Developing a system for assessing the costs associated with different procurement routes in the construction industry

DEVELOPING A SYSTEM FOR ASSESSING THE COSTS ASSOCIATED WITH DIFFERENT PROCUREMENT ROUTES IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

In developing techniques for monitoring the costs associated with different procurement routes, the central task is disentangling the various project costs incurred by organizations taking part in construction projects. While all firms are familiar with the need to analyse their own costs, it is unusual to apply the same kind of analysis to projects. The purpose of this research is to examine the claims that new ways of working such as strategic alliancing and partnering bring positive business benefits. This requires that costs associated with marketing, estimating, pricing, negotiation of terms, monitoring of performance and enforcement of contract are collected for a cross-section of projects under differing arrangements, and from those in the supply chain from clients to consultants, contractors, sub-contractors and suppliers. Collaboration with industrial partners forms the basis for developing a research instrument, based on time sheets, which will be relevant for all those taking part in the work. The signs are that costs associated with tendering are highly variable, 1-15%, depending upon what precisely is taken into account. The research to date reveals that there are mechanisms for measuring the costs of transactions and these will generate useful data for subsequent analysis.

Keywords: alliancing, partnering, procurement, tendering, transaction costs.

Introduction

The purpose of this project is to identify how clients award work, and how contractors and consultants obtain work and to explore the costs associated with different tendering approaches and contractual and non-contractual arrangements for collaboration. There are three types of cost involved: pre-tendering (marketing, forming alliances, establishing reputations), tendering (estimating, bidding, negotiating) and post-tendering (monitoring performance, enforcement of contractual obligations, dispute resolution). Together, these involve large amounts of resource, but these resources are typically dealt with as overheads, rather than individually costed. This project is the first attempt, in any industry, to generate empirical data about the costs associated with finding and getting work, and the financial consequences of different approaches. The research involves qualitative approaches, using interviews and focus groups, to develop an understanding of the main issues involved, as well as quantitative approaches, based on time sheets generated and collected by the industrial partners. The involvement of industrial partners in data collection, and their commitment to the project from the outset, overcomes the usual problems that researchers would have in collecting such sensitive and confidential data. We are very lucky in this research to have the full collaboration of a good number of industrial partners who have committed real resources and access to their data. By developing techniques for benchmarking the main indicators of procurement costs, the research will enable all participants in the construction industry to measure improvements in performance and to identify the most advantageous ways of forming project teams, thus increasing value for money.

Previous work in assessing costs

The selection of building contractors usually depends on some form of market competition. In those countries moving away from centrally planned economies, such as China, there is a clear perception that competitive tendering increases the quality and efficiency of contractors' performance (Wang *et al.* 1998). Similarly, in Hong Kong, the move towards fee-bidding for consultancy services seems to be gathering momentum (Ng, Kumaraswamy and Chow 2001).

The selection of consultants may also be subject to competition, although in the UK, this is a relatively recent phenomenon. Connaughton (1994) describes how to apply competitive processes to the selection of consultants, at a time when moves towards fee-bidding were growing increasingly popular. However, there are signs of increasing

disenchantment with competition on price, particularly in the UK (Lingard, Hughes and Chinyio 1998, Wong, Holt and Cooper 2000). In Sweden, Svensson (2001) examined the factors that influence the choice of consulting firms for international projects. He found that long-term relationships were at least as important as traditional skill and experience factors. Such research highlights the marketing effort that consulting firms require when obtaining work, although there is no assessment of their costs. It also has resonance with the moves in the UK towards innovative working practices, and away from straight price competition. This move follows the public sector's discarding of compulsory competitive tendering and replacement with the idea of "best value". The development of the public sector as a leading example of good practice in construction can be traced through a series of reports on the UK construction industry (Latham 1994)

Indeed, the use of compulsory competitive tendering for local authorities led to widespread criticism of lowest-price bidding in the UK. The recent move to "best value" as opposed to "lowest price", following the Local Government Act 1999, should help to avoid the negative effects of fragmentation and duplication in terms of monitoring, supervising and inspecting (Nettleton 2000)

Indications of the high costs of estimating and tendering

Private finance is increasingly popular with governments all over the world, as it reduces the need for them to invest capital in the short term. Grimsey (1997) estimated that in the UK, by 1997, PFI sponsors had spent more than £30m on bidding for approximately 30 schemes. His experience tells us that "[t]here has been an underestimation by all parties of the length of time to negotiate project agreements" (Grimsey and Graham 1997: p. 221). This amount of expenditure seems to form about 1½-3% of the total contract sums involved .

