

## Development of a conceptual model of construction partnering

EDDIE W. L. CHENG & HENG LI

*Department of Building and Real Estate, The Hong Kong Polytechnic University, Hunghom, Kowloon, Hong Kong*

**Abstract** This paper presents the development of a conceptual model of construction partnering. This model aims at exploring the relationship between two types of partnering (project and strategic) by studying the factors that affect the partnering process stages. It also helps to determine the critical success factors (CSFs) of the two types of partnering. The paper commences by reviewing the literature on project and strategic partnering to develop the conceptual model. A survey was conducted to test the model. Results indicate that there are some critical factors (i.e. top management support, mutual trust, open communication, and

effective co-ordination) affecting both types of partnering, while some are specific to project (i.e. facilitator) or strategic partnering (i.e. long-term commitment, continuous improvement, learning climate, and partnering experience). Practical implications are given to advise how to facilitate the implementation of partnering. Future research directions are also given to suggest how to improve our understanding of the concept of partnering.

**Keywords** construction, critical success factor, model, partnering, project

### INTRODUCTION

Hierarchically linked parties who possess differential skills and knowledge typically constitute the various roles for a construction project. Such complex relationships of project parties may adversely affect a project's performance if not managed properly. As such, partnering has emerged as a co-operative strategy that modifies and supplements the traditional boundaries between separate companies in this modern competitive market (Crowley & Karim, 1995). Although the idea of partnering is relatively new to the construction industry when compared with other industries such as manufacturing, research into construction partnering has become ubiquitous. Consequently, many papers have been published in the mainstream construction journals (e.g. Cowan *et al.*, 1992; Loraine, 1994; Larson, 1995; Dozzi *et al.*, 1996), while several partnering reports have been compiled by well-known construction bodies in the Western countries [e.g. Construction Industry Institute (CII), 1991; Construction Industry Institute, Australia (CIIA), 1996; Construction Industry Board (CIB), 1997; Reading Construction Forum (RCF), 1998]. Moreover, books on partnering were also published in the past few years (e.g. Helland, 1995; Schultzel & Unruh, 1996). As a result of the numerous research and

practice materials on partnering that have been published, a comprehensive review and critique of the research on partnering is crucial. Li *et al.* (2000) have conducted a partnering literature review. They suggested that future research should be focused on empirical studies in the following directions:

- Identification of relevant partnering criteria and critical success factors.
- Development and test of partnering models and processes.
- Formatting and selection of partnering strategies.

Many studies have identified critical success factors (CSFs) of partnering. Partnering can be disruptive and painful if the involved parties pay little or no attention to these factors. In fact, the identification of the key success factors enables scarce resources of time, manpower and capital to be allocated properly and helps to determine the critical paths that form the prerequisite components of a partnering arrangement. Moreover, CIIA (1996), after conducting a general study of partnering, expressed that the study of CSFs is their second most important recommendation.

On the other hand, partnering can extend beyond a single project-based relationship to long-term co-operation (Cheng *et al.*, 2000). Project and strategic partnering are expected to be the two most popular

types of partnering (Barlow *et al.*, 1997). It is known that strategic partnering involves in achieving and attaining a competitive advantage, while project partnering is simply used to improve project performance (Harback *et al.*, 1994; Ellison & Miller, 1995). This implies that project and strategic partnering may have separate sets of characteristics. The study of their similarities and differences is worthwhile. Therefore, this paper is intended to develop a conceptual model of construction partnering. This model explores the relationship between the two types of partnering (project and strategic) by studying the key factors that affect their process stages. It also helps to determine the CSFs of the two types of partnering.

To achieve the above research objectives, this paper is organized to:

1. Clarify the characteristics of project and strategic partnering;
2. Identify the potential success factors for partnering;
3. Develop a conceptual model to highlight the relationships between the two types of partnering, and
4. Test the strengths of the relationship between the success factors and the two types of partnering to explore the similar and different natures between project and strategic partnering and to determine the CSFs for both types of partnering.

## DEFINITIONS OF PARTNERING

Many researchers have attempted to define partnering. An early definition is provided by Stralkowski & Billon (1988) who refer to it as a process in which two or more parties co-operate to an exceptionally high level to achieve their separate but complimentary goals and objectives. A more recently developed definition from RCF refers to it as 'a set of strategic actions which embody the mutual objectives of a number of firms achieved by co-operative decision making aimed at using feedback to continuously improve their joint performance' (RCF, 1998, p. 4). The former seems to be a definition of project partnering, while the latter is strategic partnering. Clearly, project and strategic partnering are the most common types of partnering. Project partnering is the establishment of a co-operative relationship between parties for a single project, while strategic partnering involves a long-term commitment beyond a discrete project.

As the construction industry is dominated by one-off projects, project partnering is likely to take the leading role in promoting a closer relationship in construction projects (Matthews *et al.*, 1996). This is supported by an earlier paper written by Bröchner (1990) who

predicted that there is a need for the formation of project networks. In this network, members are all information intermediaries who support a single project. Indeed this is especially true in the public sector where partnering can only be promoted at the project level because of their competitive tendering policy (Woodrich, 1993).

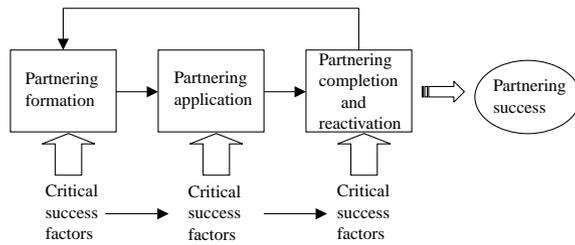
On the other hand, Agapiou *et al.* (1998) incorporated the strategic partnering concept into their logistics approach to the procurement process, which highlights the active participation of top management, long-term development of relationships between construction parties, and the establishment of confidence and dependence between parties. Ellison & Miller (1995) used the term synergy to explain such a relationship. A synergistic relationship is to seek cohesiveness of the parties who commit to modify the work practices and have a desire and willingness to experiment with new models, approaches, and means of solving problems to attain superior performance.

