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An examination of the importance of resource considerations when contractors make project selection decisions

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This research investigates the factors which building contractors consider when making project selection decisions and the processes they follow when making such decisions. The research is based on the premise that resource consideration is the most important factor for contractors when making project selection decisions. Literature was used to identify those factors thought to be most influential. The extent of the diversity of opinion disclosed indicated the necessity to obtain further information which was gathered from contractors by use of postal questionnaires and interviews. The information was analysed by ranking techniques and the results compared by Spearman rank correlations coefficient. The results obtained indicated the strengths of the factors identified. Spearman rank correlation coefficient showed a positive correlation for the results obtained from the findings of the literature study and those obtained from the survey.

A non-weighted model of contractors' tendering decision process was developed. The model shows the inter-relationship that exists between client and contractor decisions. The model also illustrates the effect of such decisions on the actions of both clients (their representatives) and contractors.

The results obtained from the survey shows that, 'the ability of the client to pay for the cost of work' is the most important factor contractors consider when making project selection decisions.

Keywords: project selection decisions, contractors, clients, tendering, resources

Introduction

Contractors do not always bid for every job that comes along. Rather, they usually select from a continually changing array of potential projects. As Milne (1980) observed, a non-selective approach to the preparation of tenders would inevitably add to the estimators' workload and impair the accuracy of estimates when capacity is exceeded. Accepting any work without adequately considering such factors as the financial, managerial, manpower and physical resources of the firm, may result in the value of the work-in-hand being beyond that which the firm can control successfully.

A contractor who accepts work without considering other factors such as 'the identity of the client', or 'the identity of the client's representatives' and the 'client's ability to pay for the work', may lead to a situation in which the indecision and the attitude of the client, or that of his or her representatives, disrupts the programme of work for the project (and other projects which the contractor may have in-hand). Such disruptions of work may result in losses or a drop in the level of anticipated profit for the firm. A contractor who wishes to maintain a

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successful and profitable operation has to consider such factors before accepting the invitations to tender.

This research examines the factors which contractors consider when making project selection decisions, listing and quantifying the factors in order of importance. A generalized model of contractors' tendering decision process has been developed to illustrate the possible implications of decisions which contractors make.

Aim of research

To identify and evaluate the factors which contractors consider when making project selection decisions and to evaluate the importance of resource requirements to such decisions.

Objectives

1. To identify the main factors which contractors consider when making project selection decisions.
2. To evaluate the importance of resource requirements relative to the other factors which contractors consider when making project selection decisions.
3. To develop a generalized model of contractors' tendering decision process.

It is hypothesized that: 'Resource requirement is the most important factor which contractors consider when making project selection decisions'.

Methodology

The conceptual framework and the hypothesis dictated, to a large extent, the general nature of the methodology adopted for this research.

From the literature, the factors which were considered by the authors to be important in making project selection decisions were identified and recorded. Since there was some disagreement among the authors as to the factors that are important, it was decided to list all the factors identified by the authors and to rank them according to the number of authors who identified them as being important for project selection.

A total of 68 factors were identified initially and these were ranked in order of the number of authors citing them. A closer examination of those factors revealed that, within the original construct, individual authors had used different expressions to mean the same thing; this led to a reduction in the number of factors identified to 42 (including elimination of some factors due to infrequent citing). Table 1 shows a list of the factors identified and ranked in order of the number of authors who identified then as being important. The sample provided a broad appreciation of the factors likely to be considered by contractors.

Within the 42 individual factors, there was little agreement among the authors, with only 14 factors receiving the support of 29% of the authors sampled. Since no single factor received the support of all 17 authors, it was decided to collect data from contractors and compare this with data obtained from the literature study.

Table 1. Factors identified by authors to be important in making project selection decisions – ranked in order of the numbers of authors who identify them as being important

