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Structural equation modelling of organizational justice and cooperative behaviour in the construction project claims process: contractors' perspectives

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A cooperative attitude is essential for successful teamwork in construction. The levels of conflict and dispute on construction projects are conceptualized as forms of cooperative/uncooperative attitude. A theoretical model demonstrates how conflict intensity, contractors' dispute tendencies and six identified constructs of organizational justice interact with and relate to each other. The model is tested using a structural equation modelling technique with partial least-squares estimation. It uses survey data obtained from 41 contractors regarding their project experience. The results suggest that perceptions about organizational justice either promote or hinder cooperative behaviour in the construction project delivery process. Organizational justice, or at least people's perceptions of it, influenced 38% of conflict intensity levels, and altered 46% of contractors' tendencies to dispute. Perceptions about the quantum of claims approved (favourability of the outcome and the perceived fairness of the outcome) influenced the levels of conflict and dispute. However, the way people are treated (quality of treatment) and the way claims are administered (quality of decision-making) have the largest impact on the model developed. Cooperative behaviour can be promoted on projects by managing construction claims in a proactive manner and by proper implementation of the claims mechanism.

Keywords: Claims, cooperation, conflict, organizational justice, structural equation model.

Introduction

Collaboration and cooperation are important to ensure the success of a construction project (Phua, 1994; Hassan, 1995). This is obvious, yet collaboration is all too rare in the construction industry and thus continues to be a major area of concern (Rooke *et al.*, 2003).

Drawing upon social exchange and organization theories and, in particular, the concept of organizational justice a conceptual model is developed for explaining and understanding cooperative behaviour in construction. By exploring conflict and dispute in project claims processes as forms of cooperative attitude, the model specifies the relationship between six constructs of organizational justice, and conflict and dispute levels. The thesis is that if organizational justice is enhanced in project processes, a cooperative attitude may be promoted, which may reduce contracting inefficiencies. In a procurement process, interactions between parties determine the quality of relationships. Thus it is reasonable to assume that the perceptions of the parties about their interactions could ultimately have an impact on their ability to resolve differences and disputes. For example, if parties perceive interactions as hostile, they will be more inclined to dispute. Organizational justice is a useful framework for evaluating people's perceptions about the processes and outcomes of decision-making. However, it is not clear if perceptions about processes are more important than perceptions about the outcome of processes in construction. It is also not clear what is the impact of those perceptions on cooperative attitude. We seek to

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clarify that. This should assist in devising ways of managing projects to promote a cooperative attitude.

Organizational justice perspective is important because it brings construction closer to mainstream organization theory, as suggested by Bresnen (1990). Thus we propose a model for investigating the intricacies of construction projects as a social setting (Cicmil and Marshall, 2005). The model is tested on real projects, to provide insights into the fundamental concerns influencing cooperative attitude in construction.

Explaining cooperative behaviour: a review of the literature

In the mainstream social psychology literature, as well as management and organizational studies, attempts have been made to understand and explain cooperative behaviour from economic and quasi-economic, social-legal and political, transaction cost economics (TCE) and organizational justice perspectives.

In an economic analysis of settlement and litigation decisions, Bebchuck (1984) posited that a party to a dispute would consider the costs and benefit of pursuing a claim when deciding whether to reject or accept a settlement offer by the other party. Similarly, Priest and Klein (1984) argued that the determinant of a decision to settle or litigate a dispute is based solely on 'economics', including the expected costs to parties of favourable or adverse decisions. Thus from an economic perspective, people are considered rational because they will engage in cooperative/uncooperative behaviour depending on the anticipated potential costs. Other authors have taken a quasi-economic view. This view, according to Harris *et al.* (1984) and Black (1987), is that social cost would make people less likely to engage in a dispute against family and friends than against people with whom they have more distant relationships. Both economic and quasi-economic views are based on the assumption that people seek to maximize material, psychological or social gain in an exchange relationship. This is relevant to construction where, prior to pursuit of a dispute resolution process, parties are likely to consider not only the cost of the dispute, but also business relationships and future business opportunities with the client or other clients. Thus both economic and social costs are important aspects that could influence cooperative attitude.

Williamson (1975, 1979) proposes the concept of transaction cost economics (TCE) to explain a contracting problem. TCE takes the view that incomplete contracting at the planning phase sets the stage for performance problems during the execution of the contract. When contingencies occur which are not fully, or only ambiguously, covered by the contract provisions, one or both of the parties to the transaction may behave opportunistically by taking actions that increase the transaction cost. Opportunistic behaviour includes lying, stealing and cheating, thereby leading to conflict and dispute between the parties. TCE implies that a transaction should be organized to minimize transaction costs. TCE relies on the use of formal governance structure, for example alternative procurement methods and contract provisions, to facilitate cooperative attitude. While applying the TCE concept, Yates and Hardcastle (2003) propose that conflict arises as a result of the incompleteness of construction contracts, caused by bounded rationality of parties and uncertainties at the outset of project development, thereby setting the stage for opportunistic behaviour during the construction stage. Thus the way a contract mechanism is designed could impact on the parties' propensity to engage in conflict.

From sociological and political perspectives Kritzer *et al.* (1991) and Felstiner (1975) distinguish three stages of claiming behaviour: naming, blaming and claiming. At the 'naming' stage, a party considers an event or behaviour of the other party as an injury or wrong; followed by 'blaming' the other party or organization for causing the wrong; and thereafter 'claiming' compensation, either through a legal or administrative forum (Felstiner *et al.*, 1981) or through written exchange with the other party. In the transition between perceived injuries (naming), blaming and claiming, a party may abandon the claim or make an offer to settle (Lind, 1997). From a sociological and political viewpoint, providing an ongoing process for discussing complaints and claims may reduce the potential for disputes.

While the other perspectives of cooperative behaviour have received attention in the construction management literature, organizational justice perspectives have received little or no attention. According to organizational justice researchers, it is the perception of injustice that shifts people from cooperative, accepting modes of interaction, to competitive, self-interested modes (Greenberg, 1990). They posit that when they believe an institution (or person) is fair and makes just decisions, people view that institution (or person) as having positive organizational justice. According to Tyler (1989) people appear to care about fairness and apply it as a yardstick in their evaluation and response (attitude) to any decision-making: interpersonal, inter-organizational or between organizations and individuals. As Lind (2001) further argues, in any transaction, people's perception of organizational justice provides them with a heuristic framework for interpreting, making decisions and responding to both current and future exchanges. Thus, people use their perceptions as a guide to regulate their behaviour, in order to match the level of

justice/injustice perceived. In the early 1960s, behavioural psychologist John Stacey Adams asserted that when people perceive a lack of organizational justice, they engage in counter-behaviour targeted at restoring justice (Adams, 1965). Counter-behaviour could be an exaggerated claim of entitlement in a project or an adversarial culture among the project team (Abrahamson, 1984). Thus Adams' propositions are relevant to construction; an understanding of how organizational justice can impact on cooperative attitude could provide an insight into how contractors' perceptions can be managed and how uncooperative behaviour can be minimized.

TCE, economic, quasi-economic, sociological and political perspectives have been criticized because they rely on formal mechanisms, incentives and sanctions to motivate cooperation. In the construction literature, studies using these approaches provide little or no information for designing procurement and contract mechanisms that can facilitate cooperation. Organizational justice studies, however, seek to understand the perceptions of parties that form the basis for uncooperative attitude, so that those perceptions can be taken into account when designing and implementing decision-making processes. However the problem with organizational justice is that people's perceptions may not always be correct. Nevertheless, it can be argued that people's perceptions, whether correct or incorrect, are important for understanding their attitude, and ultimately their behaviour.

There is little or no research in the construction literature applying the concept of organizational justice to explain cooperative attitude. This study seeks to fill the gap.

