COMPARATIVE COSTS OF THE COMMERCIAL PROCESS IN DIFFERENT CONSTRUCTION PROCUREMENT METHODS[1]

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ABSTRACT

The commercial process in construction projects is an expensive and highly variable overhead. Collaborative working practices carry many benefits, which are widely disseminated, but little information is available about their costs. Transaction Cost Economics is a theoretical framework that seeks explanations for why there are firms and how the boundaries of firms are defined through the "make-or-buy" decision. However, it is not a framework that offers explanations for the relative costs of procuring construction projects in different ways. The idea that different methods of procurement will have characteristically different costs is tested by way of a survey. The relevance of transaction cost economics to the study of commercial costs in procurement is doubtful. The survey shows that collaborative working methods cost neither more nor less than traditional methods. But the benefits of collaboration mean that there is a great deal of enthusiasm for collaboration rather than competition.

Keywords: business economics, collaboration, commercial process, procurement, supply chain.

INTRODUCTION

Transaction cost economics is largely concerned with the decision on whether to outsource, whether to make or to buy inputs (Williamson 1989). The construction industry is characterized by high levels of outsourcing (sub-contracting) and by large numbers of diverse, specialized small firms, joined in complex configurations of contracts. The question is not whether transaction cost economics forms an explanation

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for this, but how much resource is expended on the tasks of marketing, estimating, bidding, controlling, enforcing and disputing work in construction. The approach is not a transaction-cost approach, as the study is not concerned with whether firms should sub-contract or not. Rather, the study is more strategic, in working out whether there are contractual configurations that are characteristically more expensive than others. There is a strong feeling in the trade press that "new ways of working" such as partnering, strategic alliances and so on, are, in the long run, more economically viable than traditional methods (see, for example, Akintoye 1994, Baker 1990, Cowan 1987, Grogan 1992, Nunn 1998, Smith 1997). This is what we are seeking to question.

CONTEXT

Competitive tendering has been used extensively for a long time, but there is plenty of evidence that it does not necessarily result in value for money (see, for example, Pasquire and Collins 1996). The costs associated with traditional tendering practices seem unnecessarily high, due to excessive detail in the information required for the bidding processed (Poh and Horner 1995). While many countries are moving away from competitive tendering, it is still seen in some parts of the world as the ideal to strive for (for example, Shen and Song 1998). While there are plenty of articles extolling the virtues and benefits of different ways of working, the benefits are rarely placed against the costs associated with collaborative working practices (see, for example, Gordon 1994, Pokora, and Hastings 1995, Rahman and Kumaraswamy 2002). It is far from clear that the adoption of new ways of working is anything more than lip service, with sub-contractors continuing to report the same treatment at the hands of main contractors, regardless of the incidence of these new collaborative working practices (Greenwood 2001). Although many new ways of working are referred to as collaborative, this is a vague term which can be misleading because every construction project requires collaboration between many people at every stage. In the context of this study, it is taken to mean procurement where competitive bidding is not the only criteria upon which contractors, consultants and suppliers are selected. Moreover, some reliance is placed on the deliberate development of long-term working relationships, usually with a limited number of partners.

Miller *et al.* (1999) report that it is unlikely that collaborative working methods will produce promised gains and reduce transaction costs, if the sub-contractors are not fully integrated into the process. And there is plenty of evidence that they are not. Indeed, Moore and Dainty (2001) demonstrate that there are enormous cultural barriers in typical professional practices in construction that prevent the achievement of team integration in novel procurement routes. The idea that there is a single better way to organize construction projects seems not to be borne out by empirical work (Kumaraswamy and Dissanayaka 1998). Lingard *et al.* (1998), in their review of the literature on this topic, concluded that there was much still to be done in evaluating the impact of different ways of working on the costs of entering into a contract. Wang and Wu (2000), in their development of "cyberspace" procurement methods, acknowledge the enormous cultural difficulties in reengineering the tendering process such that it could be automated.