Factors identified by authors	Number of authors in agreement	Rank
Identity and reputation of the client	11	1.0
Physical resources necessary to carry out project	10	2.5
Present state of the company's workload	10	2.5
Ability of client to pay	9	5.0
Margin of profit involved (contract profitability)	9	5.0
Availability of work, both current and potential	9	5.0
Financial resources necessary to carry out project	8	8.0
Identity of the consultants	8	8.0
Time available in which to tender	8	8.0
Type of work	7	10.5
Form of contract being proposed by client	7	10.5
Adequacy of tender information	5	13.0
Contract period	5	13.0
Location of the project	5	13.0
Probable competition on the tender list	4	17.0
Contractor's perceived chances of being successful	4	17.0
Details of nominated sub-contractors	4	17.0
Value of the project	4	17.0
Current estimating workload	4	17.0
Resources to tender for the job	3	23.5
Number of tenderers	3	23.5
Construction problem (complexity)	3	23.5
Previous experience with the client	3	23.5
Previous experience with the consultants	3	23.5
Project contribution to desired optimum turnover	3	23.5
Promoting the contractor's reputation	3	23.5
Timing of the contract (convenience of contract)	3	23.5
Previous experience with similar types of work	2	30.0
Identity of probable competitors for project	2	30.0
Company goals	2	30.0
Anticipated data of possession of the site	2	30.0
Site conditions	2	30.0
Details of nominated suppliers	1	37.5
Cost of financing the project	1	37.5
Projected break-even point for the contract	1	37.5
Cost of bidding	1	37.5
Value of own work	1	37.5
Seasonal risks	1	37.5
Proposed tendering arrangements	1	37.5
Fostering good relationships with valued regular clients	1	37.5
Ability to satisfy client needs	1	37.5
Anticipated cash-flow problems	1	37.5

Two methods were used to collect the data needed from contractors. The first method was formal questionnaires which were distributed by post to contractors. The second method was unstructured interviews which were conducted among selected and interested contractors.

Data collection

The questionnaire was prepared from information gathered during the literature study and supplemented by questions to gather additional information. Approximately 150 construction firms were selected at random. The constraints in the selection being that the firm should

1. Be a building or general building contractor.
2. Have a turnover of over £8 million during the last financial year.
3. Be based in the United Kingdom.
4. Have an estimating department.

The questionnaires were sent to the chief estimators. In cases where the chief estimator was not available to complete the questionnaire, there was a request in the accompanying letter that the questionnaire should be completed by anyone in the company who participates actively in making project selection decisions.

Of the the 150 questionnaires sent, 48 were returned properly completed, giving a response rate of 32%.

As well as the questionnaire survey, unstructured interviews were conducted with four companies. After preliminary contacts with ten contractors, four of them agreed to be interviewed. The four companies interviewed represented a spread of both size and capability. Wherever possible, the chief estimator was interviewed in order to achieve an overview of the whole project selection decision-making process.

So that the amount of information that could be obtained from the interviewees would not be restricted, and to allow individual opinions to be expressed whilst minimizing interviewer bias, an unstructured interviewing technique was used. At the beginning of each interview, interviewees were given a summary of what the study was about. They were given the freedom to discuss the subject from their own point of view, drawing from practical experience all the information which they considered would be useful. Notes were taken as the interview progressed. The researcher stepped in only to clarify certain points made and to ask questions about subjects which the interviewee had not mentioned. In all cases, the interviewees passed constructive comments on the proposed model of the tendering decision process of contractors.

The interviews were conducted to obtain information from contractors on

1. The decision-making process which contractors follow on being invited to tender.
2. The factors they consider when making project selection decisions and reasons for the importance of these factors.
3. Their view on the model of 'contractors' tendering decision process' developed by the researcher from the literature.

From the information obtained during the interviews with contractors, the generalized

model of contractors' tendering decision process, which was developed during the literature study, was modified.

Data analysis

The construct used for Section A of the questionnaire was the 42 factors identified from the representative sample of literature studied. The data obtained from the responses of the contractors was analysed as follows for each of the 42 factors:

1. The total number of contractors who attached weightings to the factor was counted and recorded.
2. The number of contractors who agreed on the weighting given to the factor was counted and recorded.
3. The percentage value of each of the scaled weightings counted in 2. above were calculated with reference to the total amount of weighting given for each factor.
4. The factors were ranked in order of importance, based on the results obtained from 3. above.

To rank the factors in order of importance, the factor with the highest score of importance (in this case, the score 'very important') was ranked the most important of the 42 factors. The percentage of the number of respondents who identified the factors as being 'very important' was used in this manner to grade the factors in order of importance. In cases where the percentage of respondents who identified two or more factors as being 'very important' was the same, the calculated value for the next 'grade of importance' on the scale was used to grade the factors in order of importance. In cases where the next value was also found to be the same, subsequent values of the gradings on the scale was used in a similar manner to rank the factors.

