

ACHIEVING SATISFACTORY CONTRACTUAL TERMS FOR THE ENGINEER'S ROLE

Will Hughes¹ and Hiromu Shinoda²

¹*Department of Construction Management & Engineering, University of Reading, PO Box 219, Reading, RG6 6AW, UK*

²*Penta Ocean Construction, Tokyo, Japan*

An international survey of clients, consultants and contractors produced wide-ranging data on the views of users of the FIDIC form of contract. The purpose of the survey was to elicit views on a range of issues, prior to revising the model form, to ensure that the contract drafters produce a form that is satisfactory for its users. Those questions that focus upon the role of the engineer have been subjected to detailed statistical analysis. The analysis shows that, contrary to popular belief, the views of contract users from common law jurisdictions do not differ from those in civil code jurisdictions. The engineer's role is not generally perceived as neutral in the contractual relationships between clients and contractors. Contractors would prefer someone other than the engineer to be the first-line settler of disputes in contracts.

Keywords: contracts, engineer, law, project management, survey.

INTRODUCTION

As a pre-cursor to the publication of a new edition of their model form contract, and in parallel with the process of revision, the Fédération Internationale des Ingénieurs-Conseils (FIDIC), in conjunction with European International Contractors (EIC), commissioned a survey on users' perceptions of the Conditions of Contract for Works of Civil Engineering Construction (the Red Book). The purpose of the survey was to ascertain the views of a wide range of users on a variety of contractual issues.

The first edition of an international form of contract for civil engineering work was published in 1957 (Bunni 1998). Subsequent editions were published in 1969, 1977 and 1987. During the intervening years, the Red Book was ratified by various national and international industry bodies and became the mandatory form for use in World Bank funded projects (Andre-Dumont 1988). The Red Book is widely used for large projects financed by international banks (Molineaux 1995).

Achieving client satisfaction

In seeking to achieve client satisfaction, it is often important to get contractual and legal issues clarified at the outset of a project. Often, the commercial process of negotiation leads to the formation of contract as but "a landmark which may pass unnoticed in a continuous process of negotiation" (Akroyd 1987). The aims of the parties are connected with the output of the process, rather than with the process itself. Many view litigation and contractual recourse as unpleasant and avoidable: an unlikely eventuality. "If formation of a contract is a mere stage in the bargaining process, the real end must be full and satisfactory performance of the negotiating party's contractual strategic policy" (Akroyd 1987). Moreover, there is clear evidence that in

seeking to negotiate the terms of a deal, businesses are loath to appear to be planning for the eventuality of contractual remedy (Beale and Dugdale 1975).

The contracts used for construction projects are complex and frequently the cause of dissatisfaction, often failing to provide the level of security and recourse expected by those who use them (Thomas 1993). In use, contracts are frequently varied before being used (Bromilow 1970). Worse, the continuous re-negotiation of the deal as the relationship develops can leave parties wondering about the precise terms of their contract (Akroyd 1987).

While it is perfectly plausible to draw up a contract from scratch for each international project (Perlman 1991), it is more common in the construction industry to opt for a standard or model form. The difference between a standard form and a model form is the intention behind them. A standard form is intended for use as published whereas a model form is one that contains suggested terms to be used as a basis for detailed contract negotiation. There are advantages (Minogue 1997) and disadvantages (Hughes and Greenwood 1996) to standardizing contract forms, but it seems that common practice in the construction industry favours their use as a matter of policy. Given this predilection, and given the popularity of the Red Book, the attitudes of users towards the Red Book are extremely important in determining the extent to which the contract helps or hinders in achieving satisfactory completion of a project.

THE SURVEY

It was to assess the way in which this form should be amended to ensure its continuing suitability of this form, a survey was undertaken at the request of EIC (European International Contractors) and FIDIC. As part of the process of revising the Red Book and harmonizing with other FIDIC contracts, the purposes were:

- to examine contract users' feelings about contract policy in general and about the Red Book in particular;
- and to consider the way that the FIDIC Red Book is used in practice in order to discover what changes might be useful for those who use the contract.

