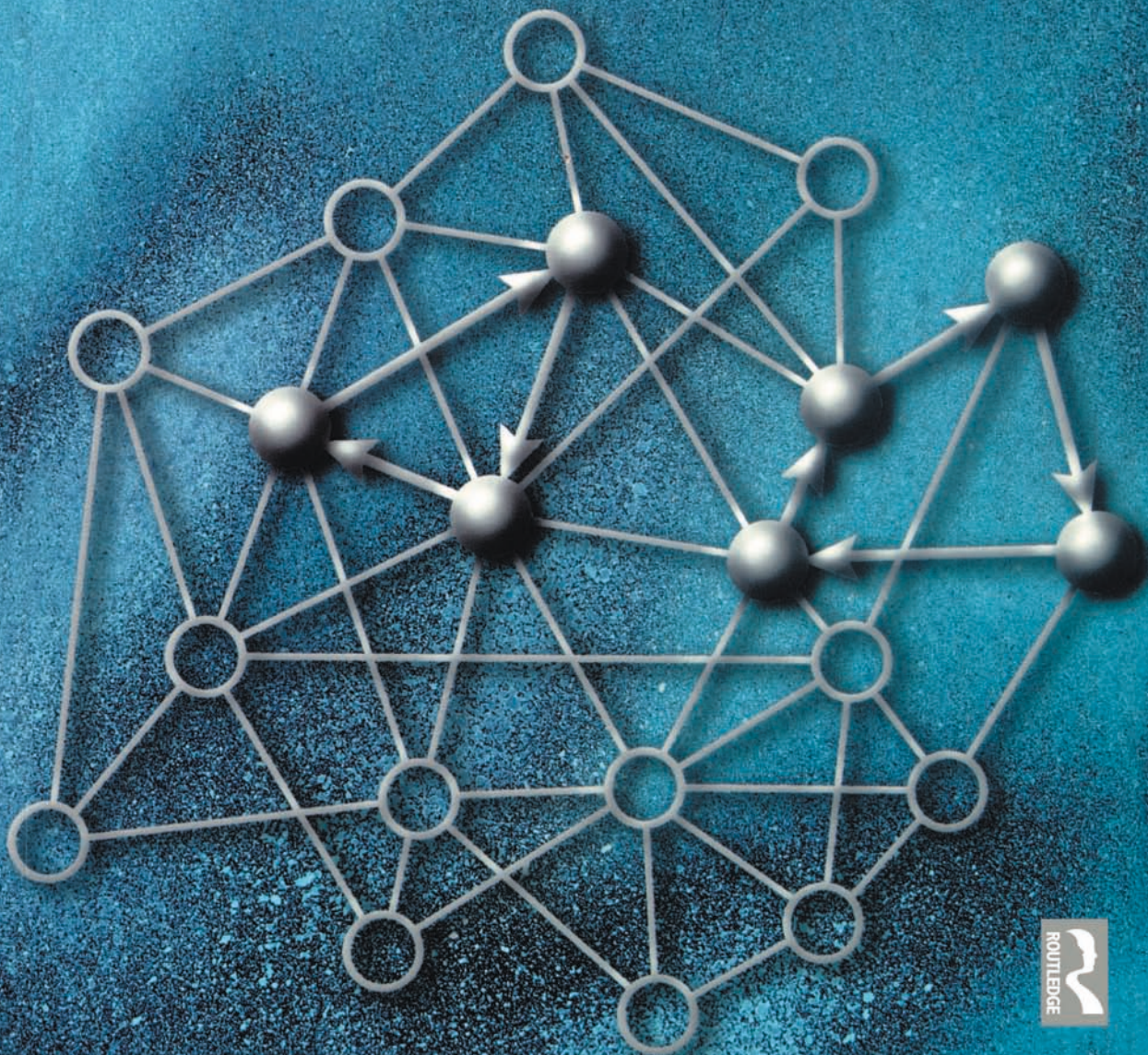


J O H N B E N N E T T
CONSTRUCTION
T H E T H I R D W A Y



Construction – The Third Way

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Construction – The Third Way

Managing Cooperation and
Competition in Construction

John Bennett

First published by Butterworth-Heinemann

This edition published 2011 by Routledge
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN
711 Third Avenue, New York, NY 10017, USA

Routledge is an imprint of the Taylor & Francis Group, an informa business

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British Library Cataloguing in Publication Data

Bennett, John

Construction : the third way

1. Construction industry – Great Britain – Management

I. Title

628'.068

ISBN 0 7506 3093 0

ISBN 978-1-135-38822-5 (ebk)

