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University of Sunderland

Commercial and Contractual management of projects

CETM 10

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1. Introduction

Research and practice have been under pressure from the building industry's problems to investigate innovations as a way to improve for decades. The construction business is well behind other sectors when it comes to promoting control. According to Sharma, Sawhney, and Arif (2017), when control is lacking, there is a clear correlation between delays, cost overruns, and environmental deterioration. According to Saad (2023), the current state of the industry is characterised by low profitability, decreasing rate of expansion, and poor productivity, all the result of these inefficiencies of the project. The UK government has called for immediate regulation to influence industry change due to the construction industry's incompetence, which is making it unable to meet the country's increasing housing needs. Scholars have highlighted this issue as catastrophic (Ayodele, Chang-Richards and González, 2021). Therefore, it makes sense to look for a major shift that will help practitioners gain efficiency via more control as a research strategy. However, there has been less investigation of how offsite anecdotes alter conventional arrangements in light of legislation's function, typical changes, procurement strategies, contract types, and forms (Barman and Charoenngam, 2017). The purpose of this research is to examine the Elizabeth project's (EP) relevant contractual and commercial concerns, as well as the bidding procedures in the United Kingdom. By making use of the right resources, the Elizabeth project hopes to analyse and analyse contractual and business concerns connected to project management.

2. Tendering Process

2.1 Trending in the UK

Following its establishment in 1931 by the Royal Institute of British Architects (RIBA), the Joint Contracts Tribunal (JCT) has been responsible for the production of standard construction contracts, guide notes, and other industry-wide documents (Barton, 2022). When it comes to UK construction industry contracts, the JCT is now far and above the competition (Conrad, 2022). According to Hadidar (2021), the Institution of Civil Engineers developed a set of standard form construction contracts known as the New Engineering Contract (NEC). Three versions have been released: NEC 1 in 1993, NEC 2 in 1995, and NEC 3 in June 2005 (El-adaway et al., 2016). Numerous large-scale engineering and construction projects in the UK and elsewhere currently use NEC 3 (Abdul-Malak and Senan, 2020). The International Federation of Consulting Engineers is acronymically known as FIDIC in French (Seppälä, 2023). In 1913, three European societies of consulting engineers came together to form it.

2.2 **UK Cross-rail Elizabeth and NED**

The Elizabeth line (EL) in London, one of the largest and most complex civil engineering projects in Europe this century, costing £19 billion, was mostly procured via NEC contracts (Botelle et al., 2022). Ullman (2017) states that the 118-kilometre line will be fully operational in May 2023, after Queen Elizabeth II formally inaugurated it in May 2022. With 600,000 daily travellers in its first year of operation, it became one of the busiest railroads in the UK. According to NEC (2023), it has an industry performance rating of 93% and extremely high customer satisfaction levels, making it one of the most trustworthy options. Including 10 cross passages, the 11.9-kilometer Crossrail Eastern Running Tunnels (C305) project included twin-bored TBM tunnels and supplementary works between Farringdon and Victoria Dock. Connecting the two railway tunnels at 600-800 m intervals, cross passages allow for the safe transfer of people and goods between the two bores in the case of an emergency, as well as access for maintenance and, in certain instances, the placement of sumps for tunnel drainage (Linde-Arias, Lemmon and Ares, 2019).

2.3 Public Laws and Legislation in UK-Procurements Procedures

The people working for the government as a commissioner or buyers of goods, services, or construction projects must be familiar with, and have easy access to, procurement requirements and rules. Government procurement policymaking and the establishment of a legislative framework are the purview of the Crown Commercial Service (CCS). Government Procurement Agreement with the World Trade Organisation and the Public Contracts Regulations of 2015 both apply to public procurement in the United Kingdom. In addition, according to another research, tendering has evolved into a method for identifying and meeting customer requirements. Competition is prevalent in the construction industry's bidding and procurement processes (Ellis et al., 2021). It is possible to choose the best contractor to execute the project using one of many established procurement processes (Jelodar, Yiu and Wilkinson, 2016). Procurement in the building business has changed throughout the years.

