REDUCING COSTS: A PRACTICAL APPLICATION OF PERFORMANCE-BASED SPECIFICATION AND TRANSACTION COST THEORIES

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Companies rarely examine the hidden costs of transactions. However, testing the appropriate transaction cost and performance-based specification (PBS) theories in a commercial environment can show real cost savings which could be delivered from appropriate process changes. The documentation from two completed projects was counted and grouped with a view to using them as a proxy for the volume of transactions in the projects, to examine the efficiency of the existing procurement route and to allocate a cost to the "administration" documentation. Analysis of the documentation using three different groupings showed that "administration" transactions were approximately 35% higher than the client anticipated - and that some ex ante and ex post costs (including enforcement) were not included. The client insisted that the outsourced Project Manager (PM) used the client's prescriptive-based suppliers. Consequently, the PM had less information on the sub-contractors than the client which gave rise to "asymmetrical information". This challenged the rationale of only partially-outsourcing the project management functions and also the client's muddled approach to the issue of using "market or hierarchy" for non-core commercial functions. Had PBS been used for these projects; there would have been a saving of approximately £114k of a total of £200k spend.

Keywords: asymmetrical information, hierarchy, market, performance based specifications (PBS), transaction costs

INTRODUCTION

Performance Based Specification (PBS) is a procurement tool whereby the final output of the facility is the basis on which the facility is procured rather than using the traditional, prescriptive method which specifies the inputs. Under PBS, contractors have, in theory, the authority choose how best to fulfil the client's requirements. The decision to outsource project management or retain it in-house can be implemented by the use of PBS where *performance* determines which inputs will be used.

The objectives for this research were to identify the volume of transactions in completed projects, categorise them in different ways to assess cross-case comparison and allocate costs, determine how many of these transactions could be removed by PBS procurement and then to assess whether these results would be generalisable to other projects.

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BACKGROUND AND CONTEXT

Transaction costs

Projects have "transaction costs". Bannock *et al.* (1998: 412) define these as "the costs associated with the process of buying and selling… that often explain why the price system does not operate perfectly." They also note that that transaction costs may influence an organisation to outsource non-key functions (the market vs hierarchy argument).

Gruneberg and Ive (2000: 119) explain that transaction costs are the hidden expenses which arise at "every transaction between two parties". The authors categorise transaction costs into search costs, product or service specification costs, contract selection/design/negotiation costs, supplier selection costs, contract performance monitoring costs and enforcement costs. (Gruneberg and Ive: 123-125).

Transactions also involve the exchange of information and Dietrich (1994: 19) discusses the concept of "bounded rationality" in transactions. He cites two principles: firstly, there are limits as to information which is processed by groups or individuals and secondly, it is not creditable to suggest that past experience can help in every situation encountered. This leads to "asymmetrical information" - where one party to a transaction has more or less information than another. Once the transaction is complete, this information disadvantage is usually eliminated. Dietrich's analysis breaks transaction costs into three parts: (Dietrich 1994: 33): "…search and information costs, bargaining and decision costs, and policing and enforcement costs." This view is enforced by Lingard *et al.* (1998) who have developed a theoretical model of *ex ante* and *ex post* transaction costs for contractor selection. This leads to the conclusion that where information is limited at the beginning of the transaction, the costs of the transaction rise over time. Where information is fully available at the beginning of the transaction, the transaction costs fall over time. Hughes *et al.* (2002) break transaction costs into four groups: marketing, tendering (including agreeing terms), monitoring, and enforcement – and link these into the Gruneberg and Ive (2000) groups mentioned above.

Chang and Ive (2000) discuss project "governance structures" – the term they used for whether market or hierarchy prevailed – which linked directly-measurable transaction costs. They also discuss opportunism as being one of the responses to an imbalance in the market information.

Part of Galbraith's (1973) view of business organisations is concerned with ensuring that information is processed at appropriate levels to prevent overload. This provides a useful perspective on transactions. He claims that a successful organisation is one that can handle uncertainty (the difference between what information is available and what is needed) and information processing during task execution.

Performance based specification (PBS)

The benefits of PBS are summarised by many writers but there is little actual research to support their claims. PBS applies throughout the life of the project. By its definition, it specifies the performance of each and every part of the project rather than prescribing the part itself. Hattis and Becker (1999:1) describe specifications as: "… issued by a buyer (a specifier) as part of a tender to a group of potential sellers (offerors), or as part of a contract with a seller to procure … a part of a building."

