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Purchase and Supplier Engineering and the London 2012 Olympics



Some of the millions of people who visited the Olympic Park during the Games give a sense of scale to its structures (photo courtesy of AECOM).

Programme Procurement in Construction: Learning from London 2012, First Edition.
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Some of the 56km of timber being installed to form the Velodrome's track (photo courtesy of Mark Lythaby).



One of the many art installations to be found in the Olympic park during the Games – this is one of the dissected and reassembled telephone boxes (photo courtesy of AECOM).

Introduction

The Games of the 30th Olympiad, held in London during the summer of 2012, gave the UK international exposure. The construction of the Olympic Park in east London and all the other Olympic venues around the country continues to receive critical acclaim. The construction of the Olympic infrastructure just had to be delivered on time; no Games had ever been delivered late and London was certainly not going to be the first. After six years of work the delivery of the 'greatest show on earth' was heralded as a triumph. This book describes how certain elements of the construction programme required to stage the Games contributed to that triumph.

In this opening chapter we therefore introduce the concept of Purchase and Supplier Engineering (PSE) and highlight the key distinguishing features of PSE from other, more standard approaches to programme procurement and supply chain management.

The Olympic Games requires the host country to deliver a spectacular stage on which the Games can be played. The scope and specifications for the infrastructure requirements of the London 2012 Olympic and Paralympic Games were no different from the 29 other Games that had preceded them. They were both diverse in engineering terms and highly complex and they were constrained by an immovable deadline for delivery – namely the opening ceremony. The project had to be completed on time and to budget, while also delivering against the legacy and environmental commitments described in London's bid proposal to host the 2012 Games. What made this challenge especially difficult was not only its scale, but that it involved almost all construction disciplines and required them to respond and overcome numerous design, engineering and construction problems. Moreover, a large and visible part of the delivery concerned the construction of sporting stadia at a time when the construction of Wembley Stadium had encountered major time and cost overruns, to the detriment of all concerned, which perhaps added to the initial reluctance of some firms to engage on the Olympics programme.

The scale of the Olympic Delivery Authority (ODA) work to deliver the stage for the London 2012 Games was valued at around £9.2 billion. Delivery of this massive investment required the procurement of approximately 2000 separate contracts in a period of less than five years. The number of contracts was comprised of approximately 250 major,

large-scale construction contracts (tier 1 contracts), with the bulk of the remainder consisting of predominantly smaller procurements.

The approach adopted to procure the infrastructure required to stage the London 2012 Olympic Games has received praise from various quarters. For example, it was commended by the ODA Chairman, Sir John Armitt, as a model for other programmes to adopt. His report, 'London 2012 – a global showcase for UK plc' (2012), published on completion of the construction programme, highlighted the approaches to supply chain engagement and procurement as key contributing factors to the success of the Olympic delivery programme. The Constructing Excellence report 'Never Waste a Good Crisis', published in 2009 following the global 'credit crunch', stated that: . . . *the ODA procurement model needed to be captured and promoted not just in the UK, but around the world.*

The construction of the London 2012 infrastructure stands out as one of the largest and most successful construction projects ever undertaken in the UK. The delivery model and programme management techniques used were both innovative and robust and helped to place the UK construction industry at the forefront of international construction achievements.

The procurement model that was developed for the Olympic delivery has since been consolidated into a model for procurement and supply chain management called Purchase and Supplier Engineering (PSE). The contents of this book are structured to follow the PSE model in its chronological order, or at least as close to that as is possible. A programme by its very nature is so vast that, while the starting point for PSE is the same as for any project, many aspects that follow are likely to occur simultaneously on the many project and package procurements and contracts that make up the programme.

The concept of Purchase and Supplier Engineering

Purchase Engineering and Supplier Engineering are the two key constituent parts that make up the PSE model. The term 'Purchase and Supplier Engineering', or PSE, was introduced after the concept was developed and deployed on the London 2012 programme. In later chapters the constituent parts that make up the complete concept of PSE are described in more detail. By way of simple introduction PSE can be described as being similar to procurement and supply chain

management. However, in order to highlight PSE's specific features, compared to the more traditionally held procurement and supply chain management (SCM) approaches, the application of the PSE model is described to illustrate the overall concept that has now been deployed on two of the largest construction programmes delivered in the UK in modern times – namely, the London 2012 infrastructure programme at over £9bn and the Crossrail railway programme at some £14bn.