The survey questionnaire was prepared in consultation with EIC and FIDIC. The questions were tested and refined by discussing them with experienced practitioners and the questionnaire was distributed around the world with the assistance of EIC and FIDIC through their member associations. Because the questionnaires were distributed to organizations that subsequently duplicated them and forwarded them to others, it is not possible to gauge how many questionnaires were distributed. A total of 204 completed questionnaires were received from 38 countries. Most responses came from UK and Western Europe, although the best represented country is Malaysia. The regional distribution of responses is given in Table 1.

SPECIFIC ISSUES

While the survey touched upon a wide range of issues, this paper develops and analyses just those concerned with the engineer's partiality and dispute resolution. Conflict is common in the construction industry, but is not always negative; there are positive aspects connected with commercial risk-taking and competition (Fenn *et al.* 1997). However, negative conflict must be resolved if it is not to escalate into disputes, which can damage progress or worse, business relationships. Therefore, disputes must be resolved, usually by third party intervention such as arbitration or

Table 1: Regional distribution

Middle East	2
Scandinavia	2
South America	3
USA and Canada	9
Asia	10
Eastern Europe	11
Africa	17
United Kingdom	31
S.E. Asia	59
Western Europe	60

litigation. Arbitration was designed to solve disputes that require more technical knowledge (Murdoch and Hughes 1996). Since a dispute is usually a mixture of legal and technical matters, the choice between arbitration and litigation provides the parties with a choice about dispute resolution.

In order to ensure timely payment to contractors, an interim resolution mechanism is used in engineering contracts, namely, the engineer's decision.

Consequently, engineering contracts traditionally have two steps for dispute settlement; reference to the engineer then litigation or arbitration. Although

there are many causes of dispute, the contractual provisions to settle are quite simple. In fact, the provision in the FIDIC contract is similar to that for British domestic civil engineering works (i.e. ICE 5th edition¹), as well as that for domestic building works, such as AIA² in the USA and JCT 80³ in the UK.

Formal tribunals are expensive, slow, inconvenient and disruptive of business relationships (Lavers 1992). O'Reilly (O'Reilly 1995) is critical of the courts' emphasis on the importance of providing a right answer, rather than giving proper weight to time and cost. Alternative Dispute Resolution (ADR) seems to overcome the some of the disadvantages of litigation and arbitration and there is a trend towards ADR procedures (Brown and Marriott 1993, Taylor and Hinkle 1996).

FIDIC, through the Red Book, have introduced ADR procedures on two occasions. The first was an 'Amicable Settlement' clause. Hollands (1992), who was chairman of the FIDIC ADR Task Committee, reported the advantages of amicable settlement over arbitration. But there is some doubt as to whether it works as intended. Criticism has been based on the difficulty of enforcing such a clause because of its generality, there being no specification of any particular method (Molineaux 1995). Although this arises from FIDIC's desire for flexibility, it seems difficult for an amicable settlement clause to overcome the inherent weakness of any non-binding provision. Thus, it was felt that a more robust mechanism was needed and that it was too important to await publication of a revised contract (Bowcock 1997). The second attempt to introduce ADR procedures, the Dispute Adjudication Board (DAB), was incorporated as an amendment to the model form.

Clearly, FIDIC is keen to reflect contemporary practice. In order to evaluate the introduction of DABs, an empirical analysis, focusing on perceptions of practitioners and current practices, is more useful than the rhetorical approach reported in the literature so far. The issues identified for investigation in this paper are as follows:

- whether the engineer's role as quasi-arbitrator is recognized and respected as an international rule,
- whether the engineer's impartiality is generally supported,
- the extent to which the adjudicator (or the engineer) should have the power to settle a dispute.

