

6th Edition

PROJECT MANAGEMENT in Construction

Anthony Walker

WILEY Blackwell

Project Management in Construction

SIXTH EDITION

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WILEY Blackwell

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Preface

As the sixth edition of this book makes its appearance, the challenge of managing construction projects to successful outcomes continues unabated throughout the world. Prestigious projects make the headlines: both those successful and those less so. The public's imagination is captured by, for instance, constructions to accommodate great sporting events such as the Olympics and spectacular buildings such as Burj Khalifa and Shanghai Tower. But such projects overshadow the enormous amount of construction which contributes hugely to people's well-being. The importance of developing all projects effectively, both public and private, is central to economy in using the world's resources. Many factors impinge on success in this arena: development and utilisation of materials and new machines, training and education of a skilled workforce, political will and understanding of people's needs, to name but a few.

A major need, central to effectively producing projects whatever their scale, is the organisation and management of people skilled in designing and building them. As with all previous editions of this book, this edition focuses further on proposing and using systems theory as the organisational approach suitable for this task and addresses the increasing complexity of the environments within which construction projects find themselves placed. In doing so, this edition has sought to explain how diverse approaches to organisation underpin systems theory and its relevance to construction project management as well as recognising the many competing paradigms and alternative perspectives available, for example in relation to differentiation and integration. Recognition has also been afforded to recent emergence of the study of temporary organisations arising in mainstream management and its relevance to construction project management.

Whilst encompassing the need to develop further theoretical aspects of construction project organisation theory, this edition has also enhanced application of organisation studies to practical issues of construction project management. More emphasis has been placed on the added complexity of construction project management by issues surrounding clients and stakeholders and by issues engendered by control and empowerment of project participants. Additional focus has been made on sustainability issues as they impinge on construction project management, on reworked views on supply chain management and on developments in partnering together with clarification of the shifting terms and definitions relating to construction organisation structures and their uses. Other general updating has been undertaken with some reorganisation of chapters and sections to aid continuity and clarity.

Six editions are not achieved without great indebtedness to colleagues from both academia and practice who have contributed enormously to my knowledge

and understanding and who have provided encouragement over many years. I fully recognise their contribution, in particular my colleagues past and present from the University of Hong Kong and those who publish in the academic press in the field of construction project management in its widest sense. And, of course, once again my thanks are due to my wife for seeing me through this edition with forbearance and encouragement. Of course, only I am responsible for any faults that remain, but hope that this edition continues to make a contribution to the field.

Anthony Walker
Hoylelake

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1

Introduction

1.1 Introduction

The management of construction projects has been carried out since people first cooperated to erect buildings, yet there is little documented knowledge of how people interacted in this process. It is revealing that historical and contemporary accounts of construction work pay little attention to how people worked together and managed their activities. Writers over the ages have concentrated upon the buildings themselves, particularly on aesthetics, the use of new materials, technological developments and the impact of buildings on their environment. How people were organised and managed received scant attention until recent times. What was written tended to be about such charismatic characters of enormous ability as Brunel and Wren, and not about how they structured their organisations.

The way in which available skills are provided and used is of paramount importance in providing what clients expect from their projects. There is little point in the construction industry developing the special skills of its members if no one is going to amalgamate them in the best manner to meet a particular client's objective.

The conventional method of organisation for construction projects, by which is meant one in which the architect or engineer is the designer and manager of the process using specialist consultants with the construction contract awarded by competitive tender after the design is substantially complete, evolved in contexts (environments) that were considerably more stable than those faced today by both the construction industry and its clients. The complexity of the conditions within which the construction industry's clients now exist makes them place increasing demands upon the industry in terms of the performance of projects (both functionally and aesthetically), the capital and running costs, environmental and sustainability demands and the time required from conception of the project to occupation. This has come about as a result of technological developments, globalisation, uncertain economic conditions, social pressures, political instability, and so on. Such forces have led to the

emergence of stakeholders in projects: that is, organisations, institutions and individuals that are not formally clients but can claim a socially/commercially acceptable interest in projects which clients are required to acknowledge and respond to. Thus, generally, the term 'client(s)' used in this book also incorporates 'stakeholder(s)' as appropriate. The distinction between clients and stakeholders is covered in Chapter 4.