It is argued that a partnering process is working mainly in line with the phases of a construction project, regardless of whether it is a strategic or project-specific partnering. In practice, project partnering is an effective management tool to improve a one-off construction project by enhancing the relationship between the construction parties (Saad & Hancher, 1998). In project partnering, the partnering team establishes the common goals and objectives for all parties to achieve. In the context of a strategic partnering, it becomes a management philosophy that is expected to work continuously for each and every project and there are more expectations from team members than a project partnering. Their distinctive natures give rise to the following questions to address:

- Are there any critical factors that are common to both project and strategic partnering?
- Are there any factors that would affect more on project than on strategic partnering or vice versa?
- Can we determine similar and/or different process characteristics between project and strategic partnering?

## CONCEPTUAL MODEL OF CONSTRUCTION PARTNERING

Determination of CSFs has been attempted in other closely related areas, such as project management (e.g. Pinto & Slevin, 1987; Chua *et al.*, 1999). Belassi & Tukul (1996) further developed a conceptual model of CSFs for project performance, which helped to group the CSFs so that their effects at different phases of a



**Figure 1** A conceptual model of partnering.

project life cycle were determined and clearly explained. Therefore, this paper is intended to develop and test a conceptual model of partnering which specifies those CSFs affecting the process of construction partnering.

The conceptual model of construction partnering is shown in Fig. 1. This conceptual model uses a three-stage process – *formation*, *application*, and *completion and reactivation*, which forms the basis for considering what factors lead to the success at each stage for the two types of partnering (project and strategic). In addition, it is proposed that there should be an individual set of critical factors affecting project or strategic partnering, while some of these CSFs are likely to affect both types of partnering. As Barlow *et al.* (1997) argued, although the basics of the two types of partnering are similar, they still possess different functions and provide diversified benefits.

The three stages are in a sequential process flow from left to right, while a loop exists for another cycle of the process. This loop distinguishes a one-off relationship from a long-term co-operation. The former is project partnering while the latter is strategic partnering. This three-stage process is proposed based upon two fundamental concerns. First, the partnering process is similar to an organizational change process (Wilson *et al.*, 1995). It is common that a change process consists of three stages (i.e. unfreezing, process and re-freezing). For another cycle to occur, the re-freezing stage will unfreeze again. The adoption of a change cycle is popular in other concepts (e.g. continuous improvement, total quality management, etc.) (Love *et al.*, 2000). Secondly, there is a common premise in the area of strategic alliance (a related concept) that the process should be composed of three key stages (i.e. creation, implementation and evaluation) (Buono, 1997; Das & Teng, 1999). Incorporating these concepts, this paper proposes the stages of partnering as follows:

- *Partnering formation* refers to an agreement, implicitly or explicitly, made by all key construction parties to establish an informal relationship for the

purpose of accomplishing mutually agreed goals and objectives. During this stage, involved parties examine their current practices and identify how partnering can help them to fill in the performance gap (Wilson *et al.*, 1995). They may be required to unfreeze their mind to accept the needs for change when they appreciate the concept of partnering.

- *Partnering application* refers to the execution of the informal relationship to accomplish the mutually agreed goals and objectives in line with the construction project. At this stage, an alliance is operating to exert its influence on the construction projects (Das & Teng, 1999). It is a process to learn and experience the newly adopted concepts and practices derived from partnering.
- *Partnering completion and reactivation* (hereinafter called partnering reactivation) refers to the intention of the construction parties to re-run an informal relationship with the same group of companies for a new project after the completion of the current project. If construction parties aim at implementing partnering for a single project, measuring the success of partnering after the completion of the project may not be of parties' interests. However, if they want to form another partnering cycle, then measuring the partnering performance is crucial as it provides information indicating how to improve in order to achieve a more successful partnering establishment.

## METHODOLOGY

As an exploratory study, the first thing to do is to develop a set of success factors for testing. Published papers have identified many potential critical factors (e.g. Cook & Hancher, 1990; Moore *et al.*, 1992; Loraine, 1994; Ellison & Miller, 1995; Dozzi *et al.*, 1996; Crane *et al.*, 1997; Barlow & Jashapara, 1998; Gardiner & Simmons, 1998). After a review of the major works of the partnering literature, 14 potential factors were identified (as shown in Table 1).

The list is not exhaustive, but a shortlist of those that are well known and applicable. As Rowlinson (1988) suggested, cross-sectional study should choose factors that are well defined and studied because respondents will be able to respond easily with well-known factors. Rather than the use of multiple-item measures, single-item measures were employed in this study. Respondents were asked to rate their views on the effects of the potential factors on the three proposed process stages of partnering.

Although it is often emphasized that multiple-item scales have more details in terms of aspects or attributes, single-item measures are argued to be suited in

**Table 1** Description of 14 potential factors affecting partnering success.

Factor	Description
Adequate resources	Each involved party supplies adequate resources to share with other members in a partnering relationship, which are enough to support a successful partnering (Crowley & Karim, 1995).
Top management support	As senior management formulates the strategy and direction of business activities, their full support and commitment is vital for partnering success (Cowan <i>et al.</i> , 1992).
Partnering agreement	When some construction parties agree to establish an informal partnering, an agreement is formed. Usually, such an agreement is associated with a list of goals and objectives to be achieved by all agreed parties (Cowan <i>et al.</i> , 1992; Harback <i>et al.</i> , 1994).
Team building	Team building is the establishment of a partnering team that consists of members from all involved parties where these representatives should be key executives and possess the authority to act on behalf of their organizations (Lorraine, 1994).
Joint problem solving	Joint problem solving is a collective decision made by the partnering team to create alternatives for problematic issues, including conflicts, disputes and claims (Mohr & Spekman, 1994; Cheng <i>et al.</i> , 2000).
Facilitator	Facilitator possesses strong partnering and construction background hired for a partnering team externally to facilitate the formation of partnering (CIIA, 1996; Schultzel & Unruh, 1996).
Open communication	Open communication in partnering refers to the free flow of resources in terms of ideas, knowledge, information, skills and technology through different effective channels (Cheng <i>et al.</i> , 2000).
Effective co-ordination	Co-ordination in partnering is the perception of one party towards the expectation of other parties on it in fulfilling a set of tasks (Mohr & Spekman, 1994).
Creativity	Creativity refers to the ability to generate new ideas. In search of breakthrough opportunities to leap forward so that performance can be greatly enhanced is a creative process (Schultzel & Unruh, 1996).
Long-term commitment	Long-term commitment to partnering is the extent of the willingness of one party to maintain the current partnering relationship with other parties to weather unanticipated problems based on some positive aspects. Commitment is crucial in partnering (Woodrich, 1993).
Mutual trust	Pruitt (1981) referred to trust as the belief of both parties on each other that it is reliable in fulfilling its obligation in an exchange relationship. Lazar (2000) has studied trust for project partnering and concluded that trust can grow over time, emerge spontaneously and pre-exist.
Continuous improvement	Continuous improvement is a long-term change process (Chapman & Hyland, 1997). It is defined as an organization-wide process of focused and on-going incremental innovation (Bessant <i>et al.</i> , 1994).
Learning climate	Learning is a means to achieve competitive advantage (Love <i>et al.</i> , 2000). How to benchmark the best practices and motivate employees to learn become common strategies of organizations.
Partnering experience	In this study, experience is accumulated to become some new knowledge or skills or custom of practices that one has developed because of one's previous participation in some partnering events.

