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Mills, Anthony; Skitmore, Martin

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**A COMPARISON OF CLIENT AND CONTRACTOR ATTITUDES TO PREQUALIFICATION
CRITERIA**

Anthony Mills¹ and Martin Skitmore²

¹ Department of Architecture, Building and Planning, University of Melbourne, Australia.

² School of Construction Management and Property, Queensland University of Technology, Australia

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A COMPARISON OF CLIENT AND CONTRACTOR ATTITUDES TO PREQUALIFICATION CRITERIA

Prequalification criteria

ANTHONY MILLS

Department of Architecture, Building and Planning, University of Melbourne, Australia.
a.mills@architecture.unimelb.edu.au

MARTIN SKITMORE

School of Construction Management and Property, Queensland University of Technology, Australia.

ABSTRACT

Contractor prequalification is concerned with assessing the likelihood of contractors meeting client and project requirements. The criteria used in this assessment have been developed in a largely idiosyncratic manner to date and with little or no consultation with the contractors affected. As a result, contractors are faced with a variety of calls for information by prequalifiers, the collection of which can be quite costly. This is leading to expensive duplication of effort by contractors in providing what is often similar information but in different formats. Furthermore, previous research has shown that the benefits of the information to prequalifiers are uncertain - many prequalifiers analyse the information in only a cursory manner. What is needed is some form of cost-benefit analysis to be carried out which will establish a common set of criteria for all to use.

As a precursor to this, the research described in this paper compares the different attitudes of both prequalifiers and contractors to prequalification criteria commonly in use in the Australian building industry. This was carried out via a postal questionnaire involving 49 contractors and 15 prequalifiers across Australia. The respondents were divided into three groups; (1) contractors doing work for mainly private sector clients and (2) contractors doing work for mainly private sector clients, and (3) construction prequalifiers (clients).

The results show that both clients and contractors have divergent opinions on the importance and value of the criteria in use. The possible reasons for these differences are discussed and the likely implications for future research in the topic.

Keywords: Benefits, costs, criteria, perceptions, prequalification, standardisation.

INTRODUCTION

Contractor selection is one of the most important aspects of project management decision making. In the face of multiple and conflicting client and project goals (eg., time, cost, quality and risk), this necessarily involves the consideration of several criteria for selection. The criteria that clients most often use has been the subject of several studies in an attempt to compile a comprehensive rank ordered list of "universal criteria" for general use [Hatash and Skitmore (1997a)].

Until now, it is the clients' views only that have been solicited in the search for such a list. Liston (1994), however, suggests that the criteria for selection should also include those that contractors also believe to be indicators of good performance. There are several obvious reasons for this:

- Contractors, being often more experienced than clients in such matters, may be in a better position to judge the relevance of potential performance criteria.
- Universal criteria may provide contractors with a more consistent basis upon which to tender or negotiate for work and a better basis for marketing their abilities [CIDA (1995)]. As such, contractors are partial

stakeholders in the process and thus, it can be argued, are entitled to have some input in the type of criteria used.

- Multiple criteria contractor selection is known to be a very subjective process [Russell *et al* (1992), Holt *et al* (1994), Liston (1994), Drew and Skitmore (1993), Hatush and Skitmore (1997a)] and therefore not always fair to the contractors under consideration
- Most clients are still using *ad hoc* criteria [Holt *et al* (1994a), Hatush and Skitmore (1997b)] which does not give contractors confidence that the system is sufficiently well considered.
- The criteria used are client oriented [CIDA (1995)] and may therefore more reflect the client's predispositions more than the likely performance of contractors. They may even be centred on the individual client representative's own personal prejudices or political ambitions.
- It is known that construction managers have different views to public clients on the subject [Russell *et al* (1992)]
- The criteria measures are often fuzzy and imprecise [Holt *et al* (1994b)]
- Even public and private sector clients have different criteria preferences [Russell *et al* (1992)]

Of course, it can be argued that as the client is footing the bill, *he who pays the piper should call the tune*. It is obvious though that, if each client adds a little to the project acquisition costs of successful (and unsuccessful) contractors the net result will be an increased industry overhead which must ultimately be passed back to the clients in the form of increased industry price levels.