Within such conditions, clients from both private and public sectors have to increase their effectiveness to remain competitive and to satisfy their own clients who transmit the demands of a complex world to them. The construction industry has in turn to respond to demands from clients that arise from such conditions and is itself also subject to external pressures in a manner similar to that of its clients. It therefore needs to respond by mobilising the talents it possesses in a way which recognises the particular needs of individual clients. It has become clearly recognised that it is unreasonable to suppose that the conventional way of organising construction projects remains a universal solution to producing a project in today's conditions.

The complexity of clients' demands, together with the increasing complexity of building, civil and industrial engineering and other construction work, particularly as a result of technological developments, has over the years resulted in increasing specialisation within the construction industry. The professions associated with construction emerged as separate skills (e.g. architecture; quantity surveying; structural, mechanical and electrical engineering; acoustics and safety), as have the many specialist subcontractors. On any project, even a small one, large numbers of contributors and skills are involved. On the largest, there is a vast range of skills and materials required and an enormous variety of people and equipment to mobilise. Where these projects are carried out overseas, there are many additional issues of culture, logistics and language. Fundamental to the management of construction projects is therefore the way in which the contributors are organised so that their skills are used in the right manner and at the right time for the maximum benefit to the client. There is little point in the construction industry developing its skills if they are not then implemented effectively.

The way in which the industry and its skills and professions evolved has compounded the problem of organising effectively as it was reinforced by professional allegiances which, in the United Kingdom and elsewhere, were compounded by the establishment of professional institutions, which in turn contributed to the division of the design professions and their separation from construction firms. Specialisation has been accompanied by the creation of independent companies offering the specialisations, and the complexity of construction has led to greater interdependency between the specialisations and hence between companies. Whilst this has also led to the amalgamation of many specialist firms into multidiscipline firms, nevertheless, a high level of differentiation continues to exist within the construction process together with a consequent need for strong integration between independent specialist companies and between specialists within the multidisciplinary organisations.

It was against this background that the conventional solution to project organisation attempted to cope with increasing complexity and uncertainty leading to the development and increasing use of alternative approaches such as design-and-build, management contracting and construction management and initiatives such as partnering and prime contracting. There are now many

alternative forms of organisation for construction projects, but there remains the need to select the most appropriate for each specific project. So what is needed is a framework for designing an organisation structure to suit the particular project in the conditions in which it has to be executed. Pressure from clients has made the professions and industry take more seriously the need for organisation design, which is a key to the ability of the project management process to be effective.

It should be clear by now that this book views a most important element of project management as an organisational issue which incorporates the way in which people are organised and managed in the project management process. This is a long step from the view of project management still taken by many who see it as a collection of planning and control techniques and other management and decision-making tools which, historically, appear to be the root of project management generally, particularly in the United States (Johnson 2013). The distinction is important as the use of techniques and tools, however sophisticated, will be of no avail if they are applied within inappropriate organisation structures seeking to achieve misguided objectives. Objectives and organisation must come first if the use of planning and control techniques is to be effective in providing the information on which management decisions can be based.

While the terminology in this book is drawn from building rather than civil engineering, the application of organisation theory is as relevant to civil engineering as it is to building. The design of both civil engineering and building project organisations will benefit from the application of the ideas arising from the issues discussed here. Project management is now fully accepted as fundamental to the success of projects by both sectors, demonstrating the parallel need identified by sponsors and managers of projects. Further progress will be made through a fuller understanding of the basis of project management, which will arise from a wider knowledge of the theoretical work identified in this book.

