A GUIDE FOR SELECTING THE APPROPRIATE PROCUREMENT METHOD FOR THE PROJECT BASED ON CLIENTS’ CRITERIA

SHAMIL NAOUM1, MEDRDAD MOHAMMAD POUR2 and DANIEL FONG3

*Department of the Built Environment, London South Bank University,*

*103 Borough Road, London, United Kingdom.   
1E-mail:* H[*naoums@lsbu.ac.uk*](mailto:firstauthor_id@domain_name.org)

*3E-mail: fongd@lsbu.ac.uk*

It is an axiom of construction management that a project may be regarded as successful if the building is delivered at the right time, at the appropriate price and quality standard, and achieving a high level of client satisfaction. Increasingly, the achievement of these criteria has been associated with the problem of procurement methods. In short the selection of the appropriate method can shape the success of the project. Procurement method is a mechanism for linking members of the building team together in a special communicating relational network throughout the building process from design right through to construction and completion. This relationship is both functional and contractual: functional via roles, authority and power; contractual via responsibilities and risks. This paper is based on an MSc dissertation by Pour (2010). It presents and analyses data obtained from a questionnaire-based survey carried out amongst professionals working in the UK construction industry regarding the selection of building procurement methods. 11 utility factors were established from 33 professional practitioners and a multi-attribute decision-making model was developed using Microsoft Excel. This model provides a mechanism that allows procurement methods to be assessed against a set of possible client requirements, by rating how well the procurement method can satisfy those needs. Clients and consultants can use this model to decide which procurement method is the most suitable for their projects.

*Keywords*: procurement, system, selection, project, concordance analysis.

# 0BIntroduction

Building procurement has become a popular term amongst the industry practitioners and researchers. It defines the boundaries and overall framework and structure of responsibilities and authorities for the project participants during the process and therefore a key factor contributing to overall client satisfaction and project success. In some cases the selection of the most appropriate procurement method can make or break the project, hence its importance for both clients and project participants. After the recent property bubble burst, and current financial slow-down, the selection of procurement methods has become even more important due to the ways it can control the risk, responsibilities, time and cost of a building. The desire to improve the building procurement systems signifies more the usefulness of a knowledge based advisory system to help to optimise such decisions, amongst the multiplicity of project variables (Love *et al*, 1998).

Franks (1990) described Procurement as “the amalgam of activities undertaken by the client to obtain a building”; in fact one of the first decisions that has to be made at the very beginning of every project is choosing the way in which the building would be procured. Project managers are usually responsible for this selection on their client’s behalf; this is the most important decision that they make in pre tender phase. Some use their experience and judgment others combine that with the use of designed charts and tables to ensure that the right method is chosen, due to the great importance of that decision.

There have been several theoretical propositions to create a useful procurement systems selection models including National Economic Development Office (NEDO) (1985), Skitmore & Marsden (1988), Franks (1990), Bennett & Grice (1990), Love *et al* (1998) and Chan *et al* (2001). The selection process has become increasingly complex, mainly as a result of the continuing proliferation of different methods of procuring building projects, the projects’ ever-increasing technical complexity and the client’s need for speedy commencement and completion, which has led to a demand for more sophisticated and systematic methods of selection to be devised.

The major difficulties in devising such methods have been identified by Skitmore and Marsden (1988) as:

• No single person, or knowledge ‘tsar’, has been found who is fully conversant with all the main procurement arrangements.

• No consensus has been found between experts which easily systemises the procurement selection.

• Examinations of the factors affecting procurement selection have shown that no mutually exclusive sets of criteria uniquely and completely determine the appropriate procurement arrangements for a specific project (Masterman, 2002).

**2 Critical Appraisal of Previous Models**

Skitmore & Marsden (1988) have provided a good basis for the future researchers trying to develop a procurement selection model. However the procurement methods have to be adjusted to reflect the most current methods practiced in the UK and also the criteria can be looked at to ensure that all of the important categories are covered.

Both Discriminant Analysis and Multi-attribute produced similar results even though the former should have provided more accurate answers (in theory) since all the utility factor scores provided by the experts are used and not just the averages.

Also it was found that the tedious and advanced calculations involved in discriminant analysis method make it unattractive for clients and consultants.

Love *et al* (1998) have adopted the same procedure as Skitmore & Marsden. Their survey was carried out in Queensland, Australia; subsequently they used a list of procurement methods popular there. Therefore their list of procurement paths are not thoroughly popular in the UK, but can be changed slightly to reflect the UK construction/ building industry. Also only six procurement methods were assessed which by no means was comprehensive compared to nine routes in Bennett & Grice (1990).

