

# Developing Relational Approaches to Contracting: The Sri Lankan Context

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## Abstract

The traditional construction procurement systems have come under constant scrutiny in the past decades for their numerous drawbacks, resulting in under-performance of the industry. International research in this area showed that the adaptation of approaches such as, partnering and alliances, which are based upon relational contracting (RC) principles, could lead to numerous benefits to all parties and uplift the industry performance. However, these practices still have not proliferated into the Sri Lankan construction industry, which continues to use the traditional system as the most popular procurement approach. Therefore, the need to identify the potential to develop RC cultures in the Sri Lankan construction industry was identified. Through the literature review, thirty factors facilitating RC and thirty-nine factors impeding RC was identified. A questionnaire survey was conducted among project team members of construction projects with Design-Bid-Build (DBB) and Design and Build (D&B) type arrangements, to gather the perceptions of the respondents in relation to the applicability and validity of these factors in the Sri Lankan context. The study revealed that overall, there is an environment conducive to the development of relationship-based procurement approaches in the Sri Lankan construction industry. It was identified that in general, the contractors were much more supportive towards adaptation of such practices and thereby shifting away from the traditional system than the consultants. In addition, it was revealed that as the level of integration within the project team improved, the project environment became more conducive towards RC approaches.

**Keywords:** Procurement, Relational Contracting, Facilitators, Impediments, Sri Lanka

## 1. Background

Most traditional forms of construction procurement rely upon segregated teams, fragmenting the construction process. The numerous drawbacks of this system such as, adversarial relationships, unhealthy competition, purely price-based selections, numerous change orders and improper risk-shedding tactics [1], creates a general atmosphere of poor co-operation, limited trust and ineffective communication in project teams, ultimately resulting in unsatisfactory project

performance. In recent years, a number of studies and industry reports around the world have addressed these issues. Industry reports in Hong Kong [2], Singapore [3] and UK [4] have highlighted limited co-operation and fragmentation as impediments for proper consideration of issues such as, buildability, safety and life cycle costs in their respective construction industries [5]. Further, other studies, (for e.g. in Canada), have found that the cost of mistrust generated by confrontational situations inherent in the traditional contracts to amount to 8 – 20% of contract value [6]. All these have created an urgent need for new procurement approaches encouraging better relationships and team working within project teams, which has influenced a global shift towards “relational contracting (RC)” practices, such as partnering, alliancing, joint venturing, relationship contracting etc.

Recent local surveys have shown the dominance of traditional procurement systems in the Sri Lankan construction industry [7] and the stated weaknesses of these systems are quite common in the Sri Lankan context as well. Further, the future construction demands of the country are likely to call for increased efficiencies and performance from the industry. Therefore, considering all these, development of RC cultures in project delivery teams in the Sri Lankan construction industry, seems sensible and appropriate in the out set. However, RC is not a “one-size-fits-all” guaranteed fix, but rather a philosophy that must be tailored for each situation for which it is applied [8]. The successful implementation of a RC culture will undoubtedly present hard work, especially in an industry full of individuals well conditioned in working in adversarial climates.

Although, many countries around the world are quite advanced in the practice of RC approaches, it remains an unexplored area for research in the Sri Lankan context. The aim of this paper is to explore the potential for building a successful relationship-based procurement culture in the Sri Lankan construction industry. Specific objectives have been set to identify the factors (1) facilitating and (2) impeding the development of a RC culture in the Sri Lankan context and (3) to assess the capacity to adopt RC practices in the Sri Lankan construction industry.

## **2. Limitations of the traditional procurement system**

Construction industry in any country is a complex, high-risk sector, dominated by contracts. It has strong backward and forward linkages with a large number of other industries such as, manufacturing, finance, labour etc. The construction industry has a direct impact on the national economy and is generally used as an indicator of economic well being of the country. It can influence a country’s national economy in four aspects namely, production of specific and national basic needs, provision of fixed capital assets and infrastructure of a country, direct contribution to the Gross Domestic Product (GDP) and employment generation [9].

Despite its significance, the industry has and continues to suffer consistently from many weaknesses. There is a deep concern that the industry as a whole is under achieving [4]. The profitability and productivity levels in the construction industry are frequently acknowledged extremely poor in comparison to other industries. Studies have shown growing dissatisfaction

among clients about the performance of the construction industry [4], indicating a rise in the demand for greater efficiencies and client focus. The industry is criticised for failing to meet the demands of the modern business environment, which require the ability to be competitive in the international market and provide best value for clients. Much of the blame has been placed on the traditional procurement systems and their limitations, which prevents the industry from performing up to its full potential.

