

# Global Perspectives on Management and Economics in the AEC Sector

Kalle Kähkönen & Janne Porkka

Combining Forces - Advancing Facilities Management &  
Construction through Innovation Series

# Global Perspectives on Management and Economics in the AEC Sector

*Edited by*

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# Preface

This book addresses company management and economics for the AEC sector. Globalisation and global operating companies are our starting points for getting an improved understanding on the dynamics of the live business and factors affecting on it. Basically construction businesses in different countries are local with its constraints, possibilities and other characteristics. Behind this scene the actual business operations and companies involved can be often to a great extent internationally integrated. This situation has created a new set of factors, actors and drivers, which are affecting on decision making on different decision making levels. How sufficiently or insufficiently we then understand or even identify the actual existence of the changed business environment? It looks obvious that we first need improved thinking and structuring principles. Based on these principles new business modelling techniques and applications can be developed.

Environmental concerns and ageing population are also affecting the whole AEC sector. These are examples of change factors that are forming gradually around us and having impact on wide variety of businesses in our societies. For the AEC sector this situation shall create new demands relating both to the end product and to the company operations and procedures.

Whereas the emerging business environment is increasingly global and complex it provides more new positive business opportunities. In particular, it seems that now there is a lot of room for integrators that can promptly adopt new trends, take grip of new business drivers, put together different players and their products for successful projects and business operations. However, behind of these manoeuvres there needs to be well-established expertise and understanding on the business environment where we are operating.

We hope this book shall be a source of new insights and solutions that can help us to understand better the modern AEC sector. It includes 30 papers from four continent providing a global view of various aspects of interest in different countries.

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# Impact of procurement method on costs of procurement

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## Abstract

Collaborative working methods offer the hope of reduced waste, lower tendering costs and improved outputs. The costs of tendering may be influenced by the introduction of different working methods. Transaction cost economics appears to offer an analytical framework for studying the costs of tendering, but it is more to do with providing explanations at the institutional/industry level, not at the level of individual projects. Surveys and interviews were carried out with small samples in UK. The data show that while tendering costs are not necessarily higher in collaborative working arrangements, there is no correlation between costs of tendering and the way the work is organized. Practitioners perceive that the benefits of working in collaborative procurement routes far outweigh the costs. Tendering practices can be improved to avoid waste, and the suggested improvements include restricting selective tendering lists to 2-3 bidders, letting bidders know who they are competing with, reimbursing tendering costs for aborted projects and ensuring that timely and comprehensive information is provided to bidders.

**Keywords:** procurement, cost of tendering, bidding cost, transaction cost economics.

## 1. Introduction

The increasing use of collaborative working methods in the UK is displacing more traditional competitive methods for selecting contractors and consultants. This move is accompanied by reduced reliance on the law when things go wrong. Proponents of collaborative working claim that the elimination of competitive tendering will reduce the costs of striking deals, whereas those who favour more traditional procurement claim that the costs of negotiation are much higher than the costs of competition. This paper reports the final results of research that has previously been reported to CIB conferences as work in progress [1, 2, 3].



## 1.1 Theoretical Work on Costs of Transactions and Costs of Tendering

Transaction cost economics (TCE) offers insights into the analysis of the costs of organizing the procurement of construction work in different ways. Coase [4] { XE "Coase, R H" \f "a" } suggested that transaction costs { XE "transaction cost economics" } were the key influence on a firm's decision about whether to produce inputs in-house or buy in goods and services (the make-or-buy decision). Finding the right contractor and agreeing a price is complex and requires binding contractual arrangements. Contractors, particularly in the UK, generally use sub-contractors rather than employing labour directly. The costs of purchasing these inputs, and ensuring that they conform to specification, are high. All these are costs of procurement; the subject of this study.

### 1.1.1 Transaction Cost Economics

Williamson [5] stressed the importance of comparative analyses of the costs of different modes of organizing productive activities. But reality is fuzzier than a simple choice between market and hierarchy in that markets are often characterized by networks of participants, creating regular relationships in what is sometimes referred to as a *quasi-firm* [6] { XE "quasi-firm" }. Such networks are increasingly prevalent in the construction industry, with the growing popularity of partnering { XE "partnering" }, etc { XE "strategic alliancing" }. The ideas of Coase and Williamson have been taken up by many who study business processes [7, 8]. These ideas seem to hold out a lot of promise for analysing and describing the situation in the construction sector.

