

A CASE STUDY OF CHANGING PROCUREMENT PRACTICES ON DELIVERY OF HIGHWAYS PROJECTS

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Despite many changes to industry best practice since the publication of the Latham and Egan report, the construction industry has been heavily criticised for inefficient procurement strategies. The publication of NEC 3 (the latest version of the New Engineering Contract) in 2005 instigated improved collaboration, flexibility, risk sharing and enhanced management practices, particularly in relation to public sector procurement projects. This study analyses the organisational benefits of changes to the procurement strategy, based on NEC 3 and including framework contracts and key performance indicators, to the Engineering Consultancy which delivers highways and transportation projects for Hampshire County Council. Quantitative data from 51 projects completed prior to 2008 when the new procurement framework was introduced was compared to data from 23 projects completed post 2008 to establish key areas of improvement. A case study approach was adopted comprising interviews with project managers, quantity surveyors and supervising engineers, together with further detailed data analysis from three typical projects. The results of the investigation demonstrate better predictability for projects delivered under the new procurement strategy as they were more likely to be delivered on time and to cost, and less likely to overrun on tender value. Other benefits identified include closer working relationships with contractors and faster agreement for compensation events, time extensions and valuations. This study supports the premise that such changes in procurement practices can lead to improvements in the efficiency and delivery of highways construction projects and overall methods of working.

Keywords: framework agreement, highway, NEC3, procurement, public sector.

INTRODUCTION

This research stemmed from the introduction of framework agreements adopted by Hampshire County Council (HCC) within the Engineering Consultancy, an in-house consultancy responsible for the majority of highways and transportation Civil Engineering projects. The rationale for the adoption of framework agreements was to bring the Consultancy in line with industry best practice and the recommendations proposed within the Egan and Latham report.

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Egan (1998:7) was critical of the traditional form of construction procurement, particularly for Local Government, where contracts were usually awarded to the lowest priced tender rather than best value due to a need for accountability, which he viewed as one of the greatest barriers to improvement. In a Chartered Institute of Building (CIOB) Report (2010) it was highlighted that having a lowest bid mentality delivers high risk, poor quality projects, that result in unplanned increases in cost and time. Other critics of the lowest bid over value approach include Byatt (2001), Naoum (2003), Black et al. (2000).

Two new Framework Contracts were introduced by HCC in 2008 using the New Engineering Contract 3rd Edition (NEC 3) as the standard form of contract in line with industry changes. These were Improvement Works Framework 1 (IWF1) for small scale works up to £500,000 and Improvement Works Framework 2 (IWF2) for more complex project ranging from £50,000 to £3,900,000. The anticipated benefits included: increasing predictability of construction durations and emphasising a zero defects culture, moving towards a procurement system based around quality and value rather than cost and improving the relationship between the client and contractors. The longer term aspiration was to bring about increases in operational efficiency and better value for money for all stakeholders. This supports Egan's recommendations (1998:7).

Framework agreements are attractive as they are simple to use, requiring only one negotiation for a series of projects, which should deliver value for money and save time. There is commercial advantage for Contractors in the framework as they will be able to bid for a higher proportion of contracts available, in the knowledge they are only in competition with a handful of other contractors. The main benefit to the Client is that by working with a small group of contractors it is easier to build closer working relationships, learn from mistakes and ensure continuous improvement. However, Mosey (2009) warned that there is a need to remain more flexible than with single projects, as much of the detailed planning will only take place as each project is identified and initiated. Frameworks provide the prospect of future projects so any potential opportunistic behaviour is outweighed by fear of long-term reputational damage, although some critics do refute this (Campbell and Harris 2005).

Prior to 2008 the Consultancy procured the majority of construction services using the Institution of Civil Engineers Conditions of Contract 7th Edition as the standard form of contract. This involved sending invitations to tender to contractors from the Approved List of Contractors, with the contract awarded to the Contractor with the lowest priced tender.

This paper will start by identifying ongoing problems within the construction industry and key recommendations made within the Egan and Latham report. It will then present the research methods adopted to assess improvements in performance within the Engineering Consultancy following the introduction of IWF2 and end with a discussion of the findings, including perceptions of key staff in relation to working practices and relationships.

