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# **COBRA 2006**

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# Project management and the changing nature of the quantity surveying profession – Heathrow Terminal 5 case study

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In the last decade there have been dramatic changes in procurement and practice within the UK construction industry. These changes have been driven by the major clients both within the public and private sectors; they have demanded cultural change and the implementation of best practice.

This paper examines BAA plc's enlightened approach to project management on one of the largest projects in Europe – the new £4.3bn Heathrow Terminal (T5) project which is due for completion in 2008. The paper also seeks to identify the changing role of the quantity surveyor, or cost consultant, within the post-Egan era and seeks to identify the competencies and knowledge base, tools and techniques now required of them.

The case study research approach will be based on a critical examination of the T5 project and the role of quantity surveyors, representing both the client and contractors. The examination demonstrates that the quantity surveyor has a significant role to play in construction cost and commercial management in the post-Egan era.

Keywords: project management, cost consultants' role, quantity surveying, education, Heathrow T5

Word count: 2998

## **INTRODUCTION**

In the last decade procurement and practice of both public and private works within the construction industry have been the subject of radical change. Numerous reports have identified both the public and private sector clients' dissatisfaction with the traditional approach within the industry. Significantly Sir John Egan, then Chief Executive of BAA plc, identified that the industry as a whole was under-achieving and challenged all in the industry to fundamentally change its culture and methods of working and *rethink construction* (Egan, 1998).

At the same time, Ashworth & Hogg (2000) reviewed the development of quantity surveying and identified a shift in emphasis from cost to value with many QSs extending the range of services that they offer clients. At first this meant developing project management, followed by the provision of development appraisals, life cycle costing, facilities management and other services. Furthermore, under partnering contracts there has been a significant shift in emphasis from claims management to pro-active

value and risk management. Davies (2006) identified that many QSs are now providing clients with strategic advice at a much higher level than was previously the case; often underpinned with an increased knowledge of sophisticated electronic information management systems.

Cartlidge (2002) neatly summed up the challenge for the profession with the observation "...quantity surveyors must get inside the head of their clients, fully appreciate their business objectives, and find new ways in which to deliver value and conversely remove waste from the procurement and construction process."

## **HEATHROW TERMINAL 5**

The BAA Heathrow Terminal 5 is one of Europe's largest and most complex construction projects. Terminal 5 was approved by the Secretary of State on 20 November 2001 after the longest public inquiry in British history (46 months) and when completed in March 2008 it will add 50% to the capacity of Heathrow and provide a spectacular gateway into London.

The £4.3bn project includes not only a vast new terminal and satellite building but nine new tunnels, two river diversions and a spur road connecting to the M25; it is a multi-disciplinary project embracing civil, mechanical, electrical systems, communications and technology contractors with a peak monthly spend over £80 million employing up to 8,000 workers on site. The construction of T5 consists of 16 main projects divided into 140 sub-projects and 1,500 "work packages" on a 260 ha site.

## **PROJECT MANAGEMENT PHILOSOPHY**

The project management approach on Terminal 5 was developed based on the principles specified in the *Constructing the Team* (Latham, 1994) and *Rethinking Construction* (Egan, 1998) but went further than any other major project. The history of the UK construction industry on large scale projects suggested that had BAA followed a traditional approach T5 would end up opening 2 years late, cost 40% over budget with 6 fatalities (Riley, 2005); this was not an option for BAA.

Significantly BAA expected a high degree of design evolution throughout the project in order to embrace new technological solutions and changes in security, space requirements or facilities functionality. On such a complex project early freezing of the design solution was not realistic.

BAA realised that they had to rethink the client's role and therefore decided to take the total risk of all contracts on the project. BAA introduced a system under which they actively managed the cause (the activities) through the use of integrated teams who display the behaviours and values akin to partnering.

This strategy was implemented through the use of the T5 agreement under which the client takes on legal responsibility for the project's risk. In effect, BAA envisaged that all suppliers working on the project should operate as a virtual company. Executives were asked to lose their company allegiances and share their information and knowledge

with colleagues in other professions. BAA's aim was to create one team, comprising BAA personnel and different partner businesses, working to a common set of objectives.

This approach created an environment in which all team members are equal and problem solving and innovation are encouraged in order to drive out all unnecessary costs, including claims and litigation, and drive up productivity levels (Douglas, 2005).

## **T5 AGREEMENT**

The T5 agreement is a unique legal contract in the construction industry – in essence it is a cost reimbursable form of contract in which suppliers' profits are ring-fenced and the client retains the risk. It focuses in non-adversarial style on the causes of risk and on risk management through integrated team approaches. The reimbursable form of contract means that there have been no claims for additional payments and no payment disputes so far on the project (NAO, 2005a).

