Chapter 1

An Overview of Cost Planning

1.1 Introduction

Buildings are an essential part of the infrastructure of modern society. They provide shelter, we work in them; they provide the very means by which civilisations function and it is because of this that we tend to take our built environment for granted. Buildings and civil infrastructure are the enablers of health care, education, commerce and justice, the essential elements of that civilisation. I often remark on the importance of buildings and civil infrastructure to my students in lectures by asking them a simple question:

If you were to ever visit London, Berlin, Paris or Rome, what would you do?

Invariably, the responses always involve visiting buildings: the Houses of Parliament in London, the Brandenburg Gate in Berlin, the Arc de Triomphe in Paris and the Coliseum in Rome, all the usual suspects. Being a railway enthusiast, I am a big fan of I. K. Brunel, the once pioneering chief engineer of the Great Western Railway. I like to use his legacy as an example of the point I am trying to make here. Approaching his iconic station building at Bristol Temple Meads, one is reminded so much of how buildings were seen as the most appropriate symbol of wealth, prosperity, ambition and achievement. For people like Brunel, buildings and civil infrastructure were a statement about the country. Brunel was a visionary but he also had a track record for blowing the budget on his projects! Maybe he used arguments with his projects' sponsors to convince them of the long-term value of their investments, who knows, but notwithstanding the **value**[1] aspects of buildings, the construction industry generally is inextricably linked with money. Simply put – buildings cost money, and usually lots of it!

This may seem a rather simplistic contention, but history reveals that understanding the costs of construction is a skill that has developed over time. In the seventh and eighth editions of this text, Douglas Ferry and Peter Brandon refer back to biblical times in order to trace the origins of cost planning, and the reading from St Luke (Ch. 14) gives a fascinating insight:

> **Would any of you think of building a tower without first sitting down and calculating the cost, to see whether he could afford to finish it? Otherwise, if he has laid its foundations and then is not able to complete it, all the onlookers will laugh at him. "There is the man' they will say, 'who started to build and could not finish".**

While there are clearly metaphorical connotations within this reading, the point is pretty clear. To build well, you must first plan! Interestingly, the final part of the reading is a harrowing reminder to many clients and builders in today's society who have not taken heed of good budgetary management.

Ferry and Brandon's Cost Planning of Buildings, Ninth Edition. Richard Kirkham.

Companion website: www.wiley.com/go/kirkham/costplanningbuildings

1.2 The 'art' of cost planning

The relationship between costs of buildings and **procurement**, procurement being the method by which buildings are delivered to the client, will be considered in detail in Chapter 7. The United Kingdom has witnessed a turbulent period of construction activity since the last edition of this book; relatively stable growth between 2001 and 2006 and then of course, the 'game-changer', more commonly known as the global economic crisis (see Figure 1.1), but allied to this has been an increasing focus on project budgets and, moreover, the ability to deliver these projects to the projected cost.

Sadly, several high-profile construction projects in the United Kingdom have been plagued with problems over programme and budget. With public sector construction projects, there is a strong emphasis on meeting the budget; so when the project runs into financial difficulties, the taxpayer and media become rather unsympathetic. Some classic examples include the following.

1.2.1 Wembley Stadium, London, UK (2000–2006)

The new national stadium at Wembley is a project that has been mired in controversy with questions over adequate cost planning and budget management. Initially, the cost of the

