Chapter 1 Dashboard		
Key Message		○ Major projects are complex. ○ The culture and methodologies of the industry condition the way projects are carried out. Appropriate procurement choices are vital. ○ Public sector clients tend to be excessively bureaucratic, and politicians and political decisions can severely disrupt the smooth running of projects.
Definitions		○ **Projects** may be standalone or part of a programme or portfolio. Projects are traditionally measured by the criteria of time, cost and quality. ○ **Programmes** are measured by the achievement of specific strategic objectives and benefits. ○ **Portfolios** are a means of structuring investment in properties or physical assets where a balance between investment and benefit is required. ○ **Building Information Modelling (BIM)** has improved project information exchanges and design clash detection as well as facilitating the 4D planning of projects.
Headings		**Chapter Summary**
1.1	Introduction	○ Construction is a hugely adaptable and inventive industry that undertakes an impressive array of projects from domestic scale to mega-infrastructure projects of cutting-edge complexity. ○ Many major projects have experienced poor out-turns regarding time and cost predictability. ○ Construction mega-projects are special due to their size, cost and complexity. They inform our approach to 'normal' projects and help to drive forward new ways of thinking and new technologies.
1.2	Why Do Projects Go Wrong?	○ Construction is a 'project-based industry' where the time, cost, quality, resources, problems and solutions are all geared to the project. ○ Construction work is complex because it involves the procurement and management of finite resources from a supply chain that often struggles to cope with demand.
1.3	Managing the Risk of Delayed Completion in the 21st Century	○ Construction projects – especially mega-projects – are frequently late and over budget. The many reasons for this include poor planning and management and the lack of dynamic scheduling, risk management and record keeping in order to control time effectively. ○ Many common forms of contract do not promote or encourage efficient time management. ○ Project management software can aid effective project planning and control and thereby minimise risk, delay and disputes in construction projects.
1.4	The Latham Reports	○ Commissioned to find ways to reduce conflict and litigation and encourage the industry's productivity and competitiveness.
1.5	The Egan Reports	○ Set up by Government to identify the scope for improving quality and efficiency in construction.
1.6	The Wolstenholme Report	○ Wolstenholme sought to establish what progress had been made since the second Egan Report in 2002.
1.7	The Farmer Review	○ Commissioned by the Construction Leadership Council to review the UK construction labour model and the poor performance of the industry. ○ Critical symptoms included low productivity, low predictability of time, cost and quality, structural and leadership fragmentation, low margins and adversarial pricing models.
Learning Outcomes		○ Understand the nature and complexity of construction projects. ○ Distinguish between projects, programmes and portfolios. ○ Appreciate the role of industry reports in understanding the culture and methodologies of construction.
Learn More		○ Read Chapter 1 Sections 1.3–1.7 to see whether the recommendations of official reports have had any significant impact on the way that the industry operates. ○ See also Chapters 2, 4 and 19–21.

1

Construction Projects

1.1 Introduction

Construction is like no other industry.

The built environment around us is testimony to the audacity and ingenuity of architects, builders and engineers over the centuries. The Egyptian pyramids, mediaeval castles and cathedrals, the canal and rail infrastructure of the nineteenth century and more recent projects such as the skyscrapers of New York and tunnels through the Swiss Alps and under the English Channel provide breathtaking exemplars that characterise the world of construction and engineering.

A particular feature of the history of construction around the world is that the buildings, structures, bridges, railways and tunnels are all essentially prototypes. This is true to this day, even where designs are identical. Repetitive housing, fast-food outlets, chain hotels and standardised factory-made components may well be 'jelly-mould' designs, but every construction site on which they are built is different, and each construction team will invariably be unique, assembled with different people from different socio-economic and cultural backgrounds. These are the people who turn design into reality in the tough and dangerous world of construction.

Construction is a hugely adaptable and inventive industry that undertakes an impressive array of projects from domestic-scale repair, maintenance and remodelling work to mega-infrastructure projects of cutting-edge complexity posing enormous technological challenges.

The E39 highway in Norway is a good example – it is 1000 km (680 mi) long and crosses fjords up to 1.3 km deep with floating bridges and tunnels – a project of breath-taking scale and environmental sensitivity.

https://youtu.be/HCT-FurFVLQ

Construction Planning, Programming and Control, Fourth Edition. Brian Cooke and Peter Williams.

