

# Procurement strategy in uk crossrail project construction essay



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This dissertation is about investigating and evaluating the procurement strategy adopted in Crossrail project. A literature review is structured under first four chapters: (1) An Introduction; (2) Crossrail Project; (3) Literature review I; and (4) Literature review II. This is done to introduce the issue.

This dissertation deals with the different procurement strategy applied for cross rail project. Cross rail being one of the biggest transportation project in Europe, have very complex procurement methods which should be very well planned. The thesis observes the methods of procurement adopted by cross rail by comparing it with different standard procurement methods and best practices used in the country. Research is carried out on three different areas of procurement. They are skilled resource procurement, type of contract used and demonstration of value for money. The initial survey carried out indicated that there is a skills shortage in Crossrail project and also some of the areas were identified which needed further clarification in using NEC3 contract.

The dissertation was carried out based on the questionnaire developed as a result of literature review. Interviews were conducted based on the questionnaire. From the results of the research it was possible to conclude that Crossrail following robust project management techniques to deliver the project successfully. However it would be too early to reach a conclusion since the project is still well under progress.

## **Acknowledgement**

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## **Chapter 1**

### **Introduction**

Rational for the research

The continuing demand for developing transportation infrastructure projects is increasing day by day. This is putting tremendous pressure on public sector for development. Transportation has been a main function of government since long time. In the present scenario, it is difficult to manage and fund mega transportation project because of the financial crunch. This reduced the ability of government to implement big and unique projects by itself. Project delivery is the method by which government encourages the private sectors and other agencies for the development of infrastructures. Transportation megaprojects include huge capital investment, expert and competitive contractors, long period of time and a perfect delivery strategy to deliver the project in time, quality and within budget. To make such mega

projects successful, a strong procurement strategy is required. A procurement strategy is to develop a framework keeping in mind the objectives and outcomes of the project. The contractual and commercial strategy will be defined at the design and construction stage itself which will align the project team towards achieving the objective. A good procurement strategy will have a positive impact on project's performance in terms of time and cost.

Client dissatisfaction is always related to late delivery of project, over budget and poor quality of work. This happens because less importance is given to value for money. The Latham report (1994) proposed change towards more collaborative culture. Partnering through the contract chain was seen as the most efficient way. The Egan report (1998) set out five key drivers which are important for the construction industry. They are committed leadership, client focus, integrated processes and teams, a quality driven agenda and commitment to people. This made a tremendous change in the industry. Innovative approaches in procurement and other areas of construction are encouraged. Value for money is given more importance than cost reduction.

### Crossrail Project

This dissertation is mainly focussed on the procurement strategy in Crossrail project. Crossrail is one of the biggest transportation projects in Europe. Cross rail is the new high frequency, convenient and accessible railway for London and the South East. The project value is worth £14. 8 billion . From 2018, Cross rail trains will travel from Maidenhead and Heathrow in the west to Shenfield and Abbey Wood in the east via 21 km of new tunnels under

central London. It will link Heathrow Airport, the West End, the City of London and Canary Wharf.

Crossrail obtained the Royal Assent in 2008. Crossrail is divided into four distinct sections. They are Central section, western section, north-eastern and south-eastern sections. After Crossrail starts operation, 24 trains are expected to run per hour. This will add 10% to the transportation capacity of London. Crossrail will also reduce the journey time between many key destinations of London.

CRL will be directly buying and managing a relatively small number of contracts with Tier 1 contractors. They, in turn, will be buying a wide variety of goods, works and services from a large number of smaller suppliers and contractors which form the supply chain for delivery. “ Cross rail’s approach to procurement is aligned with the UK governments achieving excellence in construction principles, including a fair allocation of risk and reward, early involvement of the supply chain, minimizing of interface risks, incentivizing performance and selection of suppliers on the basis of best value” (NEC, 2009).

## Research Goals

### 1. 3. 1 Aim

The aim of this dissertation is to identify, and investigate different methods of procurement and the issues involved with it in the Crossrail project. Cross rail being one of the biggest transportation project in Europe, will have very complex procurement methods which should be very well planned. The

thesis will observe the methods of procurement and the measures adopted to overcome the issues involved in cross rail.