PSE is a tried and tested approach, used effectively on a number of construction programmes to deliver a successful built-environment solution from a global supply marketplace. It is an approach that delivers the values and goals of the client across multiple projects within a highly complex programme or portfolio environment. The PSE approach sets out at the earliest stages to deliver the values and goals of the client.

While the PSE model was developed in response to the challenges of delivering the London 2012 Games' infrastructure, since its deployment on this programme it has been further developed and many elements of the model deployed on numerous other programmes of varying sizes and complexity.

Major construction projects and programmes are by their nature extremely multi-faceted, involving the mobilisation of resources employing complicated technical solutions. Nevertheless, this complexity can be managed by breaking the whole, regardless of its size, into appropriate and manageable parts and solving each of them individually. No overarching approach can be applied to meet all the requirements of a complex client and its many stakeholders' contradictory objectives and conflicting interests. However, it is possible to propose a consistent method for analysing each package of work and the capability and capacity of the many firms required to deliver these to meet the priorities set out for their particular part of the project.

Doing so ensures that each firm is capable of fulfilling its obligations to the project and, taken as a whole, all the firms then contribute towards the successful completion. This applies equally to the whole construction value chain, made up of main contractors, their subcontractors and their suppliers. PSE is a technique that can be used to measure and establish the capacity, capability and reliability of each firm in the supply chain even prior to selection. As procurement is not only about appointing contractors but is also very much a starting point in the process of delivery, PSE also deals with managing and monitoring certain aspects of the firms throughout their engagement.

Programme management is not the same as *project* management. Programme management is therefore definitely not the sum of project management multiplied across a number of projects in a programme. Therefore, because procurement on a programme cannot be about procuring each project in isolation, a much more strategic approach is required. The impact of one project on the total programme must be considered in the context of the whole. In a programme made up of, say, ten projects, nine successful projects would not equate to a successful programme. Therefore, PSE is not just concerned with each project; it adopts a far more strategic view of the programme's procurement and the capability of the supply chain to meet the programme's requirements.

PSE is based on the understanding that procurement is about buying a supply chain, and not just an individual contract. PSE also takes into account the wider supply issues, such as the capacity of suppliers to meet a project's needs and the wider programme's aggregate level of demand. It seeks to understand the exposure of suppliers in the context of their financial strength, the effect the programme has on this and also the wider economic impact of the programme. PSE therefore takes the view that the successful project is not as important as the successful programme, and that the successful programme is not achievable without the successful businesses that form its delivery supply chain.

Figure 1.1 below highlights the processes and strategies of the purchase engineering and supplier engineering streams that make up the PSE model. These streams are fundamentally linked to each other and assist in laying the foundations of the future success of a programme's delivery.

The purchase engineering and the supplier engineering functions together inform the procurement and delivery process and thereby ensure that the risks associated with procurement are managed, while opportunities are created and in doing so the client's value requirements are realised.

Purchase Engineering seeks to establish a strategy and methodology for assembling a purchasing 'machine' that can be used to procure any number of contracts efficiently to deliver the objectives of a client.

Similarly, Supplier Engineering aims to establish a framework for the programme supply chain team's interactions with the supply chain organisations that are seen as critical to the success of construction. This engagement is both during the pre-construction (procurement) and