research (Scarpello & Campbell, 1983; Sackett & Larson, 1990). Several studies have judged that single-item measures are acceptable (Wanous & Reichers, 1996; Wanous *et al.*, 1997; Oshagbemi, 1999). Moreover, the use of measurable instruments of variables developed from other areas might not be suitable because of the different study contexts (Oshagbemi, 1999). In fact, a single item is particularly appropriate for exploratory research because it is usually easier to understand than a multiple-item scale (Larson, 1997; Wanous *et al.*, 1997; Hair *et al.*, 1998). As Oshagbemi (1999) supplemented, 'the choice of which (measurement) method to use would depend largely on the objectives of the research' (p. 401). In addition to the above comments on measurement methods, this

research used single-item measures because of some advantages of such measures which are as follows:

1. It is particularly useful for collecting data from respondents with different backgrounds. Items of multi-rater in such circumstances may be difficult to design and administer (Oshagbemi, 1999).
2. It can be best applied to comparative studies (Oshagbemi, 1999). For example, comparing data generated for different time span. In this paper, the effects of the factors on different process stages were examined, which was suitable to use single-item measures.
3. It is chosen when some constraints limit or prevent the use of scales (Wanous *et al.*, 1997). For example, when measuring overall changes in an attitudinal

construct, a single-item measure might be preferable to a scale. As Wanous *et al.* (1997) advised, in case of scarce resources, single rating might be more favourable as it helps to solve practical limitations, such as the time for scale development, time for completion, the cost incurred for printing, etc.

Wanous *et al.* (1997, pp. 250–251) emphasized that ‘if the use of a single item is indicated, researchers may do so in the knowledge that they can be acceptable. The use of single item measure should not be considered fatal flaws in the review process (of academic research)’. It is worth noting that multiple-item scales of attitudinal variables are not perfect because they are unable to achieve retest reliability (Schneider & Dachler, 1978). The use of single-item measures are common to be found in partnering or project management research (e.g. Weston & Gibson, 1993; Badger & Mulligan, 1995; Larson, 1995, 1997; Russell *et al.*, 1997; DeVilbiss & Leonard, 2000). However, the results of this study should be considered exploratory unless multi-raters are used to draw more meaningful causal relationships (Larson, 1997).

### Sample used

In contrast to published studies that mainly focus on cases, this paper would like to examine the views and opinions from construction professionals around the world. Considering the problems of collecting responses from overseas, the author(s) used several electronic resource databases that could be subscribed by people around the world through Internet. The use of ‘convenience’ samples is common in most organisational research (Dipboye & Flanagan, 1979). As Sackett & Larson (1990) commented, a convenience sample cannot attain representativeness that was conceived as solely achieved by a random sampling method. However, it is not true to say that in such circumstances, generalizability cannot be guaranteed. In fact, relevance and prototypicality are two criteria for generalization other than representativeness (Sackett & Larson, 1990). A convenience sample is said to be relevant when its members come from the intended target population. For constituting a prototypic sample, the key members of the target population should be chosen. In this study, professionals of the construction field were invited to take part in this research, and thus they represented a relevant and prototypic sample.

Using respondents around the world may raise the concern of cultural differences between professionals that may affect the answers of the questions. In fact,

examining cross-cultural differences is a difficult task (Bhagat *et al.*, 1990; Triandis, 1994). It is not only because of the different dimensions of culture (Glenn & Glenn, 1981; Hofstede, 1980, 1983) but also of several methodological pitfalls (Bhagat & McQuaid, 1982). The former makes it difficult to choose which dimension(s) is/are more likely to produce the variance in responses (Triandis & Albert, 1987), while the latter increases the obstacles in demonstrating a cross-cultural study (Bhagat *et al.*, 1990). It is, however, not to say that cultural issues are not worthy of pursuit, but it has been avoided in this exploratory study to reduce the difficulties for conducting this research. It is suggested that future research can be designed to study culture by developing appropriate research methodology. In order to reduce the effects of cultural issues, this paper proposes a general model of construction partnering by testing common factors and known process stages, and using single-item measures.

### Data collection

A questionnaire was purposely designed, which was divided into two parts to test the factors on project and strategic partnering. The questionnaire was sent by e-mail to academics and practitioners in the field of construction found in several resource databases. Altogether there were 34 replies, seven replies were excluded because of incomplete responses, non-target respondents, etc., resulting in 27 responses for analysis.

Twenty-seven professionals including architects, surveyors, structural engineers, civil engineers, etc., who were involved in construction projects, participated in this survey. Most of them held a bachelor degree (except one who was a diploma holder) and had some years of work experience (no respondents were younger than 25 years of age), representing a group of experienced construction professionals.