¹ ICE Conditions of contracts, fifth edition, published by the Institution of Civil Engineering in the UK (the sixth edition, published in 1991, has introduced conciliation)

² General Conditions of Contracts for Construction, published by American Institute of Architects

³ JCT Standard form of Building Contract, 1980, published by the Joint Contracts Tribunal

Comparisons will be made between the types of jurisdiction, i.e. common law and civil code, as well as between contractual positions, i.e. employers, engineers (consultants) and contractors.

ANALYTICAL METHOD

The survey included two types of question; of perception and of fact. While factual questions can be measured on a ratio scale, perceptual questions can be measured only on a nominal or ordinal scale (Siegel and Castellan 1988). In other words, perceptions can not be shown with absolute values, but only with relative values. Therefore, non-parametric tests are used for the perceptual questions.

As well as summarizing the views of the respondents, the analysis reported here is concerned with comparing independent groups for differences in their perceptions. The data can be classified into two groups for jurisdictions (civil code and common law) and into three for contractual position (client, engineer, contractor). The null hypothesis is that the two compared groups have the same opinions or feelings with respect to a given issue. The alternative hypothesis is that the two groups differ significantly with respect to an issue. Of all tests for differences between categories of data, the Kolmogorov-Smirnov test ('KS test') is the most powerful (Siegel and Castellan 1988).

The collected data are ordinal rather than interval. However, even with ordinal data, the test is still suitable, though the results become conservative (Siegel and Castellan 1988). That is, the obtained value p will be slightly higher than it should be. This means that we can be confident in rejecting the null hypothesis when the value of p indicates significance (less than 0.05). Thus, the KS test will be used.

Since the data were not collected randomly, there is a danger that they contain bias. Indeed there are, for example, many responses from the UK and Malaysia (see Table 1, where the results for Malaysia make up most of the SE Asian responses). While the findings are expected to indicate a world-wide consensus, the data from strongly represented countries may distort the results. Moreover, considering that non-parametric tests are designed only to reject null hypothesis and the obtained value does not have any other meanings, the data from such countries may change the results. In short, the data may have a 'contamination' which leads to bias. In order to check for 'contamination', sensitivity analyses have been carried out, on a country basis. In sensitivity tests, all the data except a given country is analysed. The results of sensitivity tests are reported by Shinoda (1998). Except where indicated below, there is no data contamination.

DATA AND ANALYSIS

As mentioned previously, the survey covered many issues of interest to the EIC and FIDIC, but this paper focuses only on those questions connected with the engineer's role and dispute settlement. Questions were set out as opposing statements, with respondents asked to circle the number that most closely represented their view. In addition, there were questions of fact about the respondents' usual contractual role (client, contractor or consultant) and the usual jurisdiction (common law or civil code). The purpose of the analysis is to examine the data for any differences due to these factors. In the questionnaire, respondents were asked to circle 2, 1, 0, 1 or 2, indicating the direction and strength of their opinions, but the responses have been converted to 1, 2, 3, 4, 5 here for ease of reading and reporting the results.

Influence of jurisdiction on perceptions

The KS tests show that there is no significant difference between common law and civil code jurisdiction with regard to questions 17, 18, 19, 20, 21 and 35 ($p=0.880$, 0.630 , 0.120 , 0.097 , 0.530 and 0.861 , respectively). Sensitivity analysis, reported elsewhere (Shinoda 1998), shows that there is no data contamination that may invalidate these results. Since there is no difference between the two groups, it may be inferred that the jurisdiction of a respondent has no impact on his or her response. Thus, the effects of jurisdiction on perception are weaker than as is often said.

However, with regard to question 16, the KS test shows a significant difference of opinion ($p=0.010$); jurisdiction having an impact on perceptions. Therefore, further analysis of these responses will be interesting and is reported below.

Influence of contractual position on perceptions

As shown above, the data can be analysed without considering jurisdictions, except in the case of question 16. Here, the data will be grouped by contractual position.