Research question

Tyler and Bladder (2000) defined cooperation as whether people act to promote the goals or to harm the interests of their group. We conceptualize cooperative attitude as the extent to which people engage in conflict on a project (conflict intensity) as well as people's potential to engage in formal dispute (potential to dispute). From a theoretical review, we assume that organizational justice is a determinant of attitude/behaviour. We therefore investigate the impact of organizational justice on conflict and dispute in the process of administering a contractor's claims. The main research question is: 'To what extent does organizational justice account for conflict and dispute behaviour exhibited by contractors during the administration of claims on building and civil engineering projects?' Drawing upon the literature on organizational justice, particularly the work of Tyler and Bladder (2000) and past research in the construction field, six main constructs of organizational justice were identified as follows:

(1) Outcome favourability
(2) Decision outcome fairness (distributive justice)
(3) Procedural fairness
(4) Quality of treatment—interactional justice
(5) Control
(6) Quality of decision-making process

A conceptual model of the relationship between organizational justice, conflict and dispute is proposed (Figure 1). Each path of the model represents a hypothesis relationship between a pair of constructs. The following section describes the conceptual underpinnings of the model.

Conceptual model of organizational justice, conflict and dispute

Conflict and dispute

Pondy (1967) defined conflict as a dynamic process consisting of latent, perceived, affective or felt, and manifest stages. Latent conflict refers to potential causes of conflict, such as bad communication; perceived conflict is the actual awareness or perception of being in conflict; affective conflict is characterized by stress, tension and hostility; while manifest conflict is the activity of conflict, such as written or oral exchanges between two or more parties expressing disagreements. Thus, we define dispute as a manifest conflict. Conflict in construction may include dissatisfaction and serious disagreement about a contractor's claims, or a contract administrator's decisions on the claims. Following Kumaraswamy (1998) a dispute arises when a claim or assertion made by one party is rejected by another party, and the rejection is not accepted. Thus a dispute would arise from a conflict process (Fenn *et al.*, 1997).

Bercovitch and Langley (1993) believe intensity is an important characteristic of conflict. According to Kressel and Pruitt (1989) conflict may be characterized by its severity. Thus we assume that conflict intensity (CI) may determine a contractor's potential to dispute (PDISPU). Thus, Hypothesis 1 (see path in Figure 1) is set as follows:

H1: Conflict intensity (CI) would have a positive effect on a contractor's potential to dispute (PDISPU).

Outcome favourability, decision outcome fairness, procedural fairness and cooperative behaviour

Blau (1964) postulates that the greater the perceived outcome favourability (OFAVOUR) and decision

outcome fairness (DOFAIR) of their group's decision-making, which may be material or social/psychological, the more likely people will reciprocate in the form of cooperation. Greenberg (1982) added that people's perceptions, and thus their behaviour, would be influenced by the level of OFAVOUR from a decision-making process in terms of wins and losses; whereas the primary determinant of DOFAIR is the match or mismatch between what outcomes should have been and what the actual outcome was, in a particular situation. Thus unfavourable and unfair decision outcomes can both directly influence CI and PDISPU. In addition, Thibaut and Walker (1975), in a psychological analysis of procedural justice, posit that organizational justice is often substantially determined by other factors besides wins or losses and that it can be influenced by the level of procedural fairness applied to processes (PFAIR). In a study, Lind *et al.* (1993) suggest that a global impression of procedural fairness determines behaviour/attitude. When put together, these previous studies suggest that people react to what happens (OFAVOUR and DOFAIR) and how it happens (PFAIR).

Accordingly, the following hypotheses (paths in Figure 1) are set out:

- H2: Perceived procedural fairness (PFAIR) has a negative effect on the conflict intensity (CI).
- H3: Perceived procedural fairness (PFAIR) has a negative effect on a contractor's potential to dispute (PDISPU).
- H4: Outcome favourability (OFAVOUR) has a positive effect on perceived procedural fairness (PFAIR).
- H5: Outcome favourability (OFAVOUR) has a negative effect on potential to dispute (PDISPU).
- H6: Outcome favourability (OFAVOUR) has a negative effect on conflict intensity (CI).
- H7: Perceived decision outcome fairness (DOFAIR) has a positive effect on perceived procedural fairness (PFAIR).
- H8: Perceived decision outcome fairness (DOFAIR) has a negative effect on a contractor's potential to dispute (PDISPU).
- H9: Perceived decision outcome fairness (DOFAIR) has a negative effect on conflict intensity (CI).

Quality of the decision-making process, quality of treatment, procedural fairness and cooperative behaviour

The quality of the decision-making process (QDPROCESS) refers to the manner in which decisions are made or reached: those aspects (formal or informal) which improve the nature, quality and fairness of the decision-making process—for example, the 'neutrality and independence' of the decision-maker. In their study Tyler and Bladder (2000) found that QDPROCESS strongly influenced employees' willingness to accept an organization's decisions.

QDPROCESS is relevant to construction because projects can be complex. More often than not there is a conflict of interest among parties, so it is logical that the actual QDPROCESS would be an important determinant of cooperative attitude. CI and PDISPU can likely be influenced by people's perceptions across a number of aspects of QDPROCESS: the neutrality, impartiality, independence and professional expertise of the contract administrator; the efforts made towards accurate decision-making; the timeliness of assessments and decisions on claims; and whether contract clauses are applied consistently and correctly when deciding claims.

Tyler and Bladder (2000) identified the quality of treatment (QTREAT) people experienced in their group as a factor that would affect their perception of fairness and consequently their attitude in that group. QTREAT is embedded in the group value and relational model of procedural justice (Tyler, 1989), which suggests that people are primarily concerned about their long-term relationships and relational aspects of organizational processes and procedures. This is empirically supported by Mikula *et al.* (1990) where a considerable proportion of the injustices reported by the respondents refers to the manner in which they were treated by others. Feelings of fair treatment have been found to lead to positive evaluation of a group (Brewer and Kramer, 1986), acceptance of organizational decision-making (Turner *et al.*, 1987) and, ultimately, collaborative behaviour.

The construction procurement process is typically based on social interaction by people from different parties. Hence, the actual treatment of people would determine cooperative behaviour at the project level.

It stands to reason that, the more a contractor believes in the QDPROCESS, the more they will also believe the process is fair (PFAIR). Similarly, higher levels of perceived QDPROCESS will likely result in less CI and PDISPU; and, if people believe they are well treated (QTREAT), they will be more inclined to believe the PFAIR. This in turn, would make them less likely to elevate CI or engage in dispute. Thus, the following hypotheses (paths in Figure 1) are set out:

- H10: Perceived quality of decision-making process (QDPROCESS) has a positive effect on perceived procedural fairness (PFAIR).
- H11: Perceived quality of decision-making process (QDPROCESS) has a negative effect on a contractor's potential to dispute (PDISPU).
- H12: Perceived quality of decision-making process (QDPROCESS) has a negative effect on conflict intensity (CI).

H13: Perceived quality of treatment experienced (QTREAT) has a positive effect on perceived procedural fairness (PFAIR).
H14: Perceived quality of treatment experienced (QTREAT) has a negative effect on potential to dispute (PDISPU).
H15: Perceived quality of treatment experienced (QTREAT) has a negative effect on conflict intensity (CI).

Interrelationships among constructs of organizational justice

Hauenstein *et al.* (2001) suggest the constructs of organizational justice tend to correlate. For instance, in practice, parties to a construction contract should have no direct control over the decisions of a contract administrator on construction claims, since he or she is required, under law, to be fair and unbiased when assessing claims. However, any pre-contract negotiation and agreement between the parties regarding the rules for decision-making gives the parties some indirect control. Parties may enter into a pre-contract agreement on the methodology for analysing and calculating claims, method for project-scheduling and the content of the schedule, and rules of evidence for claims. A pre-contract agreement potentially reduces subjectivity and ambiguity in the assessment of claims during the construction phase (Aibinu, 2009). Such indirect control (CTROL) could improve how the OFAVOUR and QDPROCESS are perceived, as well as the DOFAIR. Accordingly, the following hypotheses (paths on Figure 1) are set out:

H16: Perceived control (CTROL) has a positive effect on outcome favourability (OFAVOUR).
H17: Perceived control (CTROL) has a positive effect on perceived decision outcome fairness (DOFAIR).
H18: Perceived control (CTROL) has a positive effect on perceived quality of decision-making process (QDPROCESS).