### FINDINGS AND ANALYSES

The mean scores of all factors are calculated and compared which determine their importance level on the three partnering process stages and the two types of partnering (project or strategic). The *t*-test was therefore employed. Its procedure was to compare the mean scores of two factors for a single sample (Hair *et al.*, 1998). It was used to test the null hypothesis that difference in mean scores was zero. The analyses of the factors were tied to three basic rules:

Rule 1. For a research rigor, factors with value >4.00 were considered to be critical.

Rule 2. Comparing factors between the different process stages of the same type of partnering. Difference scores are computed by subtracting the earlier stage from the later stage for the same type of partnering. Factors with significant difference scores were selected for analysis.

Rule 3. Comparing factors between the same process stage of the two types of partnering. Difference scores are computed by subtracting the project partnering from the strategic partnering for the same process stage. Factors with significant difference scores were selected for analysis.

All analyses were subject to the above three rules. Rules 1 and 2 must be satisfied before a further account of the factors could be made. Rule 3 was used to cross check the effects of the factors between project and strategic partnering. Moreover, the evaluation of the level of

satisfaction of rules 1 and 2 is subject to two further conditions as follows:

- If a factor was shown to be critical in all three stages (i.e. rule 1), then the results of the significance tests on difference scores (i.e. rule 2) were inapplicable; and this factor was deemed to be critical.
- Conversely, if a factor was not critical in all three stages, then the results of the significance tests on difference scores were not necessary to justify its criticality; and the factor was deemed to be not critical.

Table 2 shows the mean scores (and associated standard deviation), which determine the importance level of the factors on the three partnering process stages and the two types of partnering. This table provides the information supporting the evaluation based on rule 1. As shown in the table, the 14 factors were on the most

**Table 2** Mean scores of the factors.

Factor (1)	Partnering formation		Partnering application		Partnering reactivation	
	PP Mean (SD) (2)	SP Mean (SD) (3)	PP Mean (SD) (4)	SP Mean (SD) (5)	PP Mean (SD) (6)	SP Mean (SD) (7)
Adequate resources	3.41 (1.01)	3.37 (1.08)	<b>4.30</b> (0.91)	<b>4.37</b> (1.04)	3.56 (1.09)	3.63 (1.08)
Top management support	<b>4.26</b> (0.86)	<b>4.56</b> (0.58)	<b>4.52</b> (0.70)	<b>4.44</b> (0.75)	<b>4.30</b> (0.67)	<b>4.59</b> (0.57)
Partnering agreement	<b>4.07</b> (1.04)	<b>4.26</b> (0.90)	3.37 (1.08)	3.22 (1.19)	2.96 (1.06)	3.30 (1.03)
Team building	<b>4.33</b> (0.78)	<b>4.41</b> (0.80)	<b>4.00</b> (0.96)	3.89 (0.97)	3.70 (0.95)	<b>4.00</b> (0.83)
Open communication	<b>4.52</b> (0.75)	<b>4.67</b> (0.68)	<b>4.70</b> (0.67)	<b>4.52</b> (0.70)	3.96 (0.76)	<b>4.19</b> (0.88)
Effective co-ordination	<b>4.56</b> (0.64)	<b>4.67</b> (0.55)	<b>4.67</b> (0.62)	<b>4.52</b> (0.75)	<b>4.04</b> (0.81)	<b>4.15</b> (0.86)
Creativity	3.52 (0.85)	3.70 (0.87)	3.70 (1.03)	3.56 (0.80)	3.11 (1.22)	3.30 (1.03)
Joint problem solving	3.93 (0.83)	3.93 (0.83)	<b>4.67</b> (0.48)	<b>4.52</b> (0.75)	3.63 (1.21)	3.70 (1.03)
Long-term commitment	3.11 (1.25)	<b>4.70</b> (0.47)	2.85 (1.20)	<b>4.26</b> (0.71)	3.44 (1.01)	<b>4.59</b> (0.57)
Continuous improvement	3.48 (0.89)	<b>4.37</b> (0.69)	3.19 (1.14)	3.96 (0.65)	3.30 (0.91)	<b>4.19</b> (0.79)
Mutual trust	<b>4.70</b> (0.47)	<b>4.78</b> (0.42)	<b>4.78</b> (0.42)	<b>4.70</b> (0.61)	<b>4.26</b> (0.66)	<b>4.56</b> (0.58)
Learning climate	3.44 (0.85)	<b>4.04</b> (0.94)	3.30 (0.95)	<b>4.04</b> (1.06)	3.33 (0.73)	<b>4.04</b> (0.94)
Partnering experience	3.33 (1.00)	3.93 (1.14)	3.07 (1.04)	3.81 (1.08)	3.33 (1.07)	3.89 (1.15)
Facilitator	<b>4.04</b> (1.02)	3.85 (0.99)	3.37 (1.08)	3.04 (1.06)	2.70 (1.17)	2.67 (1.18)

Notes:  $N = 27$ ; PP = project partnering; SP = strategic partnering; SD = standard deviation; Scores are in bold when  $>4.00$ .

left-hand side. The top row shows the three process stages; under each of them, there are two columns where one lists the mean scores of each factor for project partnering and the other lists the mean scores for strategic partnering.

Table 3 lists the results from *t*-test. This table compared the mean scores of different stages of the two types of partnering. Under each process stage, there are three columns (difference scores, *T*-statistic, and probability level). 'Ho' is the null hypothesis, which states that there is no difference between the mean scores of the two types of partnering. To achieve a research rigour, the significance level was set to  $P < 0.01$ . Analysis of the findings is shown in Tables 4 and 5. The former is for project partnering and the latter for strategic partnering.

Table 4 lists the analysis based on rules 1 and 2 for project partnering. The *italic* cells indicate that the

factors had successfully passed rules 1 and 2, and supported for entering into discussions. Table 5 shows the same analysis but for strategic partnering. These results are elaborated in more details in later paragraphs.