Engineer's impartiality

There were two questions about the engineer's impartiality, 16 and 17 (see Table 2). It seems that whereas consultants believe the engineer's impartiality, contractors see engineers as rarely impartial. Clients seem to view the engineer as slightly impartial.

The KS test shows a significant difference between consultants and contractors ($p=0.000$) and between clients and contractors ($p=0.002$). However, there is no significant difference between clients and consultants ($p=0.112$).

Clearly, contractors are isolated, believing moderately that the engineer is rarely impartial (the mean and median are 2.25 and 2, respectively). On the other hand, consultants and client believe that the engineer is impartial (the mean and median of the consultants are 4.03 and 4, respectively, and those of the clients are 3.42 and 4, respectively). Although there seems to be a difference between consultants and clients in the strength of their belief, statistically there is no significant difference.

Direction of the engineer's partiality

Question 17 asked the direction of the engineer's partiality in administering contracts (Table 2). Contractors feel strongly that engineers favour employers. Clients and consultants agree, but to a lesser extent. The KS test shows a significant difference between consultants and contractors ($p=0.000$), but not between clients and contractors ($p=0.109$) or clients and consultants ($p=0.159$). The responses of contractors and consultants reveal that contractors feel engineers favour employers (mean and median of 4.19 and 4, respectively), as do the consultants, but to a lesser extent (mean and median of 3.56 and 4, respectively). Clients are in the middle of the two (the mean and median are 3.96 and 4, respectively), but the KS test shows no significant difference between clients and contractors or between clients and consultants.

Although the KS test shows a significant difference between contractors and consultants, it only indicates a difference of magnitude, rather than direction. All respondents have a common belief that the engineer favours the employer.

Engineer as adjudicator

Three questions dealt with the engineer's role as adjudicator, 18, 19 and 35. While 18 and 19 were about the general idea, question 35 related specifically to the Red Book.

Table 2: Selected questions and responses from the survey

Q 16: Engineers' impartiality							
	%	1	2	3	4	5	<i>No</i>
Engineers are rarely impartial in exercising their powers under a contract	Cons	6	4	8	45	37	71
	Cont	30	38	13	16	3	104
	Client	12	19	12	31	27	26
	Civil	22	32	14	19	14	79
	Com	17	18	10	34	20	122
Tot	19	23	11	28	18	201	
							Engineers are usually impartial in exercising their powers under the contract
Q 17: Direction of engineers' partiality							
Engineers typically favour the contractor in administering contracts	Cons	1	4	39	46	8	71
	Cont	1	2	16	38	42	104
	Client	0	0	23	58	19	26
	Civil	0	1	29	43	27	79
	Com	2	3	23	44	28	122
Tot	1	2	25	44	27	201	
							Engineers typically favour the employer in administering contracts
Q 18: Engineer as dispute settler							
Generally, it is a bad idea to incorporate terms which call upon the engineer to settle disputes between the employer and the contractor	Cons	7	8	7	34	44	71
	Cont	26	28	4	27	15	104
	Client	27	8	4	12	50	26
	Civil	15	27	5	27	27	79
	Com	22	13	5	28	32	122
Tot	19	18	5	27	30	201	
							Generally, it is a good idea to incorporate terms which call upon the engineer to settle disputes between the employer and the contractor
Q 19: Adjudicator as dispute settler							
Someone other than the engineer should be first line Adjudicator(s) in the event of disputes	Cons	14	10	6	25	45	71
	Cont	30	24	3	23	20	104
	Client	31	4	0	23	42	26
	Civil	20	27	6	19	28	79
	Com	27	10	2	27	34	122
Tot	24	16	3	24	32	201	
							The engineer is the best person to be the first line Adjudicator in the event of disputes
Q 20: Decisions of adjudicators							
An Adjudicator, or a formal adjudication board, should make recommendations, rather than decisions	Cons	13	17	4	23	44	71
	Cont	15	19	8	24	34	104
	Client	12	19	8	27	35	26
	Civil	16	20	9	27	28	79
	Com	12	17	5	22	43	122
Tot	14	18	6	24	37	201	
							An Adjudicator, or a formal adjudication board, should make decisions, rather than recommendations
Q 21: Appeals against adjudication							
Decisions of the engineer (or Adjudicator, or adjudication board) should not be open to appeal	Cons	10	11	3	41	35	71
	Cont	5	2	6	18	69	104
	Client	15	15	15	35	19	26
	Civil	5	9	11	29	46	79
	Com	10	6	2	28	54	122
Tot	8	7	6	29	51	201	
							Decisions of the engineer (or Adjudicator, or adjudication board) should be open to appeal
Q 35: Engineer's dispute settlement							
The FIDIC clauses governing engineer's decisions are not particularly helpful in achieving speedy and equitable settlement of disputes	Cons	6	27	25	34	7	71
	Cont	25	22	21	27	5	104
	Client	8	16	24	32	20	26
	Civil	18	23	21	28	10	79
	Com	14	23	24	32	7	122
Tot	16	23	23	30	8	201	
							The FIDIC clauses governing engineer's decisions are very helpful in achieving speedy and equitable settlement of disputes