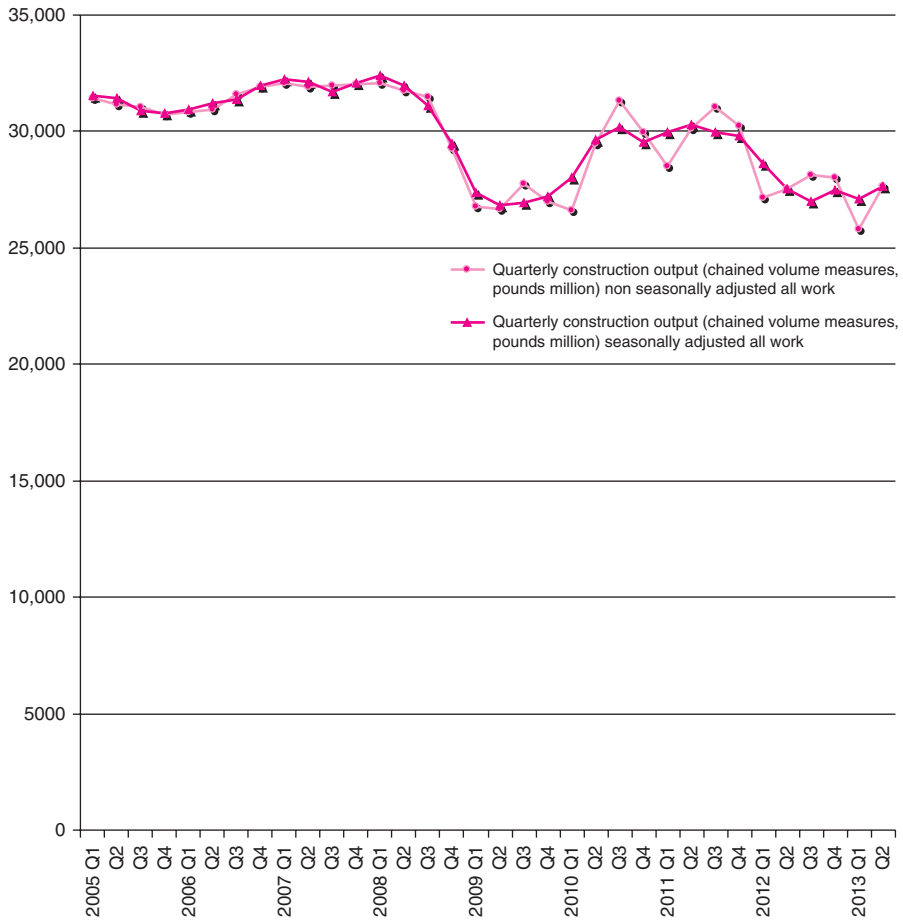

Figure 1.1 Quarterly construction output (NSA and SA) 2005–2013 (Office for National Statistics).

North London stadium was expected to be approximately £200 m. However, in the Summer of 2006, the projected cost had increased by some £715 m. The events of the Football Association and Rugby League Challenge Cups along with a host of other events were relocated to other stadia as the project rolled on beyond the anticipated completion date.

The project became the subject of intense media speculation and on 17 July 2006, the then Minister of State for Culture, Media and Sport, Richard Caborn (an MP), was asked to make a declaration on the target for practical completion (PC). He stated that he was confident that substantial completion of the stadium would be achieved in July 2006, sufficient to enable PC by September 2006. The stadium was actually handed over to the client in March 2007, just in time to host the Football Association Cup Final in May.

So, what happened to the cost plan? Readers of the eighth edition of this book will note that the contractors had disputed the projected final cost, arguing that the £715 m figure that was quoted was the 'cost shown to the banks so that they know that [we] can finance that amount should we need to'. In 2011, the BBC reported that the cost of the project to be £757 m.

A combination of factors lead to the problems faced by the project team; however, an article in *The Economist*[2] suggests that 'an unanticipated rise in the cost of steel (which doubled in 2004) and the extra labour required to ensure the building [was] ready for the May FA Cup Final [threw] the management's calculations out of kilter'.

The steelwork issue certainly had a significant impact not only on the cost plan but also the contractual arrangements between the principal contractor Multiplex and steelwork contractor Cleveland Bridge, UK. Early on in the project, Cleveland Bridge entered into a £60 m lump sum contract to design, fabricate, deliver and erect the structural steelwork at Wembley Stadium including the bowl and huge steel arch.[3] However, in the late 2003, Cleveland Bridge and Multiplex entered into formal dispute as the latter argued that it was haemorrhaging cash as a result of market conditions and specific project's issues and sought significant variation payments, or a change to a cost plus contract arrangement. This dispute continues in court as this book goes to press.