### 1. 3. 2 Objectives

In order to achieve the aim, the following objectives will be used,

To examine the skilled resource procurement strategy of crossrail since crossrail will face shortage of skilled resources through its different stages of project.

To establish the logic behind the type of contract used in procuring different contractors and different works involved in Crossrail.

To analyse and observe on how the procurement strategy for cross rail is developed to obtain value for money.

### Outline Methodology of the Research

The research process will be broken down into two key stages in order to meet the aim and the objectives indicated earlier. These are,

#### 1. 4. 1 Literature Review

This stage of the research process provides a comprehensive review of the relevant literature on different types of traditional methods of procurement. A review of cross rail's policies and procedure will also be done. This is to develop a better understanding of the best practices in procurement and will help in the understanding of cross rail procurement strategy. The literature review will form the foundation for the research and provided a detailed

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background to the subject to enable the rest of the dissertation to be conducted.

## Dissertation Contents

The second chapter will give more thorough introduction on the crossrail project. This chapter will review the project, its vision and objectives and the different procurement strategies adopted.

Chapter three and four deals with different concepts of procurement. A literature review explaining NEC3 contract, value for money and skills issues in crossrail will be done.

Chapter five starts with an explanation of how the case study area was chosen and thereafter sets out in detail the research methodology. It describes the tools used to make this investigation, describes the characteristics of the research sample, and the methods used to translate the results.

Chapter six shows the work conducted and the results obtained.

Chapter Seven will list out the main points from previous chapters to answer the questions which were set as objectives in chapter 1. This chapter will also include recommendations and suggestions for future work.

## **Chapter 2**

### **The Crossrail Project**

The Project

**Crossrail project is proposed to support the transportation requirements and economic development of London and southeast regions. “ The project comprises new tunnels running west-east through central London connecting directly with existing surface rail routes to Maidenhead and Heathrow in the west, and to Shenfield and Abbey Wood in the east” (Crossrail Environmental Statement, p3). Crossrail is an urban transportation service, instead of a long distance type of railway transportation. It is a type of project in which different type of construction works are involved and all these works are carried out throughout the route together.**



**Crossrail is a project which has different partners for delivery like Crossrail Central, London Underground, Network Rail, DLR, Canary Wharf Group and Berkeley Homes. “ Crossrail has five tunnelling drives, 21 km of twin bore tunnels under the centre of the capital dealing with the complexities that this involves” (Crossrail, 2010). Crossrail also consist of construction of eight new underground stations which will be connected to the already existing Underground and rail networks and four over ground spurs including a connection to Heathrow Airport. Crossrail limited has changed form a promotional body to a world class body which is highly efficient and able to deliver a world class railway after gaining the Royal Assent. “ Crossrail limited was a 50/50 joint venture company between Transport for London (TfL) and the Department for Transport (DfT) until 5 December 2008 when it became a fully owned subsidiary of TfL” (Crossrail, 2010). “ Crossrail’s route has four distinct sections: a central section, within central London, and western, north-eastern and south-eastern sections extending into outer London and parts of Berkshire and Essex” (Crossrail Environmental Statement, p6). New twin bore tunnels will be constructed in the central section and in some parts of south-eastern section.**

### **The Central Section**

**The central section consists of the majority of the construction works. “ New stations will be built along the central route of the line at Paddington, Bond Street, Tottenham Court Road, Farringdon, Liverpool Street, Whitechapel and Canary Wharf” (Crossrail, 2010). The new twin-bore tunnels will extend between Royal Oak in the west and Pudding Mill Lane (near Stratford) and the Isle of Dogs, in the east. Access will be provided to the west and east end of the platforms by the construction of two entrances and ticket halls in all the new stations except the Isle of Dogs station and probably Whitechapel station where this facilities will not be provided. For every Crossrail station, connections will be given to the already existing stations which will allow the passengers to transfer to other services, such as the Underground, Docklands Light Railway, other mainline services such as Thameslink, and bus services. Shafts will be provided at regular intervals throughout the route which will be used for emergency access, escape and ventilation. These shafts will be connecting the tunnels with the surface. Some of these shaft structures will be near to the new stations, whereas others will be located on their own. In addition, some temporary shafts will be constructed for tunnelling purposes, and will be filled in once construction is completed. (Crossrail Environmental Statement, p30)**