Similarly, Cropanzano *et al.* (2001) suggested that DOFAIR, PFAIR and QTREAT elements may affect one another. For instance, a decision-making authority characterized by interactional fairness (high quality of treatment) might also be seen as making a fair decision (DOFAIR). Similarly, it is likely that perceived DOFAIR may be influenced by the belief that authorities are implementing high QDPROCESS. Further, favourable outcomes may lead to higher levels of perceived fairness. Based on these assumptions, it is further hypothesized as follows:

H19: Perceived outcome favourability (OFAVOUR) has a positive effect on perceived decision outcome fairness (DOFAIR).
H20: Perceived quality of decision-making process (QDPROCESS) has a positive effect on perceived decision outcome fairness (DOFAIR).

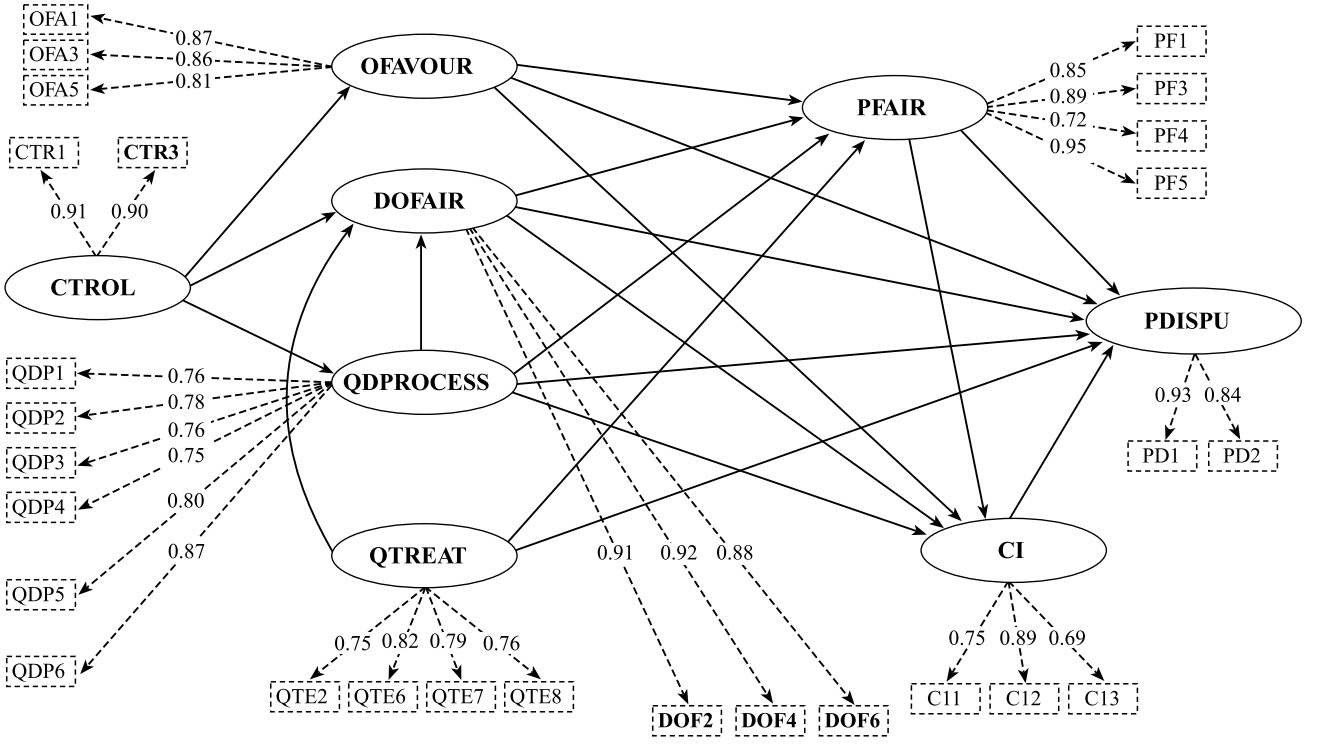

Figure 1 Conceptual model including the measurements of constructs (see Table 1 for description of indicators)

H21: Perceived quality of treatment experienced (QTREAT) has a positive effect on perceived quality of decision-making process (QDPROCESS).
H22: Perceived quality of treatment experienced (QTREAT) has a positive effect on perceived decision outcome fairness (DOFAIR).

Figure 1 represents the hierarchical structural relationship between the constructs of organizational justice and the two forms of cooperative behaviour examined (CI and PDISPU). The hypothesized latent constructs of organizational justice, conflict intensity and potential to dispute are in oval boxes. The model also shows the observable indicators (in rectangular boxes) measuring each construct. Table 1 presents a description of the indicators used.

Most of the indicators were measured with relevant response options, as shown in Table 1.

Table 1 Indicators/measurement items of constructs

Construct	Item	Description	Response options	Source
Outcome favourability (OFAVOUR)	OFA1	Actual percentage of cost claims allowed	Percentage (7 categories in ascending order)	Based on Kumaraswamy (1997); Kumaraswamy and Yogeswaran (2003)
	OFA3	Perceived level of favourability of cost claims allowed	Very unfavourable (1) Very favourable (7)	Tyler and Bladder (2000); Tyler and Schuller (1990)
	OFA5	Extent of satisfaction with losses and wins on cost claims	Very dissatisfied (1) Very satisfied (7)	Discussion with practitioners
Decision outcome fairness (DOFAIR)	DOF2	Cost claims allowed relative to what was expected	Much worse than expected (1) About what was expected (4) Much better than expected (7)	Folger and Konovsky (1989); Tyler and Bladder (2000)
	DOF4	Cost claims allowed compared with what contractor perceived it deserved	Much less than deserved (1) As much as deserved (7)	Ditto
	DOF6	Perceived fairness of cost claims allowed	Not fair at all (1) Very fair (7)	Ditto
Quality of treatment experienced (QTREAT)	QTE2	Frequency with which contractor was provided with explanations and reasons for decision made on claims	Rarely (1) Always (7)	Tyler and Bladder (2000); exploratory review of litigated cases; discussion with practitioners
	QTE6	Whether respect and concern was shown for the contractor's contractual rights	Strongly disagree (1) Strongly agree (7)	Tyler and Bladder (2000)
	QTE7	Frequency with which claims were tabled for discussion at site meetings	Rarely (1) Always (7)	Tyler and Bladder (2000); Lind *et al.* (1993)
	QTE8	Whether employer's project management follow through agreements during claims negotiation	Strongly disagree (1) Strongly agree (7)	Tyler and Bladder (2000); exploratory review of litigated cases
Control (CTROL)	CTR1	Extent of pre-agreement and clarity on methodology for calculating and quantifying claims	Not at all (1) To a great extent (7)	Exploratory review of litigated cases; discussion with practitioners
	CTR3	Extent of pre-agreement and clarity on rules of evidence for claims	Not at all (1) To a great extent (7)	Ditto
Quality of decision-making process (QDPROCESS)	QDP1	Whether decisions made on EoT claims were based upon facts, and not personal biases of the contract administrator	Strongly disagree (1) Strongly agree (7)	Tyler and Bladder (2000)
	QDP2	Whether decisions made on cost claims were based upon facts, and not personal biases of the contract administrator	Strongly disagree (1) Strongly agree (7)	Tyler and Bladder (2000)

Table 1 (*Continued*)