2.4 Tendering Selection and Processes in the UK

The bidding procedure that determines a contractor's appointment and the associated pricing is known as tendering (RICS, 2023). Ahamad et al. (2020) state that the tendering process has evolved and changed throughout the years, starting as a way to regulate the several designs needed to complete building projects. Procurement in the building business has changed throughout the years, as shown in Figure 1. Although there may be variations within each of the

three primary tendering strategies, they are all often used in the construction sector. When getting a quote for the whole scope of a building project, the single-stage competitive tender is the method most often used. More and more projects are opting for two-stage tendering processes, which allow design and bidding to overlap and are useful in situations when time is of the essence (Cicmil and Marshall, 2005). In a negotiated tender, one contractor submits an initial bid, making it essentially a one-stage tender. Next, the client's professional team (often including a professional quantity surveyor, or PQS) negotiates this (Soliño and Gago de Santos, 2016). The first step of the tendering process are consultation, contract design and packaging; the second and third are the paperwork and advertising of the contract; and the fourth and fifth are the responses to the advertisements. In addition, the following steps are involved: stage six is tender review, and stage seven is contract award (Greenwich, 2024). With all the contracts needed to get the systems and infrastructure built, the EL is a prime example of a complicated programme of projects that needs managing. According to Polaris, Lappas, and Taylor (2019), Crossrail Ltd has awarded more than 80 contracts for construction and logistics, in addition to 23 contracts for framework design.

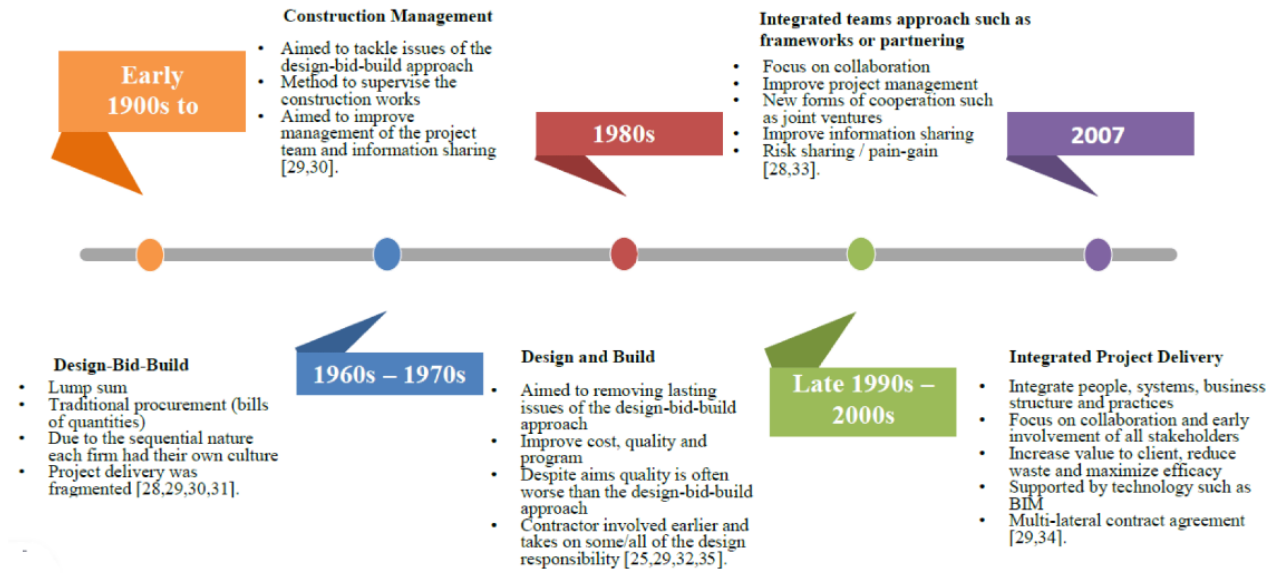

Figure 1: Timeline showing the evolution of procurement in the construction industry (Source: Ellis et al., 2021)

