

Part I

Introduction

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Chapter 1

The Management of Construction Projects

1.1 Introduction

‘Between the idea
And the reality. . . .
Between the conception
And the creation. . . .
Falls the Shadow’

One of the principal ways in which modern societies generate new value is through projects which create physical assets that can then be exploited to achieve social and economic ends – factories for manufacturing goods, offices and shops for delivering services, hospitals for health care and tunnels for transport. Societies even create assets that are exploited for largely symbolic purposes, such as opera houses and cathedrals. In a typical modern society, around half of all physical asset creation (fixed capital formation) is the responsibility of the construction industry, thereby generating around 10% of national wealth (gross domestic product). These figures are much higher for rapidly developing countries. The creation of these assets is the principal force in the dynamics of cities and change in the built environment and, therefore, one of the major sources of social and economic change. This book is about how such assets are created effectively and efficiently so that they meet the needs of the clients which make the investments, thereby providing a net gain to the economy and society for which they are created.

The creation of new values is not an easy mission – as the liberties taken with T.S. Eliot’s *The Hollow Men* in the epigraph above are intended to capture. Many problems have to be solved between the initial idea for a new asset, through its realisation on site, to the client starting to exploit it. This book covers the whole of this process conceived as a progressive reduction of uncertainty through time. In other words, it argues that the problem of managing construction projects is principally a problem in the management of information and its progressive embodiment in a physical asset. As a director of a leading European construction

corporation puts it, ‘HBG’s core competence is the generation and management of information’¹. The book will, thereby, shine a penetrating light into the shadow between the conception of a constructed asset and its physical creation.

The book is not aimed at any particular professional group within the construction industry; rather it is aimed at all those whose working lives are committed to the creation of constructed assets – at all professional groups. These include the representatives of the clients who provide the capital; the designers who turn ideas into specifications; the constructors who turn specifications into reality on site; as well as those who manage and regulate the overall process on behalf of the client and society. Creating new value through construction projects is an inherently collaborative process, and all have their specialist skills to deploy. The central premise of this book is that these specialisms can be deployed more effectively in the context of an understanding of the process as a whole. Thus, one of the most important measures of the success of this book will be the extent to which it helps in the creation of a common language for discussing the management of construction projects between different professional groups. The perspectives and terminology used in this book may be a little unfamiliar at times; this is because the book is deliberately written from a perspective of managing the entire project process, rather than the contribution of any one professional group to it.

More specifically, the objectives of this book remain unchanged for this edition:

- to provide a total project perspective on the management of construction projects from inception to completion;
- to apply business process analysis (BPA) to the management of projects;
- to define basic principles of construction project management which will allow readers to apply these principles to their particular management problems;
- to review and synthesise the large number of different tools and techniques proposed for improving construction performance, from risk management and value management, through to supply chain management and quality assurance;
- to place the use of information and communication technologies (ICTs) at the heart of the construction project management process.

In achieving these objectives, the book will provide a holistic perspective that will allow practitioners and more advanced students to place their particular specialisms – be it risk management, design management or site management – in the broader context of the project process as a whole. The sheer variety of proposed ways of improving the performance of the construction process can be daunting, even for the most enthusiastic practitioner. By placing all these different initiatives in the context of the entire project process, and by articulating basic principles of good management rather than the latest fads, this book will provide help in sorting good practice from fashionable practice. As such, it aims to facilitate the development of the evidence-based management of construction projects which ‘first and foremost, is a way of seeing the world and thinking about the craft of management; it proceeds from the premise that using better, deeper logic and employing facts, to the extent possible, permits leaders to do their jobs more effectively’².

1.2 Projects as the creation of new value

All modern societies and economies are dynamic – the only certainty is change. Many of these changes are the result of unforeseen interactions of complex forces, but societies also change through deliberate action, and one of the most important forms of deliberate action is to invest in physical assets which can then be exploited to provide the goods, services and symbols that society needs. Governments invest in schools to provide education services and in bridges to provide transport services; firms invest in shops to provide retail services and in houses to provide homes. Investments are also made in redundant quarries to create an inspirational ecological experience as at the Eden Project in Cornwall (which we shall revisit in Case 17) or a five-star hotel as at 松江區 (Songjiang) near Shanghai or on a smaller scale as a theatre at Dalhalla, Rättvik, Sweden. Investments are made to transform coastlines such as the Delta and Zuidersee projects in The Netherlands which created millions of hectares of farmland and the extensive marine works to ‘help solve Dubai’s beach shortage’ in Nakheel’s three Palm and The World developments – The World alone adds 232 km to Dubai’s coastline³. Cities change as shops are refurbished and new metros are built. Increasingly, these investments are made by partnerships of the public and private sectors. What all these investments have in common – whether directly for profit or not – is that they create something where there was nothing, create new assets to be exploited for private benefit and public good. It is in this sense that construction projects are about the creation of new value in society.