### 1.1.2 Transaction Costs in the Construction Industry

Several authors have sought to explain contracting in the construction industry, by using TCE { XE "transaction cost economics" } [9, 10, 11, 12, 13]. Indeed, there is some empirical research to support the transaction cost concepts [14, 15]. Dietrich { XE "Dietrich, M" \f "a" } [16] is critical of using traditional transaction costs theory to explain the construction sector, because it ignores the inherently dynamic nature of contracting and organization problems. Dietrich re-casts the costs of transactions in terms of the management costs associated with forming and enforcing contracts and presents this as a means for comparison with production costs. Such an approach enables both transaction and organization costs to be understood as the costs of management, whether in-house or not. These are the costs that we seek to measure when comparing different ways of organizing construction work. The literature reveals little empirical work that tests the reliability of these theories in industry generally, or in the construction sector in particular.

### 1.1.3 The Failure of Transaction Cost Analysis in Construction

{ XE "transaction cost economics:failure of, in construction" } High transaction costs may imply that it would be economical to bring inputs in-house and avoid the costs of arranging sub-contracts. Theoretically, there should be a movement towards the internal labour market and away from sub-

contracting [17]. But in the UK the trend is the other way, questioning the relevance of TCE in the construction sector.

{ XE "sub-contracting" }Hillebrandt{ XE "Hillebrandt, P M" \f "a" } and Cannon{ XE "Cannon, K" \f "a" } [18] list five characteristics of construction which affect the division of work between direct work and that which is sub-contracted:

- § The finite construction period of each project.
- § The wide geographical spread of location of projects.
- § The uneven requirement for specific skills over the life of the project.
- § The wide diversity of skills required.
- § Fluctuations in the demand for any particular type of work.

These factors far outweigh the theoretical reasons which favour the internal labour market and result in the widespread sub-contracting of the UK industry. Buckley and Enderwick [17] accept that these factors explain the situation on the ground. There may well be similar problems in applying TCE to the tendering situation. The mere fact that sub-contracting seems more expensive than direct labour is not sufficient reason to call for less sub-contracting. The important decision in the construction industry is not whether to outsource, but how best to structure relationships.

Construction projects are geographically dispersed{ XE "sub-contracting:reasons for" }. A large construction firm may be operating anywhere in the UK, perhaps anywhere in the world. Transport costs of materials make it economic to procure them near to site. If a contractor had produced components in-house, costs of transport would generally cancel any cost advantage in production and transaction costs. Moreover the diversity of components and materials used in different projects would make it unlikely that more than say 10-20 % of inputs could be produced in-house [19: Table 10.5].

Similarly with labour requirements: Before the Second World War, and for a few years afterwards, contractors employed their labour force directly. This was easier when contractors were smaller. They would find continuous employment for their best operatives, but a large number, although directly employed, were in fact casual labour{ XE "labour:casualization of" }, taken on for a few weeks while their particular trade was required on a project. This was unavoidable because, apart from wide geographical spread of work, any one trade was needed for only a part of the duration of the contract. The total amount of labour resource required by a contractor is small at the beginning and the end of the contract, with the bulk of the work being done in the middle. Moreover, each individual trade does not form a constant proportion of the whole [20: Table 4]. The labour-only sub-contracting{ XE "sub-contracting:labour-only" } system in use in the UK replaced direct, but largely casual employment.

The geographical dispersion of projects and the variations in the employment of specialist inputs over the duration of the project completely override the arguments of transaction cost theory{ XE "transaction cost economics:failure of, in construction" } for in-house production and employment. There is an overwhelming advantage in the modern construction industry in sub-contracting as opposed to direct employment and of buying in materials and products rather than manufacturing. This then raises the problems of organizing the commercial process in the optimum manner, a subject on which this research project makes a significant contribution.

#### 1.1.4 Categories of Costs of Procurement

Following Williamson{ XE "Williamson, O E" \f "a" } [21], it is useful to distinguish *ex ante* from *ex post* transaction costs{ XE "transaction costs:ex ante" }{ XE "transaction costs:ex post" } [22]. *Ex-ante* costs include the costs of tendering, negotiating and writing the contract while *ex-post* costs may be incurred during the execution and policing of the contract or of resolving disputes arising from the contracted work [21]. *Ex-post* costs include direct costs such as the cost of implementing control systems, cost accounting, measuring performance, quality assurance systems and layers of the managerial hierarchy [9]. *Ex-post* costs arising from disputes and litigation may also be high. *Ex ante* costs were tentatively identified as those incurred in (for example) contractor selection.

