MAUT-Based Dispute Resolution Selection Model Prototype for International Construction Projects

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Abstract: Disputes are common in international projects because of contractual, cultural, and legal factors. The dispute resolution methods currently adopted in international projects are varying, including litigation, arbitration, adjudication, mediation, expert-determination, dispute resolution board, and minitrial. The problem in question is on how to select the most appropriate resolution method that can fit nicely in the nature of the dispute and the disputing parties' needs. A dispute resolution selection prototype (Model) based on the analytical hierarchy process and multiattribute utility technique (MAUT) is presented in this paper. The Model developed consists of five components: Selection factors, dispute resolution methods, utility factors, relative importance weightings, and user's preferred weightings. These were based on the quantitative data provided by 41 experts in the field, who were barristers, arbitrators, mediators, and project managers. The Model is considered beneficial to the industry, as it provides construction professionals with a systematic and objective approach in the management of international project disputes.

DOI: 10.1061/(ASCE)0733-9364(2006)132:5(444)

CE Database subject headings: Construction companies; Dispute resolution; International factors; Construction industry.

Introduction

Disputes Arising from International Construction Projects

Globalization has changed the nature of many business activities. The business of construction is no exception. Construction companies of medium to multinational scale are entering into the international construction industry to diversify and expand its market shares. The increasing sophisticated information technologies are also prompting large-scale infrastructure projects to no longer be local events, but international affairs involving parties of several nations (Bon and Crosthwaite 2001; Chan 2002). For this paper, international construction projects (international projects) are those, in which the contractor, the lead consultant, or the employer is not of the same domicile, and at least one of them is working outside his (her) country of origin (Mawkinney 2001). International projects are found not only in developed countries, but also developing countries, such as China, South Africa and Vietnam (Bon and Crosthwaite 2001). Ofori (2000) suggested that the international construction industry (the industry) should make good use of construction opportunities to embrace the development of materials, project documentation and procedures, human resources, technology, and institutions. Raftery et al. (1998) considered international projects as opportunities for developing countries to leap forward, through joint ventures with foreign construction companies. These advantages, however, cannot be materialized, unless contracting parties have a good working relationship and are willing to work in a cooperative manner (Chan and Chan 2001; Ofori 1985). The success or failure of an international project depends on the project team's ability to face up the challenge of differences in cultures, morals, traditions, values, philosophies, and languages of the project partners (Cleland 1994).

The causes of disputes in international projects are largely two fold. First, the parties' knowledge and experiences in construction law and project management are not homogeneous. Much time is needed for them to get used to the local construction practices, law, and local politics (Chan 2002; Cremades 1998; Shilston and Hughes 1997; White 1999). Second, as each party has its own set of goals and objectives, it would become a difficult task to align parties' differences and to ensure that they all work toward the same set of objectives (Chan and Chan 2001; Fellows and Hancock 1994; Pronin et al. 2004). Social factors, such as language barriers and cultural differences, also contribute to difficulties in the management of international projects. Previous studies have confirmed that culture differences have a significant effect on the causation and resolution of disputes (Chan and Tse 2003; Irwin 1996; Triandis 2000; Trompenaars and Woolliams 1999; Brett 2000; Tinsley and Brett 2001; Carnevale and Choi 2000).

Selecting the Most Effective Dispute Resolution Method

Management of construction disputes in an effective way requires mapping the dispute with the most appropriate dispute resolution method (Chan 2003; Cheung and Suen 2002; Goldberg et al. 1992). Given the industry's reliance on the subjective approach to

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Note. Discussion open until October 1, 2006. Separate discussions must be submitted for individual papers. To extend the closing date by one month, a written request must be filed with the ASCE Managing Editor. The manuscript for this paper was submitted for review and possible publication on December 30, 2003; approved on September 14, 2005. This paper is part of the ***Journal of Construction Engineering and Management***, Vol. 132, No. 5, May 1, 2006. ©ASCE, ISSN 0733-9364/2006/5-444–451/$25.00.