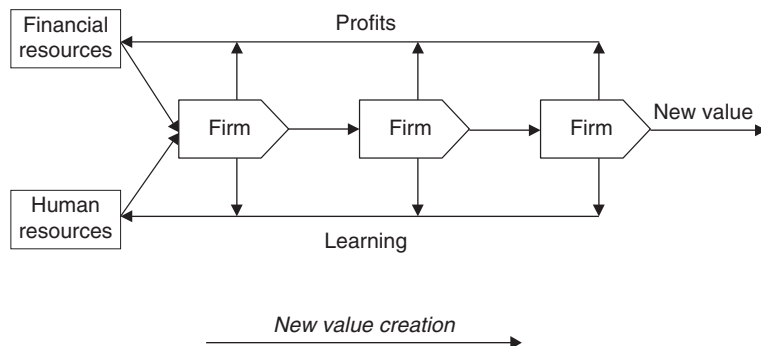


Fig. 1.1 Construction projects as the creation of new value.

This process forms a ‘value system’⁴ as illustrated in Fig. 1.1; how projects add value for clients through the value system will be explored in more detail in Chapter 3. The fundamental inputs to the process are capital and human resources – capital resources to cover the costs of investment; human resources to transform ideas into reality. The return on capital from the process is the profits taken out of the process by the participating firms. The return on human resources is the learning that takes place as problems are solved through the project life cycle. The effective achievement of both of these returns on the resources deployed in the creation of constructed assets is problematic – construction firms have low profitability compared to other

sectors, and learning often stays with the individual, rather than being captured by the firm. As will be explored in Part IV, these two problems are linked.

1.3 The project as an information processing system

All organisations are, in essence, information processing systems⁵. In order to function they must monitor their environment, take decisions, communicate their intentions and ensure that what they intended to happen does happen. In manufacturing organisations, these information flows generate and control flows of materials as well, but many service organisations are purely devoted to managing flows of information. Information flows are the heart of the business process in all organisations. These information flows are directed and enabled by the structure of the organisation, and the problem of management is the problem of continually shaping processes by manipulating the structure – what has been called the tectonic approach to organisation⁶.

The analogy of a river is useful here. What is of interest in a river is the flow of water, which irrigates crops, provides a transport route, enables the generation of hydroelectric power and is a source of leisure and repose. Yet it is through altering the banks that we shape the flow – dams and weirs create lakes and power; dykes and canals control direction; docks and locks facilitate transport; bridges and tunnels mitigate the downside of the river as a barrier. At the same time, the action of the water erodes banks, weakens riverine structures and silts navigation channels. The process – the flow of water – cannot be directly managed; we have to manage the context in which it flows, but those flows also change the ways in which we manage. The same, I suggest, applies to organisations and their flows of information, and much of this book will be about how we manage the project process through managing the organisational structure of projects, and how the project process in turn shapes those organisational structures.

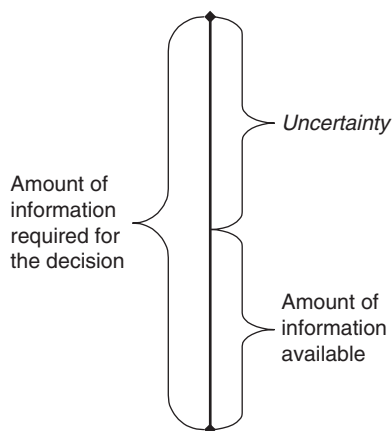


Fig. 1.2 The definition of uncertainty (source: developed from Galbraith, 1977, Fig. 3.1).

The fundamental problem in the management of information is uncertainty; in other words, the lack of all the information required to take a decision at a given time. Figure 1.2 illustrates Jay Galbraith's definition of uncertainty as the difference between the information required for a decision and the information available. This uncertainty has two sources:

- *Complexity*, or the condition where the information is, in principle, available, but it is too costly or time-consuming to collect and analyse;
- *Predictability*, or the condition where the past is not a reliable guide to the future – the future is, by definition, unknowable, but past experience is a valuable, if not infallible, guide to the future in many situations.

The challenge of managing projects in the context of uncertainty is the central theme of this book, while we will focus explicitly on the cognitive issues this poses in Chapter 13.

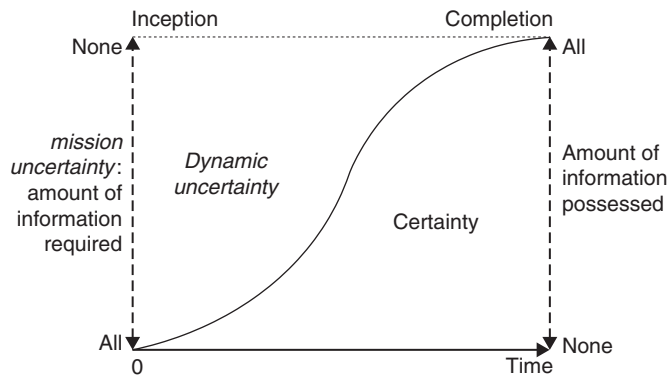


Fig. 1.3 The project process as the dynamic reduction of uncertainty through time (source: developed from Winch *et al.*, 1998).