1.2.2 The Scottish Parliament Building, Edinburgh, UK (1997–2004)

Not unlike the National Stadium at Wembley, the construction of the new Scottish Parliament Building at Holyrood in Edinburgh was shrouded in controversy, resulting in a full public enquiry by the Rt Hon the Lord Frazer of Camille, QC. In May 1997, the recently returned Labour Government committed to holding a referendum on Devolved Government in Scotland. In the referendum held on 11 September 1997, almost 75% of those voting agreed that there should be a Scottish Parliament. A new building to house the Parliament was therefore required, and in a subsequent 'White Paper', it was estimated that the cost of constructing a new Parliament would be between £10 m and £40 m. This estimate was made prior to the identification of a location or a design.

Good cost planning requires critical engagement from all project stakeholders from the outset, and a unified voice of opinion from the client. This was not the case and it could be argued that on this project there was no client. However, one of the most catastrophic failures to affect the project in terms of cost and progress was the selection of the procurement route and his opening speech prior to publication of his report, Lord Frazer said:

> *As I have said in my introduction, while I have a number of sharp criticisms and recommendations to make on matters which ought to have been much better understood, there is no single villain of the piece. There were, however, some catastrophically expensive decisions taken and principal among those was the decision taken – not cleared with Ministers – to follow the procurement route of construction management. I have very real doubts if the extent of the risk remaining with the public purse was properly understood at the time it was adopted and I remain concerned that it was not clearly grasped by the Scottish Parliament for nearly two years after the Project was handed over to the SPCB when the*

Parliament gave up trying to have a 'budget' for the building. Any building constructed under the procurement model of construction management costs what it costs.

Lord Frazer's report could not be damning enough of the fact that the project simply did not have an appropriate cost plan. Inadequate briefing was in part responsible for this (some argue that there was no brief at all!) of course, so the importance of developing the brief and its relationship with the cost plan is covered in the first section of this book. The reader is also encouraged to refer to the references for further information on briefing.

1.2.3 The British Library at St Pancras, London, UK (1974–1988)

Exposition of the relationship between cost planning, procurement route selection and the brief was a key feature of the British Library project in London, which by project completion in 1988 had amassed a net increase in £58 million on the original planned cost.

Not unlike the other projects described in this chapter, a catalogue of errors occurred which led to the final cost of the project coming in at some £500 m. Principal among these was the decision to adopt the **construction management procurement strategy**. The National Audit Office (NAO) report heavily criticised this decision and, quite surprisingly, Lord Frazer did not allude to this in his 'Holyrood Enquiry' report. Had he done so, the media would no doubt have rallied against the decision-makers in which lessons clearly had not been learned. This unsuitable method of procurement had a fundamental impact on the cost plan, as well as the thousands of design changes and variations from the original brief systematic failures in quality and cost control during production and failures in the budgetary controls of contracts for the many different work packages undertaken by various sub-contractors. The lack of experience in using construction management allied with the complex and intricate nature of the architects and engineers' contracts, and the standard conditions for work contractors led to a situation that could not possibly sustain within the original cost plan constraints. The result – a damning enquiry and NAO report was said to be the most critical assessment of a public construction project yet.

1.2.4 The FiReControl project (2004–2013)

The previous case studies have identified major problems with the budget for the design and construction of the building specifically, but the procurement strategy will also have a major impact on 'whole life costs' of the project. This is particularly the case with projects that are characterised by complex stakeholders. FiReControl was a project initiated in March 2004, with the aim of achieving efficiencies in the handling of 999 emergency calls to Fire and Rescue Services across England and Wales. The project involved the design and construction of 9 new regional control centres (RCCs) that would replace 46 existing facilities. The problem with this project was not the buildings *per se*, but with the overall strategic objectives that had not been fully understood. This led, in 2010, to the cancellation of the whole project, with many completed RCCs laying empty and unused. The NAO report on the project summarised the main failings in a damning statement: 'This is an example of bad value for money. FiReControl will have wasted a minimum of £469 million, through its failure to provide any enhancement to the capacity of the control centres of Fire and Rescue Services after seven years. At root, this outcome has been reached because the Department, without sufficient mandatory powers, decided to try to centrally impose a national control system on unwilling locally accountable bodies'.