BAA uses cost information from other projects, validated independently, to set cost targets. If the out-turn cost is lower than the target, the savings are shared with the relevant partners. This incentivises the teams to work together and innovate. It is the only way to improve profitability: all other costs, including the profit margin, are on a transparent open-book basis (NAO, 2005b). BAA takes precautions against risk of the target being too high through a detailed "bottom up" analysis by independent consultants.

The T5 Agreement focuses on managing the cause and not the effect and ensures success in an uncertain environment. High performance levels and high benchmarking standards are demanded from all parties. *"The idea is to have the best brains in all companies working out solutions to problems not working how best to defend their own corner"* (Comment by T5's Commercial Director Matthew Riley – within Broughton, 2004)

The T5 Agreement creates a considerable incentive for performance. If the work is done on time, a third goes to the contractor, a third goes back to BAA and a third goes into the project-wide pot that will only be paid at the end (Douglas, 2005). Suppliers also benefit from ring-fenced profit and an incentive scheme that rewards both early problem solving and exceptional performance.

The final strand to the T5 Agreement is the insurance policy. BAA has paid a single premium for the multi-billion project for the benefit of all suppliers, providing one insurance plan for the main risk. The project-wide policy covers construction all risk and professional Indemnity.

The T5 agreement allows the project to adopt a more radical approach to the management of risk including early risk mitigation. Key messages include: "working on T5 means everyone anticipating, managing and reducing the risks associated with what we're doing" (OGC, nd).

Due to the inherent risks buried in the second and third tier contractors, BAA stipulate in the contract with the 1<sup>st</sup> tier contractors their expectations on how 2<sup>nd</sup> tier suppliers are

engaged. Whilst this has its inherent difficulties BAA feel that as they are carrying the risk they don't want key supplier(s) contracts being let at fixed prices in high risk areas if it presents a deliver risk to T5. BAA has even gone so far as to produce a draft 2<sup>nd</sup> tier supplier contract template in some instances in an effort to drive the T5 Agreement ethos down the supply chain (BAA, nd).

## **ROLE OF THE COST CONSULTANTS/CONTRACTOR'S QS**

BAA selected a consultancy framework for cost consultancy on the T5 project comprising the Turner & Townsend Group and EC Harris Group Ltd (known as TechT). Both companies were selected under the same terms of commission and each provided 50% of the staff.

On this project these two major consultancy companies became one team "joined at the hip". At its peak the cost consultancy team comprised 120 staff, approximately two thirds of which were quantity surveyors.

Laing O'Rourke Infrastructure Ltd was selected as the major 1<sup>st</sup> tier supplier responsible for the civil construction, infrastructure and logistics delivery. Laing O'Rourke were involved in nearly 50 sub-projects with a turnover over the last three years averaging at £20 million per month managed by a team comprising more than 50 quantity surveyors (Simpkins, 2005). Significantly on this project BAA required the 1<sup>st</sup> tier contractors and TechT to work as collaborative teams, there was no "us and them" on T5.

## **RESEARCH**

In order to identify and better understand the roles of the cost consultants and the contractor's quantity surveyors and the techniques and tools used by them an in-depth literature search was undertaken leading to the development of a questionnaire which was reinforced by email contact and telephone interviews with the key personnel. The questionnaire was based on the competencies identified within the RICS APC Requirements and Competencies for construction surveyors who may be working as a consultant or for a contracting or engineering company (RICS, 2002).

## **ROLE OF THE COST CONSULTANTS/QUANTITY SURVEYORS**

BAA's Cost Consultants, initially T&T & ECH and then TechT, and Laing O'Rourke's Quantity Surveyors have provided both strategic and deliveries services from inception through to the construction phase and have contributed to:

### **1. Preparing development appraisals**

- Development of the business case and master planning.
- Producing the facility cost model allowing option appraisals within the master planning phase and functionally based cost planning.

- Executing the business case sensitivity analysis to test each option's rates of return on investment.
- International benchmarking of airport indicators (operational and construction measures) to assist with target setting.

## **2. Advising clients on project brief, preferred procurement route and cash flow**

- Design of the incentivised procurement strategy and resultant contract terms and conditions involving the development of an innovative strategy and framework agreement against which contracts could be let.
- TechT and Laing O'Rourke provided comprehensive commercial benchmarking across the whole T5 programme to enable BAA to judge whether the Anticipated Final Cost (AFCs) provided good/poor value for money compared to other BAA and non BAA projects.

## **3. Analysing whole life costs**

- Implementation and management of an innovative value improvement process which secures cost and time based on themes of designing, buying and delivering better.