The results obtained from the analysis of responses to Section A of the questionnaire is presented in Table 2. The results obtained were also used to rank the 42 factors in order of their importance when project selection decisions are being made. The percentage of the respondents who selected the individual gradings of the given scale for each individual factor was used for analysis. This was due to the fact that the number of respondents who answered the questions relating to the various factors differed, since not all respondents answered all the questions.

In Section B of the questionnaire the respondents were asked to list six factors which they considered to be most important in making the decision on whether or not to tender for projects. The results obtained from this question were considered to be useful for the verification of those obtained from responses to Section A and for comparison with those obtained from the literature study. It was assumed that the factors considered to be useful by contractors for project selection decisions would feature predominantly in the response, while those which are not usually considered by contractors would not be mentioned at all in the list of the contractors. The method was considered to be very useful as an indicator because the respondents were allowed to name any factors of their choice without bias from the writer's prepared list.

The responses obtained to the question in Section B were sorted and classified as well as

Table 2. Questionnaire survey results to Section A showing the factors analysed and their relative importance according to cumulative contractor ranking

	Analysis of scores given by contractors in percentages					
Factors	V. Imp*	Imp*	N.V. Imp*	Neg.*	Irrelevant	Rank
Client's ability to pay	89.583	8.333	0	0	2.083	1
Type of work	62.50	33.333	4.167	0	0	2
Regular client – good relationship	54.167	35.417	6.25	2.083	2.083	3
Provide client satisfaction	52.083	45.833	0	2.083	0	4
Profitability	48.936	44.681	4.255	0	2.128	5
Contractor's current workload	47.917	47.917	2.083	2.083	0	6
Chances of getting the job	40.426	40.426	17.021	2.127	0	7
Time to tender	39.583	47.917	10.417	2.083	0	8
Estimating workload	39.583	43.750	14.583	2.083	0	9
Number of tenderers	39.583	43.750	12.50	4.167	0	10
Adequacy of tender information	37.50	50.0	12.50	0	0	11
Seasonal risks	36.170	46.809	12.766	4.255	0.	12
Availability of work	33.333	60.417	6.25	0	0	13
Value of project	29.167	68.75	2.083	0	0	14
Contribution to turnover	29.167	54.167	16.667	0	0	15
Form of contract	29.167	52.083	18.75	0	0	16
Location of project	29.167	45.833	22.917	2.083	0	17
Physical resources to do the job	27.660	61.702	8.511	0	2.1277	18
Previous experience with client	27.083	52.083	18.75	2.083	0	19
Cashflow	27.083	39.583	20.833	4.167	8.333	20
Resources to tender	25.0	56.25	18.75	0	0	21
The contract period	25.0	52.083	20.833	2.083	0	22
Competition on tender list	25.0	47.917	22.917	2.083	2.083	23
Identity of the client	22.917	58.333	18.75	0	0	24
Construction problems/complexity	20.833	54.167	16.667	6.25	2.083	25
Company goals	19.565	54.348	23.913	2.174	0	26
Previous experience with consultants	18.75	58.333	18.75	2.083	2.083	27
Recovery of capital	18.75	52.083	16.667	10.417	2.083	28
Cost of financing project	18.75	29.167	47.917	2.083	2.083	29
Financial resources to do the work	18.75	37.5	31.25	4.167	8.333	30
Proposed tendering arrangements	17.021	57.447	23.404	2.128	0	31
Promoting contractor's reputation	16.667	50.0	25.0	6.25	2.083	32
Experience with similar type of work	12.5	54.167	31.25	2.083	0	33
Site conditions	10.638	42.553	44.681	2.1277	0	34
Identity of the consultants	10.417	68.75	14.583	4.167	2.083	35
Probable competitors	10.417	39.583	35.417	10.417	4.167	36
Convenience of the contract	8.696	28.261	58.696	4.348	0	37
Date of site possession	8.333	45.833	43.75	2.083	0	38
Value of own work	8.333	45.833	41.667	2.083	2.083	39
Cost of bidding	4.167	35.417	45.833	8.333	6.25	40
Nominated sub-contractors	2.1277	40.426	31.915	17.021	8.511	41
Nominated suppliers	2.083	29.167	37.50	22.917	8.333	42

possible under the factors identified by authors and used in Section A. This was necessary to maintain consistency in the factors, since the construct used for the question resulted in a wide variety of names and phrases being used to refer to the same factor. The clustering and grouping of similar factors was also carried out where necessary to achieve practical results and avoid confusion. From the results obtained from this analysis, the factors were ranked in order of importance, according to the number of times they were observed, as shown in Table 3.