There is much written about how expensive it is for contractors to bid for work. Betts (199), for example, undertook a detailed study about the processes through which contractors go in preparing their tenders, but his aim was to help them apply information systems to the tendering process, rather than to reduce our dependency on competitive tendering. The costs associated with tendering and getting work are difficult to pin down, and there is little evidence in the literature that anyone has tried. One exception was Cook (1990) who set out to analyse the costs to contractors of competitive bids, but his methodology involved simply asking contractors how much they spent, with no attempt to isolate the costs in any systematic way. With only 30 responses to his survey, his figures of 0.25% to 6% of turnover expended on competitive tendering are somewhat dubious. By contrast, one research team in the UK (Duff *et al.* 1998, Emsley *et al.* 2002) undertook extensive work to develop a neural network approach to modelling the impact of different procurement routes. While offering some promise in the modelling of the way that the procurement and contractor selection variable impact on overall costs, they conclude that more data is needed before offering more decisive conclusions.

There is, however, evidence of efforts to apply transaction cost economics to the analysis of different procurement routes. Suraya (1997) found that client organizations simply do not have the data available for any systematic evaluation of different procurement routs. Chang and Ive (2001) produced a very interesting paper in which procurement routes were taken as analogous to the sort of institutions to which this kind of analysis seems appropriate. But they were seeking to determine which procurement route would be most appropriate for given project circumstances (Chang and Ive 2001). Similarly, Chau and Walker (1994) published some preliminary findings that the costs of identifying and agreeing prices for sub-contracted components was cheaper than the cost of planning and monitoring the performance of direct labour. They were quite clear that the cost of the transaction was the major determining factor in whether to undertake work directly or sub-contract, which is interesting given that sub-contracting overcomes the enormous problem of how a contractor would provide continuity of work for a highly specialized and diverse workforce if it were directly employed.

Masden *et al.* (1991) also used the transaction cost approach in another serious attempt to generate empirical data to test these theories. This empirical study relies on selecting a limited number of variables and asking respondents to give an ordinal score to the importance of each factor, related to 74 observations from one firm involved with a shipbuilding contract. The limitations of this work 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, a problem often highlighted by those who seek to test this theory.

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 explanatory framework of transaction cost economics seems inadequate for two reasons. First, it does not deal with factors that are critically important in the construction industry: location of work and continuity of work. Second, its testing appears to create insurmountable data collection problems. While we will be able to offer insights to transaction-cost empiricists, and even data for econometric analysis, our own purposes are concerned with comparing different types of market organization to each other, not with comparing subcontracting with integration.

RESEARCH METHOD

The problem of how best to procure construction work, and the idea that collaborative working methods are better, led to this study of the costs of procurement in construction. By the costs of procurement, we mean not only the costs of tendering, but also the costs of marketing, monitoring and enforcing contracts (Hughes *et al.* 2002). One of the purposes of research currently under way at the University of Reading is to identify whether there are any systematic differences in the costs of procurement associated with different ways of working. To this end, a survey has been carried out. The survey design was based upon extensive interviews with practitioners, to identify the major variables connected with this vexed question. Although initial attempts were directed towards assessing actual costs of specific projects, it soon became clear that this was an impractical approach. The survey moved ahead once we realized that a better focus was the construction firm, rather than the project. By asking firms what proportion of last year's turnover was attributable to collaborative working relationships, and then asking how much of last year's turnover was spent on different aspects of procurement costs, two things were immediately apparent. First, firms know how much resource is devoted to particular areas of their business on an annual basis, because they know how many staff they have working on these things and how much they have paid consultants, even if they cannot disentangle these overheads into specific projects. Second, by collecting data about a firm's annual activities, although this tells us nothing about individual projects, statistical analysis enables us to determine very easily whether those who engage in a lot of collaborative work experience higher or lower costs of procurement. This is the basis of the survey currently being carried out in the UK.

RESULTS AND DISCUSSION

Distribution

The survey has been distributed to named individuals, but they were not randomly selected, so while these responses are interesting and informative, the lack of control over their distribution does not enable us, at this point, to draw conclusions about the statistical significance of the data.

Responses

The survey has generated 90 responses from parties throughout the supply chain. Table 1 shows that the single biggest category of respondents was design consultants, but about half of the responses were from contractors and suppliers. There is a representation in these results from throughout the supply chain. This table lists the options for how people would describe their main area of business. If we group similar participants together, we see 31 consultants, 16 main contractors, 25 trade contractors, 5 suppliers, 10 clients and 3 others/users.

