

1 Introduction

1.1 The aims and objectives of the book

The 1980s saw an increasing international interest in the use of value engineering in design and construction and an embryonic discussion of value management (VM). The climate in UK construction of the 1990s was right for the further development of innovative systems including VM.

The authors' research activity into the topic, which began in 1986 and was funded by the Education Trust of the Royal Institution of Chartered Surveyors (RICS), was boosted in the 1990s by further funding from the RICS and the Engineering and Physical Sciences Research Council (EPSRC). The latter funded a major study into the international benchmarking of value management practice that resulted in the completion in 1998 of 'The Value Management Benchmark' published by Thomas Telford (Male *et al.*, 1998). The benchmark was the springboard for detailed work into three areas. First, to make clear different study styles and their application at particular stages of projects, and, relate each study style with their most commonly associated method, tools and techniques. Second, to investigate the concept of quality and value to understand their interrelationship and their application within supply chain thinking. Third, to extend the use of VM into other organisational settings and investigate other more generic study styles.

This research work was carried out by the authors, or under their supervision, using a variety of research methods. Significant findings were made through grounded theory and action research approaches. This work continued unabated, reshaping, refocusing and extending the authors' ideas about the theory and practice of value engineering and more, especially value management.

What has changed from edition 1

In reviewing the context and content of the first edition, published in 2004, the authors concluded a second edition needed to take account of the following:

Value Management of Construction Projects, Second Edition. John Kelly, Steven Male and Drummond Graham.

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- A range of recent UK industry and government publications, most notably BS EN 16271:2012 – Value management: Functional expression of the need and functional performance specification, the imminent update of BS EN 12973:2000 Value Management; BS EN 1325:2014 Value Management – Vocabulary; the changes to ‘Value for Europe’ governing the training and certification of Value Management in European Union countries; the UK Government’s Management of Value (MoV) initiative, together with other leading reports, international guidance and standards on Value Management.
- Research in value management undertaken since 2002.
- Changes in value management practice, particularly in relation to the management of Portfolios, Programmes and Projects (P3).
- Developments in the theory of value, principally value for money measures, whole life value, option appraisal, and benefits realisation.
- New asset management initiatives covering the management of physical infrastructure, for example, BSi PAS55 2008 ‘Asset management: Specification for the Optimized Management of Physical Assets’, which has transitioned into a suite of three documents comprising the new standard BS ISO 55000: 2014 Asset Management (BS ISO 55000: 2014 Asset Management – Overview, Principles and Terminology; BS ISO 55001: 2014 Asset Management – Management Systems – Requirements; BS ISO 55002: 2014 Asset Management – Management Systems – Guidelines on the application of ISO 55001).
- A wealth of material contained within over 200 case studies undertaken by the authors as consultancy and research, and distilled into lessons learned and good practice.

The chapters in the second edition demonstrate the further contextualisation of value management within construction. This text is influenced principally by a UK-style construction culture. This book, draws together developments in value management thinking and practice, and argues that value management needs to develop further and potentially within different practice settings.

The objectives of the second edition

The second edition deals distinctively with the practical opportunities and difficulties of VM set in the context of theory and good practice in a range of organisational contexts.

In writing the second edition, the authors have brought together and synthesised the background, international developments, benchmarking and action research in value management to provide a comprehensive package of theory and practice. The book is overtly concerned with value management in terms of the philosophy, process, use of function analysis and the nature of team dynamics. It proposes methods for determining the client’s value system, quality criteria and whole life value. An exploration of different value management study styles is conducted, and the text proposes solutions for various activities at different stages of projects and organisational contexts. The book describes, but does not probe into, the areas of creativity, such as those described by De Bono or TRIZ, or the fields of operational research and more specifically operational hierarchies, nor does it address the whole subject area of

group decision support. These are covered excellently in texts by other authors and academic colleagues.