1.1.1 Industry Reputation

Paradoxically, the construction industry does not have the best reputation:

- It is widely recognised as being adversarial and slow to accept change.
- Easy entry into the industry encourages shoddy workmanship and so-called 'cowboy' builders.
- Many major projects have experienced poor out-turns regarding time and cost predictability including Wembley Stadium, the Scottish Parliament at Holyrood and Crossrail in London. England's current High-Speed Rail project (HS2) has suffered delays, overspending, extensive scope changes and widespread criticism.
- The industry generally suffers from a poor health and safety record.
- The Chartered Institute of Building (CIOB)[1] reports that construction underperforms in terms of inclusivity and diversity.

Conversely:

- Major contractors have encouraged top-down improvements in health and safety 'norms' which drive higher standards in the many subcontractors and smaller firms that operate in the industry.
- Building information modelling (BIM) has improved project information exchanges and design clash detection as well as facilitating the 4D planning of projects.
- Modern methods of construction, the concept of design for manufacture and assembly (DfMA) and the use of factory-built components and assemblies are being more widely integrated into mainstream projects with beneficial impact on time and cost certainty.

1.1.2 Projects

Construction is often referred to as a 'project-based industry' and, wherever there is a built environment, you will not be far from a tower crane, roadworks on a motorway or scaffolding around a building – indications of the presence of a construction project.

A construction project could be anything from a modest house extension to the £15 billion Crossrail project in London, one of the largest construction projects ever undertaken in Europe – but there is a common theme. The whole focus is on the project – the time, cost, quality, resources, problems and solutions are all geared to the project.

This brings enormous pressure on project teams, however, big or small they are, to ensure that the project is completed on time, on budget and to the correct quality standards.

The 'one-off' nature of construction creates additional pressures, however, because more or less every project has its own individuality and peculiarities depending on the site and location, the design and type of construction, the business arrangements between the parties and the hopes and expectations of all those involved. Projects may be defined as:

> *Unique, transient endeavours, undertaken to bring about change and achieve planned objectives, which can be defined in terms of outputs, outcomes or benefits.*
>
> (APM 2020)

This definition identifies the normal reasons why construction projects are carried out and the expected outcomes – a client satisfied with the finished result and completion within defined time, cost and quality expectations.

Whether a construction project is intended to provide an asset for personal use (such as a house) or for production or investment (a new factory or an office block) or to upgrade or maintain an existing asset (a house extension or repairs to a rail bridge), capital expenditure is normally required in the form of a loan, direct investment or public funding.

In some cases, public-sector projects are constructed with private-sector investment. The private finance initiative (PFI) used in the UK enabled the public sector to repay the capital cost of its projects over time according to the utility provided by the facility. This could be a toll bridge, a hospital or a prison, for instance. Concerns over value for money, however, led to PFI – and its successor PF2 (Private Finance 2) – being discontinued. Other forms of public-private partnership (PPP) have been developed in their place.

1.1.3 Programmes

In order to distinguish between a 'project' and a 'programme' take the example of a modern PPP between a local authority and the development arm of a large contractor.

> A joint venture was formed in order to build 109 new homes for sale and 69 for rent across two sites as part of a two-phase regeneration scheme that includes associated community facilities.[2]

This development is a 'programme' which are defined as:

> *Unique and transient strategic endeavours, undertaken to achieve a defined set of objectives, incorporating a group of related projects and change management activities. They can be defined as coordinated … combined to achieve beneficial change.*
>
> (APM)

A programme can therefore be described as a number of related projects brought together to achieve particular benefits in a more effective way than as a group of individual projects. Admittedly, each project in the programme may well be organised and managed individually but there might be shared facilities – such as an on-site concrete batching plant – and the same contracts manager may be in overall charge of all the projects comprised in the programme.

An important distinction between projects and programmes is that projects are traditionally measured by the criteria of time, cost and quality whereas programmes are measured by the achievement of specific strategic objectives and benefits which might otherwise have not been possible had the projects been managed independently.

A further notable difference between projects and programmes is that programmes are often punctuated by a number of milestones and are not always as strictly finite as a project. They also take far longer to complete than any of the projects within the programme and may, in some cases, have no specific end date at all.