### **The Western Section**

In the western section, there may be a requirement to change the existing Great Western mainline between Maidenhead and Paddington, such as new or realigned track. Added to that, an overhead electrification will be installed along the route west of Stockley Road (Hayes). For this purpose, erection of steel gantries will be required at about every 50m intervals. Demolition or

reconstruction of numerous bridges will be required as a result of overhead electrification in order to provide overhead clearance for the electric wires. Major engineering works like construction of a flyover will be required at Stockley to allow access for Crossrail trains to and from Heathrow Airport. New sidings for stabling Crossrail trains will be provided at Maidenhead, West Drayton and Old Oak Common. The stations at Maidenhead, Slough, West Drayton, Hayes & Harlington, Southall, West Ealing, Ealing Broadway and Acton Main Line will be remodelled to various styles in order to accommodate Crossrail trains and to provide more improved and efficient facilities for passengers such as new ticket halls, escalators, bridges and lifts. At a further five stations, platform extensions will be required to serve the Crossrail trains. (Crossrail Environmental Statement, p39)

#### The north-eastern section

The proposed works in the north-eastern section are renovation of Romford and Ilford stations, extension of platform at nine different stations, a new depot and sidings west of Romford station, construction of an underpass in order to provide access for trains, “ new sidings for construction purposes at Alders brook and Pit sea; new sidings for stabling trains at Gidea Park and Shenfield; and a new freight loop (a single track dedicated to freight trains) between Goodmayes and Chadwell Heath, to replace an existing loop at Manor Park” (Crossrail Environmental Statement, p44).

#### The south-eastern section

East of the Isle of Dogs, the twin-bore tunnels from the central section will continue under the River Lea, before emerging on the North London Line at a <https://assignbuster.com/procurement-strategy-in-uk-crossrail-project-construction-essay/>

portal near Victoria Dock Road and Custom House station. New shaft structures will be built at Blackwall Way and the Limmo Peninsula. New twin-bore tunnels will be driven beneath the Thames to link North Woolwich with Plumstead station on the North Kent Line. New portals will be located at each site and shaft structures will be constructed at Warren Lane and Arsenal Way, in Woolwich. Two new tracks will be provided beside the North Kent Line between White Hart Road in Plumstead and a point about 1, 200 m east of Abbey Wood station, to serve up to 12 Crossrail trains per hour in each direction. This will require works to two road bridges and replacement of two footbridges. Custom House station and Abbey Wood station will be reconstructed. Silvertown station, which is likely to have been closed already under powers to construct the Docklands Light Railway extension to Stratford International, will be demolished. Passive provision will be made for a new Crossrail station at Silvertown, should this become desirable following redevelopment of nearby sites. New overhead electrification will be required throughout this section. In order to accommodate this, the existing Connaught Tunnel, which runs between Royal Victoria Dock and Royal Albert Dock, will be reconstructed. Manor Wharf, in Belvedere, will be refurbished and used to load excavated material onto barges. (Crossrail Environmental Statement, p48).

## 2. 2 Crossrail Delivery Strategies

Crossrail has procured a Program delivery partner and a Project delivery partner. The project delivery partner is Bechtel, which is responsible for the delivery of central section of crossrail. The program delivery partner is the Transcend consortium made up from Aecom, Nichols Group and CH2M Hill. <https://assignbuster.com/procurement-strategy-in-uk-crossrail-project-construction-essay/>

Program delivery partner will be responsible for the overall management of the project. (NCE, 2012)

Figure 2. 1 - Crossrail Delivery Strategy. Source: Michael A Kay, p155, 2009

### 2. 2. 1 Crossrail Program Delivery Partner

The role of Transcend is to coordinate throughout the project. Since the crossrail project is split into many small contracts and small section of works, the major function of program delivery partner will be to manage the interface in merging the different components of work into a single and efficient railway system. To achieve this, program partner will be working closely with National Rail, London Underground Limited and Rail for London. The program partner is also responsible for the work of stations which are privately funded by developers like Canary Wharf Group and Berkeley Homes.