Construct	Item	Description	Response options	Source
	QDP3	Whether claims were decided without favouritism	Strongly disagree (1) Strongly agree (7)	Tyler and Bladder (2000)
	QDP4	Whether claims certifier showed consistency in applying contract clauses when assessing and deciding claims	Strongly disagree (1) Strongly agree (7)	Tyler and Bladder (2000)
	QDP5	Perceived level of claims certifier's expertise in diagnosing and assessing claims	Very low level (1) Very high level (7)	Exploratory review of litigated cases; Tyler and Degoey (1996)
	QDP6	Perceived level of claims certifier's expertise in deciding claims	Very low level (1) Very high level (7)	Ditto
Procedural fairness (PFAIR)	PF1	Perceived level of fairness of the procedure for handling claims (overall)	Not fair at all (1) Very fair (7)	Tyler and Bladder (2000); Lind *et al.* (1983)
	PF3	Overall satisfaction with procedure for assessing and deciding cost claims	Very dissatisfied (1) Very satisfied (7)	Tyler and Bladder (2000)
	PF4	Perceived extent to which claims certifier tried hard to be fair	Not at all (1) Tried very hard (7)	Tyler and Bladder (2000)
	PF5	Perceived extent to which claims were decided fairly	Not fair at all (1) Very fairly (7)	Tyler and Bladder (2000)
Conflict intensity (CI)	CI1	Frequency of disagreement with the handling of claims	Never (1) Very often (7)	Diekman *et al.* (1994); exploratory review of litigated cases
	CI2	Severity of disagreement with the handling of claims	Not severe (1) Very severe (7)	Ditto
	CI3	Perceived extent to which the disagreement influenced working relationship	Not much (1) A lot (7)	Ditto
Potential for dispute (PDISPU)	PD1	Extent to which decisions on claims would have been rejected	Not at all (1) To a great extent (7)	Tyler and Bladder (2000)
	PD2	Extent to which claims would have been disputed beyond onsite claims process	Not at all (1) To a great extent (7)	Tyler and Bladder (2000); Tyler and Schuller (1990)

Research method

Data collection and sample

A quantitative research method was adopted to test the conceptual model. The constructs of the model were operationalized into measurable indicators (see Table 1).

The indicators were developed in the form of statements in a questionnaire, which draw upon scales previously used by researchers in other contexts, but are modified to reflect the context of this study.

Depending on the nature of the question, respondents were asked to indicate their answers on a seven-point Likert scale. The respondents were employees of randomly selected general building and civil engineering construction firms registered with the Singapore Building and Construction Authority (BCA). These firms are big contractors authorized to bid for projects above S$30 million (US$20 million). Respondents completed the questionnaire based on their experience with claims on a project in which they had been involved.

Response rate and characteristics of the sample

Of the 200 contractors contacted, 41 responded, representing a response rate of 20.5%. Thirty-two per cent were foreign construction firms operating in Singapore, while 68% were local firms. Of the

individuals who responded to the survey, 40 are from China and one is German. Also, 41.5% (17) are contract managers, another 41.5% (17) are quantity surveyors while 17% (7) are either project managers or site managers. Seventy per cent of them have over 11 years' experience in construction while 66% had been involved in over 11 projects. Around 63% of the projects upon which responses were based are building projects; 37% were civil engineering projects; 51% were public; and 49 % were private sector projects. While public projects were based on the Public Sector Standard Conditions of Contract (PSSCOC), private projects used the Singapore Institute of Architects Standard Conditions of Contract (SIA). The average project value was S$97.8 million. About 60% of the projects commenced between 2000 and 2004 and all were completed between 2000 and 2005. Because the projects were awarded and completed within the same timeframe, it means they were procured under relatively similar market conditions, making them comparable for this analysis.

Reducing the problems with self-report data

In a perception and attitude survey, the data may be biased by *consistency motif*—where respondents can have the urge to maintain a consistent line in a series of answers, or at least what they regard as a consistent line (Podsakoff and Organ, 1986). They may also be influenced by their moods and may introduce artificial bias in their responses. Also, there may be problems with *common method variance* (Campbell and Fiske, 1959), since for each project the response is from a single respondent.

Following Podsakoff and Organ (1986), we used the scale-reordering method to reduce the problem of *consistency motif*. In the design of the questionnaire, items relating to the dependent constructs (CI and PDISPU) were placed after those relating to the independent constructs (PFAIR, DOFAIR, CTROL, OFAVOUR, QDPROCESS and QTREAT). Harman's one-factor test was used to assess the presence of *common method variance* (Schriesheim, 1979) prior to data analysis. To do this, the data were entered into the statistical software program SPSS version 13.0, and principal component factor analysis was conducted with the six constructs of organizational justice. The result of the unrotated factor solution showed more than one factor can be extracted. According to Schriesheim's (1979) criteria, no one general factor accounts for the majority of covariance in the measurement items. Hence, it is understood that *common method variance* was not a problem.

Data analysis

Testing the conceptual model

The research model was tested using a structural equation technique with a partial least-squares estimation approach (PLS-SEM). In PLS-SEM, parameters for both the links between measures and constructs, i.e. loadings (measurement model), and the links between different constructs, i.e. path coefficients (structural model), are estimated at the same time (Hulland, 1999).

In PLS it is assumed, for estimation purposes, that the latent variables (constructs) are specified as a linear combination of their respective indicators and, for convenience, that all indicators are standardized i.e. mean of zero and variance of one (Chin, 1998; Hulland, 1999). PLS uses a component-based approach, similar to principal components factor analysis (Compeau *et al.*, 1999).

A PLS-SEM model is usually analysed and interpreted sequentially in two stages: (1) the assessment of the reliability and validity of the measurement model, i.e. relationship between each construct and the items measuring them; followed by (2) the assessment of the structural model, i.e. relationship among the constructs (Hulland, 1999). The sequence ensures that reliability and validity of measures of constructs are ascertained before attempting to draw conclusions about the nature of the relationships between constructs.

Why PLS-SEM?

PLS does not presume any distributional form of measured variables (Chin, 1998). PLS is distribution free, hence suitable for data from non-normal or unknown distributions (Falk and Miller, 1992). Most of the measurement items (see Table 1) are perception-based, measured on a Likert scale. They are of unknown distribution, and, since normality cannot be demonstrated, PLS was preferable to covariance-based SEM (as implemented in LISREL or AMOS). PLS estimates the model parameters using the original sample. Statistical validation of the estimated model in PLS is done by the resampling method, to determine the confidence interval of the model parameters.

Resampling is a method of validating models by using random subsets of data (Chin, 1998) such as bootstrapping. Bootstrapping is a robust alternative to statistical inference based on parametric assumptions (such as normality) when those assumptions are in doubt (Mooney and Duval, 1993). Hence, PLS is also suitable where the sample size is not large (Fornell and Bookstein, 1982). Lohmoller (1982) presents examples where a model with 96 indicators and 26 constructs was appropriately estimated with 100 data cases.

PLS is primarily intended for predictive analysis in situations of model complexity but less strict statistical assumptions (Wold, 1982). Thus PLS-SEM is better suited for explaining complex relationships with large numbers of indicators (Fornell and Bookstein, 1982), where research is relatively new or changing and where theoretical models are not well formed (Jöreskog and Wold, 1982). The research model developed in Figure 1 is based on the study of organizational justice which is an established but changing concept Cropanzano *et al.* (2001). It is new in the context of construction.

Results of measurement model

In the first step of PLS data analysis the following were assessed: reliability of the questionnaire items, convergent validity of the measures associated with individual constructs (Cook and Campbell, 1979), and discriminant validity (Campbell and Fisk, 1959) of the research instruments (Gefen and Straub, 2000).

Individual item reliability

To evaluate individual item reliability, the standardized loadings (or simple correlation) were assessed using PLS-Graph 3.0 software. A conservative value of 0.70 was used as the minimum loading for items (Hulland, 1999). Nevertheless, prior to removal, the potential practical significance of items with loadings lower than 0.70 was carefully evaluated. The removal of these items was done in an iterative process; they were removed in sequence after each run. Table 1 and Figure 1 (the links between the indicators and the constructs) show the items used in the model testing and their loadings. All items have loadings above 0.70, hence it is understood they demonstrate a satisfactory level of individual item reliability.

Convergent validity

Convergent validity is the measure of the internal consistency which, according to Hulland (1999), ensures that the items assumed to measure a particular construct actually measure it and not another construct. Composite reliability scores (ρ_c), Cronbach's alpha and average variance extracted (AVE) tests were used to determine the convergent validity of measured constructs (Fornell and Larker, 1981). Using SPSS software, the calculated Cronbach's alpha values, as shown in Table 2, are all above the 0.7 threshold suggested by Litwin (1995), except one which is 0.682. Churchill (1979) and Chin (1998) suggest that a Cronbach's alpha value of 0.6 is acceptable. The results confirm internal consistency.