1.2 Evolution of Project Organisation

The way in which construction projects are organised in different countries has evolved from traditions and conventions laid down in each country over many years. The traditions and conventions of the United Kingdom have had a particularly wide significance as they have been exported to many parts of the world over the last two centuries. A very brief account of project organisation evolution in the United Kingdom may help to explain the position reached in trying to develop more effective ways of managing construction projects. It will have been paralleled in many other countries. Whilst many magnificent buildings were built in the United Kingdom in the centuries before the Industrial Revolution using traditional methods of construction and organisation typical of their time, the advent of the Industrial Revolution saw the beginning of revolution in the way in which the buildings needed by the new industrialisation were constructed and managed. The accompanying prosperity created demands for buildings for the new industries, housing to accommodate both workers and owners and demand for improved transportation all of which led to the development of new engineering and building techniques. These activities created

a concentration upon the specialist skills of the members of the building industry. The increasing importance of the engineer emerged; there was the further separation of the architect and builder as specialists; quantity-surveying skills were more firmly identified; and engineering was subdivided into civil, mechanical and electrical skills. However, this was an incremental process and specialists often acted in dual capacities. The new complexity of the conditions within which construction work was executed, with greater emphasis on economy, value and prestige, the complexity of new building materials and technologies and the developing skills of the building industry specialists themselves led to the establishment of societies for the discussion of common problems. Architectural clubs were formed in 1791, but clubs for civil engineers had been set up as early as 1771. In 1834, clubs were established for surveyors and for builders. Subsequently, to protect themselves from economic pressures on the one hand and from the unscrupulous on the other, the clubs developed, in the nineteenth century, into professional institutions as the means of defining their position and creating their public image through the acquisition of royal patronage. This further emphasised the separation of the skills associated with construction and so reinforced allegiance to specialist skills rather than the industry as a whole and created the basis from which today's 'conventional' organisational structure for construction projects has grown.

By the late nineteenth century, architects were seen to be concerned primarily with prestigious buildings and no member of the Royal Institute of British Architects could hold a profit-making position in the building industry and retain his membership. Further separation of architects from engineers followed the development of industrialisation as the position adopted by architects decreed that industrial building was the province of engineers but, at the same time, engineers were commonly employed to advise on the structure of architect-designed buildings in addition to their core work on infrastructure projects. Hence, architects were technically dependent upon engineers but engineers were not dependent upon architects, and engineers did not exclude themselves from being principals of engineering or building firms. Further separation occurred when the Royal Institution of Chartered Surveyors prohibited its members from being employed by construction firms. Bowley (1966) describes the pattern that emerged as 'the system' and believed that it had acquired a strong flavour of social class distinctions, architects being the elite. Engineers were associated with trade and industry, surveyors were on the next rung of the social hierarchy and builders were regarded as being 'in trade.' Whilst building activity between the First and the Second World War was much greater than before 1914, the period was one of consolidation of the main professions through the establishment of professional qualifications tested by examination and of codes of conduct, which raised their status and reinforced adherence to the established pattern of project organisation.

Even present-day organisation arrangements for building projects reflect, to a degree, the conservatism generated by patterns laid down before the Second World War. However, following a succession of official reports on these topics, the professions and industry responded to the demands of environments infinitely more complex than those in which these patterns were originally established. The dramatic developments in transportation; communications; health

care; manufacturing technologies and the associated economic, social and technological order have been powerful forces for client-led change in the construction industry.

The Second World War and Post-War Activity

The impetus to innovation provided by the Second World War was dramatic and focused upon the need for economy in labour and reduction in the use of materials in short supply. Wartime also generated the first governmental enquiry directly concerned with the organisation of building work (HMSO 1944). Nevertheless, this report accepted the established patterns and concerned itself, primarily, with tendering methods and arrangements for subcontractors.