In 2013, The *Yorkshire Post* reported that the £14 m RCC at Wakefield in West Yorkshire had 'finally' secured a tenant after 'six years of standing empty, costing taxpayers £5000 per day'.

1.2.5 High Speed 2 (HS2)

Although not a classic 'building' project, this massive infrastructure scheme will have the potential to revolutionise rail travel in the United Kingdom. The proposals are to build a new high-speed line linking London with Birmingham (Phase 1) and then Birmingham with Manchester/Wigan and Leeds/York. The project is ambitious, but the uncertainties associated with the complex engineering work have already had an impact on the expected costs; a statement published by the BBC in 2013 highlights that 'in June 2013 the government revised the cost of the project upwards, due to an increase in the amount of tunnelling required on the route. This took the estimated budget from £32.7bn to £42.6bn at present values – with the cost of phase one increasing from £16bn to £22bn'.

Opponents of the High Speed 2 (HS2) project believe that these costs could rise still further as a consequence of the unexpected and unanticipated additional work that will be required to the associated buildings and infrastructure to allow the project to unfold. Perhaps the most controversial aspects of the HS2 proposals are the 'business benefits' that are identified within the business case – the Government are at pains to emphasise the value that such schemes bring to the nation and its economy but as we know, value is not that easy to quantify! With construction work due to start in 2017, it will be many decades before we do learn the true value of the investment in this project.

1.3 The cost planning process

Cost planning, as a process, is difficult to define concisely because it involves a variety of procedures and techniques that are used concurrently by the Quantity Surveyor (QS) or Building Economist. Traditional cost planning will usually follow the conventional outline design-scheme design-detailed design process. In a practical sense, the cost planning process starts with the development of a 'ball park' figure (or cost bracket) to allow the client to decide whether the project is feasible. More robust techniques for doing this are described in Chapter 5. This feasibility estimate is usually calculated on a unit cost method (e.g. cost per bed for a hospital, cost per student for a school). The estimate is then refined using the elemental method; the building is broken down into its component elements and sub-elements, usually using the Building Cost Information Service (BCIS) cost structure. The elemental method is a system of cost planning and control, which enables the cost of a scheme to be monitored during the various stages of design development.

A good cost planning system should ensure the following.

1. Ensure that the tender figure is as close as possible to the first estimate, or that any likely difference between the two is anticipated and within an acceptable range.
2. Ensure that the funds available for the projects are allocated effectively and economically to the various elements and sub-elements.
3. Always involves the measurement and pricing of approximate quantities at some stage of the process.
4. Aim to achieve good value at the desired level of expenditure.

Obviously, a direct benefit of good cost planning is to reduce project risk. Steps ought to be taken to ensure that the project development budget opportunities and threats are fully appraised are identified and assessed accordingly.

Ferry and Brandon, in previous editions of this text, describe the cost planning process in three phases:

- **Phase 1**: Defining the brief and setting the budget. In disciplines out of construction project management, this is commonly referred to as scoping or framing.