Annual turnover

Respondents were asked for the annual construction turnover of their particular business unit. Table 2 shows that the survey accounts for about £5bn of construction work, in organizations whose annual turnover ranges between £115,000 and £806m. The average for all the respondents is £58m.

Collaborative working practices

Respondents were asked what proportion of their turnover could be categorized as collaborative working practices. These responses have been banded together into 10% intervals in Table 3. This shows a preponderance of companies working collaboratively for small proportions of their turnover, with fewer companies having most of their turnover attributed to collaborative working practices.

To test for patterns in collaborative working, the amount of work estimated was plotted against size of turnover, but no obvious relationship was revealed. In other words, the chances of finding collaborative working practices are no greater among small companies than large.

Value of construction work bid

One of the questions on the survey sought to discover how much work was bid for during the period. This proved slightly problematic for two reasons. First, the work bid for during the period for which we have asked for construction turnover effectively deals with a different period, as the work that would be carried out during a particular year would have been bid for at various points in previous years. Second, the work bid for in a twelve-month period would not necessarily be carried out in a twelve-month period. And third, many consultants, while giving us the amount of fee income they earned in a particular year, then provided us with the total construction budget that they bid for, rather than the amount of fee income they would have bid for. For these reasons, the numbers collected for the amount of work bid are fairly meaningless at this stage and remain to be clarified during the follow-up interviews.

Table 1: Who responded to the survey

Type of participant	Number
Design consultant	28
Specialist trade contractor	20
Main contractor	16
Trade contractor	5
Supplier of bespoke components	4
Public sector client	3
Private sector client	3
Advisory consultant	3
Developer	2
PFI/PPP SPV	2
Other	2
User	1
Supplier of materials	1
Total	90

Table 2: Annual construction turnover

Turnover	£000
Total	5,190,067
Average	57,667
Minimum	115
Maximum	806,300

Table 3: Collaborative working practice

Percentage band	Number of respondents
Blank	13
10	19
20	11
30	12
40	6
50	6
60	6
70	3
80	6
90	2
100	6

Amount of work by procurement method

Table 4 shows that most of the projects represented here are design-build variants, followed by general contracting. However, the majority of the design-build work involves

novated design teams, a process that can be viewed as closer to general contracting than to pure design-build. There is only a small amount of work taking place through other procurement methods. The difference between the total in Table 4 and the total return of over £5bn shown in Table 2 is due to the fact that not all the respondents attributed their turnover to types of procurement method.

Table 4: Construction output by procurement method

Procurement method	Amount	%
Design-build (pure)	£863,099,810	20%
Design-build (novated)	£1,101,205,275	26%
General contracting	£1,584,080,930	37%
Management contracting	£229,488,535	5%
Construction management	£515,766,540	12%
Non-project supplies	£19,342,930	0%
Other	£962,500	0%
Total construction turnover attributed	£4,313,946,520	

Most and least favoured methods of procurement

The open questions about the most and least favoured methods of procurement have produced a long and diverse list of responses. It is particularly interesting to see how people from different points in the supply chain deal with these questions. For example, suppliers of components tended to respond in terms of how they procure their supplies, with answer such as "buying from UK suppliers", or "buying from trusted suppliers". But not all of them interpreted it in this way, as some stated that they prefer faxed orders and disliked telephone orders. Effectively, these are answers to different questions, because the perception of the question is not common across or within groups of respondents. Similarly, some respondents preferred simple things such as "negotiation" or "two-stage tendering", whereas others preferred complex combinations such as "traditional, in a partnering environment, without competition". For the sake of developing an overview, the number of mentions for each of the more common responses is grouped by the main types of respondent in Table 5. Table 6 shows the summary of responses to the question about the form of procurement least favoured by the respondents. It is interesting to note that similar numbers were both for and against construction management. By far the least popular form of procurement is open competition, closely followed by design and build. But while no one seems to like open competition, apart from suppliers, design build is unpopular with consultants.