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dispute resolution selection, there is considered a need for a more systematic approach (Gold 1991; Miller 1995). Previous studies (Chan 2002; Gold 1991; Cheung and Suen 2002) suggested that research may play an important role in refining the knowledge of dispute resolution, particularly in the development of a systematic dispute resolution model. Selecting a dispute resolution method to fit in a project's particular needs is not an easy task. The industry's approach in the selection of dispute resolution method has been heavily criticized, where too much reliance is placed on intuitive judgments rather than on rational approach. Decisions of such may have created biases, due to personal preferences and experiences (Mandelbaum 1984; Gold 1991; Cheung and Suen 2002; Leung 1987).

A number of studies have stressed the need of systematic dispute resolution selection. York (1996) identified a list of "selection factors," which included cost, time, degree of control by parties, and flexibility. David (1998), in recognizing the importance of human nature in dispute resolution, expanded the selection factors by adding business relationship, power imbalance, and cultural differences. Chan (2002) highlighted the influence of the East and West cultural differences in selecting dispute resolution methods. Cheung and Suen (2002) applied the multi-attribute utility technique (MAUT) to the development of a dispute resolution selection model. The rationale behind MAUT is to consider each dispute resolution option as a valued (utility) function, which a decision maker wishes to maximize in pursuing his (her) selection objective. The utility function is an aggregate of subjective expected scores against multiple selection factors attached to each option. Mathematically speaking, the utility function of each option is represented by $U(x)=\Sigma wiui(x)$, where $ui(x)$=evaluation of the option on the ith factor and wi=weight assigned to the ith factor on the option's overall evaluation (Keeney and Raiffa 1976). The option with the highest total score is the one for the decision maker to choose.

The MAUT-based model of Cheung and Suen (2002), which consisted of a set of selection factors, a set of utility factors, and a categorization of dispute resolution mechanisms, is however designed to assist project managers of local medium-size construction projects in selecting dispute resolution mechanism(s), where contracting parties share the same construction culture. The model is also somewhat limited in terms of its use in international projects, in which contracting parties are from different cultural backgrounds. Disputes are however more complex in this respect, and its causes are more diverse.

Aims and Objectives

As the contracting parties of international projects come from different nations, it is inevitable that they use different languages, technical standards, procedures, currencies, and trade customs. This makes international projects particularly vulnerable to disputes. In recognizing these effects, in particular legal and political factors, on international projects and dispute resolution, this paper is intended to advance the knowledge of dispute resolution by developing a dispute resolution method selection model, which is specifically designed for international projects. The proposed dispute resolution model presented in this paper is designed to assist construction professionals in the mapping of a dispute at international project level with the most appropriate dispute resolution method(s). To achieve this, the MAUT has been deployed to structure the basis for the design and development of the model. The key research objectives are therefore as follows:

1. Prioritizing the key selection factors that affect the decision in the selection of dispute resolution method(s) for resolving a particular source of disputes;
2. Identifying the most commonly used dispute resolution methods in international projects;
3. Collecting quantitative data to help matching the selection factors with the most appropriate dispute resolution methods; and
4. Developing a selection model (known as the "Model" hereafter).

Table 1. Summary of Profile and Percentage of 41 Interviewed Experts

Profile	Percentage
Barristers	29
Professional quantity surveyors	19.4
Arbitrators	19.4
Project directors	19.4
Solicitors	6.4
Academics	6.4

Research Methodology

Through literature review, a list of potential key selection factors and a list of commonly used dispute resolution methods are compiled. The lists were verified and refined with interview discussions with a small group of dispute resolution experts from an international arbitration centre. Having identified the selection factors and the most commonly used dispute resolution methods, an interview survey was then conducted to collect the utility factors (U factors), which was an essential ingredient for the development of the Model. The details of MAUT and the use of it are described in a later section of data collection. A total of 41 practitioners (hereafter known as the "experts") in the field were invited. The selection of the experts was based on the following criteria:

1. Practitioners who have over five years experiences with international projects;
2. Practitioners who exhibit a good understanding of the alternative dispute resolution and litigation processes; and
3. Practitioners who are accredited mediators/arbitrators of recognized professional bodies, such as the Hong Kong International Arbitration Centre (HKIAC 2003).

The final selected experts included project directors, senior managers, barristers, solicitors, arbitrators, and mediators. They were holding senior positions in the industry and their responses would be invaluable to the study. Table 1 shows the profile and percentage of the 41 interviewed experts.