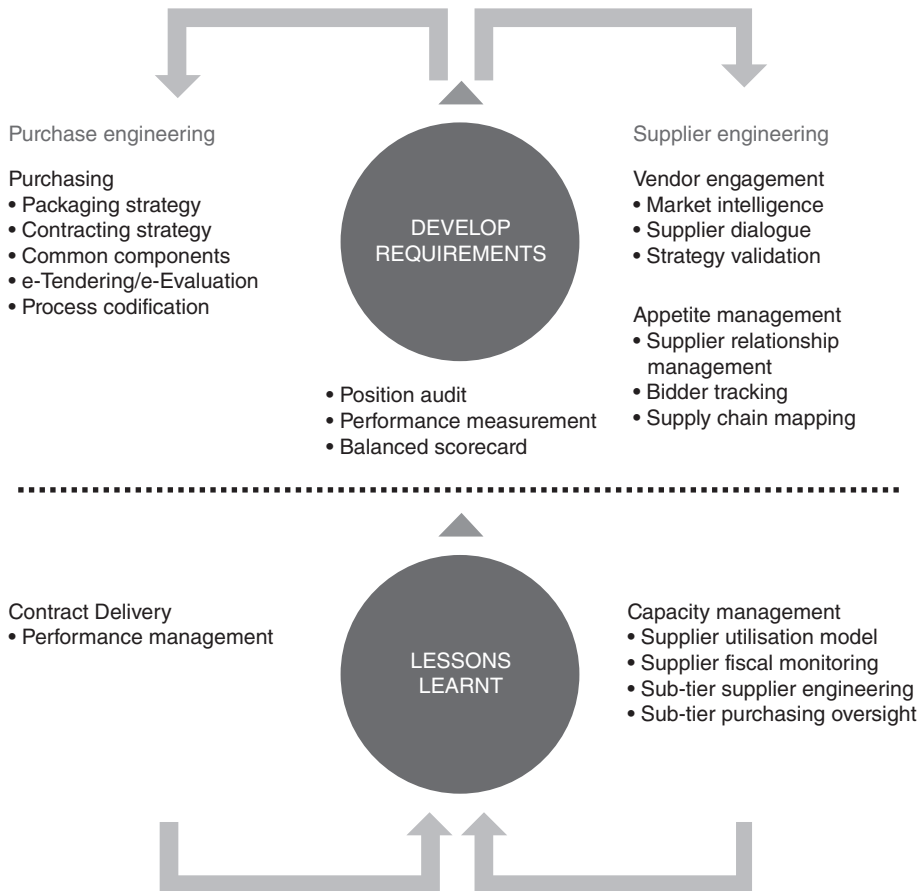


Figure 1.1 The Purchase and Supplier Engineering (PSE) model.

construction (delivery) phases. PSE helps to remove surprises during procurement and assists in the avoidance of certain project and programme supply chain risks during delivery that could otherwise lead to major cost and time overruns and undermine the value-for-money requirements of the client.

The PSE model is shown in Figure 1.1. The dotted line dividing the top and bottom halves of the diagram distinguishes between those elements of the model that are delivered during procurement, such as packaging strategy (above the line) and those that impact on delivery post-contract award, such as performance management (below the line).

Programme organisation – an Olympic case study

It is important to recognise at the outset that even large public-sector clients may be headed by people newly appointed to positions of authority. Often there is little qualified and experienced staff to support them and those that are available are not always to hand. This is partly the result of the practice of outsourcing expertise in the public sector. Moreover, there may be little build-up of relationships between the public sector and contractors over a prolonged period of time. By the nature of construction contracting, relationships tend to last only for the duration of projects; there is little opportunity for working relations to become established over a working life. This leads to problems of communication that need to be carefully managed.

For example, even before embarking on a project, contractors need to know what the client's requirements are. This goes beyond simply describing the building in technical terms. Large projects involve complex interactions, including social, environmental and economic aspects. Clients may initiate procurement in the built environment with an understanding of how they perceive success in a project, but without a clear way of explaining this to the supply chain.

Without a clear value definition, supply chains cannot respond to client requirements, as they do not necessarily understand their employers' expectations. Not being fully aware of these requirements, contractors cannot respond to these expectations clearly and coherently when putting tenders together. Clients also find it more difficult to evaluate tenders beyond the objective requirements of price and technical specifications, if they have not effectively communicated their value framework. The client might well have to meet demands from a variety of different stakeholders, with varying degrees of influence and power over their project, programme or portfolio.