Library of Congress Cataloguing in Publication Data

A catalogue record for this book is available from the Library of Congress

Composition by Genesis Typesetting, Rochester, Kent

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Preface

The leading edge of the UK construction industry has changed focus in the 1990s. This is largely in response to demands from major customers for better value, delivered faster and more reliably. Developments in information technology have added to the pressure for change. The need for change is well documented in the Latham and Egan Reports (Latham, 1994; Construction Task Force, 1998). Latham recognized the need for the industry to move from its traditional adversarial approach to one based on cooperation and trust. Egan took this conclusion further in recommending an action plan that draws on the ideas of lean thinking and partnering. Both reports indicate the extent of the problems by suggesting tough targets for the industry to improve its performance year on year.

The leading edge of the industry has begun to deliver the kind of improvements that Latham and Egan demanded. My evidence for the existence of these improvements comes from research carried out as Director of The University of Reading's Centre for Strategic Studies in Construction. Between 1994 and 1998, with several research assistants, I undertook over 200 case studies of leading practice in the UK construction industry. Most of the case studies relate to building projects which traditionally give rise to fragmented and complicated organizations characterized by all the problems described in the Latham and Egan reports. The practical lessons from these case studies and other related research are described in two reports by Bennett and Jayes (1995, 1998) describing best practice partnering, and one by Bennett *et al.* (1996) which describes a blueprint for integrating design and construction processes in the UK construction industry.

The most significant of the data describing the improvements in the performance of the UK construction industry are given in *Table 1.3*. This table shows that leading practice is already achieving cost reductions of up to 50 per cent and time reductions of up to 80 per cent compared with traditional approaches.

The case studies were undertaken in cooperation with industry and it is good to have this opportunity to acknowledge the huge contributions of time and thought given by the many leading practitioners referred to in the published reports. The case studies form an important part of research which grew out of my earlier studies of management in the Japanese construction industry. A key stage of this was research undertaken in 1991 as Professor at the University of Tokyo into the management methods used by the top five Japanese construction firms. My ideas were further influenced by working as the lead academic in research to provide a basis for Europe's policy towards construction for the European Union (Atkins *et al.*, 1994).

The European study served to bring a number of ideas together as the research team produced structured descriptions of the construction sector of all European Union countries, Japan and the USA. One part of this work produced comparisons of the relative efficiency of these major construction industries. The results in *Table 1.1* are supported by other similar comparisons which, taken together, provide two important insights. First, the results suggest that the US building industry's reputation for low cost production comes from its use of standard components and low safety and comfort levels, rather than being evidence of an efficient industry. Second, the results show that, comparing like with like, Japan has the most efficient building industry. My own research suggests that this superior performance results from an unusually integrated approach led by design build contractors and is based on a culture that supports cooperative, long-term relationships between firms.

All of this led fairly directly into research, funded by the Engineering and Physical Sciences Research Council (EPSRC), designed to understand the effects of cooperative behaviour in the UK's highly competitive construction industry. It focused particularly on the management actions needed to make long-term relationships effective. The early results from this EPSRC-funded research persuaded the Reading Construction Forum to commission two reports into best practice partnering (Bennett and Jayes, 1995, 1998), and what has now become the Design Build Foundation to commission a report into design build (Bennett *et al.*, 1996).

Bennett and Jayes (1998) provide a model (produced with the Reading Construction Forum's Partnering Task Force, ably chaired by Charles Johnson of Sainsbury's) of how industry and academia should work together. Over 12 months in 1997 and 1998 the case studies of partnering that I had done with the assistance of Sarah Jayes (now Sarah Peace) were reviewed at a series of intensive workshops designed to understand what was happening in practice. The workshops linked academic research and wide practical experience in an incredibly creative way as the Task Force of very experienced practitioners worked with Sarah and me to find consistent patterns in the case study material. The result, the model described by Bennett and Jayes (1998), is already widely used by customers and firms in the UK construction industry to guide their use of partnering.

The case studies are significant because they show that parts of the UK building industry have begun to use cooperative behaviour and that this provides substantial benefits. However, these improvements have shaky foundations. It would be easy for those involved to slip back into traditional attitudes and methods in response, for example, to a downturn in demand. The need for the fundamental change in culture called for by the Egan Report remains. Change of this kind requires a paradigm shift, which is why Sir John Egan called his report *Rethinking Construction* (Construction Task Force, 1998). That is exactly what is required: the industry needs to think about its work in a fundamentally different way. It needs to see its customers, the communities it serves, the various parts of the industry and the relationships between them differently. It needs what is properly called a paradigm shift.