In order to allow the user to adjust the relative important weightings of the selection factors to fit in the current needs of the disputants. The Model will build in reference relative important weightings based on the input of experts' experience. During the interview with the 41 experts, they were asked to carry out the analytical hierarchy process (AHP) using the SPSS computer software exercise to establish the relative importance weightings for the selection factors.

The Key Selection Factors

Factors adopted for mapping a dispute with the most appropriate resolution method(s) are varying. A number of relevant studies

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Table 2. Summary of Common Selection Factors (Adapted from Cheung and Suen 2002)

	Previous research findings						
Selection Factors	Brown and Marriott (1999)	Cheung (1999)	David (1988)	Goldberg et al. (1992)	Hibberd and Newman (1999)	Suen (2001)	York (1996)
1. Confidentiality	×	×	×	×	×	×	×
2. Parties ability to control	×	×	×		×	×	×
3. Third party control on the process				×	×	×	
4. Preservation of business relationships	×	×	×		×	×	×
5. Degree of cultural difference			×		×	×	
6. Addressing power imbalance	×		×			×	
7. Flexibility	×	×		×	×	×	×
8. Remedies	×	×			×	×	
9. Enforceability		×	×	×			×
10. Degree of formality				×			
11. Cost reduction	×	×			×	×	×
12. Speedy in time	×	×			×	×	×
13. Type of contract	×	×		×			
14. Local law system	×	×				×	
15. Relationships between parties			×			×	

have been conducted. Goldberg and his research team (1992) stressed the procedural aspects of dispute resolution in selecting a successful dispute resolution forum. They included willingness of the disputants, control by third party, degree of formality, nature of proceeding, enforceability, and confidentiality. It was also suggested that such factors as time, cost, preservation of business, binding decision, control by parties, flexibility, and confidentiality are important too. David (1988) came to the point of view that the parties' relationship is the key to successful joint ventures, and therefore critical selection factors should include impartiality, parties' control, continuing parties' relationships, and confidentiality. Taking into account of the above-mentioned studies together with the works of Brown and Marriott (1999), Cheung (1999), Hibberd and Newman (1999), and Suen (2001), a total of 15 common selection factors were identified, as summarized in Table 2.

It was anticipated, however, that only some of the 15 selection factors may be applicable in international projects. A "filtering" exercise was therefore carried out to short list the relevant selection factors. The research team invited four senior project managers, who were the arbitration panel members of the Hong Kong International Arbitration Centre (HKIAC 2003) having over ten years experience in dispute resolution and international projects, to participate in the exercise. The managers were asked in the exercise to rank the selection factors in a descending order, from the most relevant to the least relevant. A total of seven selection factors were short listed, as follows:

- Confidentiality;
- Third party control on the process;
- Preservation of business relationships;
- Reducing the adverse effect due to cultural difference;
- Enforceability;
- Cost reduction; and
- Speedy in time.

Two factors, "reducing the adverse effect due to cultural difference" and "reducing the adverse effect due to different legal systems," which were not provided in the common selection factors list, were recommended by the managers on the argument that political and legal issues are the indispensable parts of the management of international projects (Chan 1997, 2002). These views have found support in literature, and therefore, the two factors were included. All the nine factors were consequently used in the development of the Model.

Identifying Dispute Resolution Methods

Dispute resolution methods commonly used for typical construction projects include negotiation, mediation, arbitration, dispute resolution adviser (DRA), and litigation. In recent years, alternative dispute resolution (ADR) has gained favor over litigation for its low cost and speedy resolution (Brooker and Lavers 1994; Woolf 1996). Notably, mediation was used to resolve more than 70% of construction disputes arising from various events in the Hong Kong Airport Core Projects contracts (HKAA 2000). However, arbitration is still an indispensable method for resolving international project disputes and new dispute resolution methods under the theme of "disputology" have also been introduced to the construction industry (Chan 2003). Having considered the works of Cheung and Suen (2002), Fenn et al. (1999), Merna and Bower (1997), Singh (1998), and Pryles (2001), a consolidated list of the most commonly used dispute resolution methods was created, including mediation, arbitration, litigation, minitrial, adjudication, expert determination, and dispute resolution board (DRB). The list was then taken to the four managers for comments and they agreed that the list could reflect the true situations in international projects.