Composite reliability score was also examined since it is superior to Cronbach's alpha measure of internal consistency, as it uses the item loadings obtained within the theoretical model (Fornell and Larker, 1981). The composite reliabilities generated as part of PLS-Graph 3.0 output are shown in Table 2. Using the 0.7 threshold suggested by Nunnally (1978), all the constructs demonstrate an acceptable level of convergent validity. Hence the measurement items are appropriate for their respective constructs. Further, AVE (Fornell and Larker, 1981) was also used to assess the internal consistency of the constructs. It measures the amount of variance that a construct captures from its indicators relative to the amount due to measurement errors. The AVEs generated by PLS-Graph 3.0 (Table 2) show that at least 50% of measurement variance is captured by all constructs.

Discriminant validity of constructs

After assessing the individual item reliability and convergent validity of the measurement model, the discriminant validity of the measurement was then evaluated using:

(1) analysis of cross-loadings (Chin, 1998);
(2) analysis of the average variance extracted (Fornell and Larker, 1981).

Discriminant validity indicates the extent to which a given construct is different from other constructs (Hulland, 1999). Analysis of cross-loadings was conducted by standardizing the scores of the questionnaire items (measurement items), and generating the latent construct scores (in the form of regression scores) using PLS-Graph 3.0 software and SPSS 13.0 respectively. After all the standardized items and latent construct scores were entered into SPSS 13.0, Pearson's correlation coefficients for all the standardized items against the latent construct scores were computed. The result (Table 3) shows that all items loaded higher on the construct they were theoretically specified to measure, when compared to other constructs in the model. This demonstrates discriminant validity of the constructs.

Discriminant validity was further confirmed by using the following criteria: a construct should share more variance with its measures than it shares with other constructs in the model (Fornell and Larker, 1981). Thus, the AVE of the constructs should be greater than the variance shared between the construct and other constructs (that is, the squared correlation between two constructs). This implies that more variance is shared between the construct and its indicators than with constructs representing different sets of indicators. The rule that the square root of the AVE of each construct should be larger than the correlation of two constructs (Chin, 1998; Staples *et al.*, 1999) was applied. To

Table 2 Composite reliabilities (ρ_c) scores and Cronbach's alpha of constructs

Construct	Item	Composite reliability (from PLS-Graph 3.0)	Cronbach's alpha (from SPSS output)	Average variance extracted (AVE) (from PLS-Graph 3.0)
Outcome favourability (OFAVOUR)	OFA1	0.883	0.819	0.716
	OFA3			
	OFA5			
Decision outcome fairness (DOFAIR)	DOF2	0.932	0.890	0.820
	DOF4			
	DOF6			
Quality of treatment experienced (QTREAT)	QTE2	0.862	0.786	0.609
	QTE6			
	QTE7			
	QTE8			
Control (CTROL)	CTR1	0.901	0.781	0.820
	CTR3			
Quality of decision-making process (QDPROCESS)	QDP1	0.907	0.878	0.620
	QDP2			
	QDP3			
	QDP4			
	QDP5			
	QDP6			
Procedural fairness (PFAIR)	PF1	0.915	0.874	0.731
	PF3			
	PF4			
	PF5			
Conflict intensity (CI)	CI1	0.825	0.682	0.614
	CI2			
	CI3			
Potential to dispute (PDISPU)	PD1	0.880	0.740	0.791
	PD2			

demonstrate this rule, in the correlation matrix for the constructs, the diagonal of the matrix is the square root of the AVE. For adequate discriminant validity, the diagonal elements need to be greater than the off-diagonal elements in the corresponding rows and columns (Hulland, 1999). Table 4 presents the correlation matrix for the constructs. There was no correlation between any two latent constructs larger than, or even equal to, the square root of the AVEs of these two constructs. Hence the test suggests that all constructs are different from each other.

Overall, the assessment of the measurement model shows that the constructs are within acceptable levels of error and is sufficiently robust to test the relationship between constructs (the structural model).

Explanatory power of the structural model

Unlike covariance-based SEM (as implemented by LISREL and AMOS software) where there is a single goodness of fit metric for the entire model, in the second stage of PLS-SEM the structural model is assessed by looking at its explanatory power and the path coefficients (Chin, 1998) (test of the hypothesized paths). Figure 2 shows the parameters of the structural model estimated by PLS-Graph 3.0 software. The explanatory power of the model is the amount of variance in the endogenous (independent) constructs—especially conflict intensity and potential to dispute, which can be explained by the model. PLS-Graph 3.0 provided the squared multiple correlations (R^2) for each endogenous construct. The R^2 computed by PLS-Graph 3.0 is similar to the traditional regression (Chin, 1998). According to Breiman and Friedman (1985), the criterion R^2 or variances explained is critical in evaluating a structural model.

Next, an examination of the significance of the R^2 value for all endogenous constructs in the model was conducted using the F-test (Falk and Miller, 1992) as follows:

$$F = R^2 / m / (1 - R^2) / (N - m - 1)$$

Table 3 Analysis of cross-loading

	OFAVOUR	DOFAIR	QTREAT	CTROL	QDPROCESS	PFAIR	CI	PDISPU
OFA1	**0.851**	0.464	0.331	0.278	0.394	0.462	–0.076	0.194
OFA3	**0.850**	0.466	0.336	0.280	0.397	0.460	–0.074	0.193
OFA5	**0.824**	0.703	0.737	0.370	0.587	0.702	–0.333	0.588
DOF2	0.642	**0.916**	0.681	0.179	0.544	0.693	–0.301	0.607
DOF4	0.588	**0.927**	0.700	0.260	0.530	0.653	–0.253	0.514
DOF6	0.644	**0.872**	0.704	0.280	0.784	0.765	–0.367	0.444
QTE2	0.427	0.668	**0.768**	0.250	0.479	0.572	–0.295	0.516
QTE6	0.583	0.615	**0.821**	0.628	0.686	0.653	–0.281	0.425
QTE7	0.508	0.575	**0.784**	0.349	0.593	0.545	–0.399	0.512
QTE8	0.446	0.535	**0.747**	0.437	0.581	0.621	–0.500	0.369
CTR1	0.350	0.215	0.465	**0.919**	0.335	0.343	–0.234	0.441
CTR3	0.349	0.266	0.506	**0.892**	0.292	0.333	–0.156	0.173
QDP1	0.407	0.511	0.548	0.228	**0.758**	0.567	–0.229	0.379
QDP2	0.553	0.764	0.788	0.390	**0.848**	0.806	–0.513	0.602
QDP3	0.290	0.345	0.387	0.127	**0.763**	0.623	–0.472	0.165
QDP4	0.474	0.470	0.452	0.142	**0.757**	0.509	–0.292	0.387
QDP5	0.444	0.477	0.627	0.336	**0.795**	0.642	–0.410	0.214
QDP6	0.514	0.534	0.604	0.325	**0.868**	0.707	–0.441	0.185
PF1	0.500	0.592	0.584	0.277	0.666	**0.847**	–0.530	0.427
PF3	0.647	0.814	0.794	0.359	0.730	**0.879**	–0.447	0.581
PF4	0.514	0.403	0.484	0.375	0.628	**0.730**	–0.409	0.189
PF5	0.678	0.794	0.724	0.285	0.821	**0.950**	–0.503	0.496
CI1	–0.180	–0.218	–0.285	–0.173	–0.444	–0.376	**0.743**	–0.176
CI2	–0.202	–0.264	–0.437	–0.233	–0.422	–0.505	**0.885**	–0.349
CI3	–0.173	–0.301	–0.352	–0.106	–0.350	–0.396	**0.706**	–0.479
PD1	0.556	0.646	0.639	0.367	0.456	0.555	–0.364	**0.935**
PD2	0.182	0.320	0.346	0.228	0.287	0.304	–0.472	**0.836**

where N is the total number of the sample size, m is the numbers of predictors of the construct and F is distributed as a distribution with m and $(N - m - 1)$ degrees of freedom. The results are summarized in Table 5. The R^2 values for all endogenous constructs are significant ($p \leq 0.05$) meaning the explanatory power of the model developed is statistically significant.