PBS is credited with many characteristics by many writers. It is purported to more closely meet client objectives (Bramwell, 2003; Davis and Szigetti, 1997; Lee and Barrett 2003); improve quality (Foliente, 2000; Templemans Plat and Hermans, 2001), encourage innovation (Bramwell , 2003; de Ridder, 2002), improve communication by bridging the gap between professionals and users (Hattis and Becker, 2001; Foliente, 2000), reduce project risks and improve performance (Foliente, 2000); and uses the supplier's expertise rather than that of the designer (Bramwell, 2003; Foliente, 2000; Lee and Barrett, 2003). It also claims to reduce the documentation because working with performance-based codes rather than prescriptive based codes would reduce the hierarchy of documentation (Prior and Szigetti, 2003).

METHODOLOGY

The only logical methodology for this investigationwas case study because in case study "…researchers construct cases out of naturally occurring social situations." (Gomm *et al.*, 2000:3). They believe "generalisation" is acceptable if the "typical" projects studied have common links. The greater the number of "ordinary" projects studied (i.e. aggregation) the more the likelihood of the transferability of the information increases. Patton (2002:230) notes that "The logic and power of purposeful sampling lie in selection of *information-rich cases* for study in depth…" He (Patton 2002: 46) further notes that even a small sample selected purposefully allows the study of a phenomenon in depth.

However, if generalisation is the objective, then the case study/ies must be representative of the population as a whole. Gomm *et al.* (2000: 100) caution that transferability (i.e. generalisation applied to a larger population) implies there are "laws" which govern repeating patterns of events. "Data are facts produced by research. Data like facts, by themselves are meaningless. They take on meaning as they are related to theories" (Dixon *et al.*, 1987: 23). The theories derived from the literature supported the selection of a case study which could examine the other theories of transaction costs and PBS.

METHOD

The client company selected for this research outsourced the project management of buildings-related projects to a project management company. The rationale for this decision was that the client was not in the business of building projects. Outsourcing to a third party (the "market" solution) was anticipated to produce economies of scale unavailable by retaining project management in-house (the "hierarchy" solution). However, the client retained and updated a list of preferred suppliers to which the Project Manager (PM) had to adhere for project inputs. In an interview, the client revealed that the selection of preferred suppliers takes approximately 100 days every two years. The PM's cost was 10% of the final price of the project. This was to cover the projects' share of the PM's direct labour costs and overheads.

The sampling strategy was to select two completed projects which were typical of many projects completed for this client. They were to be researched in depth and the results applied generally if they showed some consistency. The first project was the provision of a service – the removal of a hazardous material (labour-only project – value approximately £97k) - and the second project was the repair of mechanical

equipment (materials and labour project – value approximately £100k). Both projects took approximately eight months.

These two projects had much in common apart from similarity in value and time to completion. Both projects were specified on a prescriptive basis and managed by the outsourced project management company acting on behalf of the client using the client's preferred list of suppliers. They shared the same procurement route (i.e. the client's preferred supplier to be used by outsourced PM); invoices were paid by the client after the PM had processed them; identical use of the client's documentation processes for health and safety, security, access passes and use of the client's tender and specification routes. The variation was in the nature of the projects (one was primarily a service provision; the other an equipment provision). The common features would make the results generalisable across the range of projects.

The PM had a single file on each project, arranged chronologically. It was decided that a count of documents could be a proxy for the volume of project transactions simply because there was simply no other way of assessing them. Accordingly, the documents were counted, listed by date and grouped by type of document, the issuer and the purpose for which they were raised. The documents were then analysed according to three emergent groupings to see which analytical route gave useful information to meet the aims of the research and supported some or all of the theory. The first grouping was based on the author's analysis of categories of documentation which appeared naturally from the count. The second grouping was split between labour, material and overheads to determine costs of the hidden transactions themselves and the third grouping was according to authors Guneberg and Ive's breakdown of transaction costs. Interviews with the PM and the client were arranged to confirm any issues outstanding at the end of the document count.

RESULTS

Each document counted represented a transaction with the PM. The number of documents counted was 78 for the hazardous materials project and 42 for the mechanical equipment project. The number of external contacts for each project varied. For hazardous materials it was 10 (comprising client, PM, three sub-contractors, planning supervisor, specification writer, statutory agents, fire alarm reinstatement and electricians). For the mechanical equipment it was five (client, PM, equipment installers, planning supervisor, statutory agents). However, there were also the unsuccessful tenders for both projects which also added to the range of contacts. Some documents comprised multiple pages (but counted as one transaction), others just single pages with only a few lines. The flaw in this analysis was that the total number of documents bore no relation to the hours (and thus costs) spent preparing each document.

There are many different ways of splitting and grouping types of documents. The purpose of this analysis is to assess the relevance of different ways of grouping them by applying each of three grouping methods to the data collected.