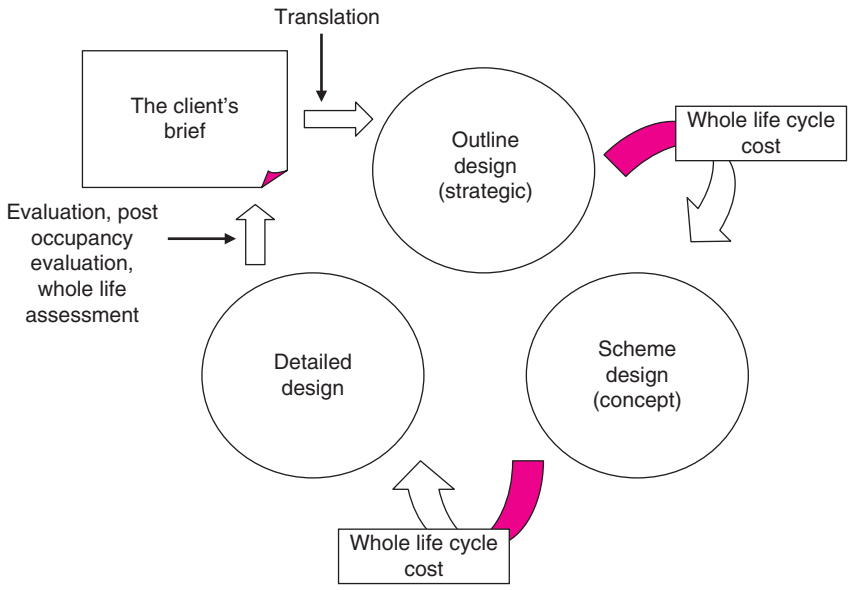

Figure 1.2 The conventional stages of the cost planning process including whole life cycle costing.

- **Phase 2**: The cost planning and control of the design process. This phase is of critical importance since decisions made at design have a direct impact upon whole life performance.
- **Phase 3**: The cost control of the procurement and construction stages. The latter part of this phase is still relevant today as it was when Ferry and Brandon first proposed the process. However, procurement has changed and decisions with regard to this are sometimes made prior to design, indeed during Phase 1. It is therefore essential that cost planning advice recognises the impact that certain procurement decisions will have one design and construction cost. This is addressed in Chapter 7.

Current thinking suggests that cost planning should continue beyond the conventional boundaries and take into account the whole life rather than the period up to PC. Figure 1.2 shows the typical cost planning process but, importantly, this is encapsulated within a whole life decision environment – in other words, it should include adequate appraisal of the long-term cost implications of design decisions (such as maintenance, energy and FM costs). This will be explored in depth in Chapters 5–7.

1.4 The profession of quantity surveying

The functions of the QS are broadly concerned with the commercial management of construction projects. This breaks down into two distinct areas of work: firstly, the planning and control of project costs; and secondly, the management of the terms and conditions of the form of contract agreed by the parties (Client and Contractor). As far as we are concerned in this book, it is only the first area which will be considered.

The methods employed in the planning and control of construction costs cover a range of activities which may include feasibility studies, cost planning, value engineering, cost–benefit

analysis and life cycle costing, which all take place during the design stage of projects, calculation of interim valuations and final accounts, which include the cost estimation of variations, and changes are the procedures that take place during the construction stage of the project. QSs can also be known as construction economists, cost engineers or construction commercial managers.

The Quantity Surveying profession can trace its roots back to the rebuilding of London after the great fire in 1666. Prior to that date, buildings tended to be built on what we now call a design build arrangement, where the client would give the builder an outline of what they wanted, the Master Builder would work out the details, arrange all the various specialist tradesmen and forward the bills to the client at regular intervals. Clearly, the difficulty with this arrangement was that the client did not know how much the building was likely to cost before it was finished and if the client wanted several estimates or quotations,[4] each builder would need to separately calculate the amount of materials, plant and labour required, with the obvious duplication of effort and cost.

With so much rebuilding work required after the great fire, a more efficient system of calculating building costs and generating estimates was clearly required. Therefore, the independent 'Quantity Surveyor' was born, whose role was originally to consider the Architect's drawings (and specifications if they were lucky) and to develop a 'Bille of Quantityes' with the purpose of allowing any firm who wishes to tender for a project, to calculate that tender on the same basis and thus minimise any duplication of efforts. This service was originally paid for by the contractors tendering for the work, but over a period of time, the role became part of the client-side responsibilities to make sure that all tenderers were issued with identical tender documents.