In Figure 2, the mean R^2 for the six endogenous constructs in the model is 0.51. This indicates about 51% of the variance in endogenous variables can be accounted for by the structural model (Falk and Miller, 1992). Thus the model is relevant for understanding the relationship between perception of fairness, CI and PDISPU; all the constructs used have a place in the model. More importantly, the model can account for 38% of the changes in CI conflict intensity and 46% of the changes in PDISPU.

Table 4 Comparisons of correlations between latent constructs and square root of AVE

	AVE	OFAVOUR	DOFAIR	QTREAT	CTROL	QDPROCESS	PFAIR	CI	PDISPU
OFAVOUR	0.716	**0.846**							
DOFAIR	0.820	0.686	**0.905**						
QTREAT	0.609	0.620	0.767	**0.780**					
CTROL	0.820	0.383	0.267	0.539	**0.905**				
QDPROCESS	0.620	0.577	0.688	0.751	0.346	**0.787**			
PFAIR	0.731	0.682	0.785	0.769	0.371	0.835	**0.855**		
CI	0.614	–0.231	–0.339	–0.471	–0.217	–0.512	–0.551	**0.783**	
PDISPU	0.791	–0.464	–0.593	–0.593	–0.339	–0.442	–0.523	0.451	**0.889**

Notes: The highlighted diagonal values are the square root of AVE of each construct. Off diagonal elements are the correlations between constructs.

Table 5 Results of F-test for significance of R^2

Endogenous (dependent) construct	R^2	F	Significance Level
OFAVOUR	0.147	6.721	0.05
DOFAIR	0.705	21.508	0.000
QDPROCESS	0.569	25.084	0.000
PFAIR	0.799	35.776	0.000
CI	0.381	4.309	0.01
PDISPU	0.464	4.506	0.000
Average R^2	**0.51**		

Test of research hypotheses

The paths of the model were tested by looking at the sign, size and statistical significance of the path coefficients between the constructs. The higher the path coefficient, the stronger the association between the independent (exogenous) and the dependent (endogenous) construct of a path.

The significance of the hypothesized relationships was determined by testing the significance of the *t* value associated with each path using the bootstrap function of the PLS-Graph 3.0 with 500 resamples. Table 6 shows the summary of the path results (also see Figure 2), the corresponding *t* values, and the estimated *p* value associated with each *t* value. For all the hypotheses, a one-tail *t* test was used. The results (Table 6) show that 8 out of 22 sub-hypotheses were fully supported. Two were marginally supported (p = 0.057, H1; and p = 0.057, H8).

Discussion and implications of the findings

Procedural fairness

From Figure 2, four dimensions of organizational justice explained about 80% of changes in PFAIR. Out of the four, the paths of three were significant. The perceived QDPROCESS had the largest and the most significant effect on PFAIR (H10). The two outcome-based dimensions of fairness—OFAVOUR (H4) and DOFAIR (H7) followed. DOFAIR was a stronger predictive influence on PFAIR than OFAVOUR. This suggests that evaluations of fairness in administering claims procedures depend not only on whether a favourable outcome is obtained, but on whether the

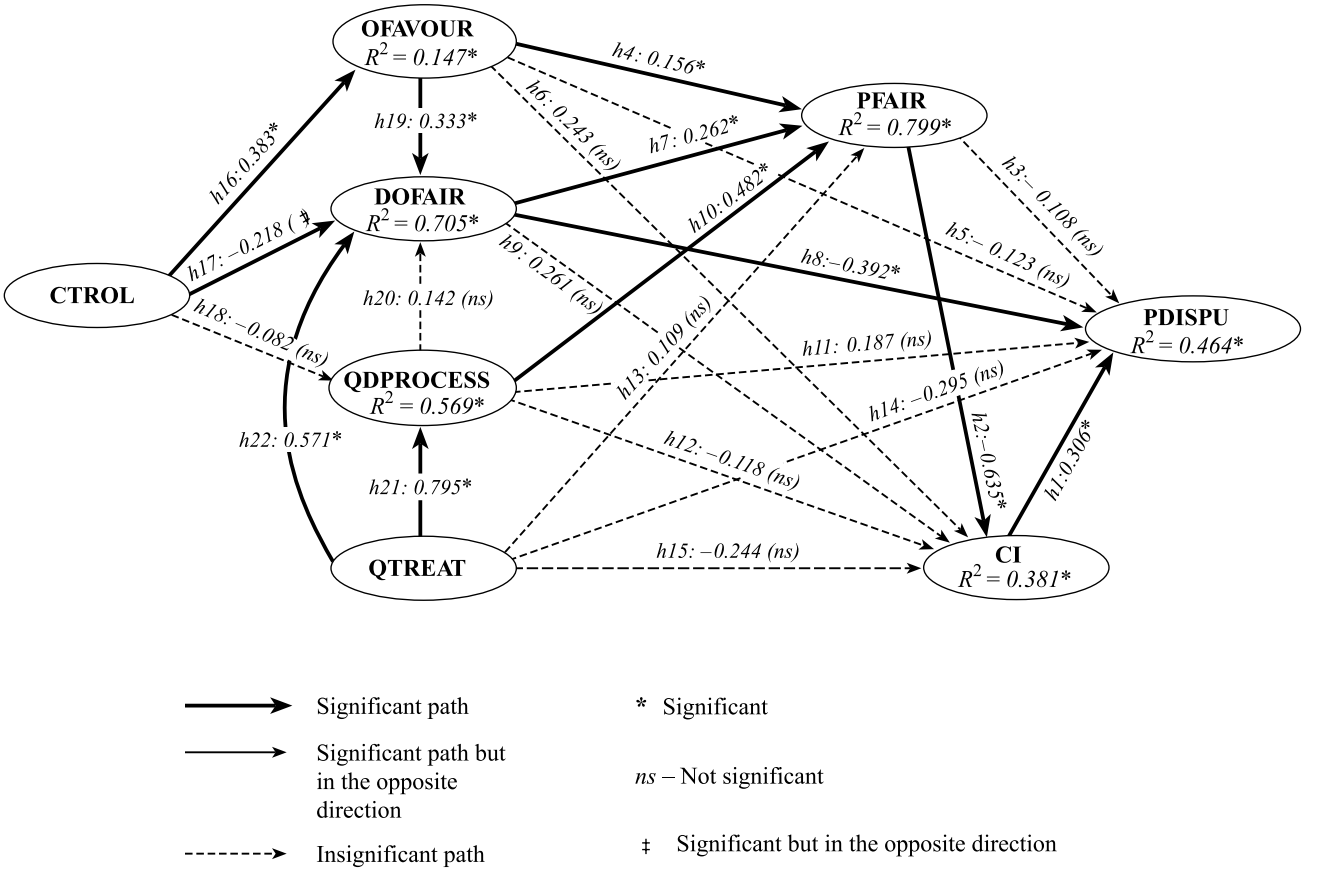

Figure 2 Result of model testing, highlighting the significant paths

Table 6 Results of hypotheses testing

Hypothesis and path	Expected sign	Path coeff. (ß)	t-value (one tail)	Sig.	Inference
H1: CI →PDISPU	+	+0.306	1.615	0.057	Marginally supported
H2: PFAIR → CI	–	–0.635	1.6893	0.049	Supported
H3: PFAIR → PDISPU	–	–0.108	0.4008	0.34	Not supported
H4: OFAVOUR → PFAIR	+	0.156	2.1945	0.017	Supported
H5: OFAVOUR → PDISPU	–	–0.123	0.8281	0.20	Not supported
H6: OFAVOUR → CI	–	0.243	1.3068	0.09	Not supported
H7: DOFAIR → PFAIR	+	0.262	1.9411	0.02	Supported
H8: DOFAIR → PDISPU	–	–0.392	1.6096	0.057	Marginally supported
H9: DOFAIR → CI	–	0.261	1.088	0.14	Not supported
H10: QDPROCESS → PFAIR	+	0.482	3.3826	0.00	Supported
H11: QDPROCESS → PDISPU	–	0.187	0.8825	0.19	Not supported
H12: QDPROCESS → CI	–	–0.118	0.4837	0.31	Not supported
H13: QTREAT → PFAIR	+	0.109	1.0740	0.14	Not supported
H14: QTREAT → PDISPU	–	–0.295	1.4447	0.07	Not supported
H15: QTREAT → CI	–	–0.244	1.0800	0.14	Not supported
H16: CTROL → OFAVOUR	+	0.383	3.1604	0.00	Supported
H17: CTROL → DOFAIR	+	–0.218	1.8512	0.03	Supported (but in the opposite direction)
H18: CTROL → QDPROCESS	+	–0.082	0.8392	0.20	Not supported
H19: OFAVOUR → DOFAIR	+	0.333	2.8942	0.00	Supported
H20: QDPROCESS → DOFAIR	+	0.142	1.0194	0.15	Not supported
H21: QTREAT → DPROCESS	+	0.795	10.1052	0.00	Supported
H22: QTREAT → DOFAIR	+	0.571	2.9253	0.00	Supported

decision outcome was seen to be fair. Significant discrepancy between entitlement and the amount allowed could increase perceived lack of PFAIR, despite a favourable decision. To ensure parity between entitlement and the claims amount allowed, there needs to be objectivity in the assessment of claims. Subjective assessment could result in legitimate claims being rejected and might increase the likelihood of doubt about the fairness of the contract administrator's decision.