CONSTRUCTION: A CHANGING INDUSTRY

UK construction accounts for over 7% of GDP or £110bn per annum of expenditure, of which 40% is accounted for by the public sector, which makes a sizeable contribution to the overall economy (Cabinet Office 2011:3). Despite this, the construction industry has traditionally been regarded as inefficient, with a reputation

for completing projects late and over budget. It is therefore unsurprising that over the last 60 years, especially in periods of austerity and recession, construction has come under scrutiny from numerous Government reports and initiatives to deliver better value for money and thus contribute to economic growth (National Audit Office (NAO) 2005). In a review of these reports, Murray and Langford (2003) reveal that they share similar underlying explanations for the poor performance of the industry as a whole. Common themes include: fragmentation between the design and construction teams, coordination and management of subcontractors, procurement with lowest priced tendering, adversarial relationships between client and contractors, and poor contractor performance and client dissatisfaction with late and over budget delivery.

The Latham (1994) report was published following a tough recession in the late 1980's and early 1990's and with extensive consultation from within the industry. Increased competition, resulted in contractors tendering very low prices to win work, with the intention of making up shortfalls and losses through additional claims (Murray and Langford 2003) which led to an industry characterised by conflict and disputes, adversarial relationships and dissatisfied clients. Sir Michael Latham made a number of recommendations including standardised contracts, evaluation of tenders on quality as well as price criteria, and the Government committing itself to being a best practice client. The most controversial recommendation was the adoption of partnering, which was not met by universal approval by main contractors who felt that their role as principal agent under traditional contracts was threatened (Green 2011).

Although generally well received, the industry was slow to react to Latham's recommendations and in 1998 a new report 'Rethinking Construction' was published. With a background in motor manufacture and a reputation of turning around struggling businesses, Sir John Egan was brought in to shake up the industry and modernise construction, as a means to create 'economic, social, and environmental value through innovation, collaboration and integrated working' (McGeorge 2013). Egan proposed several ways to speed up this change utilising his manufacturing background; including lean construction, total quality management, business process reengineering, key performance indicators, benchmarking, concurrent construction and supply chain management. He identified 7 targets for improvement; capital cost, construction time, predictability, defects, accidents, productivity and turnover, and profits. These targets have been iconified in the 5-4-7 model (Green 2011:143) which also itemises the 5 drivers for change; focus on the customer, committed leadership, product team integration, quality driven agenda and commitment to people. Critics of the initial report demanded the inclusion of an eighth target relating to client satisfaction, and also pointed to the potential conflicting views within the client organisation as clients were seen as unitary entities (Green 2011). Others directed their comments to the fact that whilst partnership is positive and useful, contract management may be more effective at delivering results (Hughes and Maeda 2002). In order to prove the value of his approach Egan established demonstration projects, called the Movement for Innovation (M4I), which provided an industry benchmark. In the follow up report *Accelerating Change* (2002), Egan again stressed the importance of integrated teams to deliver greater process efficiency, drive out outmoded adversarial culture and end lowest price tendering as the main procurement tool.

Considering industry transformation, a change was clearly long overdue for the Engineering Consultancy, however the introduction of a brand new, untested form of contract on projects worth millions of pounds carries a significant element of risk. This is why local authorities often choose to wait and see how such contracts perform

in the private sector, particularly with regard to litigation, before deciding whether to adopt new methods.

RESEARCH AIM

The overall aim of the research was to carry out a preliminary investigation to contrast data pre and post introduction of the new standardised framework agreement and to assess the efficacy and success of the change. Success is defined as greater predictability in terms of time, overall cost and variance from tender value, as well as ensuring designs and projects were right first time.

To achieve the aim, the key objectives pursued were:

- To compare existing operational monitoring data on all projects completed before and after the introduction of the new framework agreement and assess potential performance improvements
- To undertake an in-depth case study of 3 projects completed under the new framework agreement to understand why variations to the contract occurred within 4 defined compensation event categories
- To interview key staff from the case study projects and explore reasons for compensation events, perceptions of the new framework agreement, and observations regarding changes in working practices, including relationships with clients and contractors.