Table 3. Factors identified by contractors, ranked in order of the number of contractors who identify them (results of responses to Section B)

Factors identified by contractors	Number of contractors in agreement	Rank
Client related factors	38	1.0
The type of work	34	2.0
Value of the project	17	3.0
Contractor's current workload	14	4.0
Estimating workload	13	6.5
Profitability of contract	13	6.5
Location of the project	13	6.5
Form of contract	13	6.5
Physical resources to do job	12	9.0
Identity of consultants	10	10.5
Time available to tender	10	10.5
Competition related factors	8	12.0
The contract period	7	13.5
Contribution of project to turnover	7	13.5
Adequacy of tender information	6	15.5
Resources to tender for job	6	15.5
Availability of work both current and potential	5	17.5
Chances of getting the job	5	17.5
Number of tenderers	4	19.5
Proposed tendering arrangements	4	19.5
Previous experience with consultants	3	21.5
Previous experience with similar type of work	3	21.5
Company goals	2	24.0
Cash flow	2	24.0
Construction problems (complexity)	2	24.0
Value of own work	1	28.0
Financial resources to do the job	1	28.0
Promoting contractor's reputation	1	28.0
Cost of financing the project	1	28.0
Cost of bidding	1	28.0

The general model of contractors' tendering process, a hypothetical model, was first developed from information gathered during the literature review, see Fig. 1. This model was shown to the contractors interviewed to obtain their comments upon its validity.