HS2 is often referred to as a project, but it is, in fact, a programme with specific strategic objectives: to reduce journey times, increase connectivity and encourage investment. There are hundreds of individual elements to HS2 – stations, tunnels, bridges, viaducts and track, rolling stock and so on – that are geographically spread over some 400 km (260 mi), making it impossible to manage as one project.

However, HS2 also sits within a portfolio of public sector infrastructure investments in road, rail and major transport schemes.

1.1.4 Portfolios

Portfolios *are used to select, prioritise and control an organisation's programmes and projects, in line with its strategic objectives and capacity to deliver* (APM).

Local authorities, for instance, own and manage a wide variety of property, such as social housing, schools, care homes, waste and recycling centres, shopping and leisure centres, commercial property and municipal buildings, and so on, that require investment in order to maintain, adapt, replace or augment the estate. This investment usually takes place over an unspecified period, and the work involved has to be managed and prioritised.

Consequently, the related or unrelated programmes of work or stand-alone projects that arise need to be organised into a structured portfolio and managed according to urgency, need, budgetary and timing demands, usually in the form of an asset management plan.

Similar portfolios of work will be found in hospital or prison estates or in airport authorities that have large estates of properties to look after.

Portfolios are, therefore, a means of structuring investment in properties or physical assets, such as road and rail infrastructure, where a balance between investment and benefit is required and where projects and programmes are created and closed out accordingly.

The role of portfolios, and the interrelationship between projects and programmes, is illustrated in Figure 1.1 which distinguishes a stand-alone programme from that sitting within a portfolio and shows how a project can equally sit within a programme and a portfolio. It also depicts how an organisation can have stand-alone projects and programmes as well. The CIOB provides a useful summary:

- **Projects** are of relatively short duration measured in weeks/months – a new hospital for example.
- **Programmes** have longer durations measured in years with a finite end – such as upgrading a number of existing hospitals to meet modern standards.
- **Portfolios** are ongoing activities with no defined end – the repair and maintenance of a number of hospitals over an undefined or ongoing period, for example.

1.1.5 Mega Projects

The construction industry is renowned for its mega projects and there is no doubt that they have a beguiling fascination for their breathtaking scale, technical audacity, incredible timescales and enormous cost. Some recent examples of such projects are shown in Table 1.1.

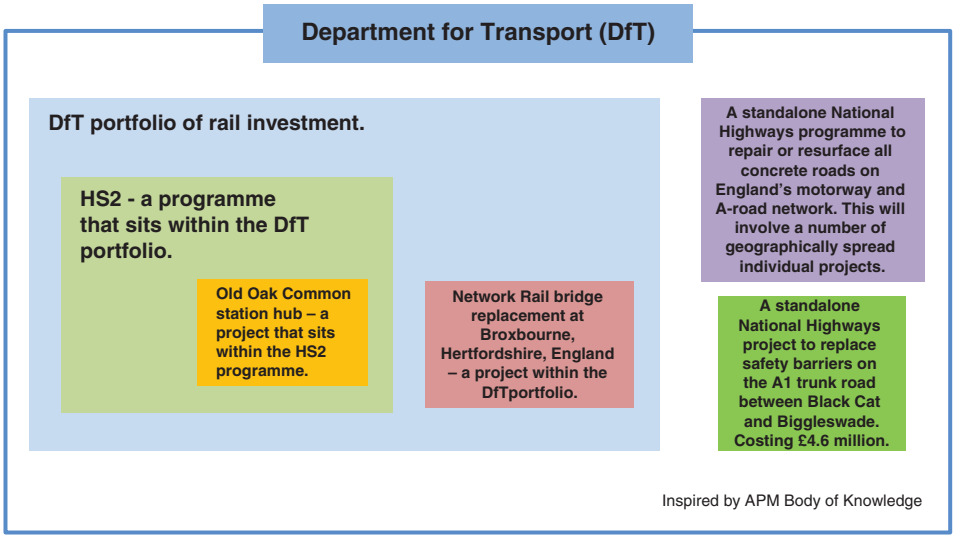

Figure 1.1 Projects, programmes and portfolios.

Table 1.1 Recent mega projects.