Table 6 compares the mean scores between project and strategic partnering at each of the three process stages, and the *t*-test was also employed. This provides information for assessment based on rule 3. This helps to identify the factors that are more important to either type of partnering. In this table, long-term commitment, continuous improvement, learning climate and partnering experience were all critical to strategic partnering. This implies that these four factors are long-term factors. One interesting point is that top management support was significantly more important in strategic than project partnering. This may be explained by the fact that supporting a long-term

**Table 3** Comparison between partnering process stages.

Factor (1)	Project partnering			Strategic partnering		
	Diff (2)	Ho: Diff = 0		Diff (5)	Ho: Diff = 0	
		<i>T</i> (3)	<i>P</i> (4)		<i>T</i> (6)	<i>P</i> (7)
<i>Formation to application stage</i>						
Adequate resources	0.89*	5.18	0.00	1.00*	4.68	0.00
Top management support	0.26	1.27	0.21	-0.11	-0.62	0.54
Partnering agreement	-0.70*	-2.70	0.01	-1.04*	-3.46	0.00
Team building	-0.33	-1.61	0.12	-0.52	-2.33	0.03
Open communication	0.19	1.55	0.13	-0.15	-1.07	0.29
Effective co-ordination	0.11	1.00	0.33	-0.15	-1.07	0.29
Creativity	0.19	0.96	0.35	-0.15	-1.07	0.29
Joint problem solving	0.74*	5.04	0.00	0.59*	3.31	0.00
Long-term commitment	-0.26	-1.66	0.11	-0.44*	-3.31	0.00
Continuous improvement	-0.30	-2.30	0.03	-0.41*	-3.70	0.00
Mutual trust	0.07	0.81	0.42	-0.07	-1.00	0.33
Learning climate	-0.15	-1.00	0.33	0.00	0.00	1.00
Partnering experience	-0.26	-1.43	0.17	-0.11	-0.62	0.54
Facilitator	-0.67*	-3.61	0.00	-0.81*	-3.94	0.00
<i>Application to reactivation stage</i>						
Adequate resources	-0.74*	-3.31	0.00	-0.74	-3.06	0.01
Top management support	-0.22	-1.36	0.18	0.15	0.85	0.40
Partnering agreement	-0.41*	-2.66	0.01	-0.22	-0.40	0.69
Team building	-0.30	-1.35	0.19	0.11	0.46	0.65
Open communication	-0.74*	-4.73	0.00	-0.33	-1.88	0.07
Effective co-ordination	-0.63*	-4.13	0.00	-0.37	-2.43	0.02
Creativity	-0.59*	-2.75	0.01	-0.26	-1.27	0.21
Joint problem solving	-1.04*	-4.40	0.00	-0.81*	-3.41	0.00
Long-term commitment	0.59*	2.84	0.01	0.33	2.08	0.05
Continuous improvement	0.11	0.62	0.54	0.22	1.24	0.23
Mutual trust	-0.52*	-3.58	0.00	-0.15	-1.00	0.33
Learning climate	0.04	0.23	0.82	0.00	0.00	1.00
Partnering experience	0.26	1.19	0.24	0.07	0.44	0.66
Facilitator	-0.67*	-4.42	0.00	-0.37	-2.18	0.04

\*  $P < 0.01$ ; Diff = Difference in mean scores; *T* = *T*-statistic; Ho = Difference in mean scores is zero.

**Table 4** Analysis for project partnering.

Factor (1)	Rule 1: critical? (2)	Rule 2: comparison (only significant differences presented) (3)
<i>Adequate resources</i>	<i>Stage 2</i>	Increased from stage 1 to 2 and decreased from stage 2 to 3
<i>Top management support</i>	<i>All stages</i>	No significant difference
<i>Partnering agreement</i>	<i>Stage 1</i>	Decreased from stage 1 to 2
<i>Team building</i>	<i>Stages 1 and 2</i>	No significant difference
<i>Open communication</i>	<i>All stages*</i>	Decreased from stage 2 to 3
<i>Effective co-ordination</i>	<i>All stages</i>	Decreased from stage 2 to 3
<i>Creativity</i>	None	Decreased from stage 2 to 3
<i>Joint problem solving</i>	<i>Stage 2</i>	Increased from stage 1 to 2 and decreased from stage 2 to 3
<i>Long-term commitment</i>	None	Increased from stage 2 to 3
<i>Continuous Improvement</i>	None	Decreased from stage 1 to 2
<i>Mutual trust</i>	<i>All stages</i>	Decreased from stage 2 to 3
<i>Learning climate</i>	None	No significant difference
<i>Partnering experience</i>	None	No significant difference
<i>Facilitator</i>	<i>Stage 1</i>	Decreased from stage 1 to 2 and decreased from stage 2 to 3

\* Open communication is marginally critical at reactivation stage (mean = 3.96).

Italic cells indicate that the factors had successfully passed rules 1 and 2.

**Table 5** Analysis for strategic partnering.

Factor (1)	Rule 1: critical? (2)	Rule 2: comparison (only significant differences presented) (3)
<i>Adequate resources</i>	<i>Stage 2</i>	Increased from stage 1–2 and decreased from stage 2–3
<i>Top management support</i>	<i>All stages</i>	No significant difference
<i>Partnering agreement</i>	<i>Stage 1</i>	Decreased from stage 1–2
<i>Team building</i>	<i>Stage 1 and 3</i>	No significant difference
<i>Open communication</i>	<i>All stages</i>	Decreased from stage 2–3
<i>Effective co-ordination</i>	<i>All stages</i>	Decreased from stage 2–3
<i>Creativity</i>	None	Decreased from stage 2–3
<i>Joint problem solving</i>	<i>Stage 2</i>	Increased from stage 1–2 & decreased from stage 2–3
<i>Long-term commitment</i>	<i>All stages</i>	Increased from stage 2–3
<i>Continuous improvement</i>	<i>All stages*</i>	Decreased from stage 1–2
<i>Mutual trust</i>	<i>All stages</i>	Decreased from stage 2–3
<i>Learning climate</i>	<i>All stages</i>	No significant difference
<i>Partnering experience</i>	None	No significant difference
<i>Facilitator</i>	None	Decreased from stage 1–2 and decreased from stage 2–3

\* Continuous improvement is marginally critical at reactivation stage (mean = 3.96).

Italic cells indicate that the factors had successfully passed rule 1 and 2.

partnering is a strategic decision that has to be made by the top management. Without top management support to a long-term partnering, it will not be successful.