Data Collection of Utility Factors

An interview exercise was carried out to collect the utility factors (U factors), which was an essential ingredient for the development of the Model. A total of 41 practitioners (hereafter known as the experts) in the field were interviewed. The aim of the interview survey was to collect and formulate a set of mean utility scores for the selection factors. It was anticipated that the mean U factors obtained would reflect the common view of the experts,

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Table 3. Summary of Averaged Utility Factors

Selection factors	Litigation	Arbitration	Adjudication	Expert determination	Mediation	DRB	Minitrial
Confidentiality	16.83	89.63	68.41	87.56	91.59	64.27	72.68
Third party control on the process	95.24	83.90	67.44	70.37	52.56	56.59	63.41
Preservation of business relationships	23.05	44.88	50.24	67.68	85.00	60.24	60.61
Reducing the adverse effect due to cultural difference	39.02	60.12	49.63	63.54	81.22	55.49	53.05
Addressing power imbalance	49.88	58.41	55.00	64.02	70.98	55.37	55.00
Enforceability	91.22	98.17	57.68	63.66	53.17	47.44	55.73
Cost reduction	22.80	32.32	53.41	70.37	80.98	60.49	61.10
Speedy in time	22.20	42.44	59.63	78.29	83.66	64.51	65.24
Reducing the adverse effect due to different legal system	40.49	63.66	49.63	67.93	74.39	56.83	55.61

Note: Mean U factors are within at the 95% confidence interval.

which can provide a reference point to reduce subjectivity that often predominates in individual decision making (Edwards 1982). The selection factors previously identified were adopted for developing the "utility factors matrix table," which formed the basic structure of a MAUT-based model (Cheung and Suen 2002).

The interview survey started with a general introduction to the experts of the research study purpose, the use of MAUT, and the instructions about completing the questionnaire. The experts were then asked to insert the utility scores against the identified selection factors for each dispute resolution method. The scale range of utility scores adopted was from a scoreboard of 10–110. The reason for adopting the scale range was to avoid any possible occurrence of a zero value in the outcome. After the briefing, the experts were given about 2 h to fill in the scores, while the interviewer would stand by to answer any queries. Because of their unique features, the degree of relevance/usefulness of the dispute resolution methods against each individual selection factor is expected to be different. For example, for mediation, it is reasonable to give some selection factors, such as *time, cost, flexibility, preservation of relationships*, and *degree of control by parties*, a higher utility score than that of *formality* and *local law system*, in a situation where the dispute in question does not involve any legal matters. Likewise, selection factors such as *flexibility* and *degree of control* would be given a higher utility score in a situation where there is a need for changes in terms of the contents of the proceedings and the strategies involved. Table 3 shows a summary of the U factors collected from 41 interviewed experts. The mean factors so obtained were within the 95% confidence interval (i.e., 95% level of confidence).

Findings on the Utility Factors

Confidentiality

First place is taken by mediation (91.59), followed by arbitration (89.63), expert determination (87.56), and minitrial (72.68). The survey results are consistent with the unique features of mediation and arbitration that parties to a dispute are not allowed to disclose any information or materials to the public unless with formal consent of the parties (Brown and Marriott 1999). Hence, they are more preferable when parties want to keep their disputes away from high profile coverage.

Third Party Control on the Process

First place is taken by litigation (95.24), followed by arbitration (83.90), expert determination (70.37), and adjudication (67.44). The results are consistent with the current practice. In litigation, the contents and the pace of hearing are virtually controlled by the court. Even though arbitration is less formal and the arbitrator is an impartial, facilitative third party, the arbitration process remains highly regulated by rules and the arbitrator directs the hearing process.

Preservation of Business Relationships

Maintaining a continuing business relationship is vital to effective business management. A good business relationship is established on the basis of trust, common interests, and mutual respect. The survey results show that first place is taken by mediation (85.00), followed by expert determination (67.68), minitrial (60.61), and DRB (60.24). The results are reasonably accurate, as part of their functions, mediation, expert determination, minitrial, and DRB are designed to sustain a continuing strategic relationship. The neutrals always try to satisfy the aspirations of the parties by coming up with a "win-win" settlement.