Lingard et al. [22] observed that some theorists argue for three categories, namely; search and information costs, bargaining and decision costs, policing and enforcement costs. These categories are roughly equivalent to the classification of transaction costs suggested by Gruneberg and Ive [23] as: search costs, product or service specification costs, contract selection and negotiation costs, supplier selection costs, performance monitoring costs and contract enforcement costs. These are more specific than the two argued for by transaction cost economists, and for the purposes of more detailed analysis can be re-stated as: pre-tendering work, tendering work and post-tendering work. However, the third category is too broad in that it includes routine management as well as dispute resolution. It is more useful to separate dispute resolution, especially in the light of contemporary developments in procurement practice specifically designed to avoid disputes in the first place. Thus, the commercial process has been divided into four stages for the purposes of this research; the management costs of which are influenced by each other. These are shown in Table 1.

*Table 1: Stages in the commercial process*{ XE "commercial process:stages in" }

<b>Marketing</b>	Developing relationships and selling, including pre-qualification for preferred tender lists, forming alliances, establishing reputations.
<b>Agreeing terms</b>	Pricing and scoping work, estimating, bidding and/or negotiating perhaps with some element of design, and fixing a price (for consultants, defining a fee and terms of engagement); this is the process of striking the deal and at this stage a contractual relationship comes into being; the result is an offer, which may be accepted by the "customer" saying "yes".
<b>Monitoring of work</b>	Managing the realization of the design, monitoring performance, ensuring the carrying out of contractual obligations during the contract period, the result is the building.
<b>Resolving disputes</b>	Dispute resolution after the contract period, there are two types - agreeing what is owed and recovering what is owed, i.e. bad debts. Claims, enforcement and disputes, the result is the discharge of contractual obligations.

The research project is concerned with an examination of the costs associated with each of these four commercial processes in construction.

As well as the costs incurred in selling goods and services, costs are also incurred at each stage by the buyer of goods and services. Together, these involve substantial resources which are typically dealt with as overheads.

These activities have been part of the construction process from early times [24]. By the middle of the 20<sup>th</sup> century the UK Government was becoming concerned at inefficiencies and waste in the system, particularly as administered by local authorities, and as a result, a series of reports was produced to try to improve procurement [25]. The earlier reports concentrated on improving the tendering system and more recently the need for more collaboration. The way that collaboration takes place is still developing.

## 1.2 Empirical Work on Factors Affecting the Costs of Procurement

{ XE "transaction cost economics:empirical work" } There have been some attempts to quantify the costs of transactions. Masden *et al.*'s [26] { XE "Masden, S E" \f "a" } { XE "Meehan, J W" \f "a" } { XE "Snyder, E A" \f "a" } study relied on a limited number variables and respondents giving an ordinal score to the importance of each factor, related to decisions about in one firm involved with a shipbuilding contract. They identify the difficulty of obtaining data as the key obstacle to testing transaction-cost theory, particularly as every case seems to be specific to a particular situation.

Chang{ XE "Chang, C Y" \f "a" } and Ive{ XE "Ive, G" \f "a" } [26] undertook an institutional analysis of transaction costs in construction, to ascertain the most effective way of organizing market relationships. They consciously avoided measuring the direct costs of different configurations, rejecting this approach as too cumbersome.

The impact of partnering{ XE "partnering:impact on cost" } was considered by { XE "Matthews, J" \f "a" } { XE "Tyler, A" \f "a" } { XE "Thorpe, A" \f "a" } Matthews *et al.* [27], 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{ XE "Pasquire, C L" \f "a" } and Collins{ XE "Collins, S" \f "a" } [28] looked at the effect of competitive tendering{ XE "competitive tendering:effect on value" } on value{ XE "value:effects of competition on" }. They found a lot of wasted tendering costs{ XE "tendering costs:abortive" }, particularly in the case of design and build{ XE "design and build:abortive tendering cost" }.

### 1.3 Estimates of the Costs of Tendering and Other Components of Procurement

There have been various estimates of the costs of tendering{ XE "tendering:estimates of cost" }. The range of estimates is great due both to the differences in methods of procurements and also to the lack of basic information. There is no doubt that tendering is expensive and each bid must incorporate the cost of failed { XE "tendering:costs of failed tenders" }tenders [29]. For example, in 1989 it was found in discussions with contractors that they expended of the order of 0.7-1.0% of turnover in the handling of tender documentation [30].