Interestingly, Harrison states that although it is fundamental, obtaining work is not the main objective of the estimating process. Estimating is to do with calculating the probable cost of carrying our work, whereas tendering is a separate process of deciding a price, an important distinction that frequently seems to go unnoticed in many writings on this topic. Harrison also points out that increased accuracy costs more money to achieve, and the cost rises more rapidly than the increase in accuracy. The only other thing that he says about the costs involved is that skilled estimators are scarce and expensive.

Anumba and Evbuomwam (1997) highlight the high costs of tendering and mention calls for clients to pay tendering costs to unsuccessful bidders, but they have no suggestion as to how the cost of tendering might be quantified. Similarly, Wåhlström acknowledges the amount of work and time involved in producing tenders but does not quantify the resources. Bunn states that it is important to understand costs associated with tendering.

The best estimates that seem to be available for the overall costs of tendering were reported as from ½-1% of turnover for the simple costs of estimating, right up to 15% if all of the unnecessary costs associated with competitive tendering are taken into account . While these are just estimates, the principle that competition may be organized wastefully is frequently espoused in the literature (see, for example, Pasquire and Collins 1996)

Disentangling the overheads

Commercial practice tends to group the costs associated with tendering into overheads, which are then recouped within the prices charged for work, by simply adding a relevant proportion to costs, along with an allowance for profit. It is these overheads that we have to disentangle in order to tease out the costs of transactions, and the impact of alternative ways of arranging transactions.

Numerous studies have examined various aspects of the commercial process in construction contracting. Uher (1996), examined cost estimating practices in the Australian construction industry. Although primarily concerned with contractors' approaches to estimating, rather than the costs of the approaches, his conclusions are interesting. Clearly, estimators rely heavily on subjective assessments and any attempts to get them to change their approach will need to focus on cultural and attitudinal considerations. A similar finding came from Akintoye , who undertook a survey of 84 UK contractors of varying sizes, looking for factors that might influence estimating practice. The complexity of the estimating process was confirmed, but there was no assessment of the costs. In a later report from the same study , the techniques by which estimates are prepared were examined, again with no attempt to look at costs. However, it is relevant that many different persons are involved in the estimating process. Large firms have estimating departments, but in addition the following may be involved: sub-contractors, managing director, contracts managers, quantity surveyors, site managers, store managers/buyers, planning or programming engineers, commercial managers, design engineers, suppliers, cost planners and insurance assessors. Thus, in collecting data from contractors, it is important to find out who is involved in each estimating process so that the relevant resource data can be identified and collected.

Bajaj, Oluwoye and Lenard (1997) undertook a small opinion survey of 19 contractors in NSW, Australia, about their approaches to risk identification during the tendering and estimating processes. There was no attempt to assess the resources expended in risk identification, the purpose being to ascertain the variety of approaches taken.

Transaction cost economics

Chang and Ive (2001) have undertaken an analysis of transaction costs in construction, but their objectives are to ascertain the most effective way of organizing the market relationships. Indeed, they consciously avoid any attempts to measure directly the costs of different configurations, rejecting this approach as too cumbersome. In this, they follow the example of other transaction cost theorists, such as Masden *et al.* (1991) whose empirical study relied on selecting a limited number variables and asking respondents to give an ordinal score to the importance of each factor. This they did in relation to 74 observations from one firm involved with a shipbuilding contract. These qualitative evaluations were analysed using econometric methods to test various hypotheses about the integration decision. The limitations of this approach are connected with using proxies for data instead of real cost data, and with studying only a small sample of decisions from one firm. There are too many approximations in their data for their conclusions to be reliable, even within the limited parameters of their study. They identify the difficulty of obtaining data as the key obstacle to testing transaction-cost theory. It seems clear that, in studying the relative costs of different ways of working in the construction industry, an approach concerned with proving or disproving transaction-cost theory is not particularly helpful.

The impacts of tendering processes on working practices

There are some notable exceptions to the general trend of ignoring the costs of undertaking business in the construction industry. Becker (1993) in considering the costs associated with the standard general conditions of contract, addressed the impact that contract clauses can have on a contract price. Although the research that led to them is not explained in the paper, his findings are interesting. For example: as risk is shifted from the owner to the contractor, the contractor will increase its indirect cost, contingencies and profit margins to cover the unknown conditions. There is no attempt to quantify the scale of the cost associated with the chosen contractual terms. But these findings point up some useful ideas about the consequences of different ways of doing business in construction. Most importantly, these assertions mean that any meaningful findings about the costs of tendering must also take account of the costs of contract supervision.