What is needed is some form of contractor selection process that produces the best cost-benefit ratio. In this situation of course, the costs and particularly the benefits are difficult to estimate. Nevertheless, it is clear that it is the total costs and total benefits to all stakeholders that are at issue.

As a starting point, it is necessary to extend the existing list of selection criteria by considering the contractors' viewpoint. Asking contractors for their opinion on the importance and usefulness of the criteria gives some measure of benefits and costs, albeit mainly to the contractors. The next stage is to compare these contractors' views with the clients. If they are of a like-mind, then the problem is greatly simplified, as there will be a homogeneous consensus group. If they are not so like-minded, then it may be necessary to start to find ways of incorporating these differences into the process.

PREVIOUS RESEARCH

As mentioned above, despite the several studies in contractor selection criteria, very few have considered non-client stakeholder views to date. Russell *et al* (1992) analysed the attitudes of three types of client organisations: public owners, private owners and construction managers with results that "... indicate a significant statistical difference among public owners or construction managers, while public owners and construction managers responded similarly." The only other study to include non-clients was that of CIDA (1993), who developed prescriptive criteria that were "subject to a broad industry consultation" and therefore can be assumed to incorporate some degree of stakeholder views.

There have been several studies into the importance of criteria in the prequalification decision [eg., Liston (1995), Russell *et al* (1992), Holt *et al* (1994b), CIDA (1995), Hatush and Skitmore (1997a)]. Each has developed a list of criteria that they considered was the most significant decision making factors. After exhaustively compiling an aggregated list of all possible criteria it was discovered that in many instances considerable overlap occurred between the criteria used by different authors. In addition, many of the criteria used by other researchers were based on local conditions, and were therefore, not appropriate to the Australian construction industry. Consequently it was decided that the CIDA (1995) model represented the most relevant and comprehensive set of criteria, and this has been used in this research.

DATA COLLECTION

The research instrument was a postal questionnaire based on the CIDA criteria. Firstly, a pilot study was undertaken comprising three domain experts who examined the layout, order and intelligibility of the questionnaire. In addition, the questionnaire was sent to an expert on survey design for evaluation. All comments were then incorporated into the final questionnaire.

The questionnaire comprised 39 questions (coded B301-B339) relating to prequalification sub-factors. Each of the sub-factors can be aggregated into one of the nine major Decision Factors. Respondents were asked to express their opinion of importance of each criterion on a Likert scale of 1 to 7.

The final questionnaire was sent to each individual with a covering letter and a stamped/self addressed envelope. Questionnaires were sent out to 158 client and contractor organisations in the construction industry throughout Australia. There were a total of 64 returned questionnaires giving a response rate of 41%.

Table 1 Survey respondents by type

Group	Description	Returned
A	Contractors undertaking mainly <i>Private</i> sector work	24
B	Contractors undertaking mainly <i>Public</i> sector work	25
C	Public sector <i>Clients</i>	15
Total		64

Twenty-four, twenty-five and fifteen useable questionnaires returned by contractors undertaking mainly *private* sector work, contractors undertaking mainly *public* sector work, and *clients* respectively (Table 1). The response rate was considerably higher than most postal questionnaires, which normally attract return rates of between 20-30%. According to Moser and Kalton (1971), a response rate of less than 30% is likely to produce results subject to non-response bias. However, this was not a problem in this case and the each of the significant groups were well represented, therefore the opinions of all sections of the entire population were considered to be adequately reflected.