At the inception stages of a construction project, uncertainty is very high – the asset of the future is little more than an idea and possibly a few sketches. How high depends upon a number of factors such as the extent to which the asset is a copy of the ones existing; the extent to which standardised components and solutions can be used; and the extent of the requirement for new technologies to solve the particular problems posed by the project. This may be thought of as the level of *mission uncertainty* inherent in the project. As the project moves through the life cycle, uncertainty is reduced as more information becomes available – ambiguities in design are resolved; geotechnic surveys are completed; regulatory approval is obtained; component suppliers provide their shop drawings; and contractors successfully complete their tasks. The level of uncertainty at a particular point in the project life cycle relative to earlier and later points in the project life cycle may be thought of as the level of *dynamic uncertainty* on the project. This framework

is illustrated in Fig. 1.3, which shows how uncertainty is progressively reduced through time, and how certainty increases until all the information required for the project is available at completion and embodied in the asset created. The area to the left of the S-curve represents information still to be acquired, that is uncertainty; that to the right represents what is known, that is certainty.

1.4 Project management and the management of projects

Construction projects have been ‘managed’ since time immemorial. Traditionally, this was the responsibility of the ‘master of the works’ – a concept retained in the modern French *maître d’œuvre* – but the emergence of a concept of ‘project management’ is a phenomenon of the nineteenth century⁷. Project management emerged as industrial societies started to build complex systems such as rail and power networks. This concept was adopted by the US aircraft industry in the 1920s, came to maturity in the US defence programme in the 1950s and gained international attention with the space programme in the 1960s. Project management is essentially an organisational innovation – the identification of a team responsible for ensuring the effective delivery of the project mission for the client. However, it has become associated with a particular set of tools and techniques – most notably critical path analysis – which has stunted its development. As the concepts of project management diffused to the construction industry from the 1960s onwards, it was this toolbox, rather than the broader management concept, which was adopted⁸.

Peter Morris (1994) argues strongly that project management is about the total process, not just about realising a specification to time, cost and quality. For this reason, he distinguishes the ‘management of projects’ as a strategic approach from ‘project management’ as a toolbox approach to delivering the project mission. This book adopts Morris’ perspective and argues for a holistic approach to managing the construction project. Effective management tools are vital – and will be discussed in detail in Part IV – but they are no substitute for a strategic overview of the process of realising a constructed asset, and skills in managing the disparate stakeholders in the project. However, this book is not just about the activities of the designated project management team, but about all those who are responsible for ensuring that the project mission is achieved – including project architects, site supervisors and contracts managers as well as client representatives. To be effective, the principles of the management of projects need to infuse the project process – construction project managers cannot operate effectively as an external add-on harrying those responsible for actually adding value.

1.5 Projects and resource bases

Construction projects mobilise capital and human resources. The capital that finances the process comes from the client and its financiers. The human resources that enable the progressive reduction of uncertainty through time are supplied

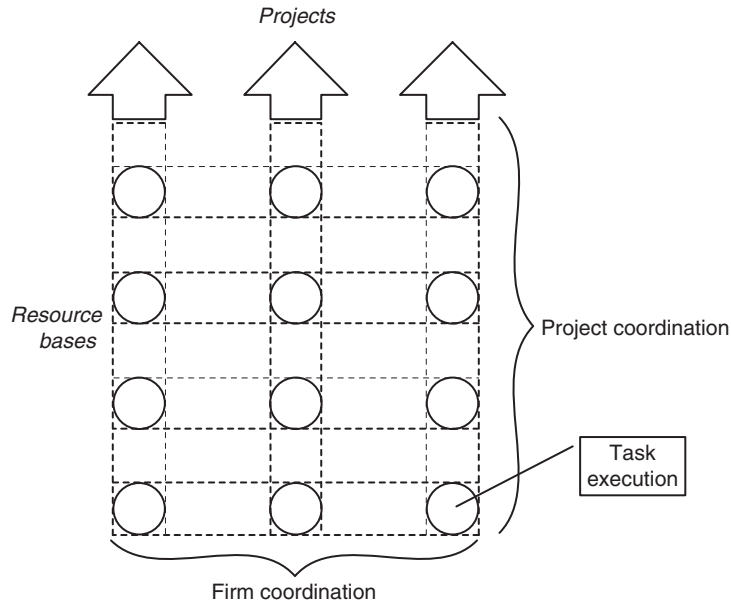


Fig. 1.4 Project organisation as a coalition of resource bases and a portfolio of projects (source: developed from Fellows *et al.*, 1983, Fig. 1.1).

by the firms on the supply side of the construction industry, which act as skill containers⁹ for these resources. Resources of equipment are also typically supplied by firms in the construction industry. Components and materials are usually supplied by firms outside the construction industry, although some construction firms are vertically integrated backwards into frequently used sources of components such as prefabricated concrete elements and materials such as aggregates. Our focus here will be on the mobilisation of human resources and specialist equipment.