Their criteria are almost identical to Skitmore & Marsden and Bennett & Grice.

Love *et al* conducted their survey in Australia and the questionnaires were only sent to professionals in Queensland, therefore it hardly represents a universal model to be used here in the UK. However the way in which the survey was carried out could help other surveys in this field to achieve their objectives.

The application of Delphi method requires a lot of time and resources who are dedicated to the research and willing to complete all of the rounds since dropping out half way through can seriously damage the outcome of the survey.

This proves to be hugely difficult in construction industry, i.e. finding a number of experts who are extremely conversant with procurement methods and at the same time have a large amount of time to dedicate to a survey.

Other difficulties include the huge task of selecting the panel of experts and also the indirect communication which could result in misinterpretation.

Although Chan *et al* (2001) claim that “Delphi technique is a useful tool for obtaining group opinions on the utility factors for the multi-attribute procurement selection model in which a consensus is to be reached. This echoes Linstone’s *et al* (1975) finding that the Delphi method is especially effective in difficult areas which can benefit from subjective judgments on a collective basis, but for which there may be no definitive answer”, the technique is very difficult to perform in construction industry and in general very impressive in theory but not hugely practical in terms of time and resources involved.

Bennett and Grice’s (1990) model is one of the most relevant and realistic as far as British construction industry is concerned, simply because the authors had gained their experience in the UK and therefore the procurement methods and the criteria assessed in their work were current and relevant. However it can be argued that the client’s requirements can be expanded and improved to develop a list of criteria that is more comprehensive and specific.

**3 Purpose of the Study**

The most recent procurement path decision chart in use at the moment is more than ten years old and with construction changing so rapidly in recent years, question rises whether these existing charts are still appropriate and could they be relied upon to work out the most suitable system for clients based on their requirements.

The survey therefore aims to find out if the tables and charts currently available for selection of building procurement systems are still relevant today. Having that established, the survey will examine the possibility that by adjusting the old tables and updating them, as they could be reused by project participants in the process of selecting appropriate procurement routes for buildings. The suggested adjustments will be made and a new computerised system will be developed in which by avoiding calculations, time will be saved and any risk of miscalculations eliminated.

The aim of this research was therefore to develop an up-to-date computerised system that can be used for the selection of building procurement methods.

**4 Methodology and the Research Model**

**4.1 *Concordance analysis***

The method of analysis was first developed by Kendall and Babington-Smith in 1939 to measure rank correlation between a number of ratings, in order to examine if results are due to chance or otherwise. This includes the calculation of coefficient of concordance (*W*) and a value of greater than 0.7 signifies homogeneous responses.

The coefficient of concordance for each criterion will be calculated to ensure the ratings provided by participants for each procurement method are in sufficient agreement with each other.

The calculation for *W* for criterion 1 - Speed is as follows:

Number of participants = *m* = 33

Number of procurement methods = *n* = 9

 (1)

 (2)



= 1.126

Subtotal of the last row is *S*w =64130.

 (3)

=0.873

If all of participants give identical rankings to methods then *W* equals 1; hence greater *W* means higher level of consistency. However a coefficient of 0.7 or higher indicates a satisfactory level of consistency in most of cases.

This test of consistency was also previously adopted by Skitmore & Marsden (1988), Love *et al* (1998) and Chan *et al* (2001).

Table 1 below presents the consistency test of this research which shows that the coefficient of concordances (*W*) for all critera are higher than 0.7 and therefore the ratings provided by participants are in sufficient agreement and homogenous.

Table 1. Consistency test of the coefficient of concordances (*W*).

|  |  |
| --- | --- |
| **Criteria** | **Results** |
| 1 – Speed | Adj. Factor=1.126  *Sw* =64130  *W*=0.873 |
| 2 – Cost | Adj. Factor=1.089  *Sw* =60215  *W*=0.819 |

*Table 1* (*Continued*)

|  |  |
| --- | --- |
| 3 – Flexibility | Adj. Factor=1.078  *Sw* =60060  *W*=0.817 |
| 4 – Complexity | Adj. Factor=1.018  *Sw* =73276  *W*=0.997 |
| 5 – Quality | Adj. Factor=1.094  *Sw* =67021  *W*=0.912 |
| 6 – Time  Certainty | Adj. Factor=1.152  *Sw* =64487  *W*=0.877 |
| 7 – Budget  Certainty | Adj. Factor=1.07  *Sw* =71769  *W*=0.976 |
| 8 – Price  Competition | Adj. Factor=1.133  *Sw* =52346  *W*=0.712 |
| 9 – Division of  Responsibility | Adj. Factor=1.118  *Sw* =62594  *W*=0.852 |
| 10 – Professional  Responsibility | Adj. Factor=1.087  *Sw* =56360  *W*=0.767 |
| 11 - Risk | Adj. Factor=1.051  *Sw* =62844  *W*=0.855 |