That is the background for this book which grew out of a request from publishers, Butterworth-Heinemann, that I should edit my earlier book (Bennett, 1991), so that it could be re-published. This earlier book describes a general theory of construction project management and illustrates practical implications with examples drawn from international best practice as it was in 1990. The book was based on research into leading practice in the UK, Western Europe, USA and Japan. In response to Butterworth-Heinemann's request, I made several attempts to edit the earlier book. Slowly and painfully it became clear that the construction industry, at least the leading edge of it in the UK, has changed and that the 1990 theory and practice no longer provide adequate descriptions. Any editing of the 1990 descriptions would be inadequate and so a fundamentally different book is needed to describe my current understanding of theory and practice.

This realization coincided with my decision to resign from the Directorship of the Centre of Strategic Studies in Construction to give myself time to think carefully about the changes taking place in construction practice. As a result, since 1997, I have had time to read about and discuss changes in other industries and in scientific thinking that have important similarities to what is happening in construction. These larger developments helped me to understand the significance of my case studies.

The resulting ideas are described in this book which, inevitably, is just one stage of a journey that began in what I now regard as an outdated paradigm based on an elemental, hierarchical view of the world in which progress is achieved by top-down management decisions. The journey includes research into Japanese management which, for most of the last 20 years, has out-performed the West in key major industries. The main differences in their approach centre on the use of long-term cooperative relationships that encourage workers at all levels to search for continuous improvements in performance. In response to the Japanese challenge, leading manufacturing firms in the USA developed partnering as a way of introducing cooperative behaviour into a culture dominated by an unquestioning faith in competitive market forces. Partnering emerged first in manufacturing and was subsequently applied to construction, initially in the USA and then in many

other countries including the UK. In researching these developments it became clear that their full realization depends on a new paradigm that is consistent with a set of ideas emerging in scientific theory. This insight provided the last piece of the jigsaw that enabled me to decide on the nature of the book required to satisfy my agreement with Butterworth-Heinemann.

As a result the book describes a new paradigm and suggests the practical implications for construction. The decision to call the book *Construction – The Third Way* recognizes the complexity of today's world and the inadequacy of the old recipes for both managers and governments. The belief of the political right in free markets, individual freedom and competition, and the left's old preoccupation with state control, high taxation and producer interests, are equally flawed. The UK has experienced both extremes during the last 50 years and the results leave the construction industry, in common with the rest of the country, in need of a third way.

The third way, as described by Blair (1998) and Giddens (1998), is often denigrated by their political opponents as being no more than a wishy-washy compromise, lacking conviction and having no clear philosophy. In fact, the complexities of today's richly interconnected communities and their impact on the world's ecology lead Blair and Giddens to recognize the need for direct, inclusive democracy at all levels guided by free and open communication, and a focus on delivering better value for everyone who accepts the rights and responsibilities of belonging to a community. This takes them beyond the old political divides of right and left. Freedom and equality provide the classic dichotomy; both are desirable but they conflict. The freedom to pursue individual interests leads to inequalities, while attempts to impose equality limit individual freedom. Either freedom or equality pushed to extremes produces poor results. What is needed is a fair balance in the interests of the whole community. As Tony Blair says 'what matters is what works to give effect to our values'.

Construction – The Third Way accepts the importance of seeking consensus on values that are then given effect using the whole spectrum of human behaviours, from cooperation to competition. Applying these ideas to construction helps us to understand how interests that are traditionally seen as being in conflict can find win:win agreements. Producers, the consultants, contractors and specialists who design and construct new facilities can have fair profits, while at the same time consumers, the customers and communities who use the facilities can enjoy better quality and value.

The practical challenge is to combine Japanese efficiency based on steady, continuous improvements in performance with the ability widespread in the USA to start new businesses and create new jobs. But to do so in a way that avoids the weaknesses of both approaches. Japan's weaknesses are evident in its recent financial crises which reveal an inflexibility in continuing to invest in ever more productive capacity, even though the market has changed and customers now want

different things. The weaknesses in the US approach are evidenced by its grossly unfair distribution of wealth, far too many children living in poverty in the richest nation on Earth, and too many people in low-paid, insecure jobs. Japan has relied too much on inward-looking cooperation and the USA relies too much on competition which reinforces inequalities. The third way balances cooperation and competition. It does this, not by wishy-washy compromise, but by basing decisions on the interests of the whole community guided by clear benchmarks of what is achievable. This requires team decisions, through communication that includes all people affected by the outcomes. The diversity of human situations and circumstances ensures that many different ideas will be tried and many different outcomes will result. The third way rejoices in diversity which comes from recognizing that communities at all levels are better off working with the richly interconnected networks that form human communities and their environments than by trying to impose the old certainties of free market competition or centralized management.