3. Commercial Issues- Elizabeth Line Project

3.1 Cost Overrun

Even though Crossrail follows the best standards in the private sector, even though Crossrail was a publicly financed project. Final estimates put the Crossrail project's cost at £18.9 billion, according to the National Audit Office. Its initial budget of £14.8bn has been steadily increasing since 2010 (Mulligan, 2022). Crossrail Business Rate Supplement, a unique tax that was imposed just on companies in London, contributed to the total amount. Heathrow, the City of London, and the Canary Wharf Group are just a few of the organisations that will gain direct benefits from the project. Developers involved in London's redevelopment initiatives also paid their share of the costs via a special fee. The project's revised cost estimate for 2018 is £15.4 million, down from the initial 2007 budget but still lower than expected. Final estimates indicated, however, that spending would rise as the project neared its conclusion (Pollalis, Lappas and Taylor, 2019).

3.2 Unforeseen Ground Conditions

The variety of materials encountered during tunnelling and subsurface excavation for the Crossrail tunnels and subterranean stations, which include stiff clays, loose gravels and sands, hard limestone layers, and shelly beds, may be very demanding. Unpredictable and uneven water flows, caused by this unpredictability, may cause excavations to become unstable.

In their description of the London basin's structure, Royse et al. (2012) list the many orogenic processes, both contemporaneous and post-depositional, that contributed to its current state. Several major faults cross the EL path that are associated with the main east-west development. The apparent uniformity and absence of marking bands in the London Clay are primarily responsible for the under-representation of faulting in central London in current research (Aldiss, 2013). The Crossrail project has greatly improved our knowledge of the geological history of certain locations.

3.3 Identification of Risks-Cost Manipulation

This included the contractor's ability to accurately assess client needs and the risks associated with a project, as well as the contractor's ability to fairly adjudicate tender applications. For instance, the customer would often visit the primary contractor's office during the pre-contract phase to go over the proposals, which included a detailed examination of the work scope and the expenses linked to each item. This goes against what is well known in the literature, which shows that contractors lower one other during competitive bidding periods by submitting estimates that do not include the whole scope of work and hence have artificially low prices to increase their chances of winning the project. Afterwards, the team take advantage of construction phase variations to align the project with the necessary scope of work.

3.4 Changes in Design and Scope

The committee appointed to consider the Crossrail bill in May 1994 rejected it on its second reading in the summer of 1993. There were a total of 39 supplementary ground and structural studies of various kinds carried out in the two years preceding this and for a little time thereafter to address certain design concerns. Because of this refusal, the project had to wait for six years of route protection before it could start preparing a new bill, during which time it received permission from the government. The Strategic Rail Authority's London East-West Study (SRA, 2001) was the last catalyst for this, and in January 2002, Crossrail (then known as Cross London Rail Links Ltd) was officially re-launched. The existing geotechnical studies from the 1990s, alterations to the initial alignment, and the expansion of the tunnelled portion east of Liverpool Street were all factors in the development of a new ground research plan (Ellis et al., 2021).

3.5 Funding Resources in Elizabeth

Crossrail, a project worth £14.8 billion, aims to construct the EL, a brand new suburban train that will serve London and the surrounding areas with high-frequency and high-speed service. Opening to the public in 2019, the route will cover more than 100 km, beginning in Berkshire to the west of London and ending in Essex and Kent to the east (Black, 2017). Sixty per cent of Crossrails's financing comes from the UK government, while forty per cent comes from Transport for London (TfL). Despite this, cross-rails spent £15.4 billion between 2015 and 2019. (Pollalis, Lappas and Taylor, 2019).