**4.2 *Final model***

After data analysis and calculation of all means of the utility factors for each criterion, a final chart was put together, which is presented in Table 2. The chart asks the user to rate 11 criteria based on the clients’ requirements which are specific to that particular project. The ratings can be from 1 (unimportant) to 5 (essential).

The model in Microsoft Excel will multiply those ratings into utility factors and add up the total for each procurement route. The method with the highest total will be selected as the most appropriate procurement route for that project. All of the methods would have a ‘FALSE’ sign next to them apart from the most suitable method which would have a ‘TRUE’ sign next to it.

Table 2 - Mean values of the respondents’ utility weightings for each criterion,

against each procurement path.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Clients priority: Essential 5  Desirable 3  Unimportant 1 | **Traditional** | | **Design and Build** | | | **Management** | | **Design and Manage** | |
| **Criteria** | **Sequential** | **Accelerated** | **Direct** | **Competitive** | **Develop & Construct** | **Management Contracting** | **Construction Management** | **Contractor** | **Consultant** |
| 1- Time**:** How important is early completion to the success of your project? | 32 | 58 | 93 | 90 | 62 | 92 | 91 | 85 | 81 |
| 2- Cost: Is a firm price needed before any commitment to construction is formed? | 82 | 43 | 90 | 90 | 89 | 25 | 20 | 26 | 22 |
| 3- Flexibility: To what degree do you feel it necessary to alter the project in any way after work has begun on site? | 90 | 81 | 35 | 35 | 51 | 84 | 93 | 71 | 81 |
| 4- Complexity: Is the building highly specialised, technologically advanced or highly serviced? | 39 | 24 | 26 | 16 | 48 | 94 | 95 | 78 | 73 |
| 5- Quality: Is high quality of design, materials or workmanship required? | 95 | 75 | 38 | 41 | 74 | 87 | 92 | 58 | 52 |
| 6- Time Certainty: Is completion on time important? | 51 | 46 | 91 | 92 | 77 | 84 | 89 | 92 | 91 |
| 7- Budget Certainty: Is completion within budget important? | 31 | 36 | 94 | 91 | 58 | 72 | 70 | 94 | 92 |
| 8-Price Competition: Is it important to choose the construction team by price competition, therefore the likelihood of a low price is increased? | 78 | 65 | 89 | 98 | 68 | 90 | 87 | 70 | 75 |
| 9- Division of Responsibility: Is single point responsibility wanted? | 33 | 31 | 94 | 95 | 72 | 33 | 17 | 88 | 93 |
| 10- Professional Responsibility: Is direct professional responsibility wanted? | 88 | 93 | 18 | 19 | 55 | 65 | 78 | 22 | 30 |
| 11- Risk: To what extent do you need risk avoidance in the event of time, cost, design liability and quality slippage? | 48 | 39 | 82 | 93 | 78 | 38 | 22 | 90 | 73 |

**5 Conclusion**

The selection and use of an appropriate procurement system is still crucial to shape project success. This paper aims to provide updated understanding of the commonly used procurement selection criteria. There have been several theoretical propositions to create a useful procurement systems selection models including NEDO (1985), Skitmore & Marsden (1988), Franks (1990), Bennett & Grice (1990), Love *et al* (1998) and Chan *et al* (2001). This research shows that adjustments can be made to the aforementioned models to make them relevant and appropriate again. The strengths of previous surveys were put together, while avoiding their weaknesses, to develop a model with new utility factors that reflect the current UK building construction based on results obtained in this survey. The results indicate that there are nine commonly used procurement routes and there are 11 procurement selection criteria commonly adopted by UK clients to select from those routes, namely, time, cost, flexibility, quality, time certainty, budget certainty, price competition, division of responsibility, professional responsibility and risk.

The results in Table 2 can be transformed into an Excel spreadsheet that multiplies ratings by utility factors and adds them up for each procurement method, and by showing a ‘TRUE’ sign next to the highest sum, the most suitable procurement system can be indicated automatically. This makes the computation much easier for users as well as enabling them to save time and avoid miscalculations.

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