Figure 1 shows the average commercial costs for each stage of the commercial process for the various types of respondent. The graph shows the percentage of annual turnover spent on each stage of the commercial process. The four stages of marketing, tendering, monitoring and enforcing are shown for selling (S) and for buying (B). Suppliers of bespoke components spend about 5% of their annual turnover on marketing, and PFI/PPP

SPVs spend a similar proportion on tendering. Much less is spent, in general on the activities associated with buying.

As the primary purpose of this work is to examine whether there are any systematic differences in these costs between different ways of working, the amount spent annually, as a proportion of turnover, has been plotted against the volume of work undertaken using collaborative working approaches. This scatter plot, in Figure 2, shows that there is little discernable pattern. In other words, the expenditure on the commercial processes of tendering, monitoring and enforcing contracts seems not to very in relation to how much a firm is involved in collaborative working practices.

Table 5: Favoured procurement

Type	Clients	Consultants	Contractors	Trade cont	Suppliers	Total
Const man	1	5				6
Des-build	1	1	3			5
Direct		2		3	1	6
Fax					2	2
Negotiation	3	3	5	10		21
Partnering	4	3	3	3	1	14
PFI		2				2
Traditional		12				12
Two stage	1	1	5	5		12
Other	1	4		4	1	10
Total	11	33	16	25	5	90

Table 6: Least-favoured procurement

	Clients	Consultants	Contractors	Trade cont	Suppliers	Total
Const man	1	3	1			5
Des-build	3	12				15
Dom sub-cont		1		2		3
Dutch auction				2	1	3
Man contract		2	1			3
Measured term		1				1
Novated DB	1	3	4			8
Open comp	3	4	6	12		25
Partnering		1				1
Selective tend			1	1		2
Traditional	2		1	2		5
Two-stage		2	1			3
Verbal order				1	3	4
Other	1	4	1	5	1	12
Total	11	33	16	25	5	90