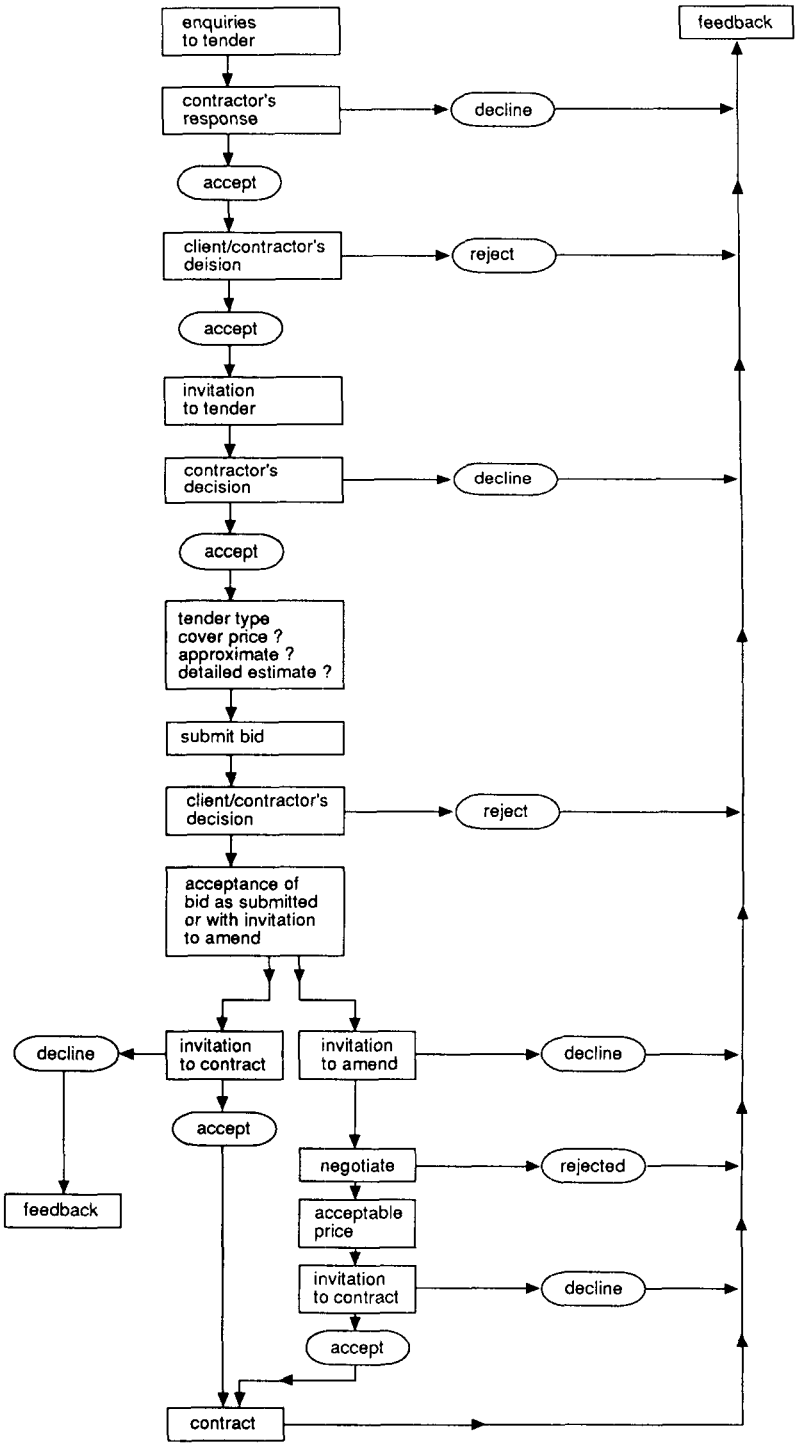

Fig. 1. Model of contractors' tendering decision process developed from informations from literature study.

The main comments made by contractors about Fig. 1 are as follows:

1. After bidding for a job, it is very rare for a contractor to decline an invitation to contract or one to negotiate amendments to the tender.
2. Due to qualification of the tenders submitted by contractors, or the need to make amendments or rebid (among other measures), a two or three stage cycle (loop) may develop before a contractor's tender is acceptable to the client or client's representatives.
3. Price is the common base on which tenders are judged but other factors may be used, depending on the circumstances surrounding the contract.

The comments of the contractors were noted and used to develop the model of contractor's tendering decision process, Fig. 2.

Results

The results showed that the majority of the respondents participated actively in making tendering decisions. In fact, 87.5% of the respondents claimed they often participate actively in making tendering decisions, while 12.5% of the respondents participate only occasionally in making such decisions.

Of the companies who participated in the survey 75% have a selected group of personnel, usually directors, who make project selection decisions, while 16.67% use only one person, usually the chief estimator or managing director, to make such decisions. Approximately 8.33% of the companies claimed they use a mixture of both systems (groups or individuals) in making such decisions, depending on the circumstances. Usually 'groups' make the decisions on large and complex projects with lots of uncertainties and 'individuals' make decisions on small and minor projects.

Information received from the questionnaire showed that an average of 62 projects were started by each of the contractors during the last financial year, although the number of projects started by each individual contractor was found to range between 3 and 730. On the other hand, the contractors received an average of 284 invitations to tender within the same year, with the number of invitations received by each contractor ranging between 50 and 2850. Within the same period, the contractors claimed they submitted tenders for an average of 73.1% of the projects for which invitations to tender were received, of which they had an average success rate of 22.41%.

The results obtained from the response to Section A of the questionnaire, as shown in Table 2, ranked client-related factors as the most important factors which contractors consider when making the decision to tender. The important client-related factors are:

1. The ability of the client to pay (ranked 1).
2. Good relationship with important regular clients (ranked 3).
3. The ability to provide client satisfaction (ranked 4).

Contractors ranked 'the type of work' as the second most important factor. The following further factors were considered to be important:

1. The margin of profit projected for the contract (ranked 5).

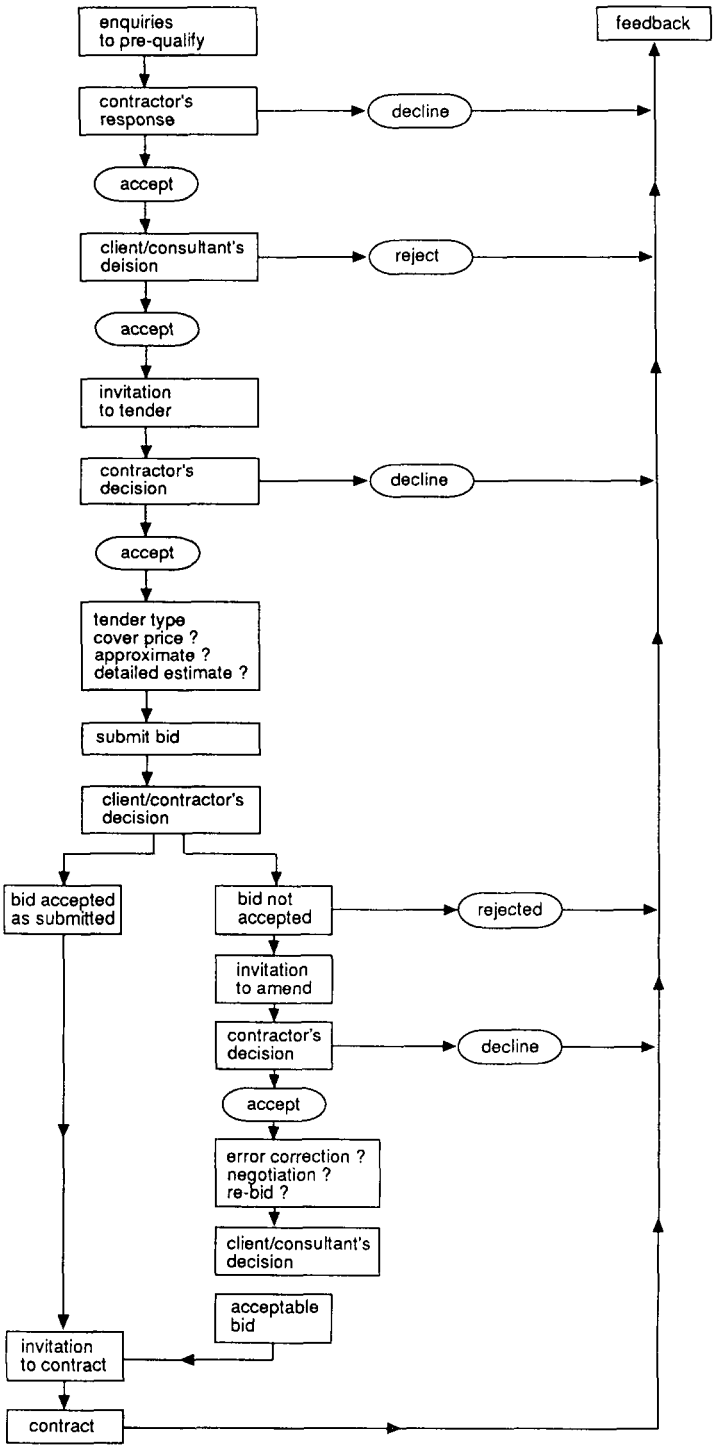

Fig. 2. Model of contractors' tendering decisions.

2. The contractor's current workload (ranked 6).
3. The contractor's chances of getting the job (ranked 7).
4. The time available in which to tender (ranked 8).
5. The current estimating workload of the company (ranked 9).

The results obtained from the responses to the question in Section B of the questionnaire are shown in Table 3. The results also gave client-related factors as the most important factors and 'the types of work' as the second most important factor. The results show that contractors also consider the following factors as being important in making project selection decisions:

1. The value of the project (ranked 3).
2. The contractor's current workload (ranked 4).
3. The current estimating workload of the company (ranked 6.5).
4. The profitability of the contract (ranked 6.5).
5. The location of the project (ranked 6.5).
6. The form of contract proposed (ranked 6.5).

When the results obtained from Section A (where the contractors graded the importance of the factors supplied) and Section B (where the six most important factors for project selection decisions were listed by the contractors) were examined and compared, it was observed that there was some rearrangement of ranks and positions among many of the factors under consideration. A general agreement with respect to their approximate level of importance was, however, still evident.

When the Spearman Rank Coefficient was used to compare the literature and empirical findings, the result obtained showed a positive correlation for the results obtained from the findings of the literature study and the two sets of findings obtained from the questionnaire survey conducted with contractors. The results are shown in Table 4.

Discussion of results

The results of the surveys carried out for this study show that 'client' related factors are the most important of the factors which contractors consider when they are making project selection decisions. The results obtained from the literature and those from the surveys carried out with questionnaires among contractors, show some disagreement, when individual factors, i.e. the identity of the client, the ability of the client to meet the cost of work, previous experience with the client, good relationship with valued and regular clients, and the ability to satisfy client needs are considered.

Tables 1 and 2 show that while authors rank 'the identity of the client' as the most important factor they believe that contractors consider when making project selection decisions, contractors regard 'the client's ability to pay' as the most important factor that influences their project selection decisions.

The differences in ranking of the individual factors, when the findings of the literature study and the questionnaire survey results were compared, appears to have resulted because the aims of the 'authors' were different from those of this research. While the aim of the research was to identify and rank the factors which contractors consider when making

project selection decision, the aim of most of the authors used in the literature study was to list and comment on the factors they believe contractors should consider when making such decisions. Also, different sources (i.e. authors and contractors) supplied the data used for the study and this may have contributed to the variations in the findings for the literature study and questionnaire survey.