Following the Second World War, the demands placed upon the building industry rapidly increased in complexity due to many factors, for example need for rebuilding in the aftermath of war, development of the Welfare State, increased sophistication of industry and the need to redevelop cities to cope with a more technological age. Yet again, the pattern of organisation of projects remained largely unaltered. Nevertheless, there were some innovations in organisation patterns through the use of negotiated tenders and 'design-and-build' but the resistance to change of the established pattern is illustrated by the reluctance of public authorities to adopt selective, as opposed to open, tendering even though this had been strongly recommended in the Simon Report (HMSO 1944) and again in the Phillips Report (HMSO 1950). Following the Second World War and the Phillips Report and the difficulties of the conventional pattern of organisation in coping with the demands of modern construction, discussion increasingly centred upon the need for greater cooperation between all parties to the construction process. However, the greater spirit of cooperation within the industry that had begun to emerge took place against the backcloth of the existing traditions and was not concerned with a fundamental reappraisal of the existing structure. This situation was reflected in the next major official enquiry, the Emmerson Report in 1962 (HMSO 1962), which reiterated the findings of the previous two reports regarding the need to improve coordination of the members of the building team.

The Significant Reports of the 1960s

Whilst also being concerned with other aspects, for instance training, the Emmerson Report was significant for its observations on relationships, particularly a lack of liaison between architects and the other professions and contractors and between them and clients. It commented, 'In no other important industry is the responsibility for design so far removed from the responsibility for production.' The report pointed out that although a common course of initial study for designers and producers of buildings had been recommended in 1950, no practical steps had been taken by 1962. Emmerson came to the conclusion that there was still a general failure to adopt enlightened methods of tendering in spite of the recommendations of earlier reports. His recommendations in this respect led directly to the establishment of the Banwell Committee in 1962. The resulting Banwell Report (HMSO 1964) and its review Action on the Banwell Report (HMSO 1967) had a significant impact. A particular concern

was the unnecessarily restricted and inefficient practices of the professions leading to over-compartmentalisation and the failure of the industry and its professions to think and act together. The 1967 review noted that the professions had done little to de-restrict their practices. The review was encouraged by the increase in selective tendering and urged further consideration of serial and negotiated tendering. The Banwell Report also related to civil engineering as well as building. The Emmerson and Banwell Reports brought into sharp focus the need to reform the approach to the organisation of construction projects. At the time, construction project management was seen to be a passive procedural activity but the movement towards a more dynamic integrated approach was being suggested by Higgins and Jessop (1965) in a pilot study sponsored by the National Joint Consultative Committee of Architects, Quantity Surveyors and Builders. They clearly identified that the problems of communication in the building industry were created to a large extent by attitudes and perceptions about the values of contributors to the building process. They were probably the first to suggest that overall coordination of design and construction should be exercised by a single person (or group). Concurrently, a review of the construction industry by the National Economic Development Council (1964) was calling for similar improvements. A rather rhetorical report by the Institute of Economic Affairs (Knox & Hennessey 1966) was also condemning the restrictive practices of the professions.

This spate of activity and concern with the performance and organisation of the industry and its professions marked the beginning of self-examination. It was induced, to a large degree, by external pressures that reflected the greater complexity of the influences at work upon the industry and its clients. The economic expansion of the early 1960s and rapidly developing technology and changing social attitudes were manifested in demands for more complex and sophisticated projects and a more economic utilisation of resources. These forces were transmitted to the industry through its clients and also directly affected its techniques and attitudes, but such self-examination was likely to be slow when undertaken in the presence of the polarisation of skills and attitudes inherent in the professional structure that had emerged over the preceding century.

The Project Manager Initiatives

During the 1960s and subsequently, progress was made in developing collaborative work and skills and in instituting procedures that provided a variety of organisational patterns, particularly in connection with the introduction of the contractor at various stages of the design process. However, there was still a need in official reports in the 1970s (National Economic Development Office 1975, 1976, 1978) to stress that more attention should be paid to structuring and managing project organisations to create conditions for cooperation between contributors. Each of these reports recognised the distinctive nature of the project management process and the role of the project manager and reflected the changes in attitudes and views expressed since the mid-1960s. Accompanying these developments were challenges to the professions from the Monopolies and Mergers Commission in relation to their codes of conduct and fee scales. Project management concepts and applications began to emerge in other industries as project management was seen to be appropriate to managing

in the newly emerging environments but construction presented distinct elements due to its amalgam of professions and structure of its industry. The professions' and industry's response to these influences reflected the manner in which the conventional structures emerged. Each sector pursued its own approach to project management while recognising rather reluctantly that the role of project manager was not the right of any one profession.