In relation to PFI projects, it has been noted that "traditional [contracting] arrangements primarily relied on standardized contract forms that allowed for the swift award of contracts at the expense of costly dispute resolution later in the process" (Grimsey and Graham 1997: p. 218), a comment that illustrates the clear inter-relationships between the various stages of a contract and the impact that economies in one stage can have on later stages. Thus, comparisons of different ways of working need also to take account of the costs of claims and disputes.

The impact of partnering was considered by Matthews (1996), who undertook one case study in which the client, the main contractor and the sub-contractors (although not the consultants) felt that partnering would lead to lower tendering costs. Pasquire and Collins (1996) looked at the effect of competitive tendering on value. Their findings on the lengths of tender lists for traditional and design-build contracts showed that there was a lot of wasted effort in terms of abortive tendering costs for contractors, particularly in the case of design and build. From their sample, 65% of the contractors would be prepared to submit a non-competitive price (cover bid), but there is no detail and the actual incidence of cover prices. This work hints at huge costs concealed within the tendering processes, but does not attempt to quantify them

Cover prices

An invitation to submit a bid may involve a contractor who does not want to do the job. It is widely believed that having been invited to submit a bid, failure to submit a bid would result in no further invitations to bid, effectively being struck of tender lists. It is not clear why this should be so, but the typical response of a contractor who does not wish to win a project for which it has been invited to bid is to submit a “cover price”

Zarkada-Fraser (2000) studies the ethics of collusive tendering, highlighting the problems that might compromise competition or defraud clients. Although collusion may influence the submission of cover prices, which in turn reduce the cost of tendering, there is no quantification of the costs involved. However, we may deduce from this paper that the high costs associated with traditional rendering practices are part of the temptation to collude and if tender costs were not so high, perhaps contractors would be less inclined to submit cover prices.

Attempts at deriving costs

One notable study took a detailed look at the contractor's process of tendering and estimating, using structured systems analysis, data flow diagrams and a data dictionary. "*Considerable resources are being devoted to the preparation of tenders in this way. Any means of improving the efficiency of this process would be very welcome to contractors and to the construction industry as a whole. This paper presents a documentation of methods of tender preparation in the form of a model of the tasks executed.*" While this was not an attempt to find a "typical" tendering process, it illustrated the detailed steps of a particularly complex one (Betts 1990).

There are, of course, some wonderful anecdotes about tendering practices, most of which, of necessity, remain anonymous. For example, in an office development in London the building already on the site had to be demolished as a first step prior to construction. In the main contract, the contractor had allowed about £80,000 for this item, and his description of the work included health and safety statements and the use of proper equipment and so on. However, this contractor sub-contracted the demolition to another, for about £40,000 and he sub-contracted it to someone else who in turn sub-contracted it again. In the end, the demolition contract was carried out over a week-end by two men with a truck, who basically pulled the building down by tying ropes to their truck and literature pulling it over piece by piece. For this, they were paid £8,000. These layers of sub-contracting appear to have cost 90% of the amount that the client paid for this work. Such anecdotes highlight the desperate need for some robust data on this issue.

Data collection

At the time of writing, we are about to commence data collection and can report our plans for this important stage of the research. First, we have divided the construction process into four stages, the management costs of which are influenced by each other:

- Stage One is marketing and selling (including pre-qualification for preferred tender lists), the result is an invitation to treat.
- Stage Two is estimating, perhaps with some element of design, and fixing a price (for consultants, defining a fee and terms of engagement): the result is an offer, which may be accepted by the "customer" saying "yes".
- Stage Three is managing the realization of the design, the result is the building.
- Stage Four is claims, enforcement and disputes, the result is the discharge of contractual obligations.

The data we collect about activities of participants relates to the resources expended, i.e. time and other costs. In order to convert the time data into costs, salary information, perhaps in £5,000 ranges could be used. This can be represented as an average hourly rate and can be converted using salary information. Each person will be allocated to a salary band. The on-costs of employment as well as overheads such as office space, telephones, secretarial support must then be added.

This implies that we shall need to discuss the project with a number of different departments or personnel in each firm and then obtain time and other cost data from them. We shall start with someone in the firm to give us an overview of the work done and the organization of the firm and help us to determine the programme of further meetings and data collection.