My conclusions about best practice for the construction industry reflect this third way. It is put into effect by teams making decisions about their work in ways that balance cooperation and competition. The teams cooperate with all organizations affected by the work, or they have targets and constraints that take account of these interests. A competitive drive for innovation and creativity comes from teams setting targets based on benchmarks of world class performance. On the evidence of the case studies I have undertaken over the past five years, teams that balance cooperation and competition in these ways deliver better value for customers and earn higher profits for construction firms. The term 'the third way' provides the most accurate description of this approach which seems to me to be the current best practice for the UK construction industry to adopt.

Writing this book has helped me to understand how these ideas all come together; my hope is that *Construction – The Third Way* will do the same for its readers.

Finally I am pleased to be able to acknowledge the many people who have contributed to the development of my ideas. These include many colleagues in the Department of Construction Management and Engineering, the staff of the Centre for Strategic Studies in Construction, many members of the Design Build Foundation and the Reading Construction Forum, including particularly its Partnering Task Force, and the editorial staff of Butterworth-Heinemann. I must especially thank my research assistant for the past five years, Sarah Peace, for her many valuable ideas and consistent help with my work. Most importantly, I am grateful for this opportunity to thank my wife, Sue, for her unfailing inspiration and support for my work.

John Bennett

The University of Reading

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The new paradigm

Paradigm shifts

The word paradigm was originally defined by Kuhn (1962) as the views shared by a scientific community but Capra (1996) describes how it is now widely used to describe the concepts, values, perceptions and practices shared by any group of people. Thus a paradigm is learnt from experience of living and working in a community. A paradigm shapes the decisions we make and the actions we take. It determines how we see the world, other people and their behaviour.

Once people have learnt one paradigm they are reluctant to change it. They make such fundamental changes only under the pressure of major events. Thus a paradigm shift is a revolutionary break with an established way of viewing the world. Many parts of the construction industry face just this kind of pressure as rapidly changing technology leads to new demands from customers.

Information technology is changing the nature of most human activities. This means that the construction of different buildings and other facilities to accommodate the new kinds of behaviour is needed. The concept of an 'intelligent building' is already changing the way buildings are used; internal comfort conditions can be matched to the changing needs of users throughout the day. Similarly there is serious research into the feasibility of continuously monitoring urban environments to help traffic flows, policing and the emergency services, and care in the community.

The construction industry has to respond to these demands for new and more sophisticated products. However, more fundamentally, new technologies are consistent with different ways of manufacturing that rely on cooperative, long-term relationships. The new methods deliver significantly better value, faster and more reliably than traditional methods. This potential was first exploited in Japan because the new technologies fit their cooperative, group culture. The advantages first became evident internationally in the car industry where Japanese products justifiably gained a reputation for providing better quality and value. In response

Western car firms adopted the Japanese methods which are now commonplace in all main manufacturing industries. They already influence the leading edge of construction practice.

The main reason for this change is that most of the construction industry's major customers face pressures in their own businesses caused by these global changes. Customers have been forced to change the way they think about their businesses and the way they work. It is therefore not surprising that many of them expect the construction firms they employ to adopt similar new and more efficient methods. Recent research into leading practice makes it apparent that adopting such methods requires the construction industry to think differently about its work; that is, to make a paradigm shift.

Collapse of the management paradigm

It is significant that changes similar to those becoming evident in parts of the construction industry are already sweeping through many other industries in the West. This has happened because the assumptions on which Western managers have traditionally based their working methods produce inefficiencies wherever they are applied. The results have become increasingly unacceptable to customers. Slow deliveries, poor quality, high prices and broken promises are no longer tolerated. As a consequence, managers in every industry have been forced to make fundamental changes in the way they work. To do this they had to think about their work in a different way. In other words they made a paradigm shift.

The nature of the widespread change in management practice is described in a great mass of new books. For example, Locke (1996) describes the collapse of the American management mystique. He argues that the strengths of American-style management are no longer relevant. Its key features, analysing problems, giving instructions to subordinates and dealing with conflicts, provide an inadequate basis for dealing with today's world. Locke argues that hierarchical, top-down approaches need to be replaced by more inclusive, cooperative approaches of which Japanese-style management is the most widely quoted example.

Essentially the same case is argued by Lazonick (1991) who traces the development of management from its origins in the market-based, proprietary capitalism that emerged from the British industrial revolution in the eighteenth and nineteenth centuries. Its fundamental idea is encapsulated in Adam Smith's invisible hand. This is the belief that if everyone pursues their own interests, the market will ensure the best outcomes. The naiveté of this view became obvious as markets grew larger and technology became capital-intensive.