These demands can be numerous and can come from inside the client organisation as well as from external stakeholders. The social and political implications need to be taken into account, as the impact of the addition of a new building on the built environment can affect third parties, such as local businesses, residents and amenities. Whether this impact is positive or negative, or is even considered, will depend on the client's priorities and their need or desire to take various factors into consideration. Publicly funded projects, for example, must demonstrate 'best value', but very often what represents value is unclear and

sometimes even remains unstated beyond the most basic description. Conventionally, clients describe value in three relatively simple terms. These are cost, time and quality. However, that is no longer adequate or sufficient, as objectives extend beyond the built asset especially in the public sector, where there is often a need to take into account environmental factors, health and safety and the social impacts that may occur.

The Olympic Delivery Authority (ODA) was the public body put in place and made responsible for developing and building the new venues and infrastructure necessary for hosting the London 2012 Olympic and Paralympic Games. A delivery partner, CLM, was appointed via a public procurement competitive dialogue process to work with the ODA to programme-manage the delivery of the construction of the venues and infrastructure for the Games.

The ODA was established by the London Olympic Games and Paralympic Games Act (2006). The Act was passed to ensure that the necessary planning and preparation for the Games could take place. It allowed the ODA to:

- buy, sell and hold land;
- make arrangements for building works and develop transport and other infrastructure;
- develop a transport plan for the Games, with which other agencies had to cooperate, and make orders regulating traffic on the Olympic Road Network and Paralympic Route Network; and
- be the local planning authority for the Olympic Park area.

As a public body, the ODA was accountable to government, the Greater London Authority (GLA) and other stakeholders for its work.

As the client, the ODA decided it needed to mobilise resources from the private sector by first procuring a delivery partner (DP). The need for expediency and the requirement for a large number of experienced professionals to be mobilised quickly meant that, by buying a private-sector DP, the ODA could bring to bear the necessary resources to organise the procurement quickly. The DP approach also had other advantages in that it meant the ODA could deploy its resources flexibly, according to the programme's requirement at any given time. It also meant that the ODA could remain a 'thin' client, with comparatively low numbers of directly employed staff, who controlled and directed the experienced construction professionals working in the DP.

The competition to award the DP contract to work with the ODA was won by a joint venture organisation made up of three companies from different parts of the construction industry. The first was a large engineering organisation and programme manager, CH2M Hill; the second was a tier 1 contractor, Laing O'Rourke; and the third was a construction management organisation, Mace. These three organisations, along with a number of strategic partners (including Davis Langdon) became the DP, known as CLM.

The Delivery Partner was tasked with the day-to-day practicalities of managing and delivering the programme and administering the contracts for each of the construction projects. Moreover, among the members of the DP they held the necessary skill sets and, if the need arose, they could be the 'builder of last resort' and step in if required to assist in the construction process. It was the depth and breadth of the DP expertise that meant they were an extremely well-informed client delivery partner, with insights and a detailed understanding of the contractors' points of view.

In 2006, when the DP was mobilising to begin its work to deliver the programme, the global economy was confident and growing and the construction industry was experiencing high private-sector demand both at home and abroad, with this demand returning very good margins for contractors. However, widely publicised problems surrounding the late delivery of the Wembley Stadium project, a major sporting venue (eventually completed in 2007), had received much negative coverage, both at home and overseas. The criticism centred around the enormous overruns of both its budgets and schedules on what was agreed to be a complex stadium construction project. Therefore the prospect of a one-off government client procuring a number of sporting arenas and other associated infrastructure, which were to be built in a densely populated area of London, on highly contaminated land and to a schedule with an immovable completion date (namely, the opening ceremony of the Olympic Games), meant that the tender opportunities offered by the Olympic Games infrastructure did not present an attractive business case to contractors when compared with alternative projects on offer from private-sector markets and their clients. These clients, after all, also had the added attraction of not being bound by the red tape of public contract regulations and EU procurement legislation.

Therefore, from the supply market's point of view, private-sector contracts offered not only greater flexibility to suppliers but – more

importantly to large tier 1 contractors – the prospect of greater profits, repeat work and the potential for sustaining the growth of previous years. The appetite of contractors for the ODA's emerging project opportunities was therefore a major challenge confronting both the ODA and their delivery partner right from the outset. It appeared at best that contractors would be reluctant to enter into any dialogue with the ODA, and at worst would not even respond to any procurement opportunities associated with the Olympic programme. These were the circumstances that acted as the catalyst to produce the PSE approach.