In summary, the analyses indicate that:

- Top management support, open communication, effective co-ordination and mutual trust were all critical at all the three process stages of both project and strategic partnering.
- Partnering agreement and facilitator were critical at partnering formation stage of project partnering, while partnering agreement is critical at the formation stage of strategic partnering.
- Adequate resources and joint problem solving were critical at the stage of partnering application of both types of partnering.
- Team building was critical at partnering formation stage of both types of partnering, while it was critical at the application stage of project partnering and the reactivation stage of strategic partnering.
- As opposed to project partnering, long-term commitment, continuous improvement and learning climate were critical in all three stages of strategic partnering. Although partnering experience failed in the tests for rules 1 and 2, it was supported to be a long-term factor (test as shown in Table 6). Thus, it is included as a critical factor. As stated, these four factors were shown to be critical in strategic, but not project, partnering.
- In general, the effects of other factors in project partnering are about the same as in strategic part-

**Table 6** Comparison between project and strategic partnering.

Factor (1)	Diff (2)	Partnering formation Ho:Proj = Stra		Diff (5)	Partnering application Ho:Proj = Stra		Diff (8)	Partnering reactivation Ho:Proj = Stra	
		T (3)	P (4)		T (6)	P (7)		T (9)	P (10)
Adequate resources	-0.04	-0.27	0.79	0.07	0.53	0.60	0.07	0.44	0.66
Top management support	0.30	2.30	0.03	-0.07	-0.70	0.49	0.30*	2.84	0.01
Partnering agreement	0.19	1.10	0.28	-0.15	-0.81	0.42	0.33	1.56	0.13
Team building	0.07	0.47	0.65	-0.11	-1.14	0.26	0.30	2.30	0.03
Open communication	0.15	1.28	0.21	-0.19	-1.73	0.10	0.22	1.80	0.08
Effective co-ordination	0.11	0.90	0.38	-0.15	-1.44	0.16	0.11	1.14	0.26
Creativity	0.19	0.78	0.45	-0.15	-0.72	0.48	0.19	0.93	0.36
Joint problem solving	0.00	0.00	1.00	-0.15	-0.94	0.36	0.07	0.42	0.68
Long-term commitment	1.59*	6.47	0.00	1.41*	5.35	0.00	1.15*	5.43	0.00
Continuous improvement	0.89*	5.77	0.00	0.78*	4.53	0.00	0.89*	4.74	0.00
Mutual trust	0.07	1.00	0.33	0.07	-0.57	0.57	0.30	2.13	0.04
Learning climate	0.59*	2.94	0.01	0.74*	2.99	0.01	0.70*	3.12	0.00
Partnering experience	0.59*	2.84	0.01	0.74*	3.22	0.00	0.56 <sup>†</sup>	2.43	0.02
Facilitator	-0.19	-0.87	0.39	-0.33	-2.21	0.04	-0.04	0.27	0.79

\*  $P < 0.01$ ; Diff = difference in mean scores;  $T = T$ -statistic.

Ho: Mean scores of factors in project partnering = those in strategic partnering.

<sup>†</sup> Partnering experience is marginally significant at reactivation stage ( $P < 0.02$ ).

nering. All differences in mean scores were not significant.

## PRACTICAL IMPLICATIONS

The analyses in the previous section give rise to the suggestions for improving a partnering establishment. The following lists the major practical implications for implementing partnering:

1. In project partnering, the three process stages are formation, application and completion. Each stage is an independent subprocess and forms the basis for the succeeding stage. For a long-term co-operative (i.e. strategic) partnering, the completion stage of a project is the foundation for reactivating another partnering process. Thus, the three stages for strategic partnering are formation, application and reactivation.
2. For the formation of partnering, expression of support by the top management is important because it provides adequate resources, such as manpower, time and finance, to form the partnering team. So, although adequate resources are not perceived to be critical, they are still necessary as they are associated with some key ingredients for the formation of partnering. For example, they involve in the arrangement of representatives and employees' attending meetings and workshops. With respect to project partnering, a facilitator is crucial to be hired to form the partnering team and charter (or agree-

ment). A charter specifies the partnering goals to be achieved by the involved parties. Specifically, the facilitator has a 'mission', that is to organize meetings and workshops for inducing open and free communication between partnering team members. Improved communication can help to reduce parties' discrepancies, resulting in establishing trust between them. With sufficient mutual trust, a team is then formed. Further workshops are organized to improve mutual understanding and expectation (i.e. to accomplish effective co-ordination). Having achieved effective co-ordination, the partnering team can establish a partnering charter. With respect to strategic partnering, a similar process is initiated, except that a facilitator may not be required. It is because the involved parties have the experience to deal with partnering formation. They have the ingredient to form a partnering team and the charter. Just in case they face severe discordance among parties, an independent facilitator is hired to act as the mediator.

3. At the stage of partnering application, both project and strategic partnering have similar process. First, the top management is still influential by supplying adequate resources in terms of information, knowledge, manpower, time, etc. Partnering team members continue to maintain mutual trust. Workshops are still organized for open communication in order to achieve effective co-ordination for duties that are basically assigned to attain the mutually agreed partnering goals. If problems are encountered, they

can be solved by joint problem solving tools (e.g. CIB, 1997). Problems are being solved persistently until the partnering goals are achieved.

4. When a project partnering is concluded (usually come to an end when the construction project is completed), the partnering team will be dissolved. In contrast, a strategic partnering possesses a longer time span with the possibility to be renewed for several projects or more. Nevertheless, a partnering relationship cannot be reactivated unless the top management of the involved parties has such an intention. This can only be achieved if there are long-term commitment, continuous improvement, partnering experience and learning climate. Moreover, partnering is reactivated when such common CSFs (i.e. mutual trust, open communication and effective co-ordination) are also present.

## FUTURE RESEARCH DIRECTIONS

As this study used a small sample to test the proposed conceptual model, the results are argued to be exploratory. However, without the feasibility of a statistical testing on causal relationships, a more generalized relationship map (or model) of the factors with the partnering process stages cannot be established. So, a larger sample is needed to ascertain any causal relationships to boost partnering arrangement. Under such circumstances, it is recommended to develop multi-item measure (or scale) of variables. More rigorous statistical analysis can then be employed to test the reliability and validity of the hypothesized relationships.