RESEARCH METHODS

A multiple perspective approach was adopted using methodological triangulation of project data to provide a clear and valid view and explore more deeply the impact and success of the procurement changes on project delivery and working practices (Patton 2002). Qualitative case study research was conducted to explore outcomes of the new framework and ensure as wide an understanding of the situation as possible (Babbie 2001) in order to complement the quantitative data generated. Case studies were selected as an appropriate method as they allow investigation in greater depth drawing out the complexity of relationships and behaviour through numerous sources of information (Denscombe 2003:32).

Initially the population was all schemes (N=74) undertaken by the Engineering Consultancy (2006 - 2011) comprising of data on 51 projects completed between 2006-2009 (pre-IWF) and 23 projects completed after the introduction of the new procurement strategy in 2008 (IWF2) and the start of this research in 2011.

After an introductory assessment, 5 schemes (2 pre-IWF and 3 IWF2) were excluded on the grounds that they were atypical schemes. These 5 schemes delivered in excess of 100% of the tender value due to exceptional circumstances and change, which created a disproportionate skewing of results. Whilst this data clearly merits further investigation to assess the surrounding circumstances, it is outside the remit of this study. This reduced the total number of schemes analysed to 69.

Existing data from pre-IWF and IWF2 projects were analysed and compared using basic performance data on tender and final cost values, cost variations, and programme durations.

In terms of data limitations, it should be pointed out that the pre-IWF projects contain figures for schemes completed at all values whereas IWF2 contracts are only for more complex projects costing £50,000 to £3,900,000. Whilst it could be argued that the

information is not fully comparable, the inclusion of the numerous lower cost schemes under IWF1 would have involved a great deal more data collection and this would have been impractical from a cost and time perspective, as this was deemed a preliminary investigation.

Secondly, case studies from 3 typical IWF2 projects were undertaken to try to ascertain why cost and duration variations might exist and to establish if lessons could be learned to inform future projects. The 3 schemes selected were chosen as they encompassed different types of project, in terms of size, type and complexity, characteristic of the range delivered by the Consultancy in the highways and transportation sector.

The selected schemes were:

- M27 Junction 5 Improvement Scheme (Phase 1). This was a scheme to improve traffic flows and reduce congestion around a busy motorway junction. Completed in July 2010 the contract was tendered on a cost only basis and was awarded to the contractor with the lowest priced tender.
- Winchester High Street Improvement Scheme. This was a major maintenance and refurbishment scheme with bespoke features in a sensitive historic area. Completed in October 2010 the contract was an NEC 3 Option D contract, target cost with bill of quantities and was tendered on a 70% price/30% quality basis and included an Early Contractor Involvement element to provide advice on materials, products and build-ability.
- Winchester Park and Ride Scheme. This was a scheme to provide a car park to the south of Winchester City Centre. Completed in April 2010 the contract was an NEC 3 Option B priced contract with bill of quantities and was tendered on a 70% price/30% quality basis.

Each case study provided a basic description of the scheme, quantitative data relating to the costs and duration of each project and more extensive cost data relating to 4 categories of compensation events which were:

- Unforeseen circumstances which could not have been reasonably foreseen or predicted (e.g. unusual ground or weather conditions)
- Design issues resulting in change (e.g. due to poor or incorrect information in the design that could not be implemented during the construction phase)
- Quantity surveyor issues (e.g. failing to include all items within the Bill of Quantities)
- Additional work (e.g. extra items requested by the Client)

All variations were agreed by the Supervising Engineer and Contractor, in accordance with the NEC Conditions of Contract.

Numeric data was underpinned by personal face to face semi-structured interviews with key practitioners within the project team including Project Managers, Quantity Surveyors and Supervising Engineers. This allowed empirical investigation in a real life setting using multiple sources of evidence which Robson (2002:59) suggests can be helpful to 'find out what is happening' and 'to seek new insights'.

The interviewer used open ended questions to allow respondents to reply freely and provide detailed information about their experiences of project delivery including usage of the IWF2 contracts for the case study projects. Respondents were not identified by name to ensure anonymity and each gave consent for their responses to

be used for any further research. Questions were tailored for each group specialism within the team. They included personal information about work experience, contractor selection, stakeholder involvement, duration and costs, compensation events, perception of the project and framework agreements, as well as potential improvements. This aided detection of project trends within the Engineering Consultancy and investigation of the rationale for cost variations and categorisation of the area of responsibility for each variation within each project.