4. Contractual Issues- Elizabeth Line Project

4.1 Issues of NEC Contracts

Failing to adequately evaluate them during the tender stage is a typical issue with NEC and Elizabeth line projects (ELP). This happens more often than one would assume and may leave contractors out of pocket. This is because recoverability is contingent upon the inclusion of all expenses, including those not included in the Defined Cost, in the charge (King, 2017). Consequently, the different parts of the pricing may not accurately represent the actual expense that the contractor faced. Because it encourages claims on additional reasons in the event of an unexpected and perhaps unjust loss, this is a possible solution to conflicts.

4.2 Delays in the Project

Sprayed concrete linings (SCL) operations at three different station sites moved into wells, while Crossrail contracts' tunnel boring machines (TBMs) hit ground impediments. Borehole casings, a groundwater abstraction hole, a string of raked temporary steel piles, and a third, unidentified TBM impediment were all later located. The discovery of casing shards on the spoil conveyer after they had gone through the TBM's screw assembly was the sole indication that the boreholes and abstraction holes had caused any noticeable damage or delays to the TBMs. However, the scraped steel piles were a major source of work delay, necessitating the construction of a temporary wood adit ahead of the TBM head and their subsequent burning to remove. Assuming their installation angle would not place them in the tunnel profile, these steel piles were found in the analysis.

4.3 Financial Challenges of Project

Using a design strategy approach increased the probability of contractors having competing design goals, which in turn increased the potential of contract revisions and delays caused by design work resolution. Cost overruns caused by design inconsistencies among programme components fell mostly on EL because it was in charge of the entire program's integration. In addition, major Crossrail reports required months to complete because of the technical assurance procedure, which increased the expenses of coordinating interdependent systems as design implementation refused to move forward (Muruganandan et al., 2022).

4.4 Conflict over Resolution Process

Geotechnical studies for Crossrail took place over a long period, mirroring previous, cancelled stages of the hybrid bill's preparation. This bill was the vehicle that garnered parliamentary approval and the authority to construct cross-rails. The Central London Rail Study recommended a new citywide east-west rail service, and in 1989, engineers began studying the project's viability in anticipation of the deposition of a private bill for Crossrail (Ridley, 2017). A second reading was supposed to take place in the spring of 1992, but that was further delayed because the government was still dedicated to the Jubilee line extension project for the London Underground, which was being considered by lawmakers at the time, and the bill was finally deposited in the autumn of 1991. Still, Crossrail's first major ground study in 1991 was a result of ongoing early project design work (Smith, 2016).

4.5 Contractors and Employers Communication

Compensation events on Crossrail continue to build up, which is a sign of how many contractor interfaces there are on the project and how often changes and delays are due to inadequate integration of different contractors' work. Pollalis, Lappas, and Taylor (2019) state that the issue stems from a lack of systems integration knowledge and a division of labour between Crossrail Ltd, which is in charge of the project's construction management, and Transport for London (TfL), which is in charge of the trains' acquisition (Kumar, 2022). There was less time for full-scale system integration testing since the trains were delayed by 18 months due to the finance arrangement that TFL ultimately decided to use. Thus, the signalling integration issues prolonged the project, even though Crossrail Ltd finished the primary construction programme on time and at a 12% reduction from the initial budget. London is feeling the pinch from potential missed tax income, even if the delay is less than average for projects of this size. Pollalis, Lappas, and Taylor (2019) predicted that beginning in 2019/20, TfL's yearly ticket earnings from the new line will surpass £800 million, and by 2022/23, they will surpass £900 million.

5. Tools, Techniques, and Documents Used in the Crossrail Project

5.1 Digital Twin

A digital and a real railway were "built" simultaneously as part of the Crossrail project. During the planning, building, and running of the real railway, the digital model proved invaluable. Crossrail Ltd required that all contractors use its procedures and software systems to facilitate efficient collaboration and digitization of the new railway (May, Taylor and Irwin, 2017). When a project first starts, it is not usual for each company to want to utilise their software and methods. However, data compatibility is essential for project managers, and achieving it is both costly and difficult (Kaewunruen and Lian, 2019). The scholar notes that the programmatic nature of these massive undertakings is a major challenge and that the key to success from a data and information standpoint is to be as specific as possible in outlining the desired outcomes, particularly in cases where numerous designers and contracts necessitate close collaboration. Project managers need to have well-defined standards and procedures in place to ensure that all parties involved are on the same page and provide consistent results (Pollalis, Lappas and Taylor, 2019).