Reducing Adverse Effect Due to Cultural Difference

First place is taken by mediation (81.22), followed by expert determination (63.54), and arbitration (60.12). In international projects, the parties must be transculturally competent. In a practical sense, they should at least be able to recognize the expectations and behavior of others. A joint workshop involving key project participants should be held to discuss the expectations of each party, to establish a project charter, to define the project mission, to agree on the choice of dispute resolution mechanism, so as to maintain a good communication channel and to prevent disputes from arising. As such, mediation and expert determination are more preferable because of their inherent "partnering" nature.

Addressing Power Imbalance

First place is taken by mediation (70.98), followed by expert determination (64.02), and arbitration (58.41). The same reasons given in "*reducing adverse effect due to cultural effect*," apply here. Mediation, expert determination, and arbitration are more user-friendly and adaptable, and are therefore more appropriate in international projects context.

Enforceability

A negotiated or mediated settlement without the support of a written agreement is not enforceable. However, awards made by

arbitrators in arbitration and decisions by judges are enforced in courts. Pryles (2001) commented that the enforceability of a mediated settlement would be much improved if legislation was to provide for its direct enforcement in the same way as an arbitral award. Therefore, it is only natural that the first and second place is taken by arbitration (98.17) and litigation (91.22), followed by mediation (63.66).

Cost Reduction

In this context, cost refers to the total costs involved to reach a settlement. Cost and time are directly correlated. Generally speaking, arbitration is more economical than litigation, but this depends on the nature of the dispute, the amount of documentation required and other administrative considerations. A lower cost is expected if the parties are not represented by lawyers and discovery is well-defined and limited. As ADR processes are procedurally less complex, and therefore they are generally less costly than arbitration and litigation. The survey results are reasonably accurate with the first place taken by mediation (80.98), followed by expert determination (70.37) and minitrial (61.10).

Speedy in Time

Speed is measured by the amount of time taken to resolve a dispute. Before the completion of a dispute resolution process, it is extremely difficult to assess and estimate how long it will take to reach a settlement. Various factors should be considered, such as the complexity and the number of disputants involved. As a general rule, the duration of ADR can be measured in days or weeks, rather than months or even years as in litigation. Therefore, it is reasonable that first place be taken by mediation (83.66), followed by expert determination (78.29) and minitrial (65.24).

Reducing Adverse Effect Due to Different Legal System

As mentioned previously, to avoid loss of face and conflicts of law, parties may prefer to settle the dispute through ADR processes. As such, it is reasonable that first place is taken by mediation (74.39), followed by expert determination (67.93) and arbitration (63.66).

Establishing Relative Weightings

One of the advantages of the MAUT technique is that the user can adjust the relative important weightings of the selection factors to fit the current needs of the disputants. Such device is extremely useful because even parties having similar disputes do not necessarily have similar needs. Needs are bound to change as economical, cultural, political, and legal factors change. For example, in a situation where the disputing parties have only limited time to resolve their dispute, "time" would inevitably become an important factor in deciding the choice of dispute resolution method. It is reasonable for them to go for dispute resolution methods such as negotiation and mediation, rather than arbitration and litigation. In this case, the time factor would be given a higher priority than other selection factors. Therefore, the assignment of the relative weightings depends on a number of factors, such as the nature of dispute, the needs of parties, and other circumstantial factors.

Table 4. Summary of Averaged Relative Importance Weightings

Selection criteria	Relative importance weightings
Confidentiality	0.123
Third party control on the process	0.111
Preservation of business relationships	0.077
Reducing adverse effect due to cultural difference	0.062
Addressing power imbalance	0.076
Enforceability	0.226
Cost reduction	0.133
Speedy in time	0.121
Reducing adverse effect due to different legal system	0.072

Note: Mean relative importance weightings are within at the 95% confidence interval.

Analytical Hierarchy Process

The AHP technique has been used in the selection of design and building proposals (Alhazmi and McCaffer 2000; Paek et al. 1992), tenders selection (Fong and Choi 2000), and procurement selection (Cheung et al. 2001). It provides decision makers with a systematic, transparent, and logical approach in prioritizing the relative importance of the selection factors, and therefore improving objectivity and reducing any human bias in making decisions. Mathematically speaking, the AHP process involves procedures to decompose a multiattribute decision problem into a system of hierarchy, which contains the objective statement, its measurable attributes, and each option concerned. The heart of such a technique is to convert the set of measurable attributes into relative importance weightings, by means of a pair-wise comparison matrix (Saaty 1980). In other words, the AHP is employed to enable the decision maker to determine their relative importance for a set of selection factors.