## **4. Planning the construction process**

- Project management of the Planning Supervision process.
- Project planning undertaken jointly between BAA/Laing O'Rourke based on overall T5 Strategic Plan using Primavera; however QS role minimal.
- Sub-Project Planning - each sub-project (£75-£100m) has its own cost and programme target - progress against the programme is commercially monitored.

## **5. Monitoring control of cost during pre-contract stage**

- TechT cost managers engaged with suppliers' cost managers to verify the cost plans and ensure alignment with the schedule. The aim was to achieve a cost plan that was 95% bottom up i.e. based on figures from suppliers by BAA's "D Day" (the milestone before the site assembly starts but when most of the manufacture is complete and design is 95% complete).
- Contractors were required to monitor their pre-contract costs and continually update BAA on the forecast cost for this period.

## **6. Preparing tender and contractual documentation**

- TechT supported BAA's Supply Chain team to negotiate and periodically review the Commercial Model Agreements (CMAs) between BAA and each of the 1<sup>st</sup> tier suppliers.
- TechT supported BAA's Supply Chain in providing advice on appropriate procurement routes and choice of Supply for each work package then utilised the CMAs as a basis for agreeing the AFC.

## **7. Advising on payments to contractors, cost control and settlement of final accounts**

- Majority of 1<sup>st</sup> tier contractors reimbursed on "an actual cost based" form of contract; interim payments and final account based on actual cost.
- TechT work in conjunction with BAA's cost verification team to check, audit and then verify that the costs approved for payment are valid.
- Laing O'Rourke used COINS (accounting package) to collate costs; BAA/TechT had *read-only* access to COINS to verify that costs were properly incurred.
- BAA ran the project using Oracle/Artemis; contractors feed information into Artemis using *comma separated variable* (CSV) files on a weekly basis, updating costs, progress and forecasts on a work breakdown structure (WBS) basis.
- Laing O'Rourke developed their own data-base system of weekly capturing costs against WBSs, recording progress and forecasting final costs, this was loaded electronically into BAA's Artemis system every Wednesday for the previous week.

## **8. Controlling the project on behalf of their employer**

- Supporting BAA's integrated team in the preparation of the project process and procedures and implementation of a project control system and software including change control and risk management.
- Introduction of performance management system with KPIs based on cost, time and quality criteria.
- Provision of monthly earned value analyses (linking time and cost) and schedule performance indices.
- TechT have driven the production of – and are the acknowledged owners of two of the ten core processes at T5 – Cost Management and Commercial Management.

## **9. Negotiating with client or subcontractors**

- TechT work with BAA in agreeing AFC targets throughout the duration of the programme; each project and sub-project has its own AFC target, progress against which is reported on and discussed on a monthly basis.
- TechT together with BAA's supply chain and 1<sup>st</sup> tier contractors work as collaborative teams.

## **10. Reporting on the programme and financial matters**

- The TechT cost managers are integrated within their project and sub-project teams, they report to the project leader, who in turn reports to the T5 Directors; TechT are also represented at Programme Office level.
- The Heads of Cost Management, Commercial Management and Performance Measurement are all senior TechT people reporting to BAA Directors.

## **11. Risk and value management**

- Ongoing option appraisal and value engineering of construction systems.
- On going value improvement initiative focusing on productivity improvements and global acquisition combining leverage and partnering based buying.
- Development of bespoke Risk Management Process aligned to the T5 insurance cover.

## **12. Giving contractual advice in case of dispute**

- Minimal dispute due to collaborative nature of the contract.

# **CONCLUSIONS AND RECOMMENDATIONS**

The T5 project is the watershed in embracing the principles of lean construction in the UK and has required a complete change in the mindset and culture of the participants. The client has a huge role to play in the project success. Instead of writing into its contracts penalties for failure BAA accepted all the risk from the outset and guaranteed its suppliers an agreed margin thus sending out a positive message to the whole project team.

BAA created a single entity harnessing "intellectual horsepower" working to get the job done rather than poring over contracts to find excuses. In return for its goodwill BAA demanded absolute transparency in the books of its suppliers; this created an approach in which all team members were equal and which encouraged problem solving and

innovation in order to drive out unnecessary costs, including claims and litigation, and drive up productivity levels.

Within the post-Egan era the role of the quantity surveyor, or cost consultant, has blossomed becoming far more client focussed. This new role requires an in-depth understanding of strategic project management embracing best practice within the whole project cycle. The profession now demands innovative problem solvers with high level IT skills who can contribute to the success of the project as part of an integrated team increasingly in an open-book target cost environment.

BAA's enlightened approach created a collaborative environment which leads to the implementation of industry best practices and world-class performance. This approach is particularly relevant to long-term projects with high risk and high complexity, valued at £200 million and above, but might not be so relevant for smaller more straightforward projects.

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