The program delivery partner will be closely working with crossrail limited as an integrated delivery partner. Staff for the program delivery team will be chosen on the basis of efficiency and regardless of the employer. Integrating the two teams in the early stage will be safe for the clients and risks can be shared. In the later stage, if everything is running smoothly, CRL can hire more of its own staff and can reduce the number of staff in program partner. This will increase more in-house control. The role of program delivery partner is very broad as compared to the project delivery partner. (NCE, 2012)

### 2. 2. 2 Crossrail Project Delivery Partner

The project delivery partner will be responsible for the delivery of Central Tunnel Section (CTS) in which stations and systems are also included. Bechtel will manage the procurement of all the contracts which will be responsible for delivery of central section. Although the contract will be between CRL and the contractors, the project delivery partner will be acting on behalf of CRL. The CTS is very well defined and therefore will require more traditional approach of project management. The main responsibilities of project delivery partner will be implementation of engineering design, managing interface within the central section, procurement, testing and commissioning. (Michael A Kay, 2009)

Both delivery partners are expected to have strong inputs in finalizing the procurement strategy. Both should make important decision like size of contract and incentivization structure to get maximum output and quality.

### 2. 2. 3 Crossrail Stakeholders

Crossrail being a mega project will have many stakeholders. The table below shows all the government and private stakeholders of Crossrail:

#### **Stakeholder**

#### **Role**

Department for Transport(DfT)

Co – Sponsor. Main interface to national government and HM Treasury

Transport for London(TfL)

Co – Sponsor. Main interface to local government, the Greater London Authority (GLA) and the Mayor of London’s office. Owner of the central section.

Crossrail Limited(CRL); previously Cross London Rail Links Limited(CLRL)

Delivery agent. Formerly a 50/50 joint venture of TfL and DfT, now a wholly owned subsidiary of TfL. Main interface to the delivery supply chain, including both the project and program delivery partners.

National Rail (NR)

Industry partner. Responsible for the operation, maintenance and renewal of the National Rail network. Infrastructure manager of crossrail end to end rail systems. Main interfaces to train operating companies (TOCs) and Freight Operating Companies (FOCs).

London Underground(LUL); a TfL subsidiary

Industry partner. Responsible for the operation, maintenance and renewal of the National Rail network. Infrastructure manager of the central section stations, except Paddington. Main interface to the PPP and PFI LUL contractors.

Rail for London(RfL); a TfL subsidiary

Operator franchising authority or shadow operator of crossrail. Infrastructure manager of crossrail stations at Paddington, Isle of Dogs and Woolwich.

Docklands Light Railway(DLR); a TfL subsidiary

Industry partner. Responsible for the operation, maintenance and renewal of the Docklands Light Railway transport system and for providing crossrail limited(CRL) with access for proposed modification of the DLR

British Airports Authority

Owner of the Heathrow spur

Canary Wharf Group(CWG) and Berkeley Homes Group(BH)

Developers that have agreed to make contributions towards the cost of stations at the Isle of Dogs and Woolwich respectively.

(Table 2. 1 – Crossrail Stake holders and roles. Source – Michael A Kay, 2009)

## **Chapter 3**

### **Literature Review – I**

#### **3. 1 Skills Issues for Crossrail**

Being a mega transportation project, Crossrail will be facing many skills shortage in different departments of its works. According to Crossrail Skills and Employment Strategy, July 2010, the following skills issues will be faced by Crossrail:

##### **3. 1. 1 Ageing workforce**

Across the construction industry and engineering fields there is an ageing workforce and for many years youth were not attracted towards the industry because they did not treated it as an attractive career option. The major issue is that the age profile of Registered Engineers has been rising steadily

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for 20 years. Now the condition is that almost 50 percent of the Registered Engineers have either crossed their retirement age, or will be reaching their retirement age in 10 years. “ In London, the issue is particularly stark with 38 per cent of the engineering workforce aged 45 to 64, and only 10 per cent aged 16-24” (Crossrail Skills and Employment Strategy, 2010). Although there was a remarkable growth in construction industry since the early 1990s, the expansion the workforce was not even. It was different among different age groups. “ The number of older workers aged 55 years and over in the industry has increased by 65 per cent since 1990, while those aged 24 and under has fallen by more than 40 per cent over the same period.” (CITB Construction Skills, 2011).