Market-based, proprietary capitalism gave way to managerial capitalism in a paradigm shift that occurred in the early years of the twentieth century. America invented management as a distinct responsibility and used its strengths to set up

large hierarchical structures to plan and coordinate vertically integrated and mechanized production processes. Chandler (1977) chronicles this second industrial revolution which led to mass production guided by what he accurately calls the visible hand of managerial decision making. This has provided unprecedented riches for those lucky enough to live in developed countries. However, work designed and controlled by managers has become increasingly unattractive to affluent and well educated workers. It is also slow to respond to today's rapidly changing technologies and markets. The inevitable tensions limit what managerial capitalism can deliver and so the way was prepared for another revolution in production methods.

The new approach emerged first in Japan and, since the early 1980s, Japan has outperformed America in the production of consumer durables. This has been most noticeable in the production of motor cars, the twentieth century's most important industry, and electronic equipment, which is already of major significance in every aspect of our lives and is likely to be the crucial industry of the twenty-first century.

Japan's success is based on what Lazonick (1991) called 'collective capitalism'. This relies on cooperation between tightly knit groups of firms. Decisions are made by consensus in networks that spread throughout multi-firm organizations and which include customers and suppliers. Government, too, is often deeply involved in the decision making of these cooperative networks.

Even more recently, the leading edge of international trade has become dominated by computer-based service industries centred on the USA which, as a result, has enjoyed a remarkable period of economic growth in the second half of the 1990s. Software and its many applications has become more significant in creating new businesses than has manufacturing. Construction, although it needs to add sophisticated services to its products, remains primarily a manufacturing industry. Hence the important lessons for the UK construction industry come more from Japan's strengths in manufacturing than the USA's strengths in software and service industries. Amongst the major developments in manufacturing, the identification of lean production is particularly important in understanding what needs to happen in the construction industry.

Lean production

Womack *et al.* (1990) describe in fine detail the move from traditional American management to Japanese cooperation at the leading edge of the motor car industry. They call the new approach 'lean production' because of the central importance placed on identifying and eliminating waste. They define waste as processes that add no value for customers. Japanese firms use lean production in their highly efficient production of motor cars that customers find increasingly attractive. Womack *et al.* explain how first Toyota, and then the other major Japanese car

producers, brought their workforce and then their customers and suppliers into their decision making processes. In so doing so they abandoned the American model of hierarchical management in favour of an entirely new approach that relies on building cooperative long-term relationships. The resulting lean production now dominates car production throughout the world.

Fundamental changes of this magnitude take place when conditions are right for the new approach. Given the right conditions, the change is self-reinforcing as the new approach sustains the factors that allowed it to emerge in the first place. This is now evident as the emergence of global markets and rapid developments in technology, especially information technology, are first causing and then reinforcing fundamental changes in management practice. The developments allow major firms to search for the lowest-cost reliable suppliers, wherever they happen to be based, so that much basic work has been moved offshore away from developed countries. In these same firms, layers of middle managers formerly employed in routine information processing have been made redundant by information technology. So those that remain are engaged in far more communication, most of which takes place through the Internet, mobile phones, faxes, video conferences and other devices handling digital data. Head offices are much smaller and many firms own little except information and networks of contacts.

These ways of working miss the unspoken but important messages that come from body language and other aspects of old fashioned face-to-face communication. So managers need new skills in building more secure relationships that can function at a distance. Therefore, ideas about cooperation and trust have become widely discussed. Managers have to recognize when work needs face-to-face relationships; hence the wide use of workshops, project offices and other arrangements that bring teams together to tackle specific, difficult problems.

This coincidence of multi-faceted, self-reinforcing changes which affect many aspects of a community and its work is evidence of what is properly called a paradigm shift. The specific change described in this book is reinforced by fundamental changes in the way science views the world. This scientific revolution has emerged over the past century but its key ideas have broken through into popular literature only very recently. These scientific ideas call into question many of the assumptions that underpin the management paradigm. Also the ideas suggest new patterns of working that are more in tune with human nature and the world we inhabit than any traditional management-based approaches.

A new view of the world

Over recent decades science has built a picture of the world and our relationships with it which is very different from that which provides the intellectual basis for the methods and institutions used by managers in Western, market economies. As these

new ideas are understood and discussed outside of the scientific communities, they are giving rise to new theories about management. Some of the theories anticipate and reinforce changes already taking place in practice.