The interviews to set up the data collection will be structured but free ranging. We are preparing aide-memoires for the conduct of our meetings to ensure that all relevant matters are covered. Taking contractors as an example, it is envisaged that we may wish to interview persons concerned with marketing, estimating and pricing, contract and site management, procurement, personnel, legal matters and design.

Once we get access to time sheet data, and the industrial partners have confirmed that this access will be forthcoming, every quantifiable unit of management time that can be related directly to project work will be required and certain data about the projects to which they relate. This will enable a thorough statistical analysis of the time sheet data, with a view to ascertaining whether there are systematic differences in procurement costs between different ways of working.

For each project about which we collect time-sheet and other resource data, we shall be eliciting a range of project data. The specification of the data required has been developed in conjunction with our industrial partners, the people who will be providing the data in the first instance before we go out to industry for broader data collection.

- **Type of procurement**: phrases such as design-build or construction management tend to cause confusion in data collection, as they mean different things to different people (Simister 1994, Loosemore 1996). Thus, in order to ascertain the important characteristics for each procurement method, more detailed and direct questions will be used, as follows:
    - Nature of relationship (e.g. partnering, competition etc.)

    - Position in relation to other members of the team
    - Degree of sub-contracting (proportion at each level)
    - Extent of contractor's design responsibility
    - Method of payment (e.g. cost reimbursement, fixed price)
- **Tendering arrangements:** The arrangements for the tendering process can have a significant impact on the costs. The average costs of estimating and tendering are generally multiplied by the number of tenderers, although in true design-build, the successful bidder's design is not lost as a tendering cost, but subsequently used in the project. Also, the incidence of cover bids will reduce the overall costs of tendering. Finally, contractors will need to undertake design of temporary works and some kind of pre-planning in order to complete their bids, and these aspects will be included. The main issues pertaining to tendering arrangements are:
    - Number of tenderers
    - Type of process (e.g. open, single-stage, two-stage, negotiation)
    - Nature of documentation (designs, specifications, bills etc.)
    - Type of contract (standard, bespoke etc.)
    - Duration of tender period
- **Type of project:** In seeking to ascertain the impact of different ways of working, we need to be able to isolate the impact of other project variables. For example, short lead-times may result in poorly planned work, and higher Stage Three and Stage Four costs. Also, certain building types may be inherently more difficult to build than others. In order to test for this kind of relationship, we will be seeking data on the following project variables:
    - Value
    - Duration of lead-time before mobilization
    - Duration of project
    - Building type
    - Location
    - Complexity (value per unit area)
- **Type of client:** Finally, it is possible that different types of client will have an impact on the way that work is carried out.
    - Funding (private, public, PFI etc.)
    - Sector (private, public)

For all of these variables, we will be seeking to develop testable hypotheses that can be modelled statistically. For example, we will hypothesize that complex projects increase the costs associated with Stage Two costs. With sufficient data, this relationship can be explored and the hypothesis will be refuted or supported. In a similar way, we shall be testing the impact on procurement costs of the full range of variables listed above.

One aspect for further consideration is the effect of inflation. All prices need to be associated with a date so that they can be indexed, perhaps Retail Price Index, perhaps Tender Price Index.

The data collection will be carried out in two stages. The first stage involves intensive interaction with the industrial partners already committed to the project. During this stage we will be testing and developing our methods. The basic approach to data collection is firms, not projects. By collecting comprehensive data from each firm, and systematically spreading our net to a large number of firms, all procurement types and all stages will be represented. During this initial phase of data collection, the list of variable will be developed, first by interviewing all relevant personnel within each firm, then by testing the data collection methods within the initial batch of firms.

Conclusions

In undertaking the initial stages of this research, several things have become apparent. First, the complexity of the data collection places significant hurdles in the way of those who wish to undertake research in this area. This is probably why so few attempts have been made at assessing these costs. The quantifications of the costs of tendering that have already been reported in the literature tend to focus on the cost of estimating and bidding, and take no account of the relationship between stages of a project. Moreover, they are drawn from impressionistic estimates, rather than analysis of data. However, the fact that they range from 1% to 15% indicates a strong feeling that there is a lot of expenditure in this area, and the value added by this expenditure is not clear.

For these reasons, this research promises to shed light in this important area of construction business, an area of business that, in any industry, is frequently under-researched. The work undertaken to date in conjunction with the industrial partners shows that the data collection techniques currently being developed are likely to provide the kind of data that can be subject to rigorous analysis, enabling better judgments to be made about the best ways to conduct

business in the construction industry.

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