Firms are different from projects – projects are temporary organisations with no autonomous capability; they rely entirely on mobilising the resources supplied by clients and the firms in the construction industry for their existence. Each project requires a large number of different types of human and equipment resources which are held by the firms on the supply side; we can think of these as the *resource bases* of the construction industry. It is with these resource bases that the continuing capacity to create constructed assets lies. These groupings of resource bases are often called the project team. However, as will be explored in Part V, the number of people involved is, in practice, too large to be meaningfully called a team. Moreover, as will become clear – particularly in Parts II and III – all these different resource bases have different interests. We can more usefully think of these groupings of resource bases mobilised on the project as the *project coalition* which comes together around shared objectives so that each member can meet its individual objectives. One of the main reasons why interests differ is

that most resource bases will be supplying resources to more than one project at once, and can find themselves juggling resources between projects. We can, therefore, most usefully think of projects as coalitions of resource bases co-ordinated by the project management team, indicated by the vertical dimension in Fig. 1.4, and firms as participating in portfolios of projects co-ordinated by the resource-base firm, indicated by the horizontal dimension, with project and firm meeting through task execution.

1.6 The five generic project processes

Business process analysis has become increasingly influential in a number of industries – both in the re-engineering of business processes to maximise the benefits of ICT systems and in the diffusion of lean thinking. Conceptually, there are important links between the notion of the management of projects as the management of the entire project life cycle and the development of BPA. This is clear from Thomas Davenport's formulation of a business process as 'a specific ordering of work activities across time and place, with a beginning, and end, and clearly identified inputs and outputs: a structure for action'¹⁰, and James Womack and Dan Jones' argument¹¹ that the emergence of project management foreshadowed their own concepts of lean thinking. The concepts behind BPA and lean thinking are central to the agenda for change set out in the UK Construction Task Force's report, on *Rethinking Construction* – colloquially known as the Egan Report. We will revisit these themes in the conclusions, showing how they have evolved into the *revaluing construction* agenda.

The approach adopted here to identifying the principal project process is that of BT¹² which identified five first-order processes (Manage the Business; Manage People and Work; Serve the Customer; Run the Network; and Support the Business). Within these five, some 15 second-order business processes were identified. The structure of this book will draw upon a review of the body of empirical studies on the management of projects across the full range of project-orientated industries which identified five first-order project processes¹³ – defining the project mission; mobilising the resource base; riding the project life cycle; leading the project coalition; and maintaining the resource base. Within these five, a larger number of more focused business processes such as risk management, supply chain management and quality management will then be explored.

1.7 Critiques of the first edition

The first edition of this text was generally well received – which is why you are reading the second one now – but it did attract a number of criticisms which we will try to address in this section.

Stuart Green has argued that the attempt to place the analysis of the process of managing projects in its institutional context is welcome, but also argue that the institutionalism deployed in the book is more 'old' than 'new' in that it is

structurally deterministic. Green then goes on to suggest that ‘there is seemingly little recognition of the role of discourse in the shaping of self-identities that lead to action, and how such streams of action combine over time to reshape context’¹⁴. Green’s principal influences in this argument are Giddens, and Powell and DiMaggio¹⁵. Green is correct to point out that the argument in the book does not explicitly rely upon Giddens’s structuration theory; however, the discussion of the ‘tectonic approach’ on page 6 shows that it is rooted in Giddens’s work and articulates the same¹⁶ dialectic of structure and process that Green advocates. The metaphor of the river in section 1.3 has been developed to make this point clearer and the overall approach is captured in the *tectonic approach* presented in Fig. 1.5. Green’s advocacy of a discourse approach, we would suggest, is compatible with a tectonic approach, save in one crucial respect. This is the tendency, well displayed in the empirical section of Green’s chapter, to focus only on process while ignoring outcomes, a weakness shared by much constructivist analysis¹⁷.