The key ideas of the new view are that our world consists of richly interconnected networks in which ideas of hierarchy are human projections not justified by the structures and processes found in nature. Competition is not the main driving force of change and evolution; it is the exception and generally provides an unsustainable basis for any species. Cooperation is much more widespread and important in explaining the evolution of life on Earth. As Dawkins (1986) puts it, life depends not on the survival of the fittest but of the 'fittingest', by which he means that the species that have survived are the ones able to cooperate best with their environments. Capra (1996) uses this new view of the world in explaining how cooperation and symbiosis have been central to the evolution of life on Earth.

Science now sees the world, including all living creatures, as one incredibly complex system of networks in which feedback loops give the whole and individual parts the power of self-organization. The properties of every part of this vast web are determined by other parts with which they interact. *Figure 1.1* illustrates in a greatly simplified form the general nature of this view of the world.

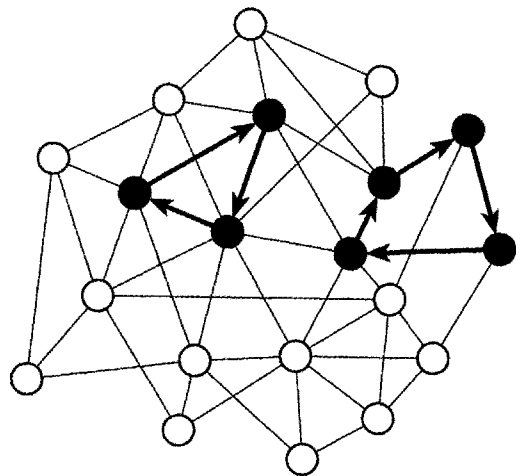


Figure 1.1: Network with feedback loops

Interdependence influences all the interactions between humans and the environments in which they live which, of course, includes other human beings. What this means is that the world we experience is determined by what we choose to regard as distinct things or events and our perceptions of them. We experience not nature, but nature as defined by our method of perception. Other species experience a different world because their perceptions are different. They literally see things we cannot see, hear things we cannot hear, smell things we do not know exist, and so on. Equally we see, hear, touch, smell and taste things that other species are unaware of.

In a similar way other human cultures experience a different world from ours. These differences are reflected most completely in the languages used to communicate. This is true for cultures based on race, religion, nationality, age, social organization, company or construction project. Each of these cultures selects parts of the richly interconnected world to give attention to, regard as important or ignore.

Having decided what should be regarded as separate and distinct, people develop ideas about the relationships between these things and events. The resulting theories guide their decisions.

Any given world view is centrally important in defining the nature of the people who share it. Which is why great efforts are made to defend any given culture. Wars are fought because people choose to see the world differently. Legal battles rage because of clashes of culture which give rise to different views about cause and effect. Children are taught, mainly by the example of adults, a great variety of different views about right and wrong. Managers in different firms working on the same project often see any given sequence of events very differently and their different perceptions create conflicts over rewards and blame.

In the construction industry, disputes are common and their incidence and the particular form they take result from current theories about management hierarchies, market competition, contractual rights and responsibilities, and much else that guides the thinking of managers in the West. The view that lies behind these theories conflicts with the picture that science now provides of humans and the world we inhabit. These errors of perception lead managers to see a world growing ever more complex and uncertain as day-to-day experience contradicts traditional theories about the way the world should behave.

Complexity and uncertainty

As a result of the mismatch between theory and experience, the choices facing customers and managers involved in construction appear bewildering. The apparent complexity and uncertainty are reflected in practical actions. For example, there are many different procurement routes currently in use in the UK construction industry, each strongly supported by practitioners who have built successful businesses by learning how to cope with the conflicts inherent in one particular approach. Thus, there are a multitude of independent specialist designers as well as a variety of multi-discipline design studios offering many different services to customers. There are general contractors, design build contractors and management contractors. There are construction managers who offer their services on a consultancy basis in competition with these various kinds of main contractor. In addition, there are specialist contractors who offer widely differing combinations of design, manufacture, construction, commissioning and maintenance services in respect of a bewildering variety of construction technologies. Then there are consultants, including project managers, quantity surveyors and facilities managers, all of whom offer to help customers deal with the choices generated by all the other specialists.

As a result there is a massive literature describing the many different procurement routes. Much research is devoted to defining and measuring the performance of the

various alternatives. As a result, the strengths and weaknesses of different approaches can be described in theoretical terms. Best practice is identified and codified on the basis of those project case studies judged to be successful because they encountered fewer problems or delivered better results than the norm. However, applying the resulting ideas in practice has become virtually impossible because the underlying paradigm causes any one construction project to appear more complex and uncertain than the theories and best practice guides assume it should be.