Procurement organisation structure – the Olympic Delivery Authority

In 2006 the challenge was to set up a method of procurement that would meet all the strategic goals and surpass all the critical success factors required to deliver the ODA's value-for-money criteria. To achieve those ends, overall responsibility for the procurement function at the Olympic Delivery Authority (ODA) rested with the ODA Head of Procurement, to whom the delivery partner's (CLM) Head of Procurement reported. The DP's Head of Procurement managed two main functional streams: the programme procurement's strategic and operational teams. The programme supply chain management team was part of, and contributed to, both these functional streams. The procurement organisation within the ODA took the form of a classic matrix management structure, in which centralised specialist functions supported multiple individual projects. The matrix structure is commonly used in best-practice organisations, as it helps to maintain consistency and capture best practice, while allowing a high degree of flexibility. Figure 1.2 shows how the programme procurement-level specialist functions, strategy and governance, operations and support and supply chain management and assurance, supported the project-level procurements. In the case of programme supply chain management, their involvement went beyond procurement and influenced the delivery – hence the term 'Supplier Engineering'.

Roles and responsibilities

The roles and responsibilities for procurement staff were defined within detailed job descriptions. These job descriptions, as well as defining the

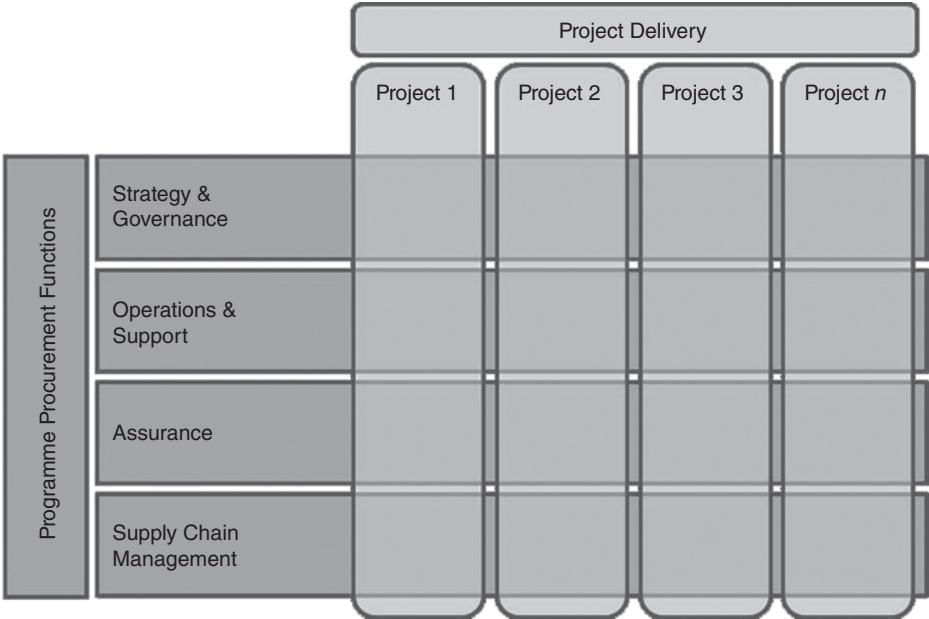


Figure 1.2 Programme-level procurement function matrix organisation.

roles’ requirements, set out very clearly the obligations for all staff to comply with the ODA procurement code (the codified process for procurement). The ODA procurement code was developed as part of the PSE process and is described later in Chapter 7. The procurement code was based on similar procedures and working instructions from within other safety-critical industries, including rail and petrochemical. The purpose of the code was to make responsibilities during the buying process completely transparent and unambiguous. The codification also facilitated clear lines of reporting and communication. The benefits of an integrated team, consisting of the CLM Delivery Partner and the ODA project sponsors (who held responsibility for the project), included encouraging people to work together in order to generate the information required to satisfy the gateways within the process. The emphasis on team integration encouraged a more cooperative working environment and a greater sense of ownership within the project teams than might have been achieved in a more formalised client-and-supplier relationship.