Most of the respondents to the questionnaire occupied senior management positions within their organisations. Most of the contractors (96%) had a turnover of greater than \$AUD1M, with 43% exceeding \$(AUD)5M. All the clients had capital works budgets exceeding \$(AUD) 50M. This was taken to indicate that all respondents were in a position to have an understanding of the prequalification process and the subsequent issues involved.

ANALYSIS AND RESULTS

Table 2 summarises the mean scores and ranks by respondent groups. This shows *Details of past projects* to be the most important factor for all groups, and that *Success of completed projects*, *Past project time performance* and *Bank reference* also seem to be important considerations by all groups. However, the Table also indicates that in many instances each group has quite different views concerning the importance of some factors. For instance *Company organisation/history* was ranked second by the *public* contractors and sixth by the *private* contractors, but only twenty-ninth by the *clients*. This suggest that there may be a range of factors that have significantly differently levels of importance for each of the groups.

A discriminant analysis was carried out on the 39 prequalification decision sub-factors, for the three respondent groups in order to highlight the different responses of the groups. Discriminant analysis is a statistical process that identifies variables that are important for distinguishing among groups, and which can then be used to develop a procedure for predicting group membership of new cases whose group is undetermined [Norusis (1994)]. The concept underlying discriminant analysis is fairly simple - combinations of the independent, or predictor, variables are formed into a linear function, which then serves as the basis for classifying cases into one of the groups.

Table 2 Mean Score and Rank by Group

Ref	Decision Factor	Private	Rank	Public	Rank	Clients	Rank
B301	Company organisation/history	5.46	6	6.04	2	4.67	29
B302	Details of past projects-track record	6.04	1	6.16	1	6.20	1
B303	Current load	5.35	8	5.28	7	5.47	12
B304	Current directors	4.50	24	4.92	14	4.27	36
B305	Current management & administration	4.96	13	5.20	9	4.67	29
B306	Employee qualifications	4.75	16	5.08	12	5.00	22
B307	Major plant & equipment	4.04	37	3.84	37	4.00	39
B308	Success of completed contracts	5.58	4	5.76	3	6.13	3
B309	Geographic location of project	4.13	34	4.32	27	4.93	23
B310	Directors statement	4.36	27	4.56	19	4.16	37
B311	Asset and liabilities	5.01	12	4.92	14	5.86	4
B312	Profit & loss statement	5.08	11	4.56	21	5.79	7
B313	Movement of assets for year	4.35	28	4.32	27	5.29	17
B314	Cash flow forecast	4.68	17	4.36	24	5.29	17
B315	Bank reference	5.57	5	5.40	5	5.86	4
B316	Credit reference	5.35	8	5.16	10	5.71	8
B317	Turnover history	4.65	18	4.56	19	5.43	13
B318	QA certification	4.17	33	4.36	24	4.73	26
B319	Actual quality achieved in past	5.88	3	5.12	11	5.33	15
B320	Type of quality program	4.25	30	4.21	31	4.73	26
B321	OH&S key personnel	4.96	13	4.72	16	4.53	32
B322	Actual safety level achieved	5.46	6	5.32	6	5.67	9
B323	Type of safety program	4.21	31	4.60	18	5.20	20
B324	Past project time performance	6.00	2	5.60	4	6.20	1
B325	Management level utilised on past projects	4.58	21	5.04	13	5.67	9
B326	Reason for variance of time & cost in past	4.63	20	4.72	17	5.53	11
B327	Scheduled performance of past projects	5.33	10	5.24	8	5.80	6
B328	Human resources management process	4.54	23	4.30	29	4.80	24
B329	Labour relations statistics over last year	4.00	39	4.34	26	4.47	33
B330	Compliance with labour legislation	4.58	21	4.26	30	4.60	31
B331	Company training program	4.42	25	3.96	35	4.40	34
B332	expenditure on skill formation	4.08	36	3.80	39	4.13	38
B333	Skill formation policy & strategy	4.33	29	3.84	37	4.33	35
B334	No. of claims on previous projects	4.80	15	3.94	36	4.73	26
B335	Explanation of previous claims	4.03	38	4.01	34	5.20	20
B336	No of claims referred to arbitration/litigation	4.21	31	4.44	22	5.33	15
B337	Record of conviction/non-compliance with	4.65	19	4.16	32	5.40	14
B338	Reason for convictions/non-compliance with	4.10	35	4.05	33	5.27	19
B339	Procedures to avoid futures breaches of law	4.39	26	4.42	23	4.80	24