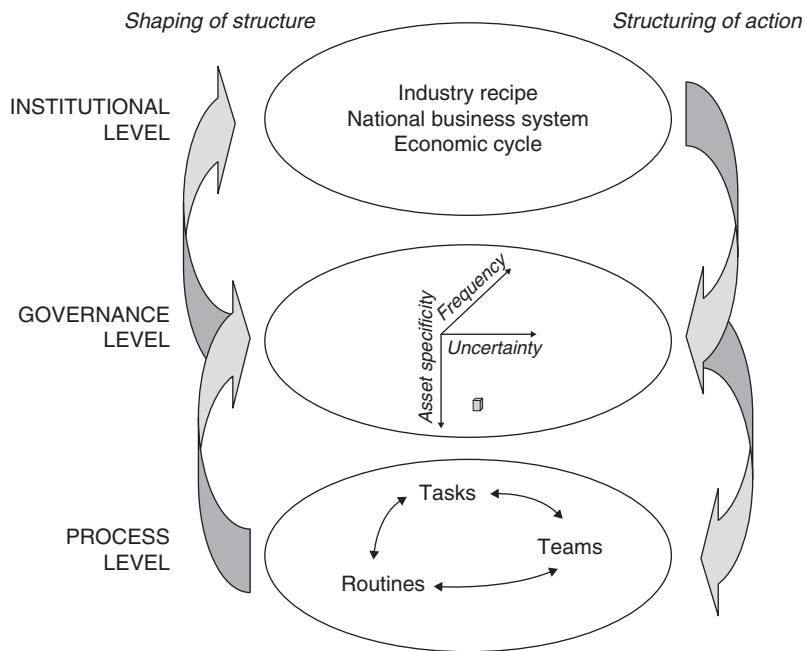


Fig. 1.5 The tectonic approach (source: developed from Winch, 2006a, Fig. 14.2).

Mark Winter and Tony Szczepanek¹⁸ argued that the perspective on projects as the creation of new value is compromised by its reliance on Porter’s concept of a value chain. Winter and Szczepanek prefer to draw on the work of Normann¹⁹ who emphasises the co-creation of value between customer and supplier, and argue for a concept of a project as a ‘value creation process’. This criticism would appear to be based on a misreading of Porter. The value chain concept does, indeed, focus on the single supplying firm, but as Porter emphasises, any

value chain is part of a larger value system in which ‘a firm’s product eventually becomes part of its buyers value chain Gaining and sustaining competitive advantage depends on understanding not only a firm’s value chain but how the firm fits into the overall value system’²⁰. That said, Porter focuses on the value chain in his analysis and does not develop the value system concept. The work of Normann and his colleagues provides a valuable, but not incompatible, development of the value system concept, and the concept of the construction project as a value creation process will be developed further in Chapter 3.

Lauri Koskela and Glenn Ballard have argued that this book takes an economist’s approach to managing construction projects, rather than a ‘production’ approach. Their arguments have already been discussed in a detailed response²¹; here we will review some of the broader points of difference. Koskela and Ballard argue that the tectonic approach advocated here:

- *Focuses on transactions rather than production.* While it is true that the section on mobilising the resource base does focus on transactions, this is only one of the four generic project processes explored in the book. We submit that the perspective developed in the book the merit of integrating both a production and a transaction cost perspective within one framework as is articulated in Part III.
- *Focuses on information flows rather than material flows.* This is perfectly true, but is inherent in the nature of the process of managing construction projects. As is explored in Chapter 15, task execution – be it a materials processing or information processing activity – is not the responsibility of the project manager. This responsibility is for co-ordination between tasks, not in executing the tasks themselves. This, we submit, is an inherently information processing activity.
- *Places uncertainty reduction at the heart of the project process.* Again, this is perfectly true, but the critique comes from a strangely backward view that all the information for the next decision is acquired as a result of the previous decision. We submit that although this contention might well hold in perfectly stable environments, this is hardly tenable in the dynamic, forward-looking environment of projects as we will see in Chapter 13.
- *Neglects the possibilities for improvement by direct intervention in the production process.* We agree that there is considerable scope for process improvement in materials flows on the project, but this is not the direct responsibility of the project manager, but of the managers responsible for task execution, and remain convinced of the need to mould information flows structurally rather than directly, although the implementation of ICT as discussed in Chapter 14 may provide a partial exception to this.

In sum, we share the assessment of Clegg *et al.*²² that the lean construction approach advocated by Koskela, Ballard and their colleagues represents a contribution to the traditional systems analysis-derived approaches to managing projects that they purport to criticise and as will be seen later, their principal contribution is to add to the toolbox for riding the project life cycle, rather than at the

strategic level of managing projects as a whole. The perspective is then neo-bureaucratic, rather than professional – a point to which we will return in section 17.6.