Engineer as dispute settler

Question 18 asked for perceptions on those contract terms that call upon the engineer to settle disputes between the employer and the contractor (see Table 2). Each respondent has a clear opinion since only 5% scored 3. While consultants seem to believe strongly that the idea is good, contractors argue against the idea. Clients seem to support the idea, but only moderately.

The KS tests show significant differences both between consultants and contractors ($p=0.000$) and between clients and contractors ($p=0.007$). Between consultants and clients, the KS test does not show a significant difference ($p=0.222$). Contractors are isolated in the view that the incorporation of dispute settler into the role of the engineer is a bad idea (mean and median are 2.78 and 2, respectively). On the other hand, consultants and client believe that the incorporation is a good idea (mean and median of consultants are 3.99 and 4, and those of clients are 3.50 and 4).

Adjudicator as dispute settler

Question 19 asked whether the engineer is the best to be first referred to in the event of disputes. If not, someone other than the engineer would be sought (Table 2).

Again, there is a clear opinion since each only 3% of respondents scored 3. Consultants seem to believe strongly that the engineer is the best person to act as a dispute settler, though 24% seek someone else. Clients seem to support slightly the consultants' belief, whereas contractors seem to disagree with it moderately.

The KS test shows a significant difference between consultants and contractors ($p=0.001$). There is neither a difference between clients and contractors ($p=0.131$) or between clients and consultants ($p=0.345$). On the one hand, consultants believe that the engineer is the best person to act as a dispute settler (the mean and median of consultants are 3.77 and 4, respectively). On the other hand, contractors clearly disagree with it and desire someone else (the mean and median are 2.80 and 2, respectively). Clients seems to support consultants (the mean and median of clients are 3.42 and 4, respectively), but only slightly. Rather, clients are in the middle of the two, considering the results of the KS tests.

Engineer's dispute settlement

Question 35 asked for an evaluation of the engineer's role as a dispute settler in accordance with the Red Book (Table 2). While in the previous two questions (18 and 19) each respondent shows a clear opinion, in this question they are less clear. In addition to the 23% scoring 3, the number of respondents who indicate that the existing engineer's role is very helpful is exactly the same as those who argue that it is not.

The KS tests do not show any significant difference in the three relations ($p=0.060$ between consultants and contractors, $p=0.131$ between clients and contractors and $p=0.564$ between clients and consultants). Since there is no difference, the total distribution (the last row of numbers in Table 2) can be seen as a generalization. The median of the total distribution is 3 and the arithmetical mean is 2.92. Therefore, the evaluation of the existing engineer's role as a dispute settler is quite neutral.

Power of adjudicators

There were two questions on the power of adjudicator, 20 and 21.

Decision or recommendation

Question 20 asked whether an adjudicator (or a formal adjudication board) should make decisions or recommendations. The data distributions are shown in Table 2.