### 3. 1. 2 Underground construction skills gap

Crossrail will have a huge requirement of skilled tunnellers. But the main problem is that since the last 30 years, the construction industry which is involved in underground works, has suffered from cyclical peaks and troughs of work due to which it failed to maintain an experienced workforce because the work were lacking continuity of employment. Not only Crossrail but there are a number of major projects in London like a number of National Grid tunnels (2009-2016), Thames Water tunnels – Thames Tunnel (2012-2020) and Lea Tunnel (2009-2014), and London Underground (LU) line upgrades from 2010 onwards. “ On an international level, there is the £2. 5bn expansion of the Copenhagen Metro, and the 3bn Dublin Metro will be delivered between 2009 and 2018” (Crossrail Skills and Employment Strategy, 2010). There is no estimate of labour available for this project but the amount of funds required for this project indicates that a huge number of

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workforces will be required to execute the work. The effect of these entire projects will definitely create a tunnelling skills shortage and this can only be overcome by giving proper training to a significant number of construction workers.

### 3. 1. 3 Logistics training needs

While excavating for crossrail tunnels, a huge quantity of excavated materials will need to be removed from the site. Although Crossrail has to remove much of the material by using rail transport and also by using barges, some materials will be removed by using road transportation system. Also, the road transportation system will be required to deliver the materials required for the station site. According to Crossrail, there will be around 3, 500 frequent lorry drivers. In addition to these drivers, there will also be a small number (around 25) of operatives at consolidation centres, around 60 people with logistics skills at site operations and around 20 at lorry holding areas and central control. (Crossrail Skills and Employment Strategy, 2010)

### 3. 2 NEC3 – The Construction Contract

The NEC is a major attempt to draft a simple and direct standard form contract from first principles without attempting to build upon the standard forms that already exist. The specification prepared in 1987 set out the aims of those drafting the NEC.

#### 3. 2. 1 Overview

As per Fenwick Elliott, 2007, the aims were to:

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Attain an advanced degree of clarity when matched to other existing contracts;

Use of a simple language which is commonly used and avoid legal jargon;

Repeat identical phrases if possible;

Specifically and unmistakably allocating roles and responsibilities to the right Person;

Aim for clarity above fairness; and

Avoid including details which can be more adequately covered in a technical specification.

To summarize, it can be said that using three core principles like flexibility, simplicity and clarity, the authors drafted core clauses which are applicable to all NEC contracts. The core clauses were then used as the basis for six main options (Nicholas Gould, 2007) . Under NEC3 these six main options remain:

Option A (priced contract with activity schedule);

Option B (priced contract with bill of quantities) provides that the contractor will be paid at tender prices. Basically, a lump sum contract approach;

Option C (target contract with activity schedule);

Option D (target contract with bill of quantities) provides that the financial risks are shared between the contractor and the employer in agreed proportions;

Option E (cost-reimbursable contract); and

Option F (management contract) a cost-reimbursable contract, where the risk is therefore largely taken by the employer. The contractor is paid for his properly incurred costs together with a margin.

As per the experts of the NEC contract, the greatest strength of NEC is that it believes in partnering approach and at the same time adopts a project management technique which is proactive. There are perhaps three ways that this is clearly demonstrated in the NEC form. First one is the early warning system. According to this system, early identification of problems involved in the project and finding an early resolution is encouraged. The early warning system says that an experienced contractor would have or ought to have recognized the need to give the warning failing which, the contractor will not be compensated for the issue. Therefore contractors are encouraged to be active in early warning procedures so that any problems arising in the future can be avoided in the initial stages and inadequate cost recovery can be avoided.