		Indicative cost	Indicative construction period
Project	**Description**	**US$ billion**	**Years**
Al Maktoum International Airport, Dubai	Airport	82	5
Dubailand, Dubai	Theme Park and leisure project	64	12
South-North Water Transfer Project, China	Canal project for irrigation system	78	48
London Crossrail Project	Tube system	23	10
Linear Chuo Shinkansen, Japan	Ultra-high-speed railway using magnetic levitation technology	52	12 (Phase 1)

Realistically speaking, the time and cost figures associated with such projects do not really matter – they are broad estimates at best. Yes, these projects are planned and, yes, timescale and cost controls are in place, but everyone knows that time will overrun significantly, and cost will spiral way beyond original expectations – it is 'par for the course' for the vast majority of these huge projects.

This does not invalidate the need for planning and control – it is just that unknown, unforeseen and unexpected events override the process. Political delays, inflation, technological change and business failures mean that the risks are high, but so are the rewards.

Mega projects change the lives of millions of people, but they are the very tip of the construction 'iceberg' and might be considered 'abnormal' in an industry-wide context. One of the great benefits of mega projects, however, is that they inform our approach to 'normal' projects and help to drive forward new ways of thinking and new technologies that can filter down through the echelons of the industry.

Sir John Egan (1998) said that the UK construction industry is capable of carrying out *the most difficult and innovative projects* imaginable and another mega-project – High Speed 2 (HS2) – is one of the largest and most controversial in recent times.

The timeline for construction works for HS2 is vague, with some estimates suggesting that it might be 20 years before the project is entirely complete. Cost is another imponderable – originally estimated to cost £32 billion, predictions range from £56 billion to £100+ billion at the time of writing.

Politically speaking, the future of HS2 is open to question as there are serious doubts about the business case for the project. This is counterbalanced to some extent by the fact that HS2 is being modelled in a BIM environment, using the latest digital technologies. Consequently, the entire project will be realised virtually, from design through construction and occupancy, before physical work is carried out – thereby creating considerable economies.

This process should facilitate enormous savings in time and money compared to traditional methods – despite the eye-watering cost – and may well set the standard for future, more modest projects, in line with government aspirations.

1.2 Why Do Projects Go Wrong?

Late and over-budget major projects certainly grab the headlines:

- The Berlin Brandenburg Airport was completed nine years late.
- The Flamanville-3 nuclear power station in France is over 11 years late and more than five times over its initial €3.3 billion budget.
- Crossrail in London was similarly £billions over budget and several years late.
- In the United Kingdom, the first phase of HS2 is reportedly four years behind schedule and phase two was eight years late before it was cancelled.
- In its annual report 2022–2023, the UK Infrastructure and Projects Authority (IPA)[3] gave phases 1 and 2a of HS2 a 'red' rating. This means that successful delivery *appears to be unachievable* and that *there are major issues with project definition, schedule, budget, quality and/or benefits delivery, which at this stage do not appear to be manageable or resolvable*. The implication is that the project *may need re-scoping and/or its overall viability reassessed*.[4]

Reasons for such delays are easy to find and can include:

- Ineffective political governance.
- Lengthy statutory approvals processes.
- Suffocating bureaucracy and political meddling.
- Hugely complex chains of command – there are over 29 000 people engaged on HS2, for instance.

- Sheer scale – HS2 Phase 1 has over 350 major construction sites.
- Extensive scope changes and 'mission creep'.
- Poor accountability.
- Poor project management.
- Poor quality materials and inadequate workmanship.
- The COVID-19 pandemic and its aftereffects.
- Scarcity of resources – especially skilled labour.

A recent survey by the Project Management Institute (PMI) revealed that only 48% of major construction projects were completed on time in 2020 and that almost one-third of projects failed to meet their original aims and objectives.[5]

In an earlier CIOB survey[6] involving several thousand projects, simple, repetitive and low-rise projects (<6 storeys) were reported to have a high chance of success using traditional management processes. This contrasts sharply with more complex projects where the likelihood of completion on time, or within a short time after the intended completion date, was reported to be significantly lower.

1.2.1 Looking for Reasons

Whilst providing useful insights into why projects may be delayed, the results from the PMI and CIOB surveys are entirely predictable. Complex projects will face problems because they are just that – complex.