The second edition follows on from a chronology and reflections on research, teaching and practice since the first edition. It describes further developments in value thinking and presents a validated approach to the method and practice of value management. It also attempts to position and reposition value management in the construction industry for the next decade.

The objectives of the book are as follows:

- Describe in sufficient detail for practical use a series of VM study styles, tools and techniques, including presenting the core technique of function analysis.
- Interpret and reinterpret the results of recent research and specifically the authors' own research into the international benchmarking of value management.
- Record developments in value thinking during the past decades, addressing the nature of value, transforming it into definitions, and also discussing its alignment with total quality management and performance indicators.
- Examine the complexity of value systems that must be addressed in any Value study, specifically the project value chain and value thread, and also organisational value.
- Present a reasoned argument for the development of the client's value system, integrating the components of value, cost, time, risk, functionality and quality.
- Examine teams, team behaviours and facilitation, and to point out practical issues when facilitating value teams in workshop settings.
- Describe an enhanced VM process, argued to be the potential foundation for future 'professional' development.

The authors intend that this book is used to enhance value management knowledge in the following ways:

- By dipping in and looking for a particular topic using the Contents list at the front of the book or the Index.
- Understanding the process of value management and the tools and techniques, in particular information contained in Parts 2, 3, 4 and the Appendix, which provide information for the background and development of value management to be appreciated together with the study styles, tools and techniques, which combine to form a value management service.
- For checking on a particular value management study style, tool or technique. The Toolbox (Appendix) is provided in alphabetical order.
- For an accomplished value management practitioner to benchmark their service. Parts 2, 3 and 4 together with the Appendix provide the study styles, tools and techniques, to permit the practitioner to adopt or amend them for their own personal use. Additionally, Part 3 explores the value concepts and describes a method for the construction of the client's value system.
- For a theoretical overview of value the reader is referred to Part 4, Chapter 11, in which the authors expose value and break it down into a number of discrete points and themes. A definition of Whole Life Value and a proposed method for its management is given in Chapter 12.

- A consolidated methodology for value management and the authors' thoughts on the subjects of managing stakeholders, professionalism and ethics in this context are set out in Part 4, Chapter 13 .

Audiences for the second edition

The second edition is written for a number of audiences. For the competent practitioner who may be looking to benchmark their existing service; for construction clients, consultants and contractors who may be looking to probe value management further; and for undergraduate and postgraduate students. This book, whilst it is focused on construction, is also applicable to projects in other sectors and much of the thinking, philosophy, systems, tools and techniques can be adopted or adapted.

For practitioners, construction clients, consultants and contractors there is one chapter devoted to an extensive collection of case study material representing the authors' diversity of practice. The case studies deal with the design and implementation of value studies in their different contexts, and the lessons learned. Further detailed case studies are also presented in other chapters to reflect the operationalisation of value management research and practice within different organisational contexts that have been undertaken by the authors.

For the undergraduate or postgraduate student taking a course or module that includes value management, the second edition is designed to be an extended exposition of the process and to present some fertile ground for individual thought.

For the researcher, this is the authors' personal view of the value management story thus far. We have utilised numerous research methods since the mid-1980s including hypothetico-deductive, action research and grounded theory based analysis. Techniques have included literature analysis, case study analysis, case vignettes, benchmarking, questionnaire survey, structured and unstructured interviews, and the real-time analysis of live projects. The second edition extends that work further by looking forward in the final chapter on the possible future direction and challenges facing value management.

1.2 Developments in UK construction

A fertile ground was prepared for further developments in value management in the UK construction industry during the 1990s, and that has continued up to the point of writing the second edition. A diverse and copious range of reports and initiatives have sought to increase the efficiency and effectiveness of the industry from the 1990s onwards, and this has influenced value management in a number of ways.