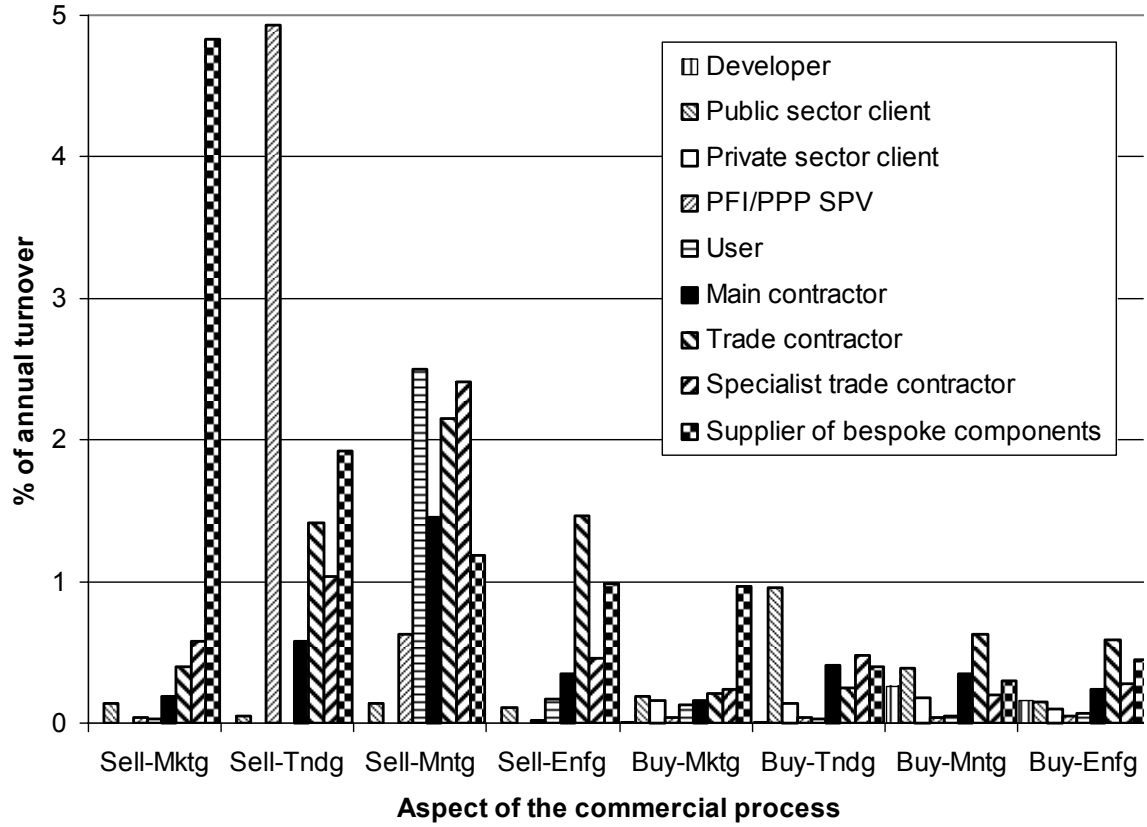

Figure 1: Commercial costs as proportion of annual turnover

Table 7 shows the same data as Figure 1, with selling costs and buying costs added together. This shows that suppliers seem to spend a much larger proportion of their turnover on the commercial process than anyone else in the supply chain. The price added in a supply chain is interesting. It seems that for each item in the building, the transfer from the supplier to the trade contractor adds 9% to its price, the transfer from the trade contractor to the contractor, 5% and from the contractor to the client, 3%. Even without allowing for any overheads or profit, the simple fact of the existence of the shortest possible supply chain adds around 18% to costs, just to deal with the buying and selling of goods and services. But if there are several more layers in the supply chain, say, four levels of sub-contracting, this amount could easily be 30%. However, it must be remembered that the alternative (in-house work instead of outsourcing), even if it were possible, would still consume costs: they would just be the costs of recruitment, employment, supervision, monitoring and lack of continuity in work flow for employees.

Figure 2 shows a scatter plot of those responses that included proportions both for collaborative working and for spending on the commercial process. For each point, the eight elements of spending were added together for the Y axis, and this number is plotted against the proportion of work undertaken collaboratively, leaving it to respondents to interpret what was meant by collaborative working. There is no obvious relationship in the graph, so statistical test were also applied, to seek out relationships. To test for the existence or strength of such a relationship, the correlation coefficient was calculated between the two sets of data. The result of -0.12 indicates that there is a very

Table 7: Proportion of annual turnover attributed to commercial processes

Type	Selling (%)	Buying (%)
Developer	0.00	0.43
Public sector client	0.44	1.68
Private sector client	0.00	0.57
PFI/PPP SPV	5.63	0.17
User	2.70	0.28
Main contractor	2.57	1.16
Trade contractor	5.43	1.66
Specialist trade contractor	4.48	1.20
Supplier of bespoke components	8.93	2.11