Going on the assumption in the literature that people are only motivated by self-interest and material gains during their interactions with others, it would be expected that OFAVOUR and DOFAIR would cast a stronger influence on PFAIR than QDPROCESS. However, in this study it appears that the basis for the parties' attitude goes beyond simply the outcome—it is also dependent on the nature and characteristics of the decision-making process. It is also possible that QDPROCESS is important to parties, as it could lead to better outcomes. Figure 2 shows that the predictive effect that QDPROCESS has on PFAIR (0.482) is larger than the combined effect of OFAVOUR and DOFAIR (0.156 + 0.262 = 0.418). This is consistent with the Lind *et al*. (1993) study, which showed that the effect of the process on PFAIR would be greater than the effect of the outcome. It is also consistent with Tyler and Bladder (2000) which showed that, after controlling for OFAVOUR and DOFAIR, QDPROCESS has the most significant influence on PFAIR.

In Figure 2, the impact of OFAVOUR on PFAIR is mediated by DOFAIR. This means those contractors who received favourable outcomes perceived the decision on their claims to be fair; consequently they also perceived the procedure for administering their claims to be fair (PFAIR). Although the relationship between QDPROCESS and PFAIR (0.482) is stronger than the relationship between QTREAT and PFAIR (0.109), the influence of perceived QTREAT on perceived PFAIR is mediated by perceived QDPROCESS. This means that a claims certifier who shows concern about the contractor's claims and entitlements, explains the reason for the decision made, and allows claims to be discussed openly (QTREAT), may be perceived by the contractor as unbiased and independent (which are indicators of QDPROCESS), and as operating a procedurally fair claims process (PFAIR). The result is consistent with studies on interaction justice which argue that, when implementing formal procedures, people have some concern about the fairness of interpersonal relations that occur in the process (Bies and Moag, 1986). Diekman *et al*. (1994) appeared to support this view when they concluded that 'people issues' are the most significant factor influencing

project disputes. Interestingly, the result (Table 6 and Figure 2) shows that perceived QTREAT has the largest predictive impact on QDPROCESS and, also, is the largest influence in the model.

Conflict intensity

Turning to the hypothesized predictors of conflict intensity, there are five dimensions of fairness: OFAVOUR, DOFAIR, QDPROCESS, QTREAT and PFAIR. These predicted about 38% of the variance in CI (see Figure 2, Hypotheses H2, H6, H9, H12 and H15). Of the five paths, the direct path between PFAIR and CI is significant (H2), implying that higher levels of perceived PFAIR were associated with fewer reports of conflict. The result also implies that, when responding to a contract administrator's assessments and decisions on claims, contractors would be concerned not only with the decision outcome, but also with how the decision was reached. The result is similar to empirical research in other contexts where unfair procedures were found to generate more anger and complaints (Alexander and Ruderman, 1987; Sheppard and Lewicki, 1987).

Following the assumption that people would typically seek to maximize their gains in any exchange, it was expected that higher levels of OFAVOUR and DOFAIR should reduce CI. However, in this study, the effects of both OFAVOUR and DOFAIR on CI are insignificant. The significance of this result should be considered cautiously because of two possibilities: first, regardless of the extent of favourable outcome received by a contractor from claims, or the perceived fairness of the decision, the contractor may engage in conflict behaviour and may disagree with the way claims were handled—thus increasing CI. This might occur where the parties adopt a competing style of conflict behaviour. Disagreement with the way claims are being handled may be used as a means of securing higher levels of favourable and fair outcomes (perceived). Second, it is possible that parties may adopt an avoiding style of conflict behaviour despite unfavourable and unfair decisions.

Potential to dispute

Hypotheses H3, H5, H8, H11, H15 and H13 proposed that OFAVOUR, DOFAIR, QDPROCESS, QTREAT, PFAIR and CI would each directly influence PDISPU. The six constructs, put together, account for about 46% of the variance in PDISPU (Figure 2). The direct paths between CI and PDISPU (H1), and between DOFAIR and PDISPU (H8) were marginally supported, but others are not. This suggests the higher the CI, the higher the likelihood of contract dispute. This is consistent with Yiu and Cheung's (2006) study which found that in construction conflict, when tension levels reach a threshold, the conflict level is high; if the tension level subsides, the conflict may not return to the original level. Thus, on projects experiencing frequent and severe conflicts, contractual disputes may be inevitable.

This finding has some implications for construction project management. Some authors have portrayed conflict as undesirable: something to be reduced or eliminated from the construction process (Latham, 1994). Others argue that conflicts are inevitable and they distinguish between functional and dysfunctional conflict (Hughes, 1994; Gardiner and Simmons, 1995; Hancock and Root, 1996). They say the challenge is to harness the potential good in conflict rather than attempting to reduce or eliminate it. In other words, the industry should look at ways of managing conflict constructively. Loosemore *et al.* (2000) investigated the merits of encouraging conflict in the construction industry. They found that contractors are receptive (although not strongly) to constructive conflict management, but as the attitudes exist in a less-than-conducive socio-structural environment, encouraging conflict may be counter-productive. They provided some justification for emphasis on conflict reduction in the construction industry, but they recommended further research on the issue. The positive association between CI and PDISPU in Figure 2 lends support to the view that, in the construction process, conflict should be reduced or avoided if possible.

The result should be accepted with caution as there is reason to believe that the path between CI and PDISPU may be positive under some circumstances and negative under others. For instance, it is possible that where parties avoid conflict, there may be low-conflict intensity. This situation, however, may be counter-productive in the long term, as the tension underlying the dispute remains latent until it eventually erupts into a dysfunctional crisis (Rahim, 1983). Thus, it is possible that low-conflict intensity can also result in high PDISPU. However, the data for this study show the higher the CI, the higher the PDISPU. This is likely where parties adopt competing styles of conflict management.

Control

In Hypotheses H16, H17 and H18 (Figure 2), CTROL explained a significant amount of the variance in the levels of favourable outcomes received from claims by the contractor (OFAVOUR)—H16. The more pre-construction discussion and agreement, as well as clarity on methodology for substantiating and assessing claims, and rules of evidence for claims (elements of

CTROL), the higher the OFAVOUR. This is consistent with Thibaut and Walker's (1975) study which showed that control is something people value primarily because of the desire to shape the favourability or fairness of their outcomes. In construction, it is possible that pre-construction discussion and agreements (CTR1 and CTR3; Table 1—indicators of CTROL) would motivate the contractor to present and substantiate claims within the pre-agreed framework (Aibinu, 2009). This could deter the contractor from submitting invalid and unjustifiable claims. Accordingly, if the pre-construction discussions are thorough, and there is pre-contract agreement on a claims assessment method, the quantum of contractor claims will be lower. Also, the pre-agreements could motivate the claims certifier to assess claims within the pre-agreed framework, rather than making a subjective judgment (Aibinu, 2009). The potential effect is that the higher the level of pre-agreements, the higher the level of claims allowed. A simple correlation analysis was conducted to test these propositions. As speculated, pre-construction discussion, agreement and clarity on methodology for substantiating and assessing claims (CTR1) is likely to pre-condition a reduced level of claims requested by the contractor ($r = -0.401$, $p = 0.009$). Also, outcome favourability (measured by the contractor's satisfaction with losses and wins on claims—OFA5) had a positive and significant association with both CTR1 and CTR3 (0.346, $p = 0.026$; and 0.324, $p = 0.039$, respectively). This means that CTROL could lead to more favourable outcomes for the contractor.