Future research can be built on a more detailed model that specifies not only the relationships between independent and dependent variables but also the relationships between independent variables. For example, it is worthy of pursuit whether open communication is closely related to effective co-ordination. In this study, their relationship is assumed but has not been tested.

Moreover, it is implied that a longitudinal study of partnering may be more appropriate in both quantitative and qualitative study. For example, the measures of the level of commitment or trust before the formation of partnering and after the completion of partnering disclose the relationships of these attributes with partnering success.

Finally, cultural issues are worthy of pursuit. Nowadays, more and more construction projects are bided successfully by overseas companies. Partnering team usually consists of local and overseas construction parties where cultural differences may exist in the

partnering team, which may in turn hinder the process of partnering. As stated previously, a suitable research plan should be designed for cultural study, including carefully developed scales that are used to measure the tested variables.

## CONCLUSIONS

This paper aims at developing a conceptual model that explores the relationship between two types of partnering (project and strategic) by examining the key factors that affect the partnering process stages. It also helps to determine the CSFs of the two types of partnering. A survey was conducted to test the conceptual model. Results indicate that there are four critical factors (i.e. top management support, mutual trust, open communication and effective co-ordination) affecting both types of partnering, while some are specific to project (i.e. facilitator) or strategic partnering (i.e. long-term commitment, continuous improvement, learning climate and partnering experience). Practical implications and future research directions are also given.

## REFERENCES

- Agapiou, A., Flanagan, R., Norman, G. & Notman, D. (1998) The changing role of builders merchants in the construction supply chain. *Construction Management and Economics*, **16**, 351–361.
- Badger, W.W. & Mulligan, D.E. (1995) Rationale and benefits associated with international alliances. *Journal of Construction Engineering and Management*, *ASCE*, **121**, 100–111.
- Barlow, J. & Jashapara, A. (1998) Organisational learning and inter-firm 'partnering' in the UK construction industry. *Learning Organisation*, **5**, 86–98.
- Barlow, J., Cohen, M., Jashapara, A. & Simpson, Y. (1997). *Towards Positive Partnering: Revealing the Realities for the Construction Industry*. The Policy Press, University of Bristol, Bristol.
- Belassi, W. & Tukel, O.I. (1996) A new framework for determining critical success/failure factors in projects. *International Journal of Project Management*, **14**, 141–151.
- Bessant, J., Caffyn, S., Gilbert, J., Harding, R. & Webb, S. (1994) Rediscovering continuous improvement. *Technovation*, **14**, 17–29.
- Bhagat, R.S. & McQuaid, S.J. (1982) Role of subjective culture in organizations: a review and directions for future research. *Journal of Applied Psychology*, **67**, 653–685.
- Bhagat, R.S., Kedia, B.L., Crawford, S.E. & Kaplan, M.R. (1990) Cross-cultural issues in organizational psychology: emergent trends and directions for research in the 1990s. In: *International Review of Industrial and Organizational Psychology*, Vol. 5 (eds C.L. Cooper & I.T. Robertson) pp. 59–99. John Wiley & Sons Ltd, Chichester.
- Bröchner, J. (1990) Impacts of information technology on the structure of construction. *Construction Management and Economics*, **8**, 205–218.