Up to the beginning of the twentieth century, most large building construction work was either procured by the Government or by private individuals, where cost was not seen as the main criterion. Infrastructure work was slightly different, and the considerable amount of canal building in the eighteenth century and railway construction in the nineteenth century was undertaken at a considerable expense by corporate organisations. These companies (the railway companies prior to nationalisation) would borrow money from the capital markets to build the permanent way (or P-way as they referred to it as) and rolling stock and raised revenue through ticket sales to passengers and charging for freight. However, most railway construction projects were grossly over budget, and for all, his image as an icon of railway engineering, I. K. Brunel was constantly being sued by construction firms for non-payment of bills on projects where he had lost control of expenditure. Clearly, a further change was required.

The Quantity Surveying profession therefore took the initiative, spurred by the development of what is now the Royal Institution of Chartered Surveyors (RICS) in 1868, by developing procedures to control construction costs by accurate measurement of the work required, the application of expert knowledge of costs and prices of work, labour, materials and plant required. Sometime later, they would use their understanding of construction technology to be able to assess the implications of design decisions at an early stage to ensure that good value is obtained for the money to be expended.

The technique of measuring quantities from drawings and specifications prepared by designers, principally architects and engineers, in order to prepare tender/contract documents, is known in the industry as 'taking off'. The quantities of work taken off typically are used to prepare bills of quantities, which have been traditionally prepared in accordance with one of the published standard methods of measurement as agreed to by the QS profession and representatives of the contractors' organisations.

Although all QSs would have followed a similar course of education and training (for those entering the profession today, this is usually to degree level), there are many areas of specialisation in which a QS may concentrate. The main distinction among QSs is between those

who carry out work on behalf of a client organisation, often known as a 'Professional Quantity Surveyor', 'Professional QS' or 'PQS', and those who work for construction companies, often known as a 'Contractor's Quantity Surveyor' or 'Contractors QS' or 'CQS'. The latter is usually responsible for all legal and commercial matters within the contracting organisation, and because of this many are now termed commercial managers.

1.5 Public sector building procurement

The innovations in procurement over the past two decades have radically changed the professional remit of QSs and other building professionals involved in providing strategic advice to clients on procurement and design. The design and economics of construction are inextricably linked with the procurement process, and this is recognised in the tranche of documentation issued by the Office for Government Commerce[5] (OGC) under the umbrella of 'Achieving Excellence in Construction'.

Achieving Excellence in Construction was launched in March 1999, by the then Chief Secretary to the Treasury, to improve the performance of central government departments, executive agencies and non-departmental public bodies (NDPBs) as clients of the construction industry. It put in place a strategy for sustained improvement in construction procurement performance and in the value for money achieved by the government on construction projects, including those involving maintenance and refurbishment.

Key aspects include the use of partnering and development of long-term relationships, the reduction of financial and decision-making approval chains, the improvement in skills development and empowerment, the adoption of performance measurement indicators and the use of tools such as value and risk management and whole life costing.

The next milestone in the development of public sector procurement is 2016, the deadline imposed by the UK Government for the integration of Level 2 Building Information Modelling (BIM). This is an exciting time for the profession and we explore the implications of BIM in Chapter 2.

With all these changes, QSs are now seen as the financial managers of the construction team who add value by monitoring the functions of time and quality, as well as the traditional function of cost. The role of the QS has therefore changed significantly in recent years from their humble origins and is now responsible for ascertaining a long-term view of building projects, assessing options and providing clients with comprehensive information on which to base investment decisions.