It is the general view that the traditional Design-Bid-Build procurement approach provides a measure of protection to less informed developers and other clients, who lack faith in the professionalism of their contractors [8]. Fragmentation of the industry has been identified as one of the major disadvantages of the traditional system. A large part of the low performance of the UK construction industry has been blamed on fragmented teams over the past few decades [4]. The lack of co-operation, limited trust and ineffective communications between these fragmented parties lead to adversarial relationships, which often result in project delays, difficulties in claim resolution, cost overruns, litigation and win-lose mentality among parties. The traditional procurement environments are ineffective in managing interdependencies between design, construction and supply activities [10], thus affecting the quality and buildability of the design. Lack of communication and cooperation and fear of opening up claims exclude valuable contributions from parties. Furthermore, fragmented teams result in extra transaction costs being incurred between fragmented functions [11], which have a direct impact on the value of production. The transaction costs of competitive tendering may constitute 15-20% of the total project value [12] and includes, costs of negotiation, monitoring contractual performance, enforcing contractual promises and costs associated with breaches of contractual promises etc [13].

These limitations of the traditional procurement systems, makes such systems inappropriate in dealing with the changing market conditions, adapting new technological developments and meeting rising clients' expectations. This has lead many researchers to stress the importance of shifting away from the traditional procurement culture to improve the industry performance. Emphasis on Relational Contracting practices has been one of the most significant developments in this context.

### **3. Relational contracting**

#### **3.1 Concepts of relational contracting**

The phrase "relationship contracting or RC" is intended to describe a spectrum of project delivery methods that emphasize and focus upon the relationship between parties to a construction project [14]. Relational contracts are regarded as informal agreements and codes of conduct between parties, sustained by the value of the future relationships that powerfully affect their behaviour [15]. In contrast to the traditional forms of construction contract, relational contracts are flexible in nature and provide a flexible response to information problems. It acts as a safe guarding mechanism designed to smoothen transactional friction and make provisions for "incomplete contract" in complex scenarios [16]. Relational Contracting (RC) defines the

relationship of parties, who do not always govern themselves bounded by the strict legal framework of the contracts. They provide the relationship among the project participants the same level of importance as the project itself. The prominence given to the terms of the contract is less compared to that given to the relationship between parties. Practices such as, partnering, alliancing, joint venturing etc; are based upon these RC principles. RC approaches are useful in achieving the overall project objective of reducing the total of production and transaction costs. It offers a cost effective means of encouraging mutually beneficial behaviour, overcoming most of the limitations of the traditional procurement systems.

### **3.2 Benefits of relational contracting**

A number of studies around the world have reported on the benefits of RC practices such as, partnering, alliancing etc. According to Thompson and Sanders [17], benefits achieved through partnering are in direct proportion to the risk assumed and dramatically increase as the relationship is unified and developed through the acceptance of uncertainty and a willingness to be vulnerable.

Most of the authors [17; 18; 19] have emphasised the lowering of the risk of time and cost overruns as main benefits of RC approaches, which are achieved as a result of better time and cost control over the project. Other than that, adopting RC practices is seen to provide an opportunity for innovation, especially in the development of value engineering changes and constructability improvement [19]. Evidence from the UK construction industry indicates that practices such as partnering and value management are providing a platform to develop sustainability strategies [10]. A case study on the National Museum of Australia [20], which was the first project alliance in building construction in the world, have observed significant added value to the client and many innovations resulting from the collective work of the parties to the contract. Many government organisations in UK that have adopted partnering have documented a decrease in litigation [17] owing to the framework for conflict resolution and improved communication. Furthermore, alliances are seen by smaller contractors, as an opportunity to join forces to work on large projects and to develop on the areas of work that need improvement [21].

Other than these measurable improvements, benefits of partnering (i.e. RC) include improvements in subjective areas such as worker morale as well [17]. This is achieved through the delegation of increased levels of authority in decision-making. Such authority raises the level of accountability of individuals and leads to increased commitment. A similar view is held by Lamont [22], who states that the empowerment, which is a direct result of partnering, can encourage individuals to work together more effectively.