- The Latham Report (Latham, 1994) spawned the Construction Industry Board, which published influential works on the modernisation of the industry. Value management was seen to be conducive to good practice and received significant coverage.
- The Egan Report (Egan, 1998), which spawned the Movement for Innovation (M4I), took advantage of Web technology to showcase examples of good practice and provided an

opportunity for benchmarking through its key performance indicator database. It was influential in shifting a substantial proportion of the construction industry towards more collaborative working, an environment in which value management thrives.

- The National Audit Office (NAO) report *Modernising Construction* (NAO, 2001) argued forcefully for the application of whole life thinking to meet the needs of end-users, the use of integrated working, risk management, and value management and value engineering to improve buildability and drive out waste from the process.
- The Strategic Forum for Construction report *Accelerating Change* (SFC, 2002) built on the work of M4I and established Rethinking Construction as the primary vehicle for public and private sector construction product and process advancement. There is significant stress on value and value-for-money, integrated working across the supply chain, and also whole life value.
- The Office of Government Commerce launched the Gateway process (OGC, 2003) which, with the accompanying construction procurement guidance, describes the benefits of good practice in construction procurement in the public sector. Documents describe the place for value management within this process.
- The NAO report *Improving Public Services through Better Construction* (NAO, 2005) defines value management and value engineering, and notes their use throughout that text and in a range of case studies.
- A report produced in 2005 called *Be Valuable: A Guide to Creating Value in the Built Environment* (Saxon, 2005) grappled with the concept of value, and set out with the goal of shaping knowledge on and about value in the built environment. It focuses on exploring, articulating, defining and trying to resolve competing views on a vital concept in construction and the wider built environment. It outlines preliminary thoughts on the 'soft landings' approach to design and management. It noted that in the buildings-sector of construction the traditional focus has been on cost minimisation and not on value optimisation. The report, in setting out a series of definitions and arguments around value-related information, explains the relationships between value and stakeholder viewpoints in the built environment. It adds, 'Most value is created in the opening stages of defining need and designing the response. Once the delivery phase begins the task shifts to defending the value proposition against erosion'. The report further adds 'Value engineering to minimise cost, can erode the proposition if unskilfully done. Changes or substitutions to meet practical needs or increase supplier profit may also risk the customer quality sought' (p 44). The report argues against value engineering as a cost reduction and substitution approach.
- The Strategic Forum for Construction report *Profiting from Integration* (SFC, 2007) continues to articulate better value for money through integrating the supply chain, a focus on whole life value, risk management and value engineering. In the same year, the NAO report *Building for the Future: Sustainable Construction and Refurbishment on the Government Estate* (NAO, 2007) examined the extent to which Government Departments and Executive Agencies are meeting sustainability targets for their new buildings and major refurbishments. Much like earlier reports, there is a continued emphasis on integrated working across the supply chain and a focus on whole life value. The report adds further that sustainability is consistent with the HM Treasury's definition of value for money, noted as 'the optimum combination of whole life cost and quality (or fitness for purpose) to meet the user's requirement' (NAO report p.7).

The report adds further that it is the responsibility of integrated teams to 'ensure that all of the aspects of sustainability included in the original design are delivered, i.e. that "value engineering" does not result in less sustainable product substitutions or the removal of sustainable design criteria on grounds of cost' (NAO report p.27). The implication is clear from this last statement that value engineering is, but should not be seen as, a cost-cutting exercise to the detriment of sustainability, and within that concern is the potential for it to focus on product and material substitution, which again may act against sustainability.