It seems that the majority feel that adjudicators should make decisions, rather than recommendations. There seems to be little difference between the three groups. The KS tests do not show any significant difference in the three relations ($p=0.429$ for the relation between consultants and contractors, $p=0.940$ between clients and contractors and $p=0.732$ between clients and consultants).

As is the case of question 35, where there is no difference in the three relations, the total distribution can be seen as a generalization. The median of the total distribution is 4 and the arithmetical mean is 3.52. Therefore, it may be concluded that it is generally felt that the adjudicator should make decisions, rather than recommendations.

Open or not open

Question 21 asked whether a decision by the engineer (or an adjudicator, or a formal adjudication board) should be open to appeal or not. The data distributions are shown as Table 2. It seems that all of the three groups feel that a decision should be open to appeal, though there seems to be a difference in strength. Contractors seem to feel strongly about this, whereas clients and consultants seem moderate in these views.

The KS tests show that there is a significant difference both between consultants and contractors ($p=0.000$) and between clients and contractors ($p=0.000$). Regarding the relation between clients and consultants, the tests show no difference ($p=0.153$).

Clearly, the contractors support strongly the idea of appeals against adjudication (the median and mean are 5 and 4.45, respectively). Although the client and the consultant are different from contractors, they also support it, but to a lesser extent. The median and mean of clients are 4 and 3.27, respectively, and those of consultants are 4 and 3.80, respectively.

Engineer's impartiality

Returning the question of the engineer's impartiality, the KS test shows a significant difference between the two jurisdictions. It was shown above that contractors differ significantly from both consultants and clients. It is useful to investigate the way in which the jurisdictional perceptions affect the positional perceptions and vice versa. Splitting that data by jurisdiction enables the same test to be carried out on subsamples of the data, to ascertain the source of the differences. This has been undertaken (Shinoda 1998) and reveals that in both jurisdictions, despite slight difference of client views, the views of consultants and contractors do not change. Thus, contractual positions affect perceptions more strongly than jurisdictions do. This reinforces the findings from the results from the other questions.

Influence on perceptions

There is no statistical difference between the two jurisdictions for all except question 16. Even with the more detailed analyses of question 16, the influence of jurisdiction on perceptions is much weaker than that of contractual position.

The results of the KS tests on contractual positions are summarized Table 3, where significant differences are marked. Of all the seven questions there is no significant difference between clients and consultants. By contrast, in five of the questions there are significant difference between consultants and contractors. This is very interesting, considering the primary function of consultants (the engineer) in a contract, which is an agreement between clients and contractors. Construction contracts rely on the third party, the engineer, for proper functioning. In other words, the engineer is supposed to be in the middle of the two parties to communicate and cooperate with the both parties. However, it seems that although there are differences between clients and contractors about the engineer's role and about settlement of disputes, there are more differences of view between contractors and consultants. This may indicate a fundamental problem with the administration of construction contracts.

Table 3: Summary of KS tests

		Consultant vs contractor	Client vs contractor	Client vs consultant
Q16	Impartiality	✓	✓	
Q17	Direction of impartiality	✓		
Q18	As a dispute settler	✓	✓	
Q19	Best adjudicator	✓		
Q20	Decision or recommendation			
Q21	Appeals against adjudication	✓	✓	
Q35	Evaluating the existing role			

CONCLUSIONS

Statistical tests can provide indications but not a whole picture. For instance, the statistical differences in question 17 and 21 mean those in magnitude, but not their orientations. In order to overcome the weakness, medians and means have been provided to enable broader inferences from the data.

There may be some discrepancies in related questions, for example, between 16 and 17 and between 18 and 19. Amongst them, question 35, asking for an evaluation of the existing role, may be the most interesting in terms of whether a practical view is different from ideal perceptions. For this reason, relations between questions should be analysed, but this is beyond the scope of this paper.