The case studies and surveys around the world have proven and established numerous benefits of RC practices in the construction industry. The examples of such successful partnerships/alliances have encouraged a considerable number of clients and contracting organisations around the world to adopt these strategies. Partnering and alliances, which may be considered as the most widespread adaptations of RC in construction, has been well researched

in many countries. Comprehensive case studies have been done on milestone projects, such as the National Museum of Australia [20], which has successfully adapted project alliancing to achieve significant benefits to all parties. Further studies in the area [8], have identified the factors facilitating and impeding partnering in countries such as, Singapore and Hong Kong. Sri Lankan construction industry however, is still far behind in this context. According to Rameezdeen [7], the only type of practice based on RC principles adopted in Sri Lanka is joint ventures (1-3%). This has also been attributed to the involvement of international contractors. However, in future as clients' expectations continue to rise, Sri Lanka will need to follow the initiative of countries such as, UK, Australia, Singapore etc; and shift towards project delivery processes encouraging cooperation and collaboration within project teams and supply chains, such as partnering. Therefore, it is worthwhile to investigate the factors, which are facilitating and deterring the adaptation of these practices in the present Sri Lankan context.

## **4. Research Method and Approach**

### **4.1 Selection of respondents**

The implementation of RC practices requires a change of attitudes and culture in the project delivery teams. This research sought to gather the perceptions of project team members, with respect to the applicability of thirty facilitators and thirty-nine impediments to RC identified through the literature survey in the Sri Lankan context. The inherent adversarial relationships present in the traditional DBB procurement culture was expected to form a barrier, in gathering data on the facilitators and impediments to RC, preventing any truly significant conclusion from being drawn up. To overcome this problem, two separate samples were selected from projects with traditional Design-Bid-Build (DBB) type procurement arrangements and projects with Design and Build (D&B) type procurement arrangements. It was decided that selection of ten construction projects with each type of procurement arrangement was a suitable and manageable sample size for this research. Selection of these two samples also enabled to explore any significant improvements in the facilitators to RC with higher degrees of integration in the project teams. The convenient sampling technique was used with the main purpose of securing a good response rate. In addition, the nature of the data collected was such that no bias could be expected by selecting the convenient sampling technique over random sampling.

RC approaches are generally advocated for large projects, which are able to gain the most benefits from implementing these approaches. This was also considered in selecting projects for this research and therefore, projects with large project values were selected. The project values of the selected projects ranged from Rupees forty-two million to Rupees ten billion. Out of the twenty projects selected, six (i.e. thirty percent) had project values greater than Rupees 1.5 billion. Only fifteen percent of the projects had project values less than Rupees 100 million.

In each DBB project, a member of the consulting team and a member of the construction team were selected and questionnaires were distributed to them. In the projects with D&B arrangements, the same team (from a single organisation) acted as the design and the

construction team. Therefore, in this instance, a single questionnaire was given to a member of the project team.

*Table 1: Facilitators and Impediments to RC*

	<b>Facilitators to RC</b>		<b>Impediments to RC</b>
1	Senior management "championing" of the partnering (i.e. RC) process	1	Prevailing attitude of cynicism
2	Empowering decision making process at the lowest possible level	2	Rigid / preconceived attitudes about specific sectors / partners
3	Support and enthusiasm of the client	3	Lack of belief in the effectiveness of partnering
4	Client's knowledge about the project processes	4	Too narrowly focused role / job
5	Vertical intra-organisational trust	5	Restricted internal / external authority
6	Mutual trust among parties	6	Lack of understanding of RC concepts
7	Efficient communication	7	Inadequate partnering skills
8	Effective coordination of parties	8	Lack of RC experience
9	Team working spirit of all parties	9	Conflicting priorities
10	Timely responsiveness	10	Competitiveness (within sector)
11	Alignment of project objectives of parties	11	Intolerance of other sectors
12	Alignment of commercial objectives of parties	12	Incompatible organisational cultures
13	Adhering to mutual goals	13	Lack of competency to perform
14	Mutually agreed performance appraisal mechanisms	14	Poor communication
15	Mutually agreed dispute resolution mechanisms	15	Lack of top management commitment
16	Combined responsibility of parties	16	Up front time required and cost for implementing RC
17	Continuous periodic evaluation	17	Bureaucratic client organisations
18	Long-term commitment	18	Poor project planning
19	Adequate resources of parties	19	Inappropriate procurement strategies
20	Experience in RC approaches	20	Inappropriate risk allocation/sharing
21	Learning culture within project teams	21	Price only selection methods
22	Capacity for innovation	22	Ambiguous contract clauses/documents
23	Positive attitude towards continuous improvement	23	Lack of scope for innovations
24	Flexible contracts to address uncertainties	24	Lack of client's initiatives
25	Encouraging and motivating risk-reward plans	25	Lack of team working attitude
26	Inclusion of all key parties in risk-reward plan	26	Lack of trust
27	Equitable risk allocation / sharing arrangements	27	Inappropriate issue resolution mechanisms
28	Clearly defined risk allocation / sharing arrangements	28	Separate coordination and monitoring plans
29	External facilitators	29	Being conditioned in win-lose environments