A reflection of the uncoordinated empirical evolution of project management as an activity separated from design skills is given by the number of definitions that emerged. The Chartered Institute of Building's (1979) paper identified 13 definitions. It commented that the confusion of terminology and usage was unsatisfactory and proposed a further definition! It was, perhaps, to be expected that those writing on such an important emerging idea, which was contrary to their traditional backgrounds, should seek to express their ideas in their own words. As to be expected, this resulted in a range of definitions that tended to reflect the particular background and experience of the writer rather than a generalised definition of the concept. However, definitions of project management have now achieved a good measure of consistency. The empirical nature of publications on project management was reflected in their emphasis on defining the jobs to be done by a project manager at various stages of a particular project rather than identifying the concept and process of project management. Nevertheless, such publications have been useful in emphasising the patterns that can be adopted with advantage to the client. Against this background, a number of project-based initiatives emerged. The project manager idea was only one such idea that was used to cover a range of organisational patterns. Others included *management contracting*, *design and construct contracts* and *construction management* all of which seek to increase integration (particularly of the contractor) and which may or may not incorporate a project manager but which do not necessarily overcome the polarisation of professional attitudes.

The 1980s saw a shift from the government-sponsored reports of the 1960s and 1970s to initiatives from the private sector, reflecting a shift in the political climate as a more pragmatic position was adopted. Carpenter (1981) was typical of clients, stressing that the industry frequently adopted inappropriate organisation structures and the British Property Federation (1983) came up with its own system to impose on an industry which it felt was not changing itself sufficiently quickly. Government reflected this pragmatism with so-called 'client guides' to procurement (Department of Industry 1982; National Economic Development Office 1985) and practical comparisons of different approaches to development with the emphasis on speed of construction (National Economic Development Office 1983, 1987). Nevertheless, Mohsini and Davidson (1992) estimated that 80% of all building projects in the United States were still procured by conventional processes although Bresnen and Haslam's (1991) work implies that it may be somewhat less at about 70% in the United Kingdom.

Following the spate of reports during the 1970s and 1980s, the process drew breath until the Latham Report (1994), which reinforced the pragmatic tone of the 1980s. Whilst its focus was predominantly on contractual matters and their impact on conflict, payments and cash flow, it nevertheless found room for an important section on project management. The changes which had taken place

since the 1970s were clearly recognised by the report's comment that 'there is increasing (if sometimes reluctant) acceptance that Project Management, and a separate discipline of Project Manager, are permanent and growing features of the construction scene'. The report continued by recognising that the manner by which project management can be provided takes a great many forms which may or may not require someone with the title of project manager. Recommendations were made requiring a clearer definition of the role and duties of project managers. Comments on project management were rather overshadowed by the contractual and other matters but a focus of the working group set up to implement the cost reduction initiative and other matters was on organisational issues to answer such questions as follows: How do you decide what to build? What is the best way to set up a team? The Latham Report began its executive summary by stating that previous reports on the construction industry had either been implemented incompletely or the problems had persisted. Again the report recognised the need for common professional education as did the Phillips Report of 1950 and the Emmerson Report of 1962 but progress over 60 years on has been minimal. Similarly, Barrett et al. (1996) comment that the findings of the Latham Report in respect of project briefing were hardly different from those of Banwell 30 years previously. That the Latham report did not address the fundamental problems of the industry was well expressed by Cox and Townsend (1997) who believed that although well intentioned, the report was flawed, mainly due to the methodology adopted, which relied on consulting vested interests within the industry that were intent on maintaining the status quo.