The CIOB survey tends to point the finger at contractors, project managers and at the standards of project management in the industry as the prime suspects when a project is delayed but there is much more to it than that:

- Construction projects invariably commence on site before the design is sufficiently well developed which can lead to late, incomplete or conflicting information being issued to contractors thereby compromising the proper planning of production on site. This issue has been raised in several official reports including the Latham Report (1994).
- Design changes are common in construction which leads to variations or changes to works information. This can lead to inefficiencies, reworking of completed work and delays awaiting confirmation of instructions.
- Many projects rely on design input from specialist subcontractors who are, invariably, appointed after the main contract has been awarded. This militates against commencement of work on site based on a complete design and can result in design clashes, conflicting or late information and potential delays should materials and components require long lead times before they can be delivered to site.
- Construction contracts often include provisional sums for work which is envisaged but not yet designed. Such work may well be defined in the contract but often this is inadequately detailed to enable the contractor to allow for the work in the schedule.
- Extensions of time allowed under construction contracts often provide inadequate recompense for the actual delay incurred on projects resulting from design changes, delayed instructions, unforeseen physical conditions or supply chain problems.
- In the event of delay, English law requires contractors to mitigate delay which can lead to inefficient working and poor use of resources.

- Contractors normally carry the risk of delay due to bad weather unless the weather is sufficiently inclement to be considered exceptional.
- Both clients and contractors are prone to being over-optimistic when planning their projects.
- Inflationary pressures and poor budgetary control.
- Disputes over contract payments can cause cash flow problems for contractors and sub-contractors. This can lead to delays on projects due to inability to secure and pay for the necessary materials and other resources needed to keep the project on schedule.
- Slightly tongue-in-cheek, there is also Murphy's law which says that:
  - Anything that can go wrong will go wrong.
  - Nothing is as easy as it looks.
  - Everything takes longer than you think it will.

1.2.2 Murphy's Law

The construction of the Scottish Parliament building in Holyrood, Edinburgh, Scotland, which was finally completed in 2004 – more than three years late – is a classic example of Murphy's law.

In a 271-page report by Lord Fraser,[7] a catalogue of reasons why the project cost so much money and took so long to build was given, including:

- The project cost was initially estimated to be £10–40 million.
- Outturn cost was £414 million.
- The Spanish architect Enric Miralles died before his vision could be completed.
- The architectural joint venture engaged for the project had different cultures and ways of working.
- Construction management procurement was chosen which placed full control of the project in the client's hands but also all the risk.
- The project was beset by accusations of poor and inexperienced management and criticisms of Members of the Scottish Parliament for meddling in the project and constantly making design changes.

It might be of some comfort that the building was generally acclaimed for its design which aimed to create a poetic union between landscape, people and culture and was awarded the 2005 RIBA Sterling Prize for architecture!!

1.2.3 Complexity

Construction projects – especially large projects – can run into difficulties simply due to the passage of time. It can take years to design a large project and the statutory approvals process – which might involve parliamentary consent – can take years or even decades. As time goes by legislation changes, project objectives and expectations can change and developments in construction materials, techniques and IT can also impact a project. The political and economic climate can change over time and changes of government, inflation or economic downturns can seriously affect the viability or scope of a project.

Inflationary pressures on the predicted cost of HS2 mean that the project may be significantly scaled-back or abandoned entirely, mid-construction. The resultant impact on the industry is enormous with future order books decimated and an entire industry looking to find £billions worth of alternative work.

Construction work is complex because it involves the procurement and management of finite resources – materials, plant, labour, temporary works, specialist contractors and so on – from a supply chain that, especially at times of high industry output, struggles to cope with demand.

Additionally, projects are often undertaken in demanding conditions, subject to the vagaries of the weather, poor ground conditions, sometimes on confined sites with difficult access and where all manner of hazards are present beyond those directly related to the construction work itself (such as traffic, pedestrians, nearby buildings, underground services or tunnels).