30	Conducting work shops for relationship building	30	Potential legal liabilities in resolving non-contractual issues
		31	Commercial pressures of contacting parties
		32	Absence of a risk-reward plan
		33	Exclusion of consultants from the risk-reward plan
		34	Exclusion of major subcontractors from the risk-reward plan
		35	Exclusion of major suppliers from the risk-reward plan
		36	Externally determined reward system for middle management or site staff
		37	Separate / unrelated risk-reward plans for different parties
		38	Local social / political / economic climate
		39	Incompatible public sector rules and regulations

## 4.2 Profile of Respondents

All the respondents fall into the category of 'professionals'. Some held senior or middle management positions within their respective organisations. Therefore, all the respondents were actively interacting and dealing with members from other organisations working in the project team. Thus, their views on the facilitators and impediments to the development of more collaborative working relationships were developed through hands-on experience of working with other project parties. Table 2 gives the years of experience of the respondents in the construction industry. On average, respondents have worked in the industry for 14 years. Seventy-seven percent of the respondents had over six years of experience in the industry.

*Table 2: Years of Experience in the Construction Industry*

Years of Experience	Number	Percentage (%)
1-5	7	23
6-10	6	20
11-15	5	16
16-20	5	16
21-25	4	13
Over 26	3	10
Total	30	100

## 4.3 Design of the Questionnaire

The questionnaire was divided into two main sections. The first section sought general information about the respondents, while the second section sought the respondents' perceptions on the factors facilitating /impeding collaborative working between project parties in that particular project. Facilitators and impediments to RC, which were found through the literature review were analysed and factors such as, mutual objectives, external facilitators, past

experience in RC practices etc; which obviously was not applicable to the Sri Lankan context, where no RC approaches are being practiced were excluded. The remaining factors were combined and thirty-seven items were obtained. The questionnaire requested the respondents indicate their degree of agreement, on a seven-point Likert scale ranging from disagree very strongly to agree very strongly, on each of the issues considering the selected projects. Therefore, care was taken to have a roughly equal number of positively and negatively worded items, to force the respondent to consider each item carefully, thereby minimizing the effect of responses automatically set towards either agreement or disagreement. A seven-point Likert scale was chosen as appropriate for the purpose of this research as it is easy to understand and interpret by respondents and discriminates well between respondents' perceptions. Furthermore, as this questionnaire dealt with factors, which may be perceived as sensitive to the respondents, it was decided to use a neutral point on the scale to avoid forcing the respondents to one side and alienating them, thus resulting in fewer completed surveys.

As the data collected using the Likert scale were ordinal in nature, it was not possible to carry out arithmetical calculations such as, mean or standard deviation [23]. Instead, the median and the inter quartile range were used. The median was taken to represent the average response of the respondents. The Mann-Whitney *U* test, which is the nonparametric equivalent of the independent samples t-test, was used to detect any differences in the respondents' perceptions between groups. The Mann-Whitney *U* tests were designed to distinguish between the perceptions of, (1) the project team members in Design-Bid-Build and Design and Build type projects and (2) the contractors and consultants in Design-Bid-Build projects

## **5. Data analysis and discussion**

### **5.1 Factors Facilitating RC in the Sri Lankan Context**

Considering the median responses given by the respondents, thirty out of the thirty-seven factors considered could be regarded as factors facilitating the development of RC in the current Sri Lankan context. Out of these, nearly seventy-five percent of the respondents 'agreed', 'agreed strongly' or 'agreed very strongly' that there is vertical intra-organisational trust and top management commitment towards developing cooperative relationships between project parties. The results also indicated that none of the respondents disagreed to the statements that their organisations possessed good competency to perform and that there was good capacity for innovation within the project team. Similarly, there was strong agreement among respondents to the statement that there was a mutually agreed dispute resolution mechanism in the projects. With respect to above three items seventy-five percent of the respondents stated that they 'agree', 'agree strongly' or 'agree very strongly' with the statements, whereas the remaining 25% of the respondents were 'undecided' on the issue.

