most *guanxi* ties are developed through informal means (like dining and gift-giving). In theory, if there is total trust, the need for a contract may be of less value.

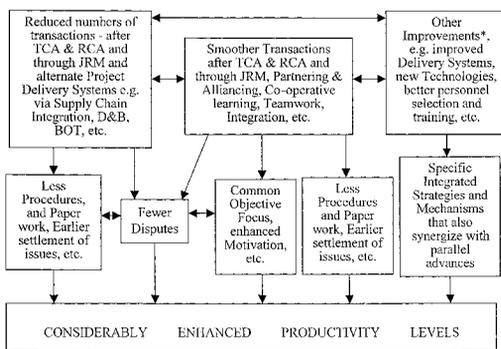
Information was collected by a 5-day stay at the project site in July 2000, and by interviewing key personnel individually from both the employer and the contractors. Interviews were conducted in both English and Mandarin and were documented. The project was the construction of a large and technically complex dam that is deemed to be one of the most challenging water

resource development projects both locally and internationally. It was declared as a demonstration project for Sino-foreign joint ventures and an ‘education base’ for good organization and close co-operation. These features and preliminary information received from one of the project participants led the authors to select the project for case study. It was anticipated that the project might provide a useful example of one approach towards RC and JRM. However, all specific references and identities have been consciously withheld in this paper, in case some interpretations may be perceived to touch on sensitive issues in this ongoing project.

The project is jointly financed by the Central Government of the People’s Republic of China and The World Bank (WB). Three separate contracts for the works (referred to here as C1, C2 and C3) of this project were awarded on an international competitive bidding basis. Contracts were based on the FIDIC (4th Edition) Conditions of Contract, where provisions for dispute resolution and settlement of claims were: the engineer’s decision, amicable settlement and arbitration. In spite of the stated aim of demonstrating close co-operation, there was no provision for RC (e.g. partnering) or any other such arrangement in the contracts. All three contracts commenced in December 1994.

A notice of claim on ‘unforeseen site conditions’ was served by one of the contractors soon after entering the site in 1994, even before excavation began. The claim was lodged in 1995 and the first official claim was submitted in 1997. Following this event and with strong encouragement from the WB (as co-financier), the employer and the three contractors signed a Memorandum of Understanding (MOU) in late 1997. This comprised ‘post contract planning’ (a major element of RC) through changing the original provision for dispute resolution and appointing a Disputes Review Board (DRB), as a restorational arrangement, in early 1998. The convergent aim (of the parties) was to minimize the ‘time and effort’ necessary to resolve disputes during contract execution (reduced TCs). The objective of the DRB was ‘to resolve disputes promptly, with minimum expense and with the least possible disruption to the administration and performance of the works’. Also the parties’ agreed expectation was, as expressed in MOU, that the mere existence of a neutral restorational arrangement like the DRB would encourage them to resolve disputes amicably by proper operation of contract provisions, so minimizing the need for any arbitrations.

Over a period of more than 2 years and almost at the closure of the project, only five claims were brought to the DRB (indicating reduced transactions). As shown in Table 4, there were 52 variations and 15 claims in C1, and 49 variations and 35 claims in C3. Except for one claim and one variation among these,



**Figure 2** Conceptual model of envisaged operational improvements. TCA, transactional cost analyses; D&B, design and build; RCA, relational contracting applications; BOT, build, operate and transfer; and JRM, joint risk management (\*note that ‘other improvements’ are not discussed specifically in the present paper)

**Table 4** Status of claims and variations raised by contractors (up to April 2000)

Contract No.	Item	Total No.	Settlement level				
			Engineer	C – O <sup>a</sup> Negotiation	After DRB hearing	Not settled after DRB hearing	Not settled & not submitted to DRB
C1	Variations	52	51				1
	Claims	15	15				
C2	Variations	149	80				69
	Claims	50	20	1	3		26
C3	Variations	49	49				
	Claims	35	34		1		
Total		350	249	0	2	3	96

<sup>a</sup>C-O, contractor-owner.

all claims and variations were settled by the engineer's decision (reduced TCs and elements of RC). The only claim sent to the DRB was successfully negotiated after the first hearing (elements of RC). Parties to C1 are hopeful of negotiating the only unsettled variation amicably (elements of RC), especially since almost all the works have been completed. Parties are targeting the possibilities of future projects. They do not wish to enter into any confrontation after having built up a successful track record of good relations. It was also noteworthy that the works under C1 and C3 were always on or ahead of schedule.

By contrast, 80 variations and 20 claims were settled by the 'engineer's decision' among 149 variations and 50 claims in C2. Among 4 claims brought to the DRB, one was negotiated after the first hearing. The other three were forwarded to arbitration, although there appears to be a possibility that one of these three claims may still be negotiated. However, there were 69 unsettled variations and 26 unsettled claims. C2 experienced delays, but the employer took proactive steps towards programme recovery by providing local construction crews as labour subcontractors.

The successful settlement of conflicts under C1 and C3 is attributed mainly to the positive attitude of the project participants (elements of RC) that was for example initially expressed through the MOU. The employer demonstrated its attitude towards the stated aim of close co-operation by introducing and leading the whole team to 'post contract planning' (a major element of RC), through the MOU that also enabled the DRB (a restorational arrangement). However, it may be argued that the DRB conferred neoclassical characteristics on the contracts. Nevertheless, the mere presence of the DRB helped the parties to settle almost all conflicts, as expected in the MOU, without even resorting to the DRB. It therefore worked as a restorational tool.