- The joint HM Government and Strategic Forum for Construction report *Strategy for Sustainable Construction* (BERR, 2008) again emphasises the importance of a focus on whole life value. Furthermore, in 2008 the Business and Enterprise Select Committee reported on a major inquiry into the UK construction industry in its publication *Construction Matters* (BEC, 2008). This was a substantive and in-depth review across the numerous facets of construction. The report addresses in a significant way the concept of whole life value.
- The Government's *Construction Strategy* (HMGC0, 2011) set out the arguments for a significant change in the long-term relationship between Government at different levels and the construction industry. The strategy sets out how the public sector will become a better, more informed and co-ordinated client such that it will achieve a set of requirements that are specified, designed, procured and delivered more effectively and efficiently to the benefit of the country. By challenging industry business models and practices the continuing intent is to replace adversarial cultures with collaborative ones. The strategy also articulates the necessity for cost reduction and innovation within the supply chain to maintain market position, and not innovation focussed around the tendering process in order to establish bargaining positions for potential future claims. It further argues that procurement should be seen not just as a stand-alone process but as part of a broader aspect within the built asset life cycle. There are a number of issues and consequences of the Construction Strategy such as proposed new procurement models, Building Information Management (BIM) and the concept of 'Soft Landings'.
- In the same year as the Construction Strategy was published, the British Standards Institute published BS8534:2011, entitled *Construction Procurement Policies, Strategies and Procedures – Code of Practice* (BSi, 2011). The standard provides recommendations and guidance on the development of policies, strategies and procedures for the procurement of construction in the built environment. It covers public and private sector organisations. The standard notes BS EN 12973, Value Management, as a normative reference, amongst others. It goes on to define VM as 'a structured approach to the assessment and development of a project to increase the likelihood of achieving the objectives at optimum whole life value for money' (p.4). It also defines a series of other terms, including value-for-money, noting this includes optimising whole life cost and quality to meet the user's requirements. The Standard views VM as an integral part of the project delivery process, noting that in the establishment of the Business Need a VM study should be undertaken. The focus of the study should be on establishing business and stakeholder needs in the short and long term, and to set objectives. The Standard is clearly recommending the use of VM in a proactive manner and at an early stage on a project. It also recommends that

VM should be undertaken at various stages throughout a project – multiple interventions – and that risk and value management should be undertaken together as part of this activity. Equally, the Standard argues that good project planning should include identifying when VM is undertaken, and also notes criteria weighting mechanisms for the selection of consultants in their use of VM.

- Finally, Construction Commitments 2012 represents the principles intended to underpin all construction projects to achieve a better industry and exceed current best practice. The six principles cover client leadership, procurement and integration, design quality, a commitment to people, sustainability, and health and safety. A focus on whole life value is noted within the design quality principle.

In the context of the foregoing, stakeholders is a term often used in construction. At an organisational level, a stakeholder is defined as a person or group of people who have a vested interest in the success of an organisation, or the environment within which it operates, and at project level a project stakeholder is a person or group of people who have a vested interest in the success of a project and the environment within which the project operates (McElroy and Mills 2000: p.759). The issue of stakeholders in the context of value management will be addressed further in Chapter 13.

To conclude, the 1980s, 1990s and 2000s saw a further significant impetus to reform the way construction operates. Procurement systems were developed based on framework agreements, negotiations, integrated team-working, guaranteed maximum price and cost plus projects that initiated forward-thinking contracts such as PPC 2000, the Defence Estates Prime Contract and the NHS ProCure 21/21+ procedures. PFI/PPP also gained significant ground as a procurement strategy that embraced whole life thinking and value-for-money through the Public Sector Comparator mechanism. VM was advocated as good practice within many of these approaches and some encapsulated it as a formal way of working. The review of reports cited earlier also articulates the increasing momentum towards thinking about value, value for money, stakeholders, whole life value, and not just cost. Some reports reviewed also caution about the inappropriate use of value management/value engineering as purely a cost-reduction methodology.

Section 1.3 reviews briefly developments in value management.