DATA ANALYSIS AND DISCUSSION

Comparison of pre IWF and IWF2 contracts

Taking the data from the projects shown in Table 1, comparisons of pre-IWF and IWF2 schemes revealed overall success with the change to procurement strategy. On average 18% fewer projects were delivered late and 5% more projects were delivered to budget under the new framework agreement. In addition, 29% more projects were completed within 10% of their tender value, the Hampshire County Council target, under the new framework.

Table 1: Comparison of projects completed before and after the introduction of the IWF2 Contract

	Projects under pre IWF contract	Projects under IWF2 contract
Number of projects	49	20
Total tender value (£)	26,022,937	13,676,569
Final contract value (£)	30,155,079	15,551,354
Percentage of projects completed within 10% of tender value	51	80
Average cost variation per scheme (%)	13	8
Average project variation between scheduled time and actual time	42 days	17 days
Percentage of projects completed late*	58	40

* Prolongation days deducted from the actual duration.

The results from this preliminary investigation reveal better time and cost predictability for the Engineering Consultancy, which suggests that the use of IWF2 as a new procurement tool has been successful in improving construction durations. This suggests that contractors are increasingly cognisant of the key performance indicator relating to time predictability, and are keen to meet deadlines to improve their position in the following performance period. This data also demonstrates better value for money for stakeholders including HCC, the Engineering Consultancy and tax payers, which is essential for public sector procurement (Byatt 2001, Raymond 2008, Griffith 2011). Overall findings are consistent with industry recommendations (Latham 1994, Egan 1998, NAO 2005, CIOB 2010) regarding standardisation, reducing construction time and costs and general predictability.

Case study data

Table 2 shows comparison figures for the case study projects. All three projects were considered to be a success in that they met the objectives of their original design briefs and were right first time.

Table 2: Comparison of case study IWF2 projects

	M27 J5 Improvement Scheme	Winchester High Street Improvement Scheme	Winchester Park and Ride Scheme
Tender value (£)	1,223,680	1,405,070	3,431,437
Final contract value (£)	1,853,980	1,513,554	3,766,030
Total cost variation (£) and percentage increase	630,299 (52%)	108,484 (8%)	334,593 (9%)
Actual duration, days late*	278 days (2 days late)	413 days (42 days early)	365 days (28 days early)
Right first time	Yes	Yes	Yes

*Figures include agreed days prolongation

Egan (2002:3) discussed the importance of improvements in quality and efficiency within the industry and aspired to a 'zero defects culture'. These results imply that the Engineering Consultancy have a robust process in place to monitor and control defects to ensure design briefs are met and clients kept satisfied. Time variations were also well controlled, with both Winchester schemes being delivered early. This supports Egan (2002) who believed that construction times were a key target for improvement. The M27 improvement scheme was delivered 2 days late which could be considered a minor failing, but this equates to less than 1% of the overall total time taken.

In relation to cost increases, the Winchester High Street Improvement and the Winchester Park and Ride scheme completed within 10% of their tender value which is within the HCC target. Unfortunately the M27 improvement scheme completed 52% above tender value with additional costs relating to poor design of drainage and issues with traffic management and safety fencing, as well as extras added by the client during construction. This does not demonstrate an improvement in cost management on this project. Lessons identified include ensuring that contract documents are audited thoroughly before tender and getting the Supervising Engineer more involved during the design stage. It may also be relevant that this project had a relatively inexperienced project manager running the project. This could reflect on a failure of the procurement process, where more time should have been spent in the pre-project phase analysing documentation or it could be attributable to a break down in project management processes and controls.

The data relating to compensation events were inconclusive. It showed that the largest proportion of cost variations for two projects were due to design issues, Winchester Park and Ride Project (55%) and M27 Junction 5 Project (60%) with the next highest category being additional work. Overall it was difficult to identify clear trends or similarities between the three case study projects, suggesting that a larger sample size is needed.

Case study interviews

Project Team members were asked specific questions about duration, costs and variations in their projects to understand whether the 3 case studies were representative of those undertaken by the Consultancy. In addition they were questioned about the new contracts and general working practices. The aim was to establish whether there had been general improvements in ways of working since the introduction of IWF2, what further recommendations could be made for the delivery of future projects and to inform ongoing best practice in meeting industry standards. Comments were categorised in 4 key areas: relationships with contractors, design, necessary change and inclusion of quality elements in tendering.