1.8 A theoretical perspective on managing construction projects

Peter Morris, conclusion to his keynote speech at the first Project Management Institute Research Conference that ‘the challenge for research ... is precisely the perceived weakness of the discipline’s theoretical base’²³ echoes a widespread perception of researchers and reflective practitioners in both the project management field and the construction project management subfield. Disciplines – in both the academic and the professional senses – mature through the development of a coherent body of ideas that deepens understanding and enables predictive propositions, and so it might be useful to be more specific regarding the theoretical perspectives deployed here. We will here present them as assertions; elaborating them adequately to convince readers of their strength is the task of the following chapters:

- Projects are temporary organisations consisting of a coalition of firms chartered by a client; as such they have distinctive properties which no current theory of organisation can comprehend²⁴.
- Projects move through distinctive life cycles because of their determinate character as temporary organisations; the termination date for the temporary organisation is typically specified more or less accurately at its foundation²⁵.
- Project managers are intendedly rational decision-makers, satisficing in the face of uncertainty, whose rationality is both bounded and shaped by impulse²⁶. This implies that moving through the project life cycle is essentially a process of *structured sensemaking*²⁷ in which project managers respond to cues in the situation and make sense of them through actions which yield further information – what Weick calls enactment. We call it structured because the sensemaking is facilitated through structured routines for search and action.
- Routines are an essential element of managerial activity, yet their implementation is contradictory in that they both constrain and enable managerial action²⁸.
- Projects are embedded in contexts that are both organisational and institutional, simultaneously shaping and being shaped by these contexts²⁹.

The overall tectonic approach to the argument in this book has been elaborated since the first edition and is shown in Fig. 1.5. In the tectonic approach, the institutional level of analysis shapes and is shaped by decisions made at the governance level. Decisions at the governance level select the organisational structures within which the project process flows, but these processes also shape governance-level decisions. The process level is where the project is performed through a flow of information which initiates and controls the flow of materials. In terms of the river analogy presented in section 1.3, the institutional level is the underlying

geography and geology of the landscape through which the river flows; the governance level is the banks of the river (whether natural or artificial); and the process level is the flow of water to the termination of the project in the 'sea' of facility operation. The institutional level will be discussed in Chapter 2; the governance level in Part III and Chapter 15; and the process level in Parts II and IV.

1.9 A practical contribution to managing construction projects

As well as deploying a distinctive theoretical perspective, the text also aims to make a strong practical contribution to managing construction projects more effectively. To indicate the contribution we hope to make, we will use the (UK) Office of Government Commerce's leaflet *Common Causes of Project Failure*³⁰ to identify more precisely where this text can contribute:

- (1) *Lack of clear links between the project and the organisation's key strategic priorities, including agreed measures of success*; this will be covered in Chapter 3.
- (2) *Lack of clear senior management and Ministerial ownership and leadership*; these issues will be covered in Chapters 15 and 16.
- (3) *Lack of effective engagement with stakeholders*; Chapter 4 tackles this in detail.
- (4) *Lack of skills and proven approach to project management and risk management*; the whole of Part IV addresses these issues, with a focus on risk management in Chapter 13.
- (5) *Too little attention to breaking development and implementation into manageable steps*; some of these issues are discussed in Chapter 8, with the scheduling issues covered in Chapter 11.
- (6) *Evaluation of proposals driven by initial price rather than long-term value for money (especially securing delivery of business benefits)*; again this is the topic of Chapter 3 supported by Chapters 9 and 10.
- (7) *Lack of understanding of, and contact with the supply industry at senior levels in the organisation*; this is covered in Chapter 5 with the more contextual issues implied here covered in Chapter 2.
- (8) *Lack of effective project team integration between clients, the supplier team and the supply chain*; Chapters 6 and 7 address the issues here.

1.10 The plan of the book

Chapter 2 assesses the role of the socio-economic context of construction projects for their effective management. Different national construction industries are organised to solve common problems in different ways. These differences have evolved over centuries and have a profound effect on the ways in which projects are managed. While the principles explored in this book remain valid for all advanced societies, the details of their application will need to be adapted for specific national contexts. This chapter indicates some of the main points of variation. In conclusion, Chapter 17 explores the prospects for the development of

the management of construction projects – suggesting how we might learn from other project-orientated sectors to mitigate our weaknesses, and how they might learn from our strengths.

The central chapters of the book follow the structure defined by the five generic project processes. Part II investigates the definition of the project mission – how do clients decide what they want, and how can members of the project coalition most effectively advise them on the full range of possibilities open to them? What tools are available for rapidly providing visualisations of the possibilities? How can all the different stakeholders be managed, some of which may be totally opposed to the project in principle? The outcome of this process defines the project mission, which allows the identification and mobilisation of the resource bases required for its realisation, discussed in Part III. How can such resource bases be selected and motivated, both those in direct contract with the client and those mobilised as subcontractors?

Once the resources are in place, they have to be managed through time as they deliver on their commitments to the project. Thus, Part IV covers the core tools and techniques of the management of construction projects, while placing them in a broader, strategic perspective. Part V switches attention to the more social aspects of the management of construction projects, exploring differences in the organisation of the project management function, and the importance of effective leadership and teamwork.

Readers may be puzzled as to why there is no explicit reference to ICT in this overview. This is because ICT is central to the information processing approach to organisations, not an optional extra. Discussions of the role of ICT are embedded in the discussions of the business processes on which it is deployed, although of course, at the present state of the art, ICT is of more use for a process such as information management than it is for stakeholder management, so the amount of discussion will vary. However, some specific issues around ICT are addressed in Chapter 14.