A further layer of complexity is added to construction projects because they normally involve much more than the work on site:

- Justification for the intended project is normally needed in the form of a business case or some other criteria such as spatial requirements, modernisation of a facility, maintenance, etc.
- The necessary finance has to be arranged which, in some cases, can involve many billions of currency.
- Planning permission will invariably be required and, for very large projects of national importance, acts of parliament are needed.
- Construction projects take time – sometimes many years – before they can even start on site. In this time, economic circumstances can change, inflation can impact construction prices and unexpected supply chain issues can arise.
- Designs for architectural, structural, heating ventilating and air conditioning (HVAC) and so on have to be procured.
- In some cases, ground investigations, archaeological surveys and digs are required.
- There may be enabling work required such as demolitions, ground remediation, service diversions, access roads and highway diversions.

1.2.4 The Consequences of Late Completion

Research, empirical evidence and past history suggest that construction clients are more likely than not to be disappointed with the outcome of their projects from the perspective of time – if not cost and quality.

This is undoubtedly true, and it is also the case that many construction projects are poorly planned, badly managed and lack the necessary levels of dynamic scheduling, risk management and record keeping in order to control time effectively.

Conversely, it is also true that the industry can point to many examples of excellence in the time, cost and quality management of construction projects large and small. The PMI survey claims that 48% of complex projects were completed on time, and considering the complexity of such projects, this is not bad. Admittedly, it could be better.

Additionally, the CIOB survey suggests that low-medium rise projects with straightforward groundworks and simple HVAC services have a high chance of success. Considering that such projects represent a large proportion of the output of the industry, this is also encouraging.

As far as complex projects are concerned, there is no lack of expertise involved. They are carried out by the top contractors who use the latest digital technologies and have highly capable staff and risk management capabilities. Such projects are simply complex, and success or failure may depend upon influential factors that are beyond the control of clients or contractors. Very often – especially in the public sector – the levels of bureaucracy are suffocating, decision making is slow and inconsistent and politicians, frankly, meddle in things they do not understand!

The fact that construction projects can go wrong is hardly breaking news! In fact, since the advent of standard construction contracts in the mid-nineteenth century, there have always been provisions for dealing with delay, disruption and additional cost. Likewise, modern construction contracts all include clauses dealing with:

- Extensions to the time for completion with respect to matters such as:
  - Variations or changes to the works.
  - Late information, including design information.
  - Delays due to the presence of underground services or difficult subsoil conditions that could not have been anticipated.
  - Failure by the client to give possession of the site at the agreed time.
  - Suspension of the works by the client.
  - Archaeological or geological findings.
  - Exceptionally inclement weather.
- Damages for late completion:
  - Where this is the fault of the contractor.
  - Reimbursement of the client for the impact of delayed completion to the extent that money can compensate for its effects.
  - A fair assessment of the client's loss (hence common use of the term 'liquidated and ascertained damages' (LADs)).
- Loss and expense/compensation payable to the contractor in the event of:
  - Prolongation costs should delayed completion be the fault of the client.
  - The additional expenditure required to deal with risk issues that were not the responsibility of the contractor.
  - Delay or disruption to the works as a result of variations to the contract, late information or instructions or other reasons for which the contractor is not culpable.

The result of late completion is bad news for everyone:

- The client side may suffer:
  - Loss of revenue, rent or sales.
  - Loss of utility in the case of a house, hospital or prison.
  - Inconvenience to the public due to prolonged roadworks.
- The contractor side may suffer:
  - Loss of profits.

- Delays to other projects whilst awaiting resources tied up unnecessarily.
- Claims from subcontractors should their work be delayed or disrupted.
- Loss of reputation.

1.2.5 Construction Industry Reports

The search for answers to the failings of the construction industry stretch back into the mists of time.

In 1944, the Simon Report – *the Placing and Management of Building Contracts* – investigated how procurement methods could improve the efficiency of the construction industry. This report was followed by several other public reports which criticised the industry and its perceived poor record of client satisfaction and its failure to deliver projects on time, on budget and to the desired quality standards.

Official reports include the Emmerson Report (1962), the Banwell Reports (1964 and 1967), the Tavistock Report (1966) and the more recent reports by Sir Michael Latham (1993 and 1994), Sir John Egan (1998 and 2002), Andrew Wolstenholme (2009) and Mark Farmer (2016). These reports, and others, are shown in Table 1.2 and are discussed in detail by Murray and Langford (2003), who debate the extent to which government has tried to shape the performance and attitudes of the industry.

Table 1.2 Construction industry reports.