Respondents felt that IWF2 contracts are an improvement as they provide and promote a closer working relationship with Contractors. This premise supports the multitude of literature on the benefits of partnering in reducing the adversarial culture within construction (Black et al. 2000, Bresnen and Marshall 2000, Naoum 2003). They were also positive about Key Performance Indicators (KPI's) which they felt offered good commercial incentives for Framework Contractors to perform better. This finding concurs with Thomas and Thomas (2005) who identified that benchmarking against past performance and other organisations, drives continuous improvement and demonstrates value for money. Several respondents also noted that Early Contractor Involvement (ECI) should be encouraged to promote further improvements. According to Mosey (2009) lack of ECI leads to greater likelihood of decisions being delayed or sidestepped, increases risk and results in poor communication between team members.

In relation to design, respondents felt that Framework Contracts do not necessarily result in a better quality product, as this is governed by the quality of the design work undertaken. Some Project Managers expressed concern that designs can be rushed to accommodate funding streams and increased time should be allocated to the design process. This illustrates a point made by Mosey (2009) that project funding can distract the client's attention away from the important task of agreeing and managing the pre-construction process. Other concerns included; enhanced training and more time to complete designs to adequate standards for Design Engineers, improved communication between Quantity Surveyors and Design Engineers, and greater involvement of Supervising Engineers during the design process to allow improved auditing of contract documents prior to tender. These comments about communication and involvement link back to the importance of ECI and also the fact that partnering is a long term commitment (Bresnen and Marshall 2000).

In terms of change, many of the project team felt that whilst it is not necessarily easier to agree Compensation Events, extensions of time and valuations, they are agreed more quickly due to the use of NEC 3. This supports the view of Eggleston (2006) who considered that NEC 3 provided a stimulus to good management with a greater emphasis on communication and cooperation.

Finally the respondents identified that increased use of quality elements within tenders and contracts yielded positive results which mirror recommendations by Egan (1998), Byatt (2001) and Wong et al. (2000) that best value tenders will include both quality criteria as well as price.

Overall the interviews provided a clear indication that the IWF2 contracts are a significant improvement over the previous procurement system, as they provide closer

working relationships with the Contractors, and much of this is attributed to the use of NEC 3 as the standard conditions of contract.

CONCLUSIONS

The changes to procurement strategy through the introduction of the IWF2 framework agreement sought to reduce tender costs and defects and improve construction durations as well as overall client satisfaction. Based on these factors the changes can be seen to be effective and successful in terms of delivering better overall value to stakeholders, which is key to public sector projects. This links to a number of the targets for improvement highlighted by Egan (1998) in *Rethinking Construction*, namely, predictability in relation to time and cost, improvements in delivery time of projects, cost reductions and zero defects. Further analysis of the data may also find that such savings have increased productivity and profit, but that is outside the remit of this paper.

If we also consider the anecdotal evidence from project team members, it is apparent that the new framework agreement has been well received and has generally improved working relationships and allowed faster decision making. This is very much in the spirit of integrated collaborative partnering espoused by many as the panacea to the inefficiencies of the construction sector. Although, as Bresnen and Marshall (2000) are keen to point out, partnering does not represent a quick fix as mutual trust and cooperation are slow to develop and compliance may not result in genuine attitude change. It could be said that as this procurement revision encompasses culture change, an assessment after 2 years is insufficient to draw any strong conclusions about management practices and ways of working, and a further protracted longitudinal study would be more appropriate to investigate this in greater detail.

Whilst the majority of evidence has demonstrated a positive transformation, an area that the new framework does not appear to have tackled is ECI, particularly interaction with the design team, who may be rushed to produce inadequate or inappropriate designs and it is disappointing to note that the fragmentation between design and construction teams identified by Murray and Langford (2003) is still very much in evidence. However, this may also be an area that needs more time to bed in.

In conclusion, the industry recommendations made by Egan (1998) and Latham (1994), particularly in relation to standardised procurement best practice, have been demonstrated as being beneficial in contributing to improved efficiency and delivery of best value within the Engineering Consultancy.

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