Using the AHP technique in selection problems involves three major steps in practice: (1) collecting scale data for the selection factors through a pair-wise comparison matrix; (2) adopting the eigenvalue method to estimate the relative importance weightings of the selection factors; and (3) checking the consistency index (CI) and consistency ratio (CR) by considering λ_{max} and random index (RI). EXPERT CHOICE (1998) is a computer software program with a pair-wise comparison matrix model specifically designed to conduct the AHP process. In the EXPERT CHOICE (EC) environment, the user is required to make judgments on the relative weightings of the selection factors listed in the matrix table, by simply entering (assigning) a scale corresponding to each factor in comparison. The CI, CR, and relative importance weightings of the selection factors would be provided by the EC.

During the survey, the 41 interviewed experts were asked to carry out the AHP exercise to establish the relative importance weightings for the selection factors. Table 4 shows a summary of the mean relative importance weightings collected from the 41 experts. Similar to the mean U factors, the mean importance weightings calculated were within the 95% confidence interval.

Developing a Dispute Resolution Model

The completed Model is shown in Table 5. It consists of the following components: (1) selection factors; (2) relative weightings, where one of the two columns serving as a reference is the

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Table 5. Completed MAUT-Based Dispute Resolution Model

			Common-used dispute resolution methods for international projects													
	Relative importance weighting		Litigation		Arbitration		Adjudication		Expert determination		Mediation		DRB		Minitrial	
Selection factors	User's own preference number	Based on 41 experts	U.F.	Score (S)	U.F.	Score (S)	U.F.	Score (S)	U.F.	Score (S)	U.F.	Score (S)	U.F.	Score (S)	U.F.	Score (S)
Confidentiality	#	0.123	16.83	2.07	89.63	11.02	68.41	8.41	87.56	10.77	91.59	11.27	64.27	7.91	72.68	8.94
Third party control on the process	#	0.111	95.24	10.57	83.90	9.31	67.44	7.49	70.37	7.81	52.56	5.83	56.59	6.28	63.41	7.04
Preservation of business relationships	#	0.077	23.05	1.77	44.88	3.46	50.24	3.87	67.68	5.21	85.00	6.55	60.24	4.64	60.61	4.67
Reducing the adverse effect due to cultural difference	#	0.062	39.02	2.42	60.12	3.73	49.63	3.08	63.54	3.94	81.22	5.04	55.49	3.44	53.05	3.29
Addressing power imbalance	#	0.076	49.88	3.79	58.41	4.44	55.00	4.18	64.02	4.87	70.98	5.39	55.37	4.21	55.00	4.18
Enforceability	#	0.226	91.22	20.62	98.17	22.19	57.68	13.04	63.66	14.39	53.17	12.02	47.44	10.72	55.73	12.59
Cost reduction	#	0.133	22.80	3.03	32.32	4.30	53.41	7.10	70.37	9.36	80.98	10.77	60.49	8.05	61.10	8.13
Speedy in time	#	0.121	22.20	2.64	42.44	5.05	59.63	7.10	78.29	9.32	83.66	9.96	64.51	7.68	65.24	7.76
Reducing the adverse effect due to different legal system	#	0.072	40.49	2.92	63.66	4.58	49.63	3.57	67.93	4.89	74.39	5.36	56.83	4.09	55.61	4.00
	Sum=1.000	1.000														
Total score (TS)				49.83		68.08		57.83		70.55		72.17		57.01		60.60
Order of preference			7		3		5		2		1		6		4	

relative importance weightings collected from the 41 experts; (3) commonly used dispute resolution methods; and (4) mean U factors. The scores of the selection factors are obtained by multiplying the U factors by the relative importance weightings. The total score (TS) for each dispute resolution method is the summation of all individual scores. The order of preference is then determined by the relative TSs, where the higher the scores, the higher the order is. The order of "1" identifies that the selected method, in comparing to other methods, is relatively the most appropriate dispute resolution method, followed by the order of "2," and so on. It is worth mentioning that the relative weightings provided in Table 5 are based on the views of the 41 experts. It by no means implies that they are reflective of all situations, and therefore, users of the Model are not necessarily bound to use them. They are included simply to be used as a point of reference, that is, to allow the comparison between the user's own preference weightings and those of the experts. As such, under the relative important weightings column, a "User's own preference" column is added to allow the users to adjust and enter their preferred weightings in the use of AHP technique (the users are advised to use the EXPERT CHOICE software to conduct the AHP process).