The interpretation of the discriminant weights, or coefficients, is similar to that of multiple regression analysis. The value of the coefficient for a particular predictor depends on the other predictors included in the discriminant function. The signs of the coefficients are arbitrary, but they indicate which variable values result in large and small function values. The relative importance of the variables can be obtained by examining the absolute magnitude of the standardised discriminant function coefficients. Generally, predictors with relatively large standardised coefficients contribute more to the discriminating power of the function, as compared to predictors with smaller coefficients.

Table 3 Questions having multicollinearity

Decision Factor	Removed	Remain
Financial Capacity	B311	B312
Time Performance	B227	B226
Skill Formation	B332, B333	B331
Claims History	B335	B334
Legislative Compliance	B338, B339	B337

Table 4 Canonical Discriminant Functions

Function	Eigenvalue	% Variance	Wilks' Lambda	Significance
1	2.6081	59.43	0.099966	.0010
2	1.9770	42.13	0.359619	.0362

Table 5 Standardised Canonical Discriminant Function Coefficients

	Function 1	Function 2
B301	-1.17956	.41965
B302	.16908	.23790
B303	-.44236	-.73869
B304	-.09922	.39629
B305	-.59064	.33293
B306	.35345	.23040
B307	.19616	-.05513
B308	.29339	-.30696
B309	.65359	.82692
B310	-.43416	-.65758
B312	.60191	-.91982
B313	.19860	.54883
B314	-.76854	-.61885
B315	.36014	.32383
B316	.39996	-.56647
B317	.27079	-.21508
B318	-.07087	.80000
B319	.03752	-.66546
B320	.36537	.32810
B321	-.79597	-.47617
B322	.62876	.70904
B323	.43838	.30237
B324	.10095	-.53772
B325	.20470	.37983
B326	.15336	.87836
B328	-.01557	.70584
B329	-1.00897	.08808
B330	.19098	.00733
B331	-.25818	-.88376
B334	-.04964	-.88128
B336	-.00227	.74814
B337	.30611	.06073

However, as Malhotra (1993) states "if multicollinearity in the predictor variables exists, there is no unambiguous measure of the relative importance of the predictors in discriminating between the groups". When there is a high degree of correlation between some of the independent variables in the data, interpretation of the results is difficult. This is because one variable will have assumed all the discriminating power of the

other correlated variable. As a result interpretation of the results should be done with considerable caution.

The bivariate correlation analysis showed that there were a number of variables that were highly correlated (Table 3). This indicated that some of the questions in the survey seemed to elicit similar responses especially when they were grouped under major headings. For instance, the responses to questions B337, B338, and B339 were highly intercorrelated; all questions refer to non-compliance or breaches of the law, and are grouped under the Decision Factor of Legislative Compliance. Consequently, it seems reasonable to delete questions B338 and B339, the leave the effect of Legislative Compliance to be taken up by question B337. Table 3 lists the variables removed from the discriminant analysis due to the anticipated effects of excessive multicollinearity.

The resulting discriminant function appears to clearly separate the groups, which suggests that clear differences exist (Table 4). The Eigenvalues of 2.6081 (Function 1) and 1.9770 (Function 2) indicate that they are good discriminators.