The contractors in turn reflected their attitudes by working in co-operation with the engineer (elements of RC). This resulted in early and amicable settlement

of almost all the claims and variations (reduced TCs), through the mechanism of the engineer's decision. Given the complex nature of the work (mainly underground work, many tunnels, etc.), there were numerous design changes leading to variation orders and many potential conflicts. But the contractors usually found solutions in a spirit of co-operation with the employer, and thus ensured progress. The engineer developed a better understanding of the issues and, as a representative of the employer, was able to appreciate and accept the reasonable claims of the contractors. This fostered trust and better relationships, maintained the progress of the work and encouraged mutually acceptable, and so apparently equitable, decisions regarding variations.

By contrast, a large number of the unsettled variations and claims in C2 can be attributed to the apparent 'claims consciousness' of the contractor. This was reflected through lodging a notice of claim for unforeseen ground conditions even before excavation commenced. Consequential apprehensions and mistrust of apparently hidden agendas may have thereby disrupted the administration and performance of the works contributing to the delays experienced on this contract. It appears however, that co-operation initiated by the employer helped to return the works progress to a reasonable schedule. Furthermore, the contractor also became a party to the MOU, and apparently appreciated the stated objectives of the employer, the MOU and of the DRB itself that also led to successful settlement of conflicts in the other two contracts. Being influenced by this environment of better relationships, the parties are expected to settle all outstanding issues amicably and reasonably soon.

Most of the project participants in this case study opted for resolution of the conflicting issues among themselves, because they realized that the legal system is only useful when things go badly wrong, and even then may lead to more problems. Also it is expensive to use, and the ability to use the legal system effec-

tively depends upon the capacities of the party. Moreover, it is difficult to re-establish a relationship once a party has resorted to the legal system. Most of the project participants, on the other hand, have demonstrated the advantages of some facets of both RC and JRM by extending future co-operation in post commencement planning and during actual operations by forming the DRB, by anticipating potential problems/conflicts through 'good' relationships, by resolving most of the claims and variations through negotiations, and by dealing with residual conflicts through co-operation and restorational techniques. These approaches on this project were found to have led to cost minimization, on-schedule work completion, and most issues being resolved within the project without disrupting relationships. Participants realized that most issues are best resolved by the construction experts on site, so that they had complete control of the events. Resorting to arbitration was realized as not only likely to lead to loss of control of the issues, but also to huge expenditures. It would also undermine business relationships and the co-operative culture established between present project participants, and lead to a bad reputation in the industry, which would also translate into barriers to future business in general.

## Conclusions

Appropriate, clear and equitable conditions of contract are commonly considered to be invaluable for successful projects. Appropriate contract conditions help to meet the specific requirements and objectives of the project. Contract conditions are expected to be clear in order to define the rights and duties of project participants and unequivocally allocate risks (or future uncertainties) to the different contracting parties. Contract conditions are also expected to be equitable, so as to allocate these risks in a 'just' way, apart from merely following the often espoused principle of assigning the risks to those best equipped to deal with them.

But not all information required to handle future uncertainties properly are discernible, and not all risks are identifiable and quantifiable at the planning stage. Thus a totally comprehensive contract is impossible to achieve, while even the more comprehensive ones are expensive and time-consuming to formulate. The alternative is to make provision for some gaps in the contract provisions and provide adequate procedures to address them as and when those risks materialize during the process of construction. This may well give rise to opportunism. Moreover, not all the risks are manageable/addressable by a single contracting party, and ideally may require the efforts of more than one contracting party.

Future co-operation in post commencement planning and during actual performance is therefore required to address these uncertainties properly. This requires joint and dynamic risk management, under the canopy of flexible contract conditions with provisions for amicable adjustment processes and rapid co-ordinated multi-party responses to emerging problem scenarios. This in turn requires a revamping of attitudes towards co-operative teamwork and risk anticipation and response/mitigation on the part of every individual, as well as of all contracting parties in the project team. In other words this calls for a veritable 'cultural revolution' in terms of project culture. Diverse interests of contracting parties need to be addressed through better relationships, co-operative teamwork and proper restorational techniques, as and when anticipated uncertainties occur. The possibility of any potential problems needs to be considered as a normal part of relationships among the contracting parties.

The above conclusions were reached in respect of construction contracting scenarios, through multiple (triangulation-type verification) research routes as presented in this paper. This was done by drawing upon relevant aspects of transaction cost economics (TCE) and relational contracting (RC) theories, the collective perceptions of the respondents to the Hong Kong-based questionnaire survey and the case study in Mainland China. The advantages of joint risk management (JRM) are thereby highlighted, and the potential for achieving this through transactionally efficient relational contracting is demonstrated. The proposed conceptual models that target both improved project delivery and operational improvements need to be validated and developed into working models. However, the integration and consolidation of relevant aspects of fundamental contractual theories and valuable experiential perceptions in this study are presented as a solid platform from which to launch further studies on JRM and its deployment, with a view to considerably improved construction industry performance levels.

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