Grouping A

This was based on the author's analysis of emergent types of documentation. As the document count progressed, categories of documents seemed to identify themselves naturally and it was these that the author used for Grouping A (see Table 1).

Table 1: Results of Grouping A: author's original grouping

Grouping A	% of documents	
	Hazardous materials	Mechanical equipment
Bills (including invoices, payments)	24	5
Specifications	4	12
Drawings	4	-
Health and safety requirements/permits	17	10
Minor works requests	3	5
Contracts	-	-
Tender	6	24
Administration*	42	44
TOTAL	**100%**	**100%**

*NB administration included contact lists, meeting minutes, miscellaneous emails, orders, clarifications, confirmations, quotations

The significant feature of this grouping was the quantity of documentation which comprised "administration" - consistent across both projects. Some of these were duplications – e.g. written confirmation of telephone calls. Much of this documentation could be generalised as relating directly to the client's prescriptive procurement processes rather than specifically to the projects under review. The client agreed with the breakdown of the author's groups, but felt that "administration" should have been nearer 7.5-10%, rather than the 42% or 44% shown. He admitted that his "estimate" had never been confirmed by research. In both cases PBS would have reduced much of administration as it related to clarifications and adherence to the client's processes.

Grouping B

The next obvious issue was see if it was possible to allocate costs to the man-hours involved in the various groupings and in particular for "administration". The breakdown was to be labour, materials, "direct overheads" (those directly related to the projects and documented) and "indirect overheads" (those which were known but not documented in the project file). However, it was impossible to allocate costs since there was insufficient data to extrapolate the hours spent preparing documents. Furthermore, any calculation would not have taken account of the number of personnel involved in any process (e.g. attending meetings).

Grouping C

Further analysis using Gruneberg and Ive's categories of transaction costs was applied to the documents counted and is as shown in Table 2.

Table 2: Results of Grouping C: according to Gruneberg and Ive (2000)

Grouping C	% of documents	
	Hazardous materials	Mechanical equipment
Search	-	-
Product or service specification	12	35
Contract selection/design/negotiation	-	-
Supplier selection*	29	29
Contract performance monitoring	59	36
Enforcement	-	-
TOTAL	**100%**	**100%**

**NB in this context "supplier selection" included contact lists, tenders, purchase orders, meetings etc. – costs which were not allocated to the two projects.

Analysis according to this grouping was more useful. It highlighted that there were no search costs, contract selection/design/negotiation costs or enforcement costs included in the documents. This is probably the most significant analysis of all as it clearly illustrates that these costs were not borne by the projects – but by the client. The lack of enforcement costs (i.e. the absence of such documentation in the files) implied there were no disputes or delays when in fact both these projects incurred disputes. The client had emptied his budget paying for suppliers and had no money to pay the PM his agreed project fees. These negotiations are not recorded in any documentation in the project file. Ultimately, the Grouping C analysis revealed two hidden PM overhead transaction costs: (a) the cost of the final fee negotiation itself and (b) the lost percentage between what was agreed as the project management price ex ante (10%) and the ex post negotiated rate (5%) when the projects were complete.

DISCUSSION

The three methods selected were thought to have the potential to offer a variety of results. However, using the document count in the groupings chosen as a proxy for the volume of transactions did not yield all the anticipated data for the research objectives but it did highlight other issues.

First, it was not possible to assess all the project transactions (i.e. only those represented by documents in the PM's file) since so many *ex ante* transactions were not under the PM's control. All transactions were external to the PM – but many of these known and unknown transactions existed because the client retained control and authority over suppliers. The number of additional "market" transactions cannot, therefore, be counted from the PM's documentation. In effect, the project delivery represented only the "monitoring" element of Hughes *et al.*'s (2002) analysis.

Second, by categorising each project's documents in different ways and then performing a cross-case comparison of the two projects within the groupings, it was possible to assess whether certain documentation groupings were consistent in a service and/or a material supply project. The proportion for "administration" documentation was consistent for both projects (42% for the hazardous material project and 44% for the mechanical equipment project). This gives some credibility to using purposive, information-rich case studies (suggested by Patton, 2002) to transfer their specificity to the general situation as suggested by Gomm *et al.* (2000).

Assessing whether these results could be improved by a different procurement route was a challenge and while it is possible to theorise, without knowing the *ex ante* and *ex post* documentation quantities (and full determination of the procurement paths) it could be a leap in judgment. However, given that the case studies covered the delivery stage of the projects, it ought to be reasonable to assume that delivery should have been effected in the most efficient manner possible – the end result of an efficient procurement process. The client's hybrid procurement route of market and hierarchy mix did not necessarily deliver this requirement. It would appear from the findings that the client's involvement placed considerable responsibility with the PM without the matching authority – thus the PM carried the project risks – and his reward was the only cost "at risk" throughout the process. In this sense, PBS would have reduced the risks carried by the PM and deferred them to the client's preferred contractors over whom the PM would have had authority. The client would then have had only one point of contact with the project i.e. the PM. This would have reduced the transactions, communications and information exchange – all of which added to

costs on the project. The current situation is an example of asymmetrical information and opportunism as described by Dietrich (1994), Galbraith (1973) and Chang and Ive (2000).