The two sets of results obtained from the questionnaire survey were, generally, in agreement. Since both sections of the questionnaires were completed by the same respondents, the variations observed were probably due to the difference in the method used to collect the data.

Spearman rank correlation coefficient indicated a statistically significant positive correlation when the findings of the literature study and the two sets of results obtained from the questionnaire survey were compared (see Table 4). The findings of the questionnaire and literature study survey were supported by the contractors interviewed. The contractors claimed that such factors as, 'the financial standing of the client', 'the identity of the client' and 'the identity of the clients' representatives' are very important factors which influence their decision during project selection.

Table 4. Results of Spearman rank correlation coefficient

	Findings from literature study	Findings from responses to question 9
Findings from responses to question 9	0.405	
Findings from responses to question 10	0.723	0.657

The contractors interviewed were in agreement that tried, reliable and regular clients take precedence over others during project selection. Information obtained during the interviews also revealed that most contractors usually carry out detailed investigations to find out about some clients and their financial standing, in cases where the client is not known or when doubts exist about the client's ability to fund the project.

The results obtained from the questionnaire survey show that while contractors believe that 'the type of work' is the second most important factor to be considered when making project selection decisions, the result obtained from the findings of the literature study (which rank it 9.5) showed that authors do not attach as much importance to that particular factor.

Contrary to the general belief among the authors that the finite amount of resources at a contractors disposal makes 'the physical resources necessary to carry out the project' a very important factor, the results obtained from the questionnaire survey and interviews showed that contractors do not accept that it is a very important factor. Contractors do not attach much importance to this factor because they believe that resource constraints can be overcome easily by obtaining extra resources from alternative sources (e.g. hire, lease, sub-contracting etc. . .) when those at the contractor's direct disposal cannot cope with the work-in-hand. However, this is done only after due consideration has been given to the mobilization of such resources and adequate attention has been given to a realistic programme with adequate lead time.

Similarly, the results of the questionnaire survey showed that contractors do not regard 'the financial resources necessary to execute the contract' as an important factor. Since contractors see the provision of the financial resources primarily as the responsibility of the client, contractors believe that most of the problem has been solved once the identity, reputation, financial standing and the ability of the client to meet the cost of the project have been established. The necessary finance to start, carry out and maintain cashflow is usually obtained by contractors from their own funds or from traditional sources, pending the agreed time when client starts making payments for the work done and the project achieves break-even point.

Tables 1, 2 and 3 show that both contractors and authors agree that the 'contractor's present workload' is a very important factor. The importance of 'the company's workload' becomes obvious when one considers the combined effect of the ability of the principals of the company to control an ever increasing workload, and the inverse relationship that can develop between profitability and the number of projects. The view is shared by Milne (1980), who observed that, 'tendering and accepting work without adequate financial, managerial or manpower resources will mean that, at times, the value of work-in-hand will go beyond that which the principals of the firm can successfully control. The unnecessary additional work, even if secured at high rates, may prove to be a source of difficulty resulting in low return or possible loss'. This view is supported by Smith (1986), who discussed the danger of 'over-trading' which is often present with the possibility of increased turnover. He observed that when a contractor becomes over-stretched, both financially and in terms of technical and management staff, the scramble to recover ever increasing overhead costs often results in price cutting to secure the necessary volume of work, inevitably leading to disaster.

Contractor's Tendering Decision Model

The models of a contractor's tendering decision process illustrates a generalized pattern of the decision process of contractors. The model (see Fig. 2) shows the inter-relationship that exists between contractor and client actions and decisions. The process is both interactive and iterative. The contractor's decision process consists of both active and passive processes, as a result of dependence of some of the contractors' decisions and actions on those of other parties (i.e. the client and/or the client's representatives).

The contractor's active processes include such actions as

1. Marketing, which is carried out in order to obtain a place on the tender list.
2. Responses to invitation-to-tender and to decisions made by the client and/or his or her representatives.
3. Amendments to bids.
4. Entering into contracts.