Hypothesis H17, which proposed a positive relationship between CTROL and DOFAIR, was not supported by the data. Although the path is significant ($p = 0.03$), instead of a positive sign as hypothesized, the path is negative, suggesting that the higher the control, the lower the DOFAIR. The result is inconsistent with the Thibaut and Walker (1975) model, which suggests that control is something people value primarily because of the desire to shape the fairness of their outcomes. In the context of this study, control was measured by two items, namely the extent of pre-agreement and clarity on methodology for substantiating and assessing claims (CTR1) and extent of pre-agreement and clarity on rules of evidence for claims (CTR3). Higher levels of control would imply that at the pre-construction stage the contractor is able to bring input to methods of substantiating and assessing claims and rules of evidence for claims, thus exercising control over the claims process. It is expected that decisions arising from the use of such pre-agreements would be seen as fair. Because of the change in the direction of the relationship, the result is inconclusive. However, it may be that on the projects studied, the pre-agreements were not properly implemented during construction, thereby leading to lower levels of DOFAIR. The results were checked for indirect impact of CTROL on DOFAIR. From Figure 2, the fact that the links between CTROL and OFAVOUR, and between OFAVOUR and DOFAIR were significant (0.383, $p = 0.000$ and 0.333, $p = 0.000$ respectively), and are stronger than the link between CTROL and DOFAIR (0.218, $p = 0.003$), suggests that OFAVOUR mediates the relationship between CTROL and DOFAIR. This in turn suggests that when CTROL was high, contractors received favourable outcomes and perceived the decisions made about their claims to be fair.

Interrelationships among constructs

Four hypotheses address the interrelationship between four dimensions of organizational justice (H19, H20, H21 and H22). The hypotheses proposed OFAVOUR, DOFAIR, QDPROCESS and QTREAT are interrelated. Three of the hypotheses were supported (H19, H21 and H22). The paths (Figure 2) show that the higher the OFAVOUR, the higher the DOFAIR (H19). Also, the higher the QTREAT, the higher the perceived DOFAIR (H22). Further, the higher the perceived QTREAT, the higher the perceived QDPROCESS (H21).

CTROL, OFAVOUR, the perceived QTREAT and QDPROCESS jointly predicted about 70% of the variance in the contractors' perceived fairness of claims-certifiers' decisions (DOFAIR). Of the four, QTREAT was the strongest predictor of DOFAIR (H22), followed by OFAVOUR (H19). Both control and contractors' QTREAT predicted about 57% of the variance in the perceived QDPROCESS. Again, the quality of treatment experienced stood out as the most substantive and important pre-condition of quality decision-making.

Conclusion and recommendations

A new theoretical framework, based on organizational justice, has been used to investigate conflict and contractors' potential to dispute, during project claims-administration processes. The results suggest that perceptions about organizational justice either promote or hinder cooperative behaviour in the construction project delivery process. Organizational justice, or at least people's perceptions of it, influenced 38% of conflict intensity levels, and altered 46% of contractors' tendencies to dispute. The findings support a claims-administration strategy based on principles of fairness when attempting to lessen conflict and dispute. A major implication of the findings is that the manner in

which contract administrator implements project process and governance mechanisms would influence a contractor's perceptions about organizational justice and thereby determine the contractor's cooperative attitude.

Evaluations of claims outcomes appear to be important predictors of conflict and dispute behaviour, thereby supporting the theoretical view that people will be more interested in maximizing their gain in any exchange or interaction. However, the model used in this study also found perceived quality of treatment has the largest predictive impact—suggesting that in an exchange informal aspects relating to how decision-making procedures and processes are implemented, and how people are treated, also play important roles in conflict escalation and dispute development. Thus, the knowledge developed here adds value to theory by highlighting that the 'self-interest' explanation for conflict and dispute behaviour in construction is incomplete; organizational justice perceptions are also important. Incidentally, the organizational justice concept combines the effect of peoples' evaluation of outcomes (OFAVOUR and DOFAIR) with people's evaluation of formal and informal aspects of decision-making procedures (CTROL, QDPROCESS and QTREAT). The implication for practice is that it is not enough simply to design formal contract processes and procedures when attempting to minimize claims and reduce conflict and dispute. There is also a need to enhance a contractor's perception of fairness by paying greater attention to interaction and treatment, and to the implementation of the procedures and processes for administering claims. Interaction aspects of claims procedures are linked to the employer's project management personnel and consultants administering the contract. They are also dependent on interactions between the project owners' consultants and the quality of the contractor's interaction with the team. This lends support for the use of the project alliance and partnering approach when procuring projects, and where it is not suitable the project delivery process needs to promote interaction and transparency.

The results were based on a cross-sectional design capturing the opinions of contractors only. Capturing the views of project owners and contract administrators would have produced a more holistic result. This, unfortunately, was not possible because of the sensitive nature of the subject. For confidentiality reasons, contractors would not provide project names, or names of clients and consultants, when interviewed. This limitation, although acknowledged, does not nullify this study's findings because perceptions of fairness would differ between employer, contractor and consultants. By studying contractors' perspectives, we reasonably assume that an understanding of the contractors' perceptions which are the basis for disputes would help the clients devise strategies of counteracting those perceptions and that would enable clients to minimize their exposure to dispute with their contractors.

The indicators used in the model development are robust measures of the constructs; and they lead to the following general recommendations for practice: contract administrators and members of the project owner's management team need to ensure that rejections of a contractor's claim, or parts of a claim, are justified with logical, objective and methodical arguments that are both convincing and acceptable. They also need to treat contractor personnel with dignity and respect through transparent communication; by showing concern for their contractual rights; and by providing an opportunity for them to voice their concerns during claims-assessment procedures. It is helpful to assess and decide claims in a timely manner. Contract provisions need to be consistently interpreted and applied.

To enhance positive perceptions of fairness, a contract administrator needs to demonstrate professional expertise when diagnosing and assessing claims. When a contractor perceives a lack of professional expertise and/or experience, trust in the decision-making process could diminish. Hence, project owners' management teams need to build their competence for managing claims, conflict and dispute. Required competencies may include: diagnostic skills, behavioural skills (to prevent escalation of conflict or avoid deadlock in reaching agreement), and a capacity to provide support and assurance to the relevant parties. A contract administrator should have adequate knowledge in construction, understand the contract terms and their implications, and be able to evaluate a contractor's claims. They may also need to justify their decisions in ways that are understandable to the contractor and the project owner. Project owners may wish to consider these qualities when appointing the project management team.

Contractors also need to build competency for claims, conflict and dispute management. A contactor sometimes finds it difficult to substantiate genuine claims as a result of lack of relevant documentation. Rejection of such claims by the contract administrator may lead to loss, perceived lack of fairness and, hence, dissatisfaction and resentment. These sentiments, in turn, provide fertile ground for opportunistic behaviour and adversarial relationships with the project owner, when further claims arise on the project or on future projects.

The findings may have some limitations because the antecedents of perceptions about fairness, and how they influence conflict and dispute, could vary across different cultural settings (Brockner *et al.*, 2000), forms

of contract, and different types of procurement methods. Although the results provide vital information for the construction industry globally, its application could differ in countries with a different cultural background. However, Singapore's construction industry has been influenced by western project management culture. It is therefore unlikely that culture would prevent a generalization of the findings. Also, the results are based on projects procured by traditional procurement methods, and with SIA and PSSCOC standard forms of contract. Additionally, this study did not consider the changes in the relationship between fairness, conflict and dispute that may be accounted for by procurement method and contract form. Finally, the sample size is based on perceptions of 41 contractors in Singapore. Future research could be conducted with a larger sample, and in other countries, to facilitate international comparison.

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