5.2 BIM

According to Akponeware and Adamu (2017), public sector projects may potentially save a lot of funding throughout the design and procurement phases if they were to use collaboration tools like building information modelling (BIM), which are required for more efficient and effective teamwork. In line with official policy in the United Kingdom, several professional organisations have made cooperation a top priority. The scholar also states that delivering and maintaining high-performing infrastructure requires cooperation across supply chains (Kurwi et al., 2021).

Aigbavboa, Oke, and Mutshaeni (2017), Poland (2017), and others have found that working together helps with common issues like rework and collision detection. Researchers have shown that working together has many benefits, including the following: facilitating the sharing of information and skills (Ren et al., 2011), helping to preserve connections (Sogaxa, Simpeh and Ndihokubwayo, 2021), and reducing difficulties (Zimina, Ballard and Pasquire, 2012).

5.3 Gantt Chart

Stages	2005-7	2009-11	2012-13	2014-15	2016-17	2018-19	2020-22
Project initiative							
Quality audit							
Design coordination							
Design management							
Documentation and certification							
Feedback							
Site tour							
Error identification							

5.4 Pareto

In an uneven relationship among inputs and outputs, the Pareto Principle states that 80% of consequences arise from 20% of the causes (Dunford, Su and Tamang, 2014). This principle was named after economist Vilfredo Pareto. This concept is a good way to keep in mind that inputs and outputs do not have an equal connection. In order for the ELP to be considered a Pareto improvement, it must enhance the lives of at least one person while negatively impacting no one else. One may argue that this is an unrealistic benchmark since, while some people would gain from public sector efforts, the majority of the population will have to pay for them via taxes (Denham, Dodson and Lawson, 2019). This causes the Kaldor-Hicks criterion to take the place of the Pareto improvement concept. According to Farrow and Zerbe (2013), the social welfare is enhanced if the project's beneficiaries are willing to compensate the project's failing to move forward with the project.

6. Managing Complex Projects by Project Managers

In Management by Objectives (MBO), the importance of long-term goals is less important than short-term, measurable goals. There are a lot of meetings and paperwork involved with MBO since it reflects a hierarchical management approach. Most modern methods of project management adhere to the MBO framework, which is based on the control-oriented New Public Management tenets. According to Picciotto (2019), a researcher asserts that a project manager's job is to ensure that this happens. Conventional project management practices give paid service to conducting objectives evaluations at the outset of a project but primarily focus on the planning, executing, and managing the project (Khosravi, Rezvani and Ashkanasy, 2020). Similarly, one researcher has found that those working in project management are more concerned with defending the methods used to get to a goal than the goals itself. Project management manuals push this view on readers by focusing on completing projects without caring much about the broader societal impact or how well they fit into the operational and social environment (Morris, 2013). They promote tried-and-true approaches that centre on planning and control, driven by logic and procedure. Managers whose job it is to get things done without challenging authority figures will find this appealing. With critical focus, they pursue well-defined objectives. They are very satisfied when they accomplish their goals in a timely and cost-effective manner (Alzoubi, 2022).

7. Conclusion

The new Elizabeth Line, known as Crossrail, has enormous economic and environmental advantages for the United Kingdom and the city of London. Overall, the project has a solid

financial case, due to its potential to reduce traffic on London's current transport network and to promote employment growth in the city. The "right project" and "done right" both apply to Crossrail. Because of the high expense and potential danger associated with new ideas, megaprojects often keep to traditional approaches rather than embracing sustainability or innovation. But unlike other projects of its magnitude, Crossrail prioritised innovation and built sustainability from the start.

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