Table 5 gives the standardised canonical discriminant function coefficients, which shows that B301 (-1.17956) had the largest absolute value for Function 1, and B312 (-0.91982) had the largest value for Function 2

The Territorial Map (Fig 1) shows a clear ‘star’ pattern formation, with each group (1-*private*, 2-*public*, and 3-*clients*) separated from the others. Considering function 1 (x-axis), the centroids of the two groups of contractors (1-*private*, 2-*public*) are close, while the centroid of the *clients* (Group 3) is well separated. This indicates that Function 1 reflects the divergence of views between the client-contractor groups. Similarly, function 2 (y-axis) also shows the centroids between the *public* and *private* groups to be well separated, while the client centroid is in between. This indicates that Function 2 is used to identify the discriminating variables between the *public-private* contractor groups. The Territorial Map (Fig 1) shows that the groups have their centroids clearly separated from the others, and there is no overlap between the membership of the groups. This again suggests that the respondents to the survey have distinctly different views on the importance of various prequalification criteria.

Once the discriminant scores are computed the cases in the data are assigned to a particular group, this is then compared with the actual group membership which is already known, and the accuracy of the classification is determined. Table 6 shows that the cases are reasonably accurately classified (ie. 92.2%) by the above two functions, the discriminant functions clearly separating the groups.

Table 6 Classification of results

Actual Group	No of cases	Predicted Group A	Predicted Group B	Predicted Group C	Percentage Correct
A (Private)	24	21	1	1	87.5%
B (Public)	25	1	23	1	92.0%
C (Clients)	15	0	0	15	100%
Percentage Correct					92.2%

DISCUSSION

Clients and contractors have different views on the importance of prequalification information. Table 7 shows the criteria that best discriminate between the views of clients and contractors. It can be seen that *Company organisation/history* has the largest coefficient and therefore represents the most widely different view. For instance from Table 2, both *private* (Rank 6) and *public* contractors (Rank 2) believe *Company organisation/history* to be an important technical indicator. Clients, on the other hand, rank this criterion as one of the least important (Rank 29) suggesting that a company’s organisation and history are almost irrelevant in making prequalification decisions. Another divergent criteria *OH&S key personnel* also follows a similar

pattern, clients consider it to be relatively unimportant (from Table 2) while contractors give it a higher ranking and therefore believe it to be an important prequalification decision making factors.