1.11 Summary

This chapter has laid out the information processing approach to the management of construction projects as the principal source of the creation of new value in modern societies that will be developed in this book. In order to give an early taste of how it fits together, Case 1 applies it to the construction of the Channel Fixed Link. However, before we move to developing the perspective in detail, Chapter 2 sets out the context of managing construction projects which influence the ways in which they are managed.

Case 1 The Channel Fixed Link

The fixed link under the Channel/La Manche is one of the most challenging construction projects completed in the twentieth century. The range of challenges its project managers faced well illustrate the importance of taking a holistic

approach to the management of construction projects. While the performance of the project on the traditional criteria of schedule, budget and conformance to specification is superior to the majority of mega-projects, it was widely seen at the time of its opening in 1994 as a failure. An *ex post* re-evaluation of the cost-benefit case for the project in 2003 – 10 years after it opened – has argued that its net present value is negative by over £10m in 2004 prices and it was therefore a burden on the UK economy. However, this argument ignores the fact that the bulk of the capital came from outside the UK. While there might be a large disbenefit to the global economy, the economy of the Brussels–London–Paris triangle has surely gained significantly because it reaped most of the benefits and paid few of the costs. After a major financial restructuring and the opening of the High Speed 1 through to London, Eurotunnel finally moved into profit in 2008.

Defining the project mission was fraught and an egregious case of strategic misrepresentation. The completed project was the third attempt that had actually started tunnelling; the other two had been abandoned as key stakeholders lost commitment to the project because of economic and political pressures. The fear among the Eurotunnel project management team that this would happen again should Labour win the 1987 election led them to commence tunnelling – thereby sinking capital – before the design had been adequately developed, leading to some expensive design changes. Although the technical solution implemented had been developed in the 1950s, this focus on the technology led to serious errors in the definition of the project mission. Throughout the early phases, the mission was defined in terms of providing a tunnel as a challenging, but relatively well-defined, civil engineering problem. It was only around 1990 that it became clear that the true project mission was to provide an integrated transport system – a much more challenging systems engineering problem using many innovative technologies. This failure to define the mission properly led to inadequate attention being paid to the design of the mechanical and electrical services, procurement of the rolling stock and the commissioning of the system as a whole.

The *mobilisation of the resource base* also created serious – indeed showstopping – management problems. The main problem was that the constructors – who formed the Transmanche-Link (TML) consortium – were also the promoters of the project. As a result, the construction contract was signed when their representatives were also on the client side. This generated enormous suspicion on the part of other stakeholders – most notably among the global banking consortia that were providing the capital – that the contract was biased towards the interests of TML. As a result, Eurotunnel's project management team was obliged to play tough publicly with TML in a masterly display of scapegoating, and its chief executive gained a ferocious reputation among TML managers. A related problem was the use of inappropriate contracts for different parts of the works. Only the tunnelling contract was incentive based; the contract of the rolling stock was a cost-plus one, and the fit-out and termini were on a lump sum. As might have been predicted, the cost-plus contract witnessed by far the largest percentage cost overruns, while the lump-sum contract was the focus of most of the crippling arguments between the stakeholders, which diverted attention away from actually delivering the project mission.

Against this context, *riding the project life cycle* was extremely difficult and escalation inevitable. Although sophisticated schedule and budgetary management

systems were in place, they could not be meaningfully used as management tools because of the continuing negotiations between TML and Eurotunnel. Everything was open to negotiation as the project coalition moved from one crisis to another. Schedules and budgets were typically set as the result of tense negotiations to justify outcomes, not to plan project realisation. Tools and techniques can only be effective for project management where appropriate organisational contexts exist for their implementation. Despite this, the project achieved outcomes that compare favourably with other major civil and petrochemical engineering projects around the world. Indeed, in one respect, the project performed better than the benchmarks – it worked. A high proportion of very large petrochemical facilities fail to meet their planned performance criteria, and the track record of the IT sector in delivering large systems is appalling. On the criteria of fitness for purpose and conformance to specification, the fixed link is a great success.

Leading the project coalition was extremely difficult and overwhelmed more than one senior executive. Senior executives lost their jobs, marriages and nerves. On site, there were particular management problems in the early stages of the tunnelling on the British side as the TML member firms responsible failed to work together in a co-ordinated manner. This breakdown of managerial control led to lost lives, as well as to problems with the schedule. Perhaps surprisingly, there were few intercultural problems between the British and the French. The relatively bureaucratic British approach with heavy reliance on systems and procedures contrasted with the more action-orientated French approach, but this did not appear to cause problems. What is most remarkable about the human resources deployed on the project is the extremely high level of commitment to the project, even as it entered its final commissioning stages.

