Whole Life-cycle Costing
Risk and Risk Responses

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The UK government has challenged the way its organisations deliver services, and has placed on them a duty to continuously improve in order to provide the services that people require economically, efficiently and effectively. This concept of ‘best value’ has dominated public sector capital investment policy in the UK since the 1990s. This has been the case particularly in large buildings and civil infrastructure projects such as hospitals, prisons and highways. As a result of the fundamental revisions in public procurement policy that have subsequently taken place, interest in and demand for the use of whole life-cycle costing (WLCC) techniques have risen to unprecedented levels. These policy changes are clearly demonstrated in recent government publications such as ‘Construction Procurement Guidance, No 7 Whole Life Costs’ (Office of Government Commerce), which states that ‘all procurement must be made solely on the basis of value for money in terms of the optimum combination of whole life costs and quality to meet the user’s requirements’. This view is fully endorsed by National Audit Office (NAO) policy and reinforced in their joint guide ‘Getting value for money from procurement – How auditors can help’. Consequently the award of public construction contracts based on simply the lowest capital cost bid is no longer recognised as good practice; best value must be taken into account and thereby WLCC should be fully appraised as part of the decision making process.

Within the UK public sector, WLCC must now be taken into account in all business cases, which aim to justify capital investment in construction. This applies to projects financed by traditional public capital as well as through the Private Finance Initiative (PFI) and Public–Private Partnership (PPP) approaches. The tangible effects of this essential change in procurement can be seen in, for example, the NHS ProCure 21 strategy. ProCure 21 promotes the better use of NHS assets and resources to achieve the right buildings and equipment, in the right place, in the right condition, of the right type, at the right cost (from both capital and whole life points of view), at the right time whilst facilitating effective response to future needs of the service with minimal impact on the environment. The ProCure 21 programme incorporates WLCC models in the tendering process for its frameworks and requires specific models to be completed for each NHS scheme subsequently undertaken by the framework contractors in England. These models have helped the NHS to make significant steps forward in attaining better value for money in capital procurement.
The transition to WLCC-based decision making has been slow and arduous, as this book will demonstrate. The techniques of WLCC have been viewed by many as a complex and highly uncertain science, two descriptions that are perhaps not wholly without merit. In respect of the latter, this book studies in depth the element of ‘risk’ in WLCC, and presents possible strategies and techniques for dealing with this. However, the continuing research into WLCC will provide us with better models with which to inform the decision making process and deliver best value to NHS stakeholders in the future. This book bears evidence to this, providing examples of the practical applications of the technique and the subsequent benefits that can be obtained.

The authors are to be congratulated on this timely and thought-provoking work, which shows the real value of WLCC, particularly within the economic constraints surrounding public procurement today. I feel sure the book will provide an indispensable reference to practitioners as well as a useful study guide to undergraduate and postgraduate students in the construction and economic disciplines.

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Further reading

National Audit Office/OGC. Getting value for money from procurement – how auditors can help.

Useful websites

www.nhs-procure21.gov.uk
www.nao.gov.uk/guidance/topic.htm
www.ogc.gov.uk
The construction industry has recently experienced a paradigmatic shift in its approach to product delivery and the achievement of customer satisfaction. Where previously the design and construction teams placed a heavy emphasis on delivering buildings at the lowest capital cost, a greater awareness and desire to consider costs over the whole life of the building have prevailed. Clients now want buildings that demonstrate value for money over the long term, and are not interested simply in the design solution which is the least expensive. These changes have led to and highlighted the importance of whole life-cycle costing (WLCC) approaches to the design, construction and operation of buildings.

Rethinking Construction, the government report into the industry, strongly advocated the need to build right first time and every time by considering the long-term costs and economic performance of constructed assets. Additionally, recent health and safety legislation has also placed a specific duty on clients and designers to consider the potential risks of construction, maintenance and operation over the whole life of the building. These drivers, along with the increase in the number of buildings procured under the Private Finance Initiative (PFI) and Public–Private Partnerships (PPP) routes, have led to project stakeholders taking a greater interest in WLCC decision making.

So why is WLCC so important?

One of the reasons behind the rise in popularity of WLCC is that it provides a far more accurate assessment of the long-term cost effectiveness of a project than standard economic methods that focus solely on first costs or on operating-related costs in the very short term. WLCC provides vital information on projects such as those procured under PFI, where the consortium requires long-term cost forecasts of service provision that they will be contracted to provide. It also provides the government with knowledge about the anticipated economic liabilities that they will acquire when the asset becomes the property of state. This, however, is just one example of the benefits of WLCC.

Standard cost and value analysis techniques are generally used to quantify and assess the economic implications of a building design. While these techniques do provide a basis for making project cost decisions, they often do not account for many of the parameters, which may affect the actual project value or cost. The existing methods also fail to consider formal decision making processes and risk assessment methods in performing a cost benefit analysis. Investments in buildings are long-lived and as a consequence involve some degree of uncertainty over the life of the building, and the operational and maintenance costs, amongst other factors. If there is substantial uncertainty concerning cost and time information, then a WLCC analysis may have little
value for decision making if it fails to account for this. Therefore, it is essential to assess the degree of uncertainty associated with the WLCC results and to take this additional information into account when making decisions.

The book is structured in three parts, each reflecting the importance of WLCC throughout the various stages of the whole life of a building or constructed asset. Although the examples in this book are taken from the construction industry, the intentional aim of this book is to be as generic as possible, demonstrating WLCC with risk assessment as universally applicable to many other capital investment decision making scenarios. The book presents a logical approach to the understanding, development and execution of a WLCC analysis, with the express intention of promoting and inspiring confidence in the process.

Part I deals with fundamentals of WLCC and consists of five chapters, which provide a general background and appreciation of WLCC concepts, whole life risk management techniques and key decision making milestones through the project life. Throughout this book, the terms ‘building asset, building facility and project’ are used interchangeably and are taken in their widest possible meaning, to incorporate all aspects of the development from inception to eventual decommissioning.

Part II covers aspects relating to WLCC risks and risk responses during the design stage, and consists of five chapters. A key theme in this Part is the concept of integrating service life forecasting, environmental life-cycle assessment and WLCC. Additionally, it also introduces a practical framework for assessing whole life risks and risk responses during the design stage. Part II also includes an innovative framework for developing WLCC budget estimates. The Part concludes with a case study on the practical application of WLCC to the selection of mechanical services. This Part is written in a way that should provide stimulus to the reader to think about WLCC and risk during the design stage, and encourage a holistic approach to design decision making.

Part III considers WLCC issues during the post-design stage of the building life. This includes the analysis of WLCC risks and risk responses during the construction and operational phases. Example risk registers are presented here with guidance on how the analyst should approach and deal with risk. We will also look at some innovative approaches to operational stage WLCC analysis, both for new projects and existing buildings. This Part concludes with a case study example of the application of WLCC in asset occupancy analysis.

Throughout, the book contains a mixture of established theory, practice and innovation relating to WLCC budgeting and risk management. Although we cannot expect to cover all aspects of WLCC, guidance on suitable sources of additional information is provided. Readers who wish to explore some of the issues in the book in greater detail should refer to the list of further reading and references at the end of each chapter.

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Liverpool
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The authors affirm that any mistakes and errors in the book are entirely our responsibility.

 Ideals are like stars. We never reach them but, like the mariners on the sea, we chart our course by them.

Carl Schurz