The statistical analysis has indicated how much detail can be inferred from the survey, as well as the danger of taking the numbers of various responses at face value. For example, it seemed that consultants felt more strongly than clients about the impartiality of engineers, but the difference has no statistical significance.

Contractors feel that engineers are rarely impartial in administering the contract. All groups feel that engineers' partiality is toward clients. Contractors are against the idea of engineer as first-line settler of disputes, preferring an adjudicator or adjudication board, whereas consultants are in favour of being the first-line settler of disputes. The general view about the engineer as settler of disputes is neutral, with those in favour exactly balancing those against, and with no significant difference between any groupings of respondents.

All parties feel that adjudicators should make decisions rather than recommendations, with such decisions open to appeal, although contractors felt more strongly about the need for appeal than the other groups.

The jurisdiction in which respondents usually operate has no impact on their views of the issues reported here, whereas their usual contractual position is significant.

ACKNOWLEDGMENT

The authors are grateful to EIC and to FIDIC for their financial support of this research and for the use of the data.

REFERENCES

- Akroyd, R.I. (1987) *A guide to contracting, negotiation and the law*. London: Sweet & Maxwell.

- Andre-Dumont, H. (1988) The FIDIC conditions and civil law. *International Construction Law Review*. **5**(1), 43–52.
- Beale, H. and Dugdale, A. (1975) Contracts between businessmen: planning and the use of contractual remedies. *British Journal of Law and Society*. **2**: 45–60.
- Bowcock, J. (1997) The new supplement to the FIDIC Red Book. *International Construction Law Review*. **14**(1), 49–60.
- Bromilow, F.J. (1970) The nature and extent of variations to building contracts. *Building Economics*. **9**(3), 93–104.
- Brown, H.J. and Marriott, A.L. (1993) *ADR principles and practice*. London: Sweet and Maxwell.
- Bunni, N.G. (1998) *The FIDIC form of contract: the fourth edition of the Red Book*. 2ed. Oxford: Blackwell Science.
- Fenn, P., Lowe, D. and Speck, C. (1997) Conflict and dispute in construction. *Construction Management and Economics*. **15**(6), 513–518.
- Hollands, D.E. (1992) FIDIC study on amicable settlement of construction disputes. In: Fenn, P. and Gameson, R. (eds) *International Conference on Construction Conflict* London: Spon, 362–366.
- Hughes, W. and Greenwood, D. (1996) The standardization of contracts for construction. *International Construction Law Review*. **13**(2), 196–206.
- Lavers, A. (1992) Construction conflict management and resolution: analysis and solutions. In: Fenn, P. and Gameson, R. (eds,) *Construction conflict management and resolution*. London: Spon, 3–20.
- Minogue, A. (1997) The case for the defence. *Building*. **262**(49), 12 Dec 1997, 28–29.
- Molineaux, C.B. (1995) Real time dispute resolution: updating FIDIC. *International Construction Law Review*. **12**(2), 258–266.
- Murdoch, J.R. and Hughes, W.P. (1996) *Construction contracts: law and management*. 2ed. London: Spon.
- O'Reilly, M.P. (1995) Risk, construction contracts and construction disputes. *Construction Law Journal*. **12**(3), 343–354.
- Perlman, M.S. (1991) Legal guide on drawing up international contracts for the construction of industrial works. *The American Journal of International Law*. **84**(1), 345.
- Shinoda, H. (1998) *Need for alternative dispute resolution in international civil engineering construction*. Unpublished MSc Thesis, Dept of Construction Management & Engineering, University of Reading, Reading.
- Siegel, S. and Castellan, N.J. (1988) *Non-parametric statistics for the behavioural sciences*. 2ed. New York: McGraw-Hill.
- Taylor, R. G. and Hinkle, B. (1996) How to use ADR clauses with standard form construction industry contracts. *International Construction Law Review*. **13**(1), 56–88.
- Thomas, R. (1993) *Construction Contract Claims*. Basingstoke: Macmillan.