Factors such as, open and efficient communication between parties, effective coordination between parties, team working attitude of all parties and mutual trust among parties, which are essential in building a RC culture, all had a median of 5. This meant that on average respondents 'agreed' that these factors were present in the current project environments. These factors, along

with top management support were found to be the most important facilitators of RC in the works of Cheng and Li [24] and Kumaraswamy et al [8]. Thus, the presence of these factors to this extent in the present project environment, where polarisation of parties is expected due to past experiences of adversarial relationships, disputes etc; is an important aspect.

## **5.2 Factors Impeding RC in the Sri Lankan Context**

On average, the respondents agreed that commercial pressures on organisations prevented them from working co-operatively with other project parties. This was especially relevant to the contractors, as increased competition, as well as lowest price selections, had forced them to operate in increasingly tight margins. Thus, they are forced to compromise and choose between developing collaboration and better relationships with project parties having conflicting objectives to their own and their own objectives of profit maximisation. The result was consistent with the findings of the Construction Industry Institute of Australia (CIIA) study, where there was strong agreement among respondents that commercial pressures on organisations was a barrier to developing successful partnering relationships.

In addition to above, median responses of 'undecided' were obtained for six items, where the responses were spread in an equal manner between agreement and disagreement. For instance, the results revealed that the respondents were divided between agreement and disagreement, with respect to long-term commitment of the other project member organisations, the ability of their own organisations to work collaboratively with competitor organisations, equality between project parties, timely responsiveness to problems, joint responsibility for the project outcome and arrangements to share rewards as well as risks. Therefore, it was necessary to investigate these items further and explore if the perceptions improved with integration of teams, by comparing between DBB and D&B projects before a conclusion could be made.

## **5.3 Differences in Ratings by Consultants and Contractors in DBB Projects**

The Mann-Whitney  $U$  test was carried out using SPSS (which is a computer software for statistical calculations), to assess whether there were any significant differences between the contractors and consultants of DBB projects. The results show that thirty out of the thirty-seven factors considered had a significance level greater than 0.05. Therefore, the null hypothesis,  $H_0$  is supported for these thirty factors. The remaining seven factors had a significance level lower than 0.05. Therefore, for these factors the alternative hypothesis,  $H_1$  is accepted. This means that with regard to these seven factors, there are different perceptions in the two groups of respondents.

There were considerable differences between the opinions of the two groups with respect to four items. Seventy-five percent of the contractors were willing to allow small losses to their own organisations in expectation of end of the project mutual gains or future projects from clients. This was indicative of the long-term commitment of the contractors, which is an important facilitator to RC. However, all of the consultants were either undecided or disagreed with the

statement. All the contractors were either 'undecided' or 'disagreed' with the statement that all project parties were held jointly responsible for the outcome of the project, while none of the consultants disagreed with the statement. The contractors' responses were indicative of their frustration that the consultants were able to escape blame for problems in design and design communication. Altogether, the responses indicate that generally contractors have a more conducive attitude towards developing collaborative relationships within the project teams.

#### **5.4 Differences in Ratings by Respondents in DBB and D&B projects**

In addition, Mann-Whitney  $U$  tests were carried out to assess whether there were any significant differences between DBB and D&B project cultures. Results indicated that twenty-five out of the thirty-seven items considered have a significance level greater than 0.05. Thus, for these items the decision is to accept the null hypothesis  $H_0$  that there are no differences in opinions between the two groups of respondents. Conversely, the remaining twelve factors had a significance level lower than 0.05, leading to acceptance of the alternative hypothesis  $H_1$ .