Projects and programmes

Many of the tools and techniques described in this book are applied across a number of projects within a programme, to give an overarching view not necessarily available to any one firm actually working on one or more projects within a programme. For example, a main contractor may not be in a position to assess a subcontractor's or a supplier's exposure to the programme, because they are unaware of the competing commitments of other main contractors on the programme, who may be using the same suppliers.

At other times this could be viewed as interference in the business affairs of a supplier, but it is essential for monitoring the delivery of a programme of projects, where multiple projects are competing for the finite capacity of a specific supply pool. This programme approach to understanding demand ensures that firms are not overexposed on any one project and that, more importantly, the sum of exposure on all projects does not impact negatively on the programme as a whole. One successful project does not make a successful programme, and yet the very nature of project management is focused on delivering a successful project, often in ignorance and possibly to the detriment of other projects within a programme. Only when all projects within a programme have met their targets can programme managers claim to have satisfied the client's objectives and delivered success for the programme.

The principles described in this book provide the necessary guidance on establishing criteria to assess the success of a programme using a balanced scorecard approach. By establishing and communicating the targets of the programme, these form the criteria that influence the delivery of success for each of the individual projects that make up the programme. Most importantly, these criteria can also be used to guide clients in the selection of suitable suppliers in terms of their appetite, capacity and capability to deliver the programme's criteria for success.

While this book is concerned with the management of a programme of work for large, complex projects, the techniques can be applied to any programme or portfolio of projects. The same techniques can be used by contracting organisations, whose business is managing multiple projects. This approach is in contrast to the way firms operate in the construction industry, where projects are often viewed in isolation, as if they take place alone rather than in the context of the other projects running

concurrently. Projects are often delivered in silos according to the needs of the individual client in question, and only passing attention is paid to any corporate strategic view – usually at head office, often with little translation of this on the project site. However, once a project starts on site, the project team are charged with delivering the project without any concern for the business as a whole or for any impact their decisions might have on other projects being delivered elsewhere. This is often true when projects are delivered by the same contractor, but for different clients. Changing this approach to projects, and taking a far more strategic approach to their procurement either at a programme or a project level, represents an opportunity for efficiency gains, risk avoidance and value improvement.

The aim of the book is to provide an understanding of the programme procurement principles developed and to give practical advice on avoiding many of the problems that can arise. For example, it is not sufficient to procure main contractors alone, while ignoring the impact of their selection of subcontractors and suppliers, because problems frequently arise in construction when subcontractors do not have the capacity and capability to service all their commitments on all their contracts. Labour and resources are often moved from one contract to another by subcontractors, depending on the demands of competing projects, the threat of penalty clauses or delayed payments for late delivery. This leverage over subcontractors is important, because resources are pulled by the leverage of their clients, who are often the main contractor. It should be recognised that the vast majority of main contractors are not vertically integrated and therefore they rely on their subcontractors to carry out the physical delivery of the construction process.

Concluding remarks

This chapter has introduced the concept and model of PSE in its most basic terms and has discussed some of the challenges the model was developed to address. It has also highlighted the way in which the programme procurement function works as a function within the wider programme management team and described how the ODA utilised third-party specialists in their delivery partner, CLM, to mobilise the appropriate resources for developing and implementing the necessary requirements for realising the ODA's vision as part of a fully integrated client function.

The next chapter introduces some of the economic theory and highlights some of the market dynamics that act upon the construction industry. The success and growth of the construction sector often relies on the success and growth of the economy in general. The PSE approach was initially developed to respond to a market that was operating in an extremely buoyant global economy. When the recession began in 2007, during the delivery of the programme, the attention to detail and the systems that were developed to avoid the risks of a volatile marketplace enabled the teams working on the London 2012 Games to avoid the risks associated with the downturns in the economy, in particular the avoidance of supply chain failure. For this reason the authors feel it necessary to give some economic context, as it was this sensitivity to the economic environment that shaped the development of the approach now known as Purchase and Supplier Engineering (PSE).

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