Elements and hierarchies

The view which gives rise to these concepts of complexity and uncertainty sees the world as made up of independent elements that form hierarchies.

In this view, construction activities are seen as independent in the sense that each of them can be carried out in isolation by specialists. The specialists' work is arranged sequentially. Indeed, in traditional craft work the separate crafts do not need to meet. Each craft undertakes its work independently and leaves the finished work in the form expected by the next craft in the sequence. So bricklayers leave window openings in the form expected by carpenters who provide the fixing grounds for joiners, who are followed by glaziers and then painters in a sequence determined as an integral part of craft training. *Figure 1.2* illustrates the model implicit in this view of construction as a sequential network.

In a similar way the work of the traditional professions is designed to allow each discipline to work independently. This independence is seen as a strength as

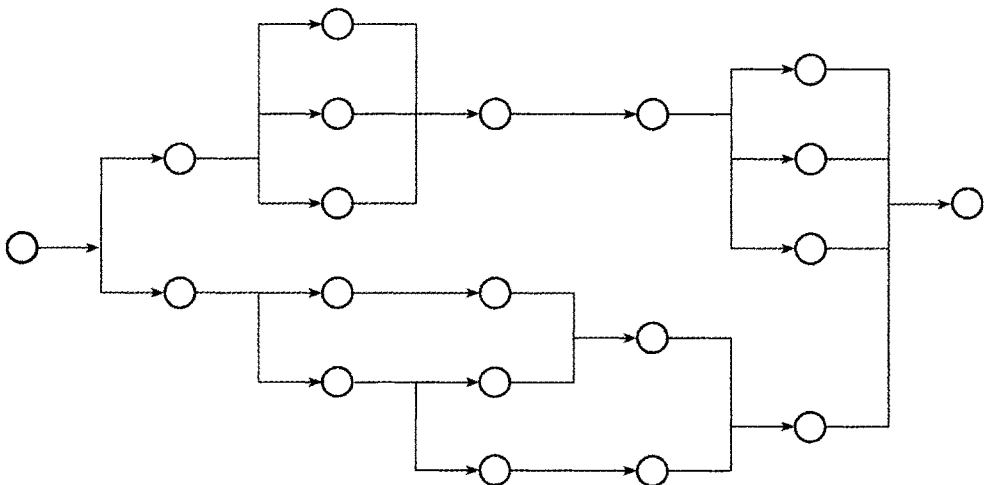


Figure 1.2: Construction seen as a sequential network

professionals argue that they can provide customers with independent advice. The fact that each element of the resulting advice is partial and in total includes many contradictions is a problem only for the customer, not for his or her independent professional consultants. The construction professions are well practised in the complicated games that result from their separate and independent agreements with their customers (or clients, as they prefer to call them).

The organizational arrangements implicit in the old paradigm are riddled with perceptions of hierarchy of the kind illustrated in *Figure 1.3*. Each independent activity has its own hierarchy and only the top levels are supposed to communicate with each other. So, each specialist contractor involved in a project is required to

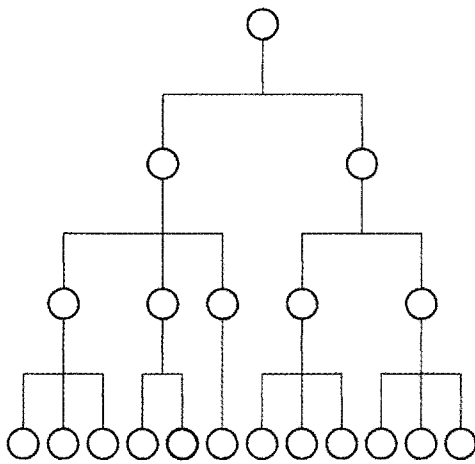


Figure 1.3: Construction seen as a hierarchy

nominate one manager to be responsible for his firm's work. Communication is then channelled through the named managers. Direct contact between other levels is seen as bad practice and is forbidden in many standard forms of construction contract.

The concept of hierarchy is more pervasive than this and indeed dominates thinking about relationships throughout construction projects. In building projects in the UK, for example, there is a widely recognized hierarchy of disciplines. Architects sit proudly at the top and craftsmen and their supporting labourers struggle at the bottom. People know where they fit in the hierarchy and

defer to those above them. Thus, in traditional practice, architects' judgements and decisions are rarely questioned by other professions. Yet it is accepted as reasonable that architects should make judgements about the timeliness and quality of other peoples' work. If an architect's judgement about another's work is challenged it is seen as a very serious problem, and most forms of contract include elaborate procedures to deal with what is classified as a formal dispute. Most formal disputes in construction arise in this way and are based on conflicts resulting from the different perceptions of the independent professions.