1.3 Developments in value management

The essence of value-based thinking is a focus on delivering value and value-for-money to a client, customer or end-user. Value and value-for-money are multifaceted, are often context-driven, and involve elements of subjectivity, judgement and the need for appropriate measures. In project-based organisations or industries, such as construction, they typically involve consideration of clients, customers, end-users and other important stakeholders that impact or influence projects. In this context, value-based thinking keeps the client, customer, end-user and other key stakeholder requirements to the fore. Its focus is on their requirements, which the Value Management methodology typically expresses as functions. As a management approach, value-based thinking seeks innovative alternatives to meet those functions and requirements. Within the framework provided by these principles, the VM methodology uses tools and techniques to select the

most effective option that best meets those functionally expressed requirements at optimal or least cost and then delivers them efficiently. Typically it will also involve issues around trade-offs, clarity over value-criteria, engagement with the market place and supply chains, and considerations of risks to creating and delivering value throughout the whole process of delivery.

Maximum value as defined by Burt (1975) is obtained from a required level of quality at least cost, the highest level of quality for a given cost or from an optimum compromise between the two. This is a useful definition because it highlights the relationship between value, quality and cost. In this book, the definition of value is extended to include a relationship between time, cost, risk, functionality, and the variables that determine the quality a client seeks from the finished project.

Value management

Value Management is a philosophy, a set of principles, and a formal, structured, value-based management methodology for improving organisational decision-making. Its aim is to optimise organisation performance by increasing effectiveness and efficiency through a Value Study. The basis of a formal value study is as follows:

- It is a function-oriented management methodology that can fit into a wider organisational context at
 - Corporate level
 - Portfolio, Programme and/or Project level
 - Service and/or product level.
- It is a structured, challenging and mediating process involving key stakeholders drawn from across important value interfaces. For example, key user representatives, client senior managers and the different members of the design team. Hence, it involves using the right team at the right time.
- It focuses on exposing, making explicit and exploring a construction client's 'value criteria' and using this subsequently for resolving trade-offs surrounding solutions, options and alternatives.
- It permits different 'value systems' to coalesce to the benefit of the client across a project, Programme, Portfolio and organisation.
- It is a change-oriented methodology.

At project level, Value Management is the name given to a process in which the functional benefits of a project are made explicit and appraised in alignment with a value system determined by the client. It is concerned therefore with optimising the strategic, concept, feasibility, technical and operational aspects of a project and its outcomes against that explicit value system.

This definition applies to all types of projects irrespective of which sector they come from. For example, the project could be the design and manufacture of a product, the design and construction of a building or infrastructure as physical assets or products, the re-evaluation of an organisational process or the provision of a new or improved service in banking, insurance or public services such as education or health.

The factor that makes value management possible in construction is the identification of a project. The client for the project would implicitly or explicitly establish a value system for that project. 'The client' in the context of this definition and for the remainder of this book is the person, persons or organisation responsible for the inception and, perhaps, funding of the project and for its eventual adoption back into the client's mainstream business.

During its first three decades of life, however, value management (practised as value engineering) developed within the manufacturing sector with only a slight take up into other areas. From the mid-1970s onwards value management was adopted for use as a value-for-money measure within the construction industries of initially the United States and subsequently a number of other countries. In the United Kingdom, the 1990's and 2000's have seen growth in its development and practice at differing intervention points across a wide range of construction project types. Over the same period risk management has developed and is often associated with value management as a complementary service. That future developments in value management belong to the service sector is beyond dispute. The authors take the view that value engineering is a subset of value management, and that risk management is an inherent and integral part of value management and a value study; they are contiguous. Risk and Risk Management are about assessing the risks to delivering value and value for money in an organisational and project context.

Developments in value management practice

New practices, particularly in management, bring with them the 'trending' effect. A good idea is launched into the marketplace as a new service by an entrepreneurial consultant. Recognising the good idea, other consultants offer the same service. Over time, the service assumes the trappings of standardisation, regulation and institutionalisation; clients buy from the best, which can now be distinguished, and some consultants discontinue the service.