The information exchanged and decisions made (in this case study, represented by the document functions) should be performed at the right level in the procurement chain as suggested by Galbraith (1973). This can be assessed by comparing the expected with the actual document counts. In this study, the client made decisions remotely from the responsible PM (because the client had the supplier information) and this implies that these decisions were taken at the wrong level increasing the quantity and breadth of transactions. In addition, the client required that the (prescriptively-procured) hazardous materials project had an outsourced specification-writer and an outsourced planning supervisor. Hazardous materials are removed under legislation with very strict controls, the environment favoured for PBS implementation by some writers (Davis and Szigeti, 1997). Had this been a PBS project, these extra consultants and processes would have been unnecessary. The hazardous material removal company could have written their own specifications, health and safety plans and methods statements in accordance with the relevant legislation and the client's in-house requirements. The actual saving to the project would have been approximately 14% of the project costs i.e. £14k.

In the mechanical equipment project, and had PBS been used, savings would have been made earlier in the process by letting the suppliers produce their own designs to fulfil the client's specifications. These costs were hidden in the unavailable *ex ante* documentation. During interviews it was discovered that the client's continued involvement affected the levels at which decisions were made. However, had PBS been used two years earlier, at the time of original equipment procurement, this project would not have been necessary at all with a saving of approximately £100k.

The applicability of these findings to a generalised case is feasible – for all the reasons listed in the literature search and in the selection of these sample projects. The procurement route for these projects (i.e. Chang and Ive (2000) "governance structure") is not clear. It is a hybrid of market and hierarchy and applies to all the client's buildings-related projects – a further justification for extrapolating these typical projects to the client's general project procurement.

CONCLUSIONS

The findings in this report resonate with many theories. First, they support the theories regarding asymmetrical information leading to opportunism. The PM had the responsibility for the client's preferred contractors but had no authority to terminate if they performed badly. It is therefore reasonable to assume that the true cost of these projects is far higher than is invoiced directly to the client. Without more detail as to what the "100 days every two years" comprises, the costs of paying invoices, and the other controls which the client exercises, it is unlikely that there can be a complete and true analysis of the actual transaction costs of these projects using the counted documentation method. Dispute resolution ("contract enforcement") which involved "re-negotiating" the PM fee after the project completions, arose out of "opportunism" and imbalanced information. It was also a hidden issue which added to the transaction costs.

Second, the theories regarding decisions taken at inappropriate levels (i.e. by the client instead of the PM) and reduction in communication and documentation by using PBS,

are also supported. After outsourcing (market), the client hoped that project management costs would be lower than the in-house (hierarchy) cost. However, the client appeared unaware of the transaction costs prior to outsourcing and is unaware of current costs. The current PM reward system involves asymmetrical information and his role encompasses contract enforcement with no authority for non-performance of the client's sub-contractor.

Third, using PBS would also allow the PM the responsibility to match the authority needed to control the sub-contractors – which may improve the quality of the project.

If the sub-contractors were procured on a performance basis (i.e. PBS), the number of transactions between PM and supplier, PM and client, and client and supplier would reduce by lowering the overall number of transactions and ultimately transaction costs. This supports the theory that PBS reduces the number of transactions, the quantity of documents and relies on the supplier's expertise – all of which will reduce costs.

It would be easy to conclude that the client has not outsourced sufficient work to make outsourcing truly cost-effective. Every transaction is external thus adding range, quantity and ultimately, cost. Crossing so many external corporate boundaries it could also be argued that partial outsourcing only increases the quantity and range of transactions. The "market or hierarchy" decision appears unresolved adding to confusion and complexity and increasing the unknown transaction costs. These "invisible costs" could well undermine the economics of the original decision to outsource the PM function and support a case for PBS rather than the current prescriptive procurement.

Finally, the success of this research was that it yielded realistic data for the client to examine and upon which to change processes to reduce costs. Using PBS the client could have saved £114k of £200k spent. If the processes were altered and applied across the £6m annual project spend, the changes could yield significant savings for the client and rewards for the PM.

Albert Einstein was famed for saying that "not everything that can be counted counts, and not everything that counts can be counted". This fits neatly with this particular research into transaction costs and PBS.

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