Conflicts have become a serious problem in the UK construction industry and report after report complains about the incidence of disputes. Latham (1994) provides a well argued and influential report that makes detailed proposals for ending the adversarial attitudes engendered by disputes. Its proposals, however, are framed within the old paradigm and so, although it makes sound recommendations about teamwork and partnering, it sees the way forward largely in terms of better contracts, more clearly defined responsibilities, a broader evaluation of competitive

tenders and similar ideas grounded in the management paradigm. More fundamental changes in the construction industry are required before its customers will get the standards of quality, speed and efficiency they expect from other businesses.

Change in construction

The ideas described in this book are based on the view that the problems described by Latham (1994) and others are caused not by the nature of construction but by the way managers in the industry choose to view their work. So to move forward from the perceived complexity and uncertainty caused by a paradigm based on elements and hierarchies requires managers to change the way in which they see construction. It is not customers, nor designers, nor specialist contractors who cause the problems. The construction industry's poor performance derives from managers throughout the industry taking an old-fashioned view of their work and, in so doing, creating frameworks that force customers and technical specialists to waste time and resources on unproductive activities.

This is the situation that has faced managers in most industries during the past two decades. Some, including some in construction, have made the necessary changes. The results seen in other industries have been described by many authors. For example, Oliver and Wilkinson (1992) and Womack and Jones (1996) leave no doubt about the benefits of making the paradigm shift nor about the deeply ingrained resistance to change on the part of those still attached to the old ideas.

The argument on which this book is based is that the world appears to be complex and uncertain to managers of construction projects because they choose to view it in terms of elements and hierarchies. The book uses a wide range of recent research into leading practice in construction to propose a more useful way of seeing the world so that what is all too often seen as complex and uncertain can be recognized as manageable.

Practical theories

Two sets of ideas are particularly useful in understanding the practical implications of the new paradigm. They are systems thinking and chaos theory. Together they provide a framework of ideas that are implicit in the long-term strategies of really successful organizations. These ideas help managers make good decisions even though they cannot predict all the problems they will face, nor the source of good answers.

A useful introduction to the practical implications of these ideas can be found in De Geus (1995) which was written to help the Shell Group plan its future strategies. De Geus looked at the histories of companies that had existed as large enterprises at the end of the nineteenth century. An intensive search identified only about forty that still exist today with their corporate identity intact. All the rest had been swept away by changing markets or technologies that they had been unable to deal with.

The strength of De Geus' work is in his finding that the surviving companies share key characteristics which enable them to be efficient and yet cope with

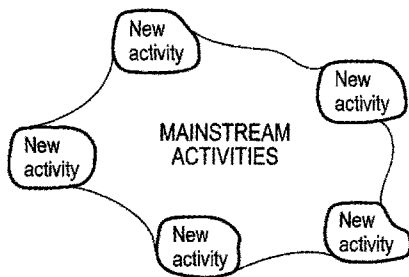


Figure 1.4: Companies that survive long-term

major changes. Figure 1.4 illustrates the most important characteristics of the surviving companies. They sustain and steadily develop their physical and human resources in their mainstream businesses and, at the same time, tolerate marginal activities. These are usually pursued by small dedicated groups of enthusiasts who believe they have spotted a potential opportunity or simply want to develop an interesting idea. It is the existence of activities at the margin that allow companies to change direction as markets and technologies change. In con-

trast, companies unwilling to tolerate activities that consume resources outside of their mainstream business are often destroyed by the stress of making fundamental changes under pressure from market forces or technological innovations.

In the short-term, tightly managed companies are often more efficient at their mainstream business than their more tolerant competitors. However, centralized companies are not flexible and De Geus' study shows that during the twentieth century, centrally directed change has been difficult to manage. Companies tolerant of activities at the margin of their businesses have a better track record in responding to change.

Tolerance is needed because there is no way of predicting which marginal activities will provide the best response to some future threat. All that senior management can do is ensure that they recruit talented people and then give them the tools and opportunities to understand specific parts of the company's environment. Most will concentrate on the mainstream business but some will get excited by other ideas and they must be allowed to pursue them inside the company. In the short term this is wasteful of resources but, in the long term, De Geus' study tells us that tolerance for marginal activities gives organizations the flexibility needed for long-term survival.

Thus managers need to reconcile the demands of short-term efficiency and long-term flexibility. Systems thinking and chaos theory provide ideas that help achieve this difficult balance.