Report	Title	Year
Simon Report	The Placing and Management of Building Contracts	1944
Emmerson Report	Survey of Problems Before the Construction Industries	1962
Banwell Report	The Placing and Management of Contracts for Building and Civil Engineering Work	1964
National Economic Development Office (NEDO)	Action on Banwell	1967
Tavistock Report	Interdependence and Uncertainty	1966
Latham 1	Interim Report – Trust and Money	1993
Latham 2	Final Report – Constructing the Team	1994
Levene Efficiency Scrutiny	Construction Procurement by Government	1995
Egan Report 1	Rethinking Construction	1998
National Audit Office	Modernising Construction	2001
Egan Report 2	Accelerating Change	2002
National Audit Office	Improving Public Services through better construction	2005
Constructing Excellence	Never Waste a Good Crisis: Wolstenholme Report	2009
Construction Leadership Council	Modernise or Die: Farmer Review	2016

The Latham and Egan reports are, perhaps, the most well-known, but several of the reports published prior to these raised similar issues. Banwell even suggested that a common form of contract should be adopted for use on all construction projects which was 30 years before Latham made the same recommendation.

Official industry reports tend to be characterised by their strategic 'top-down' nature. Matters considered usually include leadership, client satisfaction, procurement methods, contracts, design and design briefing, dispute resolution and so on. Whilst these reports deal with issues that broadly impact project outcomes, they are pan-industry issues. They do not deal with the nitty-gritty of time management – the scheduling, resourcing and control of time (and cost) on individual projects.

To this end, a report entitled *Managing the Risk of Delayed Completion in the 21st Century* was commissioned by the Chartered Institute of Building in 2009. It was not sponsored by government but nonetheless adds considerably to the body of knowledge about the industry and its practices, especially as regards the subject matter of this book.

1.3 Managing the Risk of Delayed Completion in the 21st Century

This report investigated a significant number of construction projects in order to try to further the awareness of time management issues in the construction industry and to understand the importance of planning engineers and project schedulers in the management of time.

In doing so, the research also helped to identify the extent of unresolved delay in a variety of building projects and the level of understanding of project control techniques in the industry.

1.3.1 Summary of Findings

In a useful survey of some 2000 construction projects, the CIOB (2009), concluded that the common standard forms of contract used in construction *do not promote or encourage efficient time management*. A further observation was the trend towards developing contracts that are *increasingly punitive if not executed efficiently using good quality time management and project controls*.

Current industry trends were also reported to include:

- Demand for complex project solutions in shorter timescales and within tighter financial constraints.
- High demand for accurate completion dates.
- For contractors to undertake risks normally taken by the employer.
- A growth in Design and Build (D&B), Guaranteed Maximum Price (GMP) and Engineer Procure and Construct (EPC) contracts.

The report further concluded that simple, repetitive, low-rise projects have a high chance of success using traditional management processes but that the more complex the project,

the less likely it is that it will be completed on or near to the completion date using traditional methods. Projects that are most likely to be delayed were reported to include:

- Low-rise hospitals, clinics and health-related buildings.
- Prisons and security buildings.
- Stadia and sports-related buildings.
- Railway stations.
- High-rise buildings.
- Complex engineering projects.

In a nutshell, the CIOB survey observed that:

- Most projects of a simple nature can be time-managed intuitively by competent practitioners.
- Complex projects cannot.

1.3.2 Detailed Observations

The CIOB report indicated that simple projects, such as petrol filling stations, school classrooms and repetitive housing, finished on or near the required completion date, but only 20% of complex projects finished on time, with over 60% being delayed by 6 months or more. In this context, the £150 million Holyrood Parliament building suffered £150 million in prolongation costs![8]

Further observations from the report were that:

- Only 10% of respondents were familiar with project management software suitable for satisfactory time and cost management.
- A further 10% stated that no project management software was used at all and that time schedules were prepared using spreadsheets.
- Over 50% reported that Microsoft Project was their software of choice.
- Only a third of respondents calculated the duration of activities on the schedule by applying the productivity of resources to the quantity of work to be carried out.
- More than half of respondents acknowledged that only the master schedule was used to manage time and that no short-term planning was employed.
- Nearly 20% of projects were procured on the basis of bespoke, non-standard contracts but this made no difference to the effectiveness of project time management.
- More than half of respondents used bar charts for the long-term planning of their projects but only one-sixth of these were familiar with fully linked critical path networks for managing the timing and sequencing of the work.
- 75% of respondents were familiar with short-term or 'look-ahead' programmes, but very few of these programmes were reported to be integrated into the master schedule in order to see the effects of the short-term programme on the overall timescale.
- Less than 10% of respondents kept site records in a relational database and more than 50% kept paper records only.