1.6 International dimensions

The profession of Quantity Surveying is a peculiarly British institution, due chiefly to the historical context outlined above. For those who care to remember as far back at the 1970s, this peculiarity was made the subject of a humorous sketch, the *Bookshop Skit*, written by John Cleese and Graham Chapman. In the sketch, a bookseller deals with a customer who seeks to buy the most obscure of book titles, ones that no ordinary bookseller could hope to have in stock – much to his annoyance and anger. Having batted away requests from the customer for *Olsen's Standard Book of British Birds* (minus the gannets!) and *The Amazing Adventures of Captain Gladys Stoat-Pamphlet and her Intrepid Spaniel Stig among the Giant Pygmies of Corsicato*, the customer then demands a copy of *Ethel the Aardvark Goes Quantity Surveying* – but much to the booksellers delight he discovers that he does have a copy to sell her!

The sketch ends with the bookseller reciting the opening paragraph to the customer as he thumbs open the first page *Ethel the Aardvark was trotting down the lane one lovely summer day, trottety-trottety-trot, when she saw a nice Quantity-Surveyor…* anyway, we digress!

Through emigration in the nineteenth and twentieth centuries, the British construction procurement system has been exported to Commonwealth countries, so that in English-speaking countries such as Australia, New Zealand, South Africa and Canada, there are well-established firms of QSs represented by their own national professional bodies. Clearly, the local construction industry in these countries has developed separately, which also shows that the skills of the QS have been found to be valuable. In Europe, the pre-contract and post-contract roles are generally split, so the feasibility and cost-planning function are taken by the Economist de la Construction in France or the Baueconomist in Germany. The post-contract function of valuations and final account preparation is often taken by the Resident Engineer, assisted by a technician cost engineer. In the United States, the situation is substantially the same, although in recent years many large firms of QSs are operating very successfully in the United States where clients see the considerable value of the QS core skills in technology, law and economics. Traditionally, these skills require different professions who do not necessarily have the detailed knowledge of the construction industry.

1.7 The future of cost planning

Cost planning, like any other discipline, within construction is continually developing and responding to the ever-changing demands of today's clients. In order to meet this challenge, there exists a basic set of competences that cost planners should acquire and continue to develop over their careers. In the United Kingdom, the RICS sets out these competences in both the Assessment of Professional Competence (APC) and Continuing Professional Development (CPD) requirements. This text is introductory and aims to provide that first step, but future cost planners must recognise the importance of the following:

- Understand the impact of early stage strategic decisions on the project life cycle costs and performance.
- Recognise the importance of sustainability through a wider understanding of how buildings perform in use; environmental and energy issues should act as the catalyst to a wider appreciation of whole life cycle costing.
- Harness the benefits of increased interdisciplinary collaborative working with other professionals within the client, design and construction teams.
- Engage with the design team from the outset in order to foster a greater understanding of the impact of design decisions on whole life cycle cost.
- Develop effective risk management strategies with the cost planning process.

In Chapter 2, we shall examine some of the recent developments that have taken place in the cost planning discipline from a BIM perspective.

Further Reading

Boussabaine, A.H. (2006) Cost Planning of PFI and PP Building Projects, Routledge, ISBN: 10:0415366224.

Lee, S., et al. (2011) Willis's Elements of Quantity Surveying, 11th edn, Wiley-Blackwell, ISBN: 10:1444335006.

Ostrowski, S.D.C. (2013) Estimating and Cost Planning Using the New Rules of Measurement, Wiley-Blackwell.

Endnotes

1 The concept of value is based on the relationship between satisfying needs and expectations and the resources required to achieve them.
2 Project management: Overdue and over budget, over and over again, *The Economist*, 9 June 2005.
3 'Ruthless but lawful' *QS News*, Friday, 14 July 2006.
4 The difference between 'estimate' and a 'quotation' is very important. An estimate is only an indication of what the cost of the project will be and may change if, for example, material or labour prices change. A quotation, on the other hand, is a fixed price and will only change if the client varies their instructions.
5 The full 'Achieving Excellence in Construction' documentation can be downloaded from the Office for Government Commerce website at www.ogc.gov.uk.