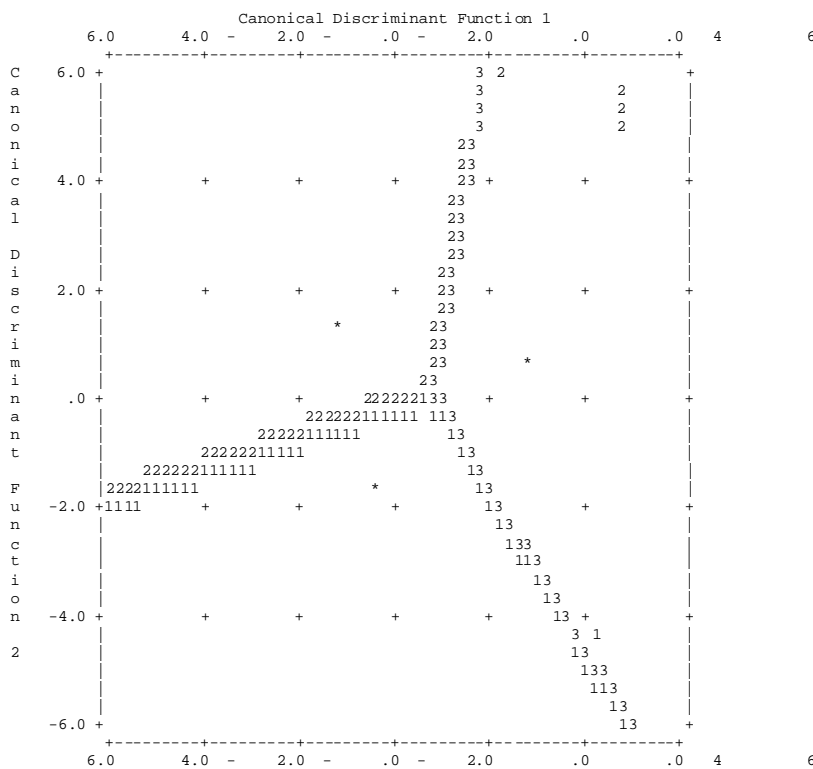


Fig 1 Territorial Map

Table 7 Discriminating criteria between clients and contractors

Variable Code	Decision Factor	Decision sub-factor	Function 1 Coefficient*
B301	Technical Capacity	Company organisation/history	-1.17956
B329	Human Resources Management	Labour relations statistics over last year	-1.00897
B321	Occupational, Health & Safety	OH&S key personnel	-.79597
B314	Financial Capacity	Cash flow forecast	-.76854

* Standardised Canonical Function Coefficients

The divergence of views amongst contractors is shown by reference to the coefficients in function 2. The results highlight the fact that they may not be a homogeneous collection of firms. Scrutiny of the standardised coefficients (Table 8) indicates that *Profit & Loss statement*, *Company training program* and *No. of claims on previous projects* are some of the best discriminators between the attitudes of private contractors. If the ranks in Table 2 are also considered it shows that the *private* contractors rank these factors relatively highly but relatively lowly by the *public* contractors. This may represent the factors that characterise the *private* contractors, and it may be reasonable to suggest that private clients expect these types of characteristics from their contractors.

Table 8 Discriminating criteria between Private & Public contractors

Variable Code	Decision Factor	Decision sub-factor	Function 2 Coefficient*
B312	Financial Capacity	Profit & loss statement	-.91982
B331	Skill Formation	Company training program	-.88376

B334	Claims History	No. of claims on previous projects	-.88128
B326	Time Performance	Reason for variance of time & cost in past	.87836
B309	Technical Capacity	Geographic location of project	.82692

* Standardised Canonical Function Coefficients

SUMMARY AND CONCLUSIONS

Universal criteria may provide contractors with a more consistent basis upon which to tender or negotiate for work and a better basis for marketing their abilities [CIDA (1995)]. As such, contractors are partial stakeholders in the process and are expected to have some say in the type of criteria used. Also the benefits of the prequalification process as a whole should improve if the selection of contractors is based on criteria that contractors themselves believe are important.

The outcome of this research was to demonstrate that the views of contractors are quite different to those of clients. This suggests that, if the views of all prequalification stakeholders were solicited, the end result would be quite different to that which occurs in practice at present.

Multiple criteria contractor selection is known to be a very subjective process [Russell *et al* (1992), Holt *et al* [1994], Liston [1994], Drew and Skitmore [1993], Hatush and Skitmore, (1997a)] and therefore may not always be fair to the contractors under consideration. The criteria currently in use are client-oriented [CIDA (1995)] and may therefore more reflect the client's predispositions more than the likely performance of contractors. They may even be centred on the individual client representative's own personal prejudices or political ambitions.

If contractors are not engaged in the process it is possible that clients are overlooking criteria that are important to the prequalification decision. Most clients are still using *ad hoc* criteria [Holt *et al* (1994a), Hatush and Skitmore (1997b)] which does not give contractors confidence that the system is sufficiently well considered. This research supports that view and suggests that the criteria that are ranked highly by contractors and low by clients as possible candidates. From the results of this survey, these include *Company organisation/history* and *OH&S key personnel*.

It is already known that construction managers have different views to public clients on this issue [Russell *et al* (1992)] and this research has shown that the contractors are a heterogeneous collection of firms that vary in their opinions of the importance of prequalification criteria. The *private* contractors considered such factors as *Profit and loss statement* and *No. of claims on previous projects* to be important. The *public* contractors on the other hand did not put credence on these factors when making prequalification decisions. This may be because the preferences shown by *public* and *private* contractors generally represent their perception of their clients' expectations.

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