Many researchers have pointed out the wasteful expense of competitive bidding, but little has been done to test the assumption that contractor selection methods influence costs of the tendering{ XE "tendering costs:influence of selection methods" } process. Clients need to be able to make informed judgements on the best value{ XE "best value" } and not the cheapest price in their selection decisions [31]. Current practice makes such informed decisions very difficult to achieve. Cook{ XE "Cook, A E" \f "a" } [32] simply asked contractors how much they spent on tendering, with no attempt to isolate the costs in any systematic way, and got 30 responses varying from 0.25% to 6% of turnover expended on competitive tendering. At a workshop involving the industrial partners for this research project in July 2000, it was reported that building services contractors had calculated that up to 15% of their turnover could be accounted for by “unnecessary” tendering processes, intriguingly close to the 14% associated with “organizing work” reported by Masden *et al.* [26]{ XE "Masden, S E" \f "a" }{ XE "Meehan, J W" \f "a" }{ XE "Snyder, E A" \f "a" }.

Private finance{ XE "private finance initiative" } is increasingly popular with governments all over the world, as it reduces the need for them to invest capital in the short term. Grimsey and Graham { XE "Graham, R" \f "a" }{ XE "Grimsey, D" \f "a" } [33] estimated that in the UK, by 1997, PFI sponsors had spent more than £30m on bidding for approximately 30 schemes. Experience indicates that “[t]here has been an underestimation by all parties of the length of time to negotiate project agreements” [33: 221]. This forms 1½-3% of the total contract sums involved.

{ XE "tendering costs:estimates of" }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.

## 2. Research

### 2.1 Objectives

{ XE "research:purpose of" }There are three types of cost of interest in this research: pre-tendering (marketing, forming alliances, establishing reputations), tendering (estimating, bidding, negotiating) and post-tendering (monitoring performance, enforcement of contractual obligations, dispute resolution). As well as the costs incurred in selling goods and services, costs are also incurred at each stage by the buyer of goods and services. Together, these involve substantial resources which are typically dealt with as overheads, rather than individually costed.

Some of the specific objectives of this research project were defined as:

- § Identify how clients award work and how consultants and contractors obtain work.
- § Explore the structure and magnitude of the costs of the commercial process.
- § Develop a mechanism for measuring the true costs of the commercial process.
- § Use this new data and understanding to quantify the relationship between forms of procurement, types of project and the costs of the commercial process.

### 2.2 Method

{ XE "research:methods" }The research involved qualitative approaches, using individual and group interviews, to develop an understanding of the main issues involved, as well as quantitative approaches, based on questionnaires to the industry. By developing techniques for benchmarking the main indicators of tendering costs, the findings should 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.

The research was carried out in four stages: first, develop and trial data collection methods involving interviews, discussions and feasibility study of various data collection methods; second, two separate surveys of companies, one related to annual business activity and the other to individual bids; third, analysis of the structure of supply chains; fourth, in-depth interviews. The final step was analysis and synthesis of results and findings. Interviews and discussions continued throughout the process. The results of the surveys have already been reported to earlier conferences [1, 2, 3] and the analysis of the interviews will be published later.

### 3. Surveys

The surveys revealed that the amounts spent on tendering and other aspects of commercial activity vary wildly. Table 2 shows the amounts spent on the aggregated commercial process (all four of the stages from Table 1) by various parties in the process, both in buying and in selling. There is enormous variability here. Moreover, as previously reported, there is simply no correlation with different methods of procurement. The costs vary a lot, but procurement variables are not the most important influence on how they vary.

*Table 2: Proportion of annual turnover attributed to commercial processes*

<b>Type</b>	<b>Selling (%)</b>	<b>Buying (%)</b>
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

Table 3 shows cost related to preparing bids, excluding aspects of the commercial process other than bidding. While consultants clearly spend a much larger proportion of their turnover on bidding than contractors do, contractors usually carry out only a small proportion of the work, subcontracting most of it. It is also interesting the pre-qualification costs are of a similar order of magnitude to bidding costs. While they are presented here according to procurement method, there was actually no correlation to be found between procurement method and cost of bidding. In isolating some of the variable, Table 4 shows that focussing simply on main contractors doing full proposals in non-PFI bids, there is still a huge amount of variability, from 0.07% to 0.8%. If nothing else, these figures reveal that the earlier researchers were indeed correct to conclude that the data are extremely difficult to collect, and that there are too many other variables to isolate the effect of tendering or procurement methods.