In construction, projects and their management are intertwined with notions of value, value-for-money and the best ways to manage these throughout the project life cycle. This is also inextricably linked to developments in VM. The history of construction project management in the United Kingdom can be tracked through landmark projects, for example, the construction of the National Exhibition Centre (NEC) in Birmingham, the London Liverpool Street station complex, Wembley Stadium, the Scottish Parliament, and the 2012 Olympics complex in London. At the time of the NEC project, employment of a consultant project manager was relatively rare but soon became recognised as a better way of doing business. Within a short period of time many consultancy organisations were selling the services of project management. However, over time those unique assets that make project management special have become recognised and the activity of project management has become a specific and accepted skill. In the United Kingdom, the Association for Project Management (APM) aims to be the first point of contact for and the national authority on project management, and through the International Project Management Association (IPMA), an international authority. This has to be viewed alongside, for example, the Project Management Institute in the

United States. The APM and PMI both develop Bodies of Knowledge, and standards for project management, Programme and Portfolio Management which include references to value management and value engineering. These institutes aim *inter alia* to develop professionalism in project management and to achieve recognised standards and certification for project managers.

Value management activity in UK construction started to come to the fore in the early 1980s. Value management was given a further boost in Europe by the European SPRINT programme (Strategic Programme for Innovation and Technology Transfer) in the early 1990s. It was the precursor to the establishment of European value management standards and a training and qualification system entitled Value for Europe, configured with its own European Governing Board (EGB). As part of this development, within the United Kingdom, the Institute of Value Management, operating under the auspices of the EGB, has developed systems and procedures for certification and training, training course approvals, ethics and standards, and a branch network. SAVE International in the United States, and its affiliates, have similar structures. There is a debate on institutional structures and practitioner frameworks for VM and professionalism in Chapter 13.

1.4 The structure of the second edition

The book is structured into four parts, each with a particular focus.

Part 1, entitled *The Introduction*, which includes the current chapter and Chapter 2 on the further evolution of VM, provides the background for the remainder of the book. *Part 2*, building and extending on this, is entitled *The Anatomy of a Value Study*, and comprises five chapters. Its scope is to establish how to design and conduct a value study under different circumstances. Chapter 3 deals with value study styles on projects. Chapter 4 deals with the core VM technique of Function Analysis. Chapter 5 deals with teams, team dynamics, and managing value teams, a particular issue for the management of workshops. Chapter 6 deals with innovation and benefits realisation. Chapter 7 provides an extensive suite of nine detailed case studies conducted by the authors, and the lessons they have learned from those studies.

Part 3, entitled *Whole Life Business Value*, comprises four chapters. Its scope is to extend the discussion on where and how VM can be applied in different organisational contexts. Chapter 8 deals with physical asset management, an important emerging theme for those organisations that have to manage a significant portfolio of physical assets through time. It brings to the fore issues of asset ownership, management and performance, and whole life value. VM case studies conducted by the authors are also presented. Chapter 9 deals with Portfolio, Programme and project management, and how VM can be applied in that context. The chapter presents a case study that has also been conducted by the authors in this area. Chapter 10 competes Part 3 and is concerned with option appraisal, risk management and whole life costing. A VM case study is presented that brings together a whole range of different facets for consideration in option appraisal. *Part 4*, entitled *Developments in Whole Life Value Thinking*, comprises three chapters. Its scope is to look forward at possible future developments in VM. Chapter 11 breaks apart the concept of value. Chapter 12 proposes a methodology for exploring and managing whole life value. Chapter 13 draws together a number of strands

from across the whole book, and presents an enhanced VM methodology and extends the notion of study styles. It also addresses institutional and practice structures for the continued development of VM, and the related concepts of profession, professionalism and ethical standards. The Appendix contains a value management tool box; an alphabetical listing of those tools and techniques commonly associated with value management.

The chapters in this book depict a construction context principally influenced by a UK-style construction culture. The aim of the first edition was to record, discuss and establish the development of value management until 2003. This second edition reflects on the significant developments in asset management, Portfolio, Programme and project management, whole life value, and construction practice over the past 10 years through the lens of the authors' considerable research and consultancy experience. It presents a new paradigm for value management practice for the next decade.

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