Subsequently, the Egan Report, *Rethinking Construction* (1998) argued for a radically changed industry with higher margins for contractors, better value for money for clients, improved welfare (particularly safety) and better training. Many of these benefits were seen to be achievable through supply chain management using long-term partnerships. Subsequent experience of these initiatives has not perhaps been as successful as anticipated. The report identified five key drivers for change: 'committed leadership, focus on the customer, integrated processes and teams, a quality-driven agenda and commitment to people'.

The effort which went into the follow-up to the Egan Report far outstripped anything which had gone before. The Strategic Forum for Construction (SFfC) was established in 2001 to take its recommendations forward through the coordination of all the bodies associated with the industry. Whilst the Egan Report was much wider than previous reports, it did not explicitly focus on project management but it is interesting that its four key areas are client engagement, integrating teams and supply chains, people issues and enhancing the value of the product – which comprise the essence of project management. The SFfC's (2002) major publication was *Accelerating Change*, which identified progress since the Egan Report, including innovation, key performance indicators and, most importantly, demonstration projects which 'provide the opportunity for leading edge organisations from whatever part of construction to bring forward projects that demonstrate innovation and change that can be measured and evaluated'. It noted that over a thousand construction organisations were actively involved in its initiatives – which in itself provides a major integration problem! SFfC also set up a number of significant groups to further progress its agenda, including Constructing Excellence, the Construction Clients' Group and the Sustainability Forum. Subsequently, SFfC has focused on leading the

industry's thinking on a range of issues of major concern to the industry, clients, stakeholders and society at large. Currently, these include procurement and integration of project teams, commitment to people, client leadership, sustainability, design quality, and health and safety. The long-term challenge is for the initiatives to percolate to all levels of the industry rather than remain with the more progressive, usually large, firms.

Such reviews, reports and developments have been valuable in identifying initiatives for improving the construction industry, but they have focused on immediate and practical issues. Underlying many of the challenges and ideas which were identified was the need for a framework for designing organisational structures which would allow project management functions to be clearly identified to reflect the demands of different projects and enable initiatives appropriate to the specific project to be incorporated.

Alongside the increasing recognition of the importance of project management in government reports and from slow beginnings in the 1970s, construction project management research has grown to respectable levels of rigor, scope and volume. Whilst striving to develop its own paradigms, it has also drawn on relevant theories from other disciplines as well as attempted to identify theories of project management, albeit some say not too successfully to date. Nevertheless, a substantial body of research has arisen and spawned a valuable and respected crop of refereed academic journals as the discipline matures. Turner (2010) illustrates the evolution of project management research in terms of its range of topics and methodology employed drawn from the *International Journal of Project Management*. It could be that the research culture of construction project management may not lie so much in its own theories than in the application of theories from other disciplines to construction project management issues and problems, for example economics, sociology, psychology and management generally.

1.3 Management and Organisation

Before discussing project management specifically and particularly organisation structure, it is necessary to have a clear idea of what is meant by management and by organisation. It is hardly surprising that definitions of management have occupied authors of management literature at length when the *Shorter Oxford English Dictionary* lists 10 meanings of 'to manage', ranging from 'training a horse' and 'wielding a weapon' to 'controlling the course of affairs by one's own action'. The minds of many are also conditioned by its ironical use, which the dictionary quotes as 'to be so unskilful or unlucky as to do something'. Much of the literature presupposes that the reader has a clear idea of the concepts of management and organisation. Some writers offer a dictionary-style definition, but the operational definitions offered by Cleland and King (1983) continue to provide a useful perspective.

An operational definition is one that identifies a number of observable criteria, which, if satisfied, indicate that what is being defined exists. Cleland and King's operational definition of *management* identifies the criteria of 'organised activity, objectives, relationships among resources, working through others and decisions'. In providing an operational definition of *organisation*, Cleland