The contractor's passive processes include such client- and consultant-originated activities as:

1. Being placed on the tender list.
2. Being invited to tender.

3. Being invited to amend bids or to re-bid.
4. Being asked to enter into a contract.

The tendering decision process of contractors starts with the contractor obtaining a place on the tender list, as a result of marketing activities, and ends with the contractor entering into a contract to execute the project if successful in getting the job. In between these two extremes, various decisions will need to be made by both parties (the contractor and the client) that will determine whether the contractor continues with the tendering process until a contract is entered into or the contractor is forced to withdraw from the bidding process due to the rejection of the bid. The contractor may decline to tender for the contract after considering various factors that are perceived to be important to the success of the project and the organization.

While this model represents only a generalized illustration of the decision-making process followed by contractors when tendering for contracts, it is believed that such factors as 'the existing relationship that exists between both parties' (the contractors and clients) and previous contractual agreements may influence the decision process followed by contractors when tendering for contracts in competition. As observed by one of the contractors interviewed 'cases are known when contracts are won over a drink'.

Conclusions

The results obtained lead to rejection of the hypothesis postulated at the beginning of the research. The findings of the research show that 'the ability of the client to pay the cost of work' is the most important factor contractors consider when making project selection decisions. This is followed by 'the type of work'.

While results obtained from all the surveys carried out indicate the importance of 'client-related factors', in which 'the ability of the client to meet the cost of work' and 'the identity of the client' were the most important, there was discord between the results obtained from authors (literature study) and contractors on the importance of 'the type of work'. While contractors believe that 'the type of work' is a very important factor, the results obtained from the authors consider it as being of only moderate importance.

The results obtained from the research showed that while the authors believe that 'the physical and financial resource requirement necessary to execute the contract' is a very important factor that needs to be considered by contractors when making project selection decisions, results from the survey of contractors disagreed with this view. While contractors agree that resource requirements, both physical and financial, need to be considered when project selection decisions are being made, they attached less importance to it relative to some other factors because they believe that resource constraints can be overcome by the ease with which additional financial resources can be obtained provided the principals of the firm can handle the workload.

While agreement between the two sets of contractor data obtained from the questionnaire survey was observed, as shown by the results obtained from Spearman rank correlation coefficient, a sizeable amount of discord was present also (but, in order to be directly related to the difference in the techniques used to collect the data and analyse the two questions, further investigation is required).

A non-weighted model of contractors' tendering process showing the interaction between

the client's and the contractor's actions and reactions and the opportunity paths followed by the contractor in response to the various situations has been developed.

Bibliography

Ahuja, H.N. and Arunachalam, V. (1984) A simulation to aid in bid-no-bid decision. *Proceedings of the 4th International Symposium on Organization and Management of Construction*, July, Waterloo, Canada.

Aqua Group (1986) *Pre-contract Practice for Architects and Quantity Surveyors*. Blackwells Scientific, Oxford.

Baker, M. and Orsaah, S. (1985) How do the customers choose a contractor?, *Building*, pp. 30–1.

Bentley, J.I.W. (1987) *Construction Tendering and Estimating*, E. & F.N. Spon, London.

Calvert, R.E. (1987) *Introduction to Building Management*, Butterworths, London.

Cooke, B. (1983) *Contract Planning and Contractual Procedures*. Macmillan, London.

Eastham, R.A. (1987) The use of content analysis to determine a weighted model of the contractor's tendering process. *Proceedings of Conference held at University of Salford, 8–10 January*, pp. 351–63.

Farrow, J.J. (1976) *Tendering: An Applied Science*. Occasional paper No. 1, The Chartered Institute of Building, Ascot.

Fellows, R.F. and Langford, D.A. (1980) Decision theory and tendering, *Building Technology and Management*, pp. 36–9.

Harris, F. and McCaffer, R. (1983) *Modern Construction Management*, 2nd edn, Granada Publishing Ltd, London.

Hudson, E. (1988) The tender approach: contractors' tenders, *Chartered Quantity Surveyor*, 10 June, p. 17.

Marsh, P.D.V. (1987) *The Art of Tendering*, Gower, Aldershot.

Milne, J.A. (1980) *Tendering and Estimating Procedures*. George Godwin Ltd.

Smith, R.C. (1986) *Estimating and Tendering for Building Work*, Longman.

Wilson, O.D., Atkins, A.S., Sharpe, K. and Kenley, R. (1987) Competitive tendering: the ideal number of tenders, in *Managing Construction Worldwide* edited by P.R. Lansley and P.A. Marlow, pp. 175–86, E. & F.N. Spon, London.

Wilson, O.D., Sharpe, K. and Kenley, R. (1987) Estimates given and tenders received: a comparison, *Construction Management and Economics*, **5**, 211–226.