*Table 3: Average bid cost as a proportion of the value of the work to the bidder*

<b>Procurement Route</b>	<b>Full Proposal</b>		<b>Pre-qualification</b>	
	<b>Consultants</b>	<b>Contractors</b>	<b>Consultants</b>	<b>Contractors</b>
General Contracting	5.07%	0.81%	3.42%	0.36%
Management	3.06%	0.25%		0.05%
Novated D&B	4.21%	0.21%		
Pure D&B	0.47%	0.80%		1.05%
All procurement routes	4.44%	0.64%	3.42%	0.63%

Table 4: Average bid costs for main contractors in non-PFI full proposals

Sector	Procurement Route	Type of Bid	Project value	Bid cost
Private	Novated D&B	Partnering	£15,000,000	0.12%
Public	Traditional	Preferred / Framework	£15,000,000	0.14%
Private	Novated D&B	Single stage tendering	£1,600,000	0.33%
Private	Novated D&B	Single stage tendering	£1,600,000	0.33%
Private	Novated D&B	Single stage tendering	£220,000,000	0.11%
Private	Traditional	Single stage tendering	£9,000,000	0.07%
Private	Traditional	Single stage tendering	£3,300,000	0.15%
Private	Traditional	Single stage tendering	£7,000,000	0.11%
Public	Traditional	Single stage tendering	£200,000	0.39%
Private	Pure D&B	Two stage tendering	£250,000	0.80%
Private	Traditional	Two stage tendering	£4,000,000	0.20%
Private	Traditional	Two stage tendering	£600,000	0.57%
<b>Average (of summed values)</b>				<b>0.12%</b>

## 4. Interviews

While space precludes a full treatment of the interview data, it is interesting to extract the summary points that came from fifteen structured interview, in which the same set of questions was put to participants from throughout the supply chain:

- § In terms of trustworthiness, interviewees felt that people in construction are no different from those in any other sector; construction has its fair share of rogues. You have to be careful about who you deal with.
- § The most effective form of marketing is word of mouth and repeat business. { XE "repeat business" }
- § While many people prefer negotiation with firms they can trust, when tendering they get between 3 and 6 firms to bid, although it can be difficult to get serious bids from this many bidders.
- § Every one prefers to be the only player in their market. Nobody likes to be one of a large number of tenderers, but most acknowledge that some competition is inevitable and acceptable.
- § There are many ways of finding a price without competition { XE "competition" }. Some involve knowledge of the current market rates, others involve cost-plus contracting. In all cases, contractors need intimate knowledge of their own costs.
- § Disputes seem to be rare these days, especially involving contractors. Partnering has played a significant role in the reduction of disputes. Reforms to the legal processes have resulted in fewer litigious episodes.



- § Design competitions{ XE "design competitions" } should not be based on full designs. Partnering seems to be good for getting contractors in early, but it involves a serious commitment and involved negotiations in order to set it up.
- § Consultants sometimes may cause problems, as can contract documentation{ XE "documentation:quality of" }.
- § Because disputes are rare, they are relatively unimportant in terms of the day-to-day business of construction. When they crop up they can be very problematic.

Overall, the interviews revealed that cost is not the most significant thing about tendering and procurement. The costs may indeed be important but the benefits of exploring different ways of working are much more important. There is was a lot talk of increasing value, rather than reducing cost. Thus, a focus on the cost of tendering is probably not the right focus to take. While some processes cost more than others, the benefits from entering into those processes outweighed the extra costs. This was clear from the interviews.

## 5. Conclusions

This research work has shown that costs of tendering vary a lot, but that they are not proven to be *that* different. Some procurement techniques work better than others, and that is more important than their cost. Although tendering costs can be very high, they are usually a small proportion of the whole cost of procuring work. Indeed, the cost of construction as a whole is only one of many costs incurred by businesses, and there is much evidence that the benefits of well-designed and constructed facilities are much more important than the costs of acquiring them. The worries that people have about costs are equally applicable in all selection and procurements. The interaction with industry has revealed that there are wasteful practices and that these can be avoided. There were strong messages emerging from the research, and they were not about costs: early involvement of designers and builders, reimbursement for tendering costs on cancelled projects, selection on value rather than price, selective tendering lists of only two or three, revealing the identity of competitors and the timely release of comprehensive information. If such practices were adopted by clients, a lot of waste would be removed from the systems of construction procurement.

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