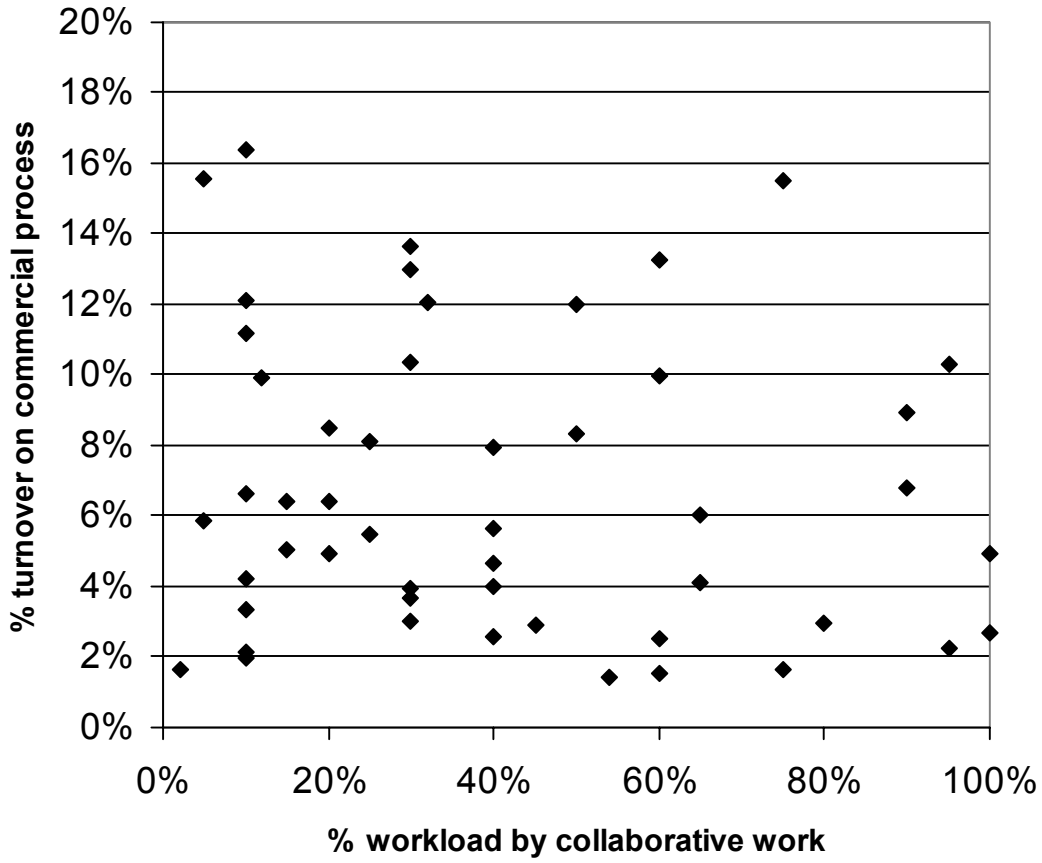

Figure 2: Relationship between costs of procurement and collaborative working

slight correlation, in that a very few cases of reduced procurement costs may be explained by the adoption of collaborative practices. The lack of a relationship may be because there is none, or it may be due to the wording of the question, which leaves respondents to decide for themselves what is meant by collaborative working.

To investigate further, correlation was calculated for each of the four types of cost. No significant relationship was discovered, values of -0.10, -0.16, -0.09 and -0.07 arising respectively for collaboration correlated with marketing, tendering, monitoring and enforcing, respectively. In other words, these numbers have no statistical significance, and therefore, the incidence of collaborative working practices is not associated with either higher or lower costs in any aspect of the commercial processes.

Finally, a few questions on the survey form related to statements asking for attitudes to certain issues. Briefly, these revealed that there was marginal agreement with the idea that most people in the industry can be trusted; overwhelming agreement that collaboration is better than competition; definite benefits from adopting new procurement practices; and a feeling that spending on the commercial processes is just about right, with only a small proportion rating it as too much.

CONCLUSIONS

The costs associated with the commercial processes in construction vary between negligible and 9%, depending upon the position in the supply chain and nature of work being carried out. At each step in the supply chain, the costs are cumulatively added, but there is no reason to suppose that procuring things in a different way would eliminate these costs: they may differ, but they would merely be transferred to a different cost heading. Even in a situation of multi-layered sub-contracting, the value-added by each successive party in the supply chain may be only local knowledge and access to various kinds of vendor. But this kind of knowledge is difficult to get any other way, and such qualitative reasoning may be lost in a purely quantitative approach to the question.

From the data presented here, there appears to be no relationship between the type of working methods and the costs of tendering. While it can be expensive to get into framework deals and partnering arrangements, the expectation of the parties is that this up-front investment results in lower downstream costs. But there is no evidence to support either of these assertions, which is very interesting. This means that there are more influences on these costs than the mere presence or absence of collaborative working methods. However, it must be pointed out that this study is only about costs, not about the benefits of such working practices. It is also important to consider re-phrasing the question about collaborative working practices, as this means different things to different people. It may be better to ask instead about the absence of competition, which is a much easier concept.

The distribution of survey forms needs to be carefully controlled, so that reliable calculations can be made about confidence limits. While the work reported here forms only a pilot study, the final distribution would have to use random sampling. It is interesting how responses to surveys of this nature seem much easier to get from consultants than from any other part of the supply chain. Clients of the industry are the most difficult participants to sample from. This work shows that the methods developed for examining this question are fruitful and worth pursuing. The next stage of the work

will be to use random sampling to deal with a much larger number of participants, and to connect the statistical findings with data from interviews.

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