- Buono, A.F. (1997) Reengineering partnerships: process intervention in strategic alliances. *S.A.M. Advanced Management Journal*, **62**, 21–27.
- Chapman, R.L. & Hyland, P.W. (1997) Continuous improvement strategies across selected Australian manufacturing sectors. *Benchmarking for Quality Management and Technology*, **4**, 175–188.
- Cheng, E.W.L., Li, H. & Love, P.E.D. (2000) Establishment of critical success factors for construction partnering. *Journal of Management in Engineering, ASCE*, **16**, 84–92.
- Chua, D.K.H., Kog, Y.C. & Loh, P.K. (1999) Critical success factors for different project objectives. *Journal of Construction Engineering and Management, ASCE*, **125**, 142–150.
- Construction Industry Board (CIB) (1997) *Partnering in the Team*. A Report by Working Group 12 of the Construction Industry Board. Thomas Telford, London.
- Construction Industry Institute (CII) (1991) In search of partnering excellence. Publisher no. 17–1, Report. Bureau of Engineering Research, University of Texas, Construction Industry Inst., Austin, TX.
- Construction Industry Institute, Australia (CIIA) (1996) *Partnering – Models for Success*. University of Technology, Sydney, NSW.
- Cook, E.L. & Hancher, D.E. (1990) Partnering: contracting for the future. *Journal of Management in Engineering, ASCE*, **6**, 431–446.
- Cowan, C., Gray, C. & Larson, E. (1992) Project partnering. *Project Management Journal*, **22**, 5–11.
- Crane, T.G., Felder, J.P., Thompson, P.J., Thompson, M.G. & Sanders, S.R. (1997) Partnering process model. *Journal of Management in Engineering, ASCE*, **13**, 57–63.
- Crowley, L.G. & Karim, M.A. (1995) Conceptual model of partnering. *Journal of Management in Engineering, ASCE*, **11**, 33–39.
- Das, T.K. & Teng, B. (1999) Managing risks in strategic alliances. *Academy of Management Executive*, **13**, 50–62.
- DeVilbiss, C.E. & Leonard, P. (2000) Partnering is the foundation of a learning organization. *Journal of Management in Engineering, ASCE*, **16**, 47–57.
- Dipboye, R.L. & Flanagan, M.F. (1979) Research settings in industrial and organizational psychology: are findings in the field more generalizable than in the laboratory? *American Psychologist*, **34**, 141–150.
- Dozzi, P., Hartman, F., Tidsbury, N. & Ashrafi, R. (1996) More-stable owner-contractor relationships. *Journal of Construction Engineering and Management, ASCE*, **122**, 30–35.
- Ellison, S.D. & Miller, D.W. (1995) Beyond ADR: working toward synergistic strategic partnership. *Journal of Management in Engineering, ASCE*, **11**, 44–54.
- Gardiner, P.D. & Simmons, J.E.L. (1998) Conflict in small- and medium-sized projects: case of partnering to the rescue. *Journal of Management in Engineering, ASCE*, **14**, 35–40.
- Glenn, E.S. & Glenn, C.G. (1981) *Man and Mankind*. Ablex Publishing Co., Norwood, NJ.
- Hair, J.F., Anderson, R.E., Tatham, R.L. & Black, W.C. (1998) *Multivariate Data Analysis*, 5th edn. Prentice Hall, Englewood Cliffs, NJ.
- Harback, H.F., Basham, D.L. & Buhts, R.E. (1994) Partnering paradigm. *Journal of Management in Engineering, ASCE*, **10**, 23–27.
- Helland, R.B. (1995) *Project Partnering – Principle and Practice*. Thomas Telford, London.
- Hofstede, G. (1980) *Culture's Consequences: International Differences in Work Related Values*. Sage Publications, Beverly Hills.
- Hofstede, G. (1983) The cultural relativity of organizational practices and theories. *Journal of International Business Studies*, **14**, 75–89.
- Larson, E. (1995) Project partnering: results of study of 280 construction projects. *Journal of Management in Engineering, ASCE*, **11**, 30–35.
- Larson, E. (1997) Partnering on construction projects: a study of the relationship between partnering activities and project success. *IEEE Transactions on Engineering Management*, **44**, 188–195.
- Lazar, F.D. (2000) Project partnering: improving the likelihood of win/win outcomes. *Journal of Management in Engineering, ASCE*, **16**, 71–83.
- Li, H., Cheng, E.W.L. & Love, P.E.D. (2000) Partnering research in construction. *Engineering, Construction and Architectural Management*, **7**, 76–92.
- Loraine, R.K. (1994) Project specific partnering. *Engineering, Construction and Architectural Management*, **1**, 5–16.
- Love, P.E.D., Li, H., Irani, Z. & Holt, G.D. (2000) Re-thinking TQM: toward a framework for facilitating learning and change in construction organizations. *TQM Magazine*, **12**, 107–116.
- Matthews, J., Tyler, A. & Thorpe, A. (1996) Pre-construction project partnering: developing the process. *Engineering, Construction and Architectural Management*, **3**, 117–131.
- Mohr, J. & Spekman, R. (1994) Characteristics of partnership success: partnership attributes, communication behavior, and conflict resolution techniques. *Strategic Management Journal*, **15**, 135–152.
- Moore, C., Mosley, D. & Slagle, M. (1992) Partnering: guidelines for win-win project management. *Project Management Journal*, **22**, 18–21.
- Oshagbemi, T. (1999) Overall job satisfaction: how good are single versus multiple-item measures? *Journal of Managerial Psychology*, **14**, 388–403.
- Pinto, J.K. & Slevin, D.P. (1987) Critical factors in successful project implementation. *IEEE Transactions on Engineering Management*, **34**, 22–27.
- Pruitt, D.G. (1981) *Negotiation Behavior*. Academic Press, New York.
- Reading Construction Forum (RCF) (1998) *The Seven Pillars of Partnering: A Guide to Second Generation Partnering*. Thomas Telford, London.
- Rowlinson, S.M. (1988) *An analysis of factors affecting project performance in industrial building*. Unpublished PhD Thesis, Brunel University, Wetherby, UK.
- Russell, J.S., Jaselskis, E.J. & Lawrence, S.P. (1997) Continuous assessment of project performance. *Journal of Construction Engineering and Management, ASCE*, **123**, 64–71.
- Saad, I.M.H. & Hancher, D.E. (1998) Multimedia for construction project management: project navigator. *Journal of Construction Engineering and Management, ASCE*, **124**, 82–89.
- Sackett, P.R. & Larson, J.R. Jr (1990) Research strategies and tactics in industrial and organizational psychology. In: *Handbook of Industrial and Organizational Psychology*, Vol. 4 (eds M.D. Dunnette & L.M. Hough), 2nd edn, Vol.

- 1, pp. 419–489. Consulting Psychologists Press, Inc., Palo Alto, CA.
- Scarpello, V. & Campbell, J.P. (1983) Job satisfaction: are the parts there? *Personnel Psychology*, **36**, 577–600.
- Schneider, B. & Dachler, H.P. (1978) A note on the stability of the job descriptive index. *Journal of Applied Psychology*, **63**, 650–653.
- Schultzel, H.J. & Unruh, V.P. (1996) *Successful Partnering: Fundamentals for Project Owners and Contractors*. John Wiley & Sons, Inc., New York.
- Stralkowski, C.M. & Billon, S.A. (1988) Partnering: a strategic approach to productivity improvement. *National Productivity Review*, **7**, 145–151.
- Triandis, H.C. (1994) Cross-cultural industrial and organizational psychology. In: *Handbook of Industrial and Organizational Psychology*, Vol. 4 (eds H.C. Triandis, M.D. Dunnette & L.M. Hough), 2nd edn, pp. 103–172. Consulting Psychologists Press, Inc., Palo Alto, CA.
- Triandis, H.C. & Albert, R.D. (1987) Cross-cultural perspectives. In: *Handbook of Organizational Communication* (eds J.M. Fredric, P.L. Linda, R.H. Karlene & P.W. Lyman). Sage, Beverly Hills.
- Wanous, J.P. & Reichers, A.E. (1996) Estimating the reliability of a single-item measure. *Psychological Reports*, **78**, 631–634.
- Wanous, J.P., Reichers, A.E. & Hudy, M.J. (1997) Overall job satisfaction: how good are single-item measures? *Journal of Applied Psychology*, **82**, 247–252.
- Weston, D.C. & Gibson, G.E. (1993) Partnering-project performance in US Army Corps of Engineers. *Journal of Management in Engineering, ASCE*, **9**, 410–425.
- Wilson, R.A., Songer, A.D. & Diekmann, J. (1995) Partnering: more than a workshop, a catalyst for change. *Journal of Management in Engineering, ASCE*, **11**, 40–45.
- Woodrich, A.M. (1993) Partnering: providing effective project control. *Journal of Management in Engineering, ASCE*, **9**, 136–141.