“ Second, those risks for which the employer is not expressly responsible under clause 80. 1 are risks for which the contractor is liable. Finally, the target cost option most clearly reflects the early warning proactive management approach by affecting the financial bottom line of the parties, in particular the contractor” (Fenwick Elliott, p7, 2007).

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### 3. 2. 2 Target cost contracts

In traditional form of contracts, a lump sum contract is used to carry out the work on the basis of which contractor will be paid. This sum will only be adjusted for the changes which will be done by employers or for any other risk items which will be mentioned in the contract for matter such as design errors. In this type of approach, the work will always be awarded to those contractors who quote the lowest price to do the job. In the present scenario, this type of procurement is highly discouraged and rarely practiced especially in the public sector department where best value or value for money is mostly preferred.

It is now usual in the public sector where best value applies for procurement systems to provide for payment to the contractor based upon its recorded costs. To make sure that there should be no cost overrun which will be difficult to control in the future, a target for these costs is fixed at the beginning stage. This target is adjusted in such a way that any changes made by the employer and other price risk allocated to the employer under the contract are taken into account. Incentives are given to the contractor so that cost can be kept minimum. To ensure this, a gain share / pain share mechanism is fixed at the initial stage of the project. The costs are recorded and compared with the target cost. Any saving from the work will be shared between the contractor and the employer in a pre-agreed manner. Same thing happens when the recorded price exceeds the target price.

### 3. 3 Value for Money

Value for money is always beneficial to the client. It means that the project is worth doing and is more refereed in business terms rather than financial terms. Value for money is all about creating a better working environment. The term value means to make sure that a right choice is made about getting best balance of benefits in terms of cost and risk. Value management is a defined and systematic approach for the analysis and development of a project so that chances of achieving these requirements are increased and value for money will be achieved. “ Value engineering is a continuous process in which all the components and processes involved in construction are critically appraised to determine whether better value alternatives or solutions are available.” (OGC, Risk and value management, p7, 2007). This helps in reducing wastage and managing all those inefficient processes involved in the different stages of construction.

Value management is very important because it gives an option for stakeholders to give their input in the project by encouraging more participation, teamwork and end user buy in. The benefits which can be obtained by following value management approach is more focus on business needs, more flexibility to make the future needs simple, taking stakeholders into consideration to get different views and developing more options, considering various options by being innovative and creative, prevention of unnecessary wastage and inefficiency and encouraging teamwork to find solutions. (OGC, Risk and value management, p8, 2007).

Value management aims to maximize project value within time, cost and quality constraints. However, sometimes extra capital expenditure is required at the start of the project to improve whole life project value. It is <https://assignbuster.com/procurement-strategy-in-uk-crossrail-project-construction-essay/>

important that the value management method is based on the whole-life cost of ownership instead of acquisition alone. “ Issues of health and safety, sustainability, design quality, build ability, operation and maintenance and disposal should all be considered during value management reviews and evaluation of options” (OGC, Risk and value management, p9, 2007).

Departments should act as intelligent customers by discussing with suppliers all the elements of the contract price including level of service, timescale of the assignment, skill mix of the supplier’s team and how costs are to be remunerated. Optimizing the cost of delivering a service or goods over the full life of the contract rather than minimizing the initial price, introducing incentives into the contract to ensure continuous cost and quality improvements throughout its duration, aggregating transactions to obtain volume discounts, collaborating with other departments to obtain the best prices and secure better discounts from bulk buying is the best approach. Developing a more effective working relationship with key suppliers to allow both departments and suppliers to get maximum value from the assignment by identifying opportunities to reduce costs and adopt innovative approaches.

## **Chapter 4**

### **Literature Review – II**

#### **4. 1 Inspiring Future Talent**

It is very important for the crossrail project and also the for the industry that more and more young people get attracted towards the construction and engineering industry and choose it as their career paths. CRL will inspire

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young people by offering them with opportunities to work in the industry in the form of work placements and Apprent