All the items, except one, showing significant differences between the two groups indicated better facilitators to RC in D&B project cultures. There were noteworthy differences between the two groups with regard to equality between parties within the project team and timely responsiveness to problems. In DBB, projects 50% of the respondents 'disagreed', 'disagreed strongly' or 'disagreed very strongly' to the statement that there was equality between project parties. Whereas, less than 25% of the respondents from D&B projects 'disagreed' with the statement. The consultants' dominant position in the DBB project teams, especially in approving payments to contractors was significant in affecting the equality between parties in these projects. Furthermore, more than 50% of the respondents in DBB projects disagreed that there was timely responsiveness to problems arising in projects. This was interrelated to the fact that there was poor coordination in these projects. Over 50% of the respondents in DBB were undecided or disagreed (with 25% of the respondents stating they 'disagree strongly' or 'very strongly') to the fact that there was effective coordination within the project team. On the other hand, 75% of the respondents from the D&B projects stated varying degrees of agreement to the statement. Similarly, project team members from D&B projects were more supportive towards trying to reach win-win solutions to problems. This indicated that a change of adversarial attitudes was possible through better integration in the project process.

However, a surprising result was obtained for one item, where 100% of the respondents from D&B projects agreed that commercial pressures on their organisations were preventing them from working cooperatively with other project parties. On the contrary, the respondents from DBB projects gave a median response of 'disagree' to the statement, with less than 50% of the respondents stating that they agree with the statement. This may be explained by the fact that the D&B projects considered in the research had rigid lump sum contracts and the statement applied especially to the relationship between the D&B team and the client. In fact, in two of the projects considered there was expressed disagreement between the client and the D&B contractors with respect to claims for price fluctuation.

Overall, the test results revealed that the D&B projects had stronger facilitating environments to RC than DBB projects. Therefore, the hypothesis, that as relationships between project parties improve through integration of project teams, the project environment seemed more conducive to RC approaches was accepted.

## 6. Conclusions

In general, the results showed that there is a facilitating environment to Relational Contracting in the Sri Lankan construction industry. However, the factors facilitating better relationships between parties in the traditional Design-Bid-Build procurement environments are overridden by barriers to corporative working such as, adversarial climates, conflicting objectives, commercial pressures and other inherent pressures created by the traditional procurement environments. The dominant position held by the consultants in the traditional Design-Bid-Build project teams over the contractors had added on to these pressures. Commercial pressures on organisations were found to be the most prominent impediment to developing and maintaining cooperative relationships between parties.

Further, comparison of perceptions of contractors and consultants in Design-Bid-Build projects revealed that, contractors were more supportive towards the development of collaborative project environments than the consultants. This showed the frustration of the contractors towards the inferior position they are constantly given within project teams, as well as the unwillingness on the part of consultants to give up their dominant position. Mann-Whitney *U* tests between Design-Bid-Build and Design and Build project team members revealed that the factors facilitating RC were stronger in the Design and Build environments. Significant improvements were found in Design and Build projects with respect to equality between project parties, timely responsiveness to problems and the willingness of project parties to reach win-win solutions to disputes. However, a surprising finding was made with respect to one item. All the respondents from Design and Build projects agreed that commercial pressures on their organisations were preventing them from working cooperatively with other project parties, whereas, the respondents from Design-Bid-Build projects on average, disagreed with the statement. The discrepancy was attributed to the rigid lump sum contracts used in majority of the Design and Build projects, and their effect on the relationship between the client and the Design and Build team. Nevertheless, overall it could be seen that there were more or stronger facilitators to RC with increased integration in project teams. This complimented the findings of Kumaraswamy et al [11] and their statement that approaches to building a RC culture can be reinforced through measures to promote integrated teams could be held valid to the Sri Lankan context as well.

It was revealed that the research findings concurred with the findings of similar researches done in other countries. Therefore, it could be deduced that the results obtained have a high reliability. Further, these findings make all the relevant international literature on this area applicable to the Sri Lankan context as well. RC based approaches, such as, partnering and alliances are not practiced in the Sri Lankan construction industry. Therefore, the validity of the results could not be explored in a real RC culture.

Drawing from the results of this study, it is recommended that initiatives should be taken in shifting away from the traditional project delivery strategies towards RC. Measures should be taken to promote integrated teams in project delivery process. The government and other industry related institutions could initiate this movement by promoting integrated project teams and supply chains following the initiative of Construction Industry Review Committee (CIRC) of Hong Kong and Strategic Forum for Construction in UK. At the same time, awareness should be given to clients (especially clients of large scale or repetitive construction projects) on these RC practices and the potential benefits that could be obtained through their adaptation.

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