Discussion

There are limitations associated with the development and use of the Model, and broadly speaking, they can be summarized as limited samples and limited access to EXPERT CHOICE.

Limited Sample

The development of the Model was heavily dependent on the number of experts available. Despite the small sample size, 41 experts, the research team was impressed by the experts' knowledge and their professionalism. The experts were experienced barristers, mediators, arbitrators, and project managers, and they have extensive experiences with international dispute resolution, and therefore, their responses are unquestionably of an extremely high standard. However, a larger sample size with knowledgeable experts will help further improve the accuracy of the Model.

Limited Access to EXPERT CHOICE

The Model requires the support of EXPERT CHOICE to determine the relative important weightings in the user's own

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preference column. This may be a problematic issue, for those who have no access to EXPERT CHOICE. Further, training is required for beginners in the use of EXPERT CHOICE, despite the software's user-friendly settings. Alternatively, the users themselves may make up their own relative importance weightings based on simple mathematics, i.e., summation of all relative importance weightings. The drawback of using such an approach is that it is relatively less accurate and reliable.

Practical Benefits to the Industry

The Model presented in this paper can be applied to improve consistency in the decision making process. It can reduce not only subjectivity but also provides the users with much needed flexibility. As Bevan (1992) pointed out, by making the dispute resolution process more flexible, systematic, and objective, the chance of getting the dispute resolved will be maximized. The Model developed here makes good use of both the MAUT and the AHP techniques. The users, including but not limited to the construction professionals in international projects, can benefit from the Model in a number of ways. First, it can be used to structure and analyze the dispute, i.e., using the AHP to help the users in prioritizing the relative importance weightings for the selection factors. Second, the Model helps construction professionals to structure the dispute resolution process and determine the most appropriate dispute resolution method(s) in a systematic manner. Third, in setting up an established framework, the Model facilitates an understanding of various DR mechanisms. Fourth, the Model may act as a supplementary back-up tool, when the intuitive judgement of the user on the dispute resolution method selection requires a further objective confirmation.

Further Research Studies

This study has identified some further research areas in the field, which should focus on the following aspects:

- The Model derived from this study will provide guidance principles to the selection of dispute resolution. The drafting of corresponding dispute resolution clauses for international projects, either in anticipation of disputes or for ad hoc situations, shall be developed to further enrich the Model;
- The calculation of scores as described in this paper can be automated by using database technologies, such as MYSQL (2002) and PHP (2002), to streamline the decision making process;
- The Model may be set up in an internet-based environment for on-line international dispute resolution selection by parties stationing in different parts of the world; and
- As the calculated total score could be used as a hypothesis to choose the most appropriate dispute resolution method, further quality data and decision making programs should be developed to guide the users in evaluating and validating their choices, through comprehensive considerations of legal, cultural, and personal factors.

Conclusion

Like many statistical methods and management techniques, the Model presented in this paper is a dispute resolution selection prototype to assist construction professionals, particularly those working in international projects, to map a dispute with the most appropriate resolution method. The Model is not designed to replace the functions of dispute resolution advisors, mediators, arbitrators, and lawyers in the dispute resolution process. Rather, it is designed to provide a more transparent and systematic approach in the management of disputes. For international projects, where disputes are inevitable, the Model is an invaluable tool to provide support for disputing parties, project managers, and contract administrators. However, they are advised to consult experienced dispute resolution advisors, mediators, arbitrators, or lawyers, when dealing with the disputes of a complex nature. The MAUT-based Model is beneficial to the industry, as it helps construction professionals to make an informed choice of the selection of dispute resolution method, through studying multiple selection factors in a systematic manner.

Acknowledgments

The research team members would like to express their appreciation to the Secretary-General of Hong Kong International Arbitration Centre (HKIAC) and to the arbitrators/mediators panel members of the HKIAC for their information and participation in this research project. The work described in this paper was partially supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (Project No. PolyU-5103/03E).

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