The construction of the Channel Fixed Link was a remarkable adventure, mobilising massive resources and capturing the imagination of the world. On most criteria it was a very successful project, outperforming on budget and schedule most other projects of a similar scale, and working almost perfectly once opened, yet it represents a textbook example of project escalation derived from strategic misrepresentation. Many of the management problems encountered were generated very early on during the definition of the project mission – the lack of clarity regarding the roles of different stakeholders led to mistrust; the inappropriate definition of the mission as a civil engineering project rather than an integrated transport system project led to lack of management attention to key elements of the mission; these problems in definition were compounded by errors in the mobilisation of the resources bases, and in combination, these made riding the project life cycle very difficult. Leading the project mission in this context became intense – too intense for some.

Sources: Winch (1996b); Fetherston (1997); Winch (2000b); Winch *et al.* (2000); Anguera (2006).

Notes

- 1 Seminar, TU Delft, May 2000.
- 2 Pfeffer and Sutton (2006, p. 74).
- 3 <http://www.nakheel.com/developments/> (accessed 07/07/08).

- 4 Porter (1985).
- 5 This is the central thrust of the major contributions to organisation theory of James March (March and Simon, 1993; Cyert and March, 1992), Herbert Simon (1976) and, more recently, Jay Galbraith (1977). See Mintzberg (1979) for the broader context of this body of organisation theory.
- 6 See Winch (1994a) which reports on the co-ordination of the engineering/manufacturing interface in 15 UK engineering firms and shows how information flows initiate and control material flows.
- 7 Pinney (2001) shows how the basic concepts of project management evolved during the nineteenth century, and how they started to become clearly articulated in contrast to the emergent theory of repetitive manufacturing associated with, for instance, scientific management. The railways were seminal in this development, although the lessons of the earlier canal-building period were not forgotten, and the construction of the great seaways of the later nineteenth century posed enormous managerial challenges.
- 8 This critique is developed in Morris (1994); see also Giard and Midler (1993).
- 9 The concept of 'skill container' is taken from Kristensen (1996).
- 10 Davenport (1993, p. 5).
- 11 Womack and Jones (1995, p. 156).
- 12 Cited in Davenport (1993, Chapter 2).
- 13 Winch (2000a).
- 14 Green (2006, p. 234).
- 15 For example, Giddens (1984); Powell and DiMaggio (1991).
- 16 See particularly Winch (1994a, p. 5).
- 17 See the critique of Weick's work in Winch and Maytorena (forthcoming).
- 18 Winter and Szczepanek (2008).
- 19 For example, Normann and Ramirez (1993).
- 20 Porter (1985, p. 34). The misreading is both understandable and widespread given the counter-intuitive use of the term 'chain' by Porter to denote one link in the overall system.
- 21 Koskela and Ballard (2006) and Winch (2006b); see also Koskela and Howell (2008).
- 22 Clegg *et al.* (2006).
- 23 Morris (2002, p. 53).
- 24 The original insight here comes from Cherns and Bryant (1984), followed by Bryman *et al.* (1987) and became a founding proposition of the Scandinavian school of project management research (Lundin and Söderholm, 1995). However, there has been little attempt to combine theorisation of the temporary organisation with theories of inter-firm organisation to provide a more encompassing theory of project organisation.
- 25 Morris (1994) and Lundin and Söderholm (1995) both conceptualise the life cycle and examples in the practice of managing projects come in forms as varied as the advocacy of value engineering and stage-gate processes.
- 26 This assertion adopts the Carnegie school's behavioural theory – see Simon (1955), Cyert and March (1992) and Shapira and Berndt (1997) for an application to construction project management; it also accepts the critique of the 'coolly cognitive' Carnegie approach (Adler and Obstfeld, 2007) developed from a reading of Dewey (2002). In this perspective, there is no contradiction between the notion of 'rationality' and the notion of 'impulse' because Carnegian rationality is about how things happen, not why.
- 27 The concept of sensemaking is very much associated with the work of Karl Weick (1979, 1995), and has been applied to managing projects by Thomas (2000) and Ivory *et al.* (2006) amongst others. See Walsh (1995) for an overview of the wider sensemaking literature, and Winch and Maytorena (2009) for a critique of the solipsistic tendency in sensemaking research. The contribution of sensemaking in project risk management is explored further in section 13.2.
- 28 The importance of routines for economic activity was first analysed by Nelson and Winter (1982), while Dewey (2002) argues for the profound importance of 'habit' in social interaction. From this perspective, project management practices as routines are both constraining 'disciplines' in the analogy of a prison as in Foucault (Burrell, 1988) and enabling prerequisites of action as in Dewey (2002).

- 29 Engwall (2003) shows how projects have history and context, while the particular inspiration
for this conceptualisation of embedment is Giddens (1984). Applications in the project context
have been made by Bresnen *et al.* (2004), Sydow (2006) and Manning (2008) amongst others.
- 30 Office of Government Commerce (2005b).

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