1.3.3 Claims and Disputes

A worrying feature of the CIOB Report is the extent to which claims were reportedly based on the master schedule, when the site was working on short-term programmes, and that progress reporting and delay notices were based on poor records measured against programmes that had not been updated. This observation may go some way to explaining why disputes develop and why many of them are ill-founded at best and spurious at worst. The Latham Report did not unearth this level of detail but was nonetheless critical of the industry's claims record.

1.3.4 Project Management Software

The CIOB survey makes a compelling argument for a greater uptake of project management software in order to aid effective project planning and control and thereby minimise risk, delay and disputes in construction projects.

In order to help in this process, the CIOB published a guide to good practice in 2010 (CIOB 2010).

1.3.5 Further Developments

Publication of the CIOB research provided the impetus for the development of an entirely new and novel form of contract drafted with the problems associated with the time and cost management of complex projects in mind. This contract was launched in April 2013 as the Complex Projects Contract 2013 (CPC2013).

CPC2013 was later amended following industry feedback and renamed the Time and Cost Management Contract 2015 as part of the Time and Cost Management Contract Suite of contracts. This suite also includes subcontract and consultancy appointment forms.

Turning to wider issues concerning why the construction industry generally under-achieves its clients' expectations, it is necessary to look at government-sponsored reports – at least the more recent ones – and to try to establish whether they have had any significant impact on the way that the industry operates:

- The Latham reports (1993 and 1994).
- The Egan reports (1998 and 2002).
- The Wolstenholme report (2009).
- The Farmer report (2016).

1.4 The Latham Reports

Perhaps the most influential of all the reports concerning the industry and its problems was *Constructing the Team* written by the late Sir Michael Latham (1994) who was commissioned by both government and the industry to review the procurement and contractual arrangements in the UK construction industry.

Prior to final publication of his report in July 1994, Sir Michael produced an interim report in December 1993 called *Trust and Money*. This interim report encapsulated, perhaps more than the final report, the real problems in the industry, some of which remain unchanged 30 years later.

1.4.1 Trust and Money

This report raised concerns about the extent of mistrust between professionals and contractors and between contractors and subcontractors in construction. It also flagged up the endemic culture of late and conditional payments operating in the industry which the Housing Grants, Construction and Regeneration Act 1996 (commonly referred to as the Construction Act) has to some extent, but not entirely, resolved.

Finally, the prevailing atmosphere of mistrust and slow payments was reported to result in disharmony in project teams, poor standards of work and poor client satisfaction.

1.4.2 Constructing the Team

The purpose of *Constructing the Team* – better known as the 'Latham Report' – was to find ways to '*reduce conflict and litigation and encourage the industry's productivity and competitiveness*'. The specific terms of reference for the review were to consider:

- Current procurement and contractual arrangements.
- Current roles, responsibilities and performance of the participants, including the client.

The report took account of the structure of the industry and the need for fairness, accountability, quality and efficiency and paid particular regard to:

- Client briefing.
- Procurement methods.
- The design process.
- The construction process.
- Contractual issues.
- Dispute resolution.

1.4.3 Post-Latham

Whilst *Constructing the Team* made 30 main observations and recommendations, the principal emphasis was on 'teamwork' in order to achieve 'win-win' solutions. Additionally, Latham noted several issues which influence the ability of the construction industry to respond effectively to its customers' requirements. These are summarised briefly in Table 1.3 which also includes a commentary on developments since 1994.

Some of the main points made by Latham clearly have important consequences for the planning, production and control of construction and are therefore directly relevant to this book. These are included in Table 1.4 which also indicates the extent to which Sir Michael Latham's ideas have been adopted since his report was published.

Table 1.3 Latham issues.

	Factors governing ability of the industry to respond to customers' requirements	
	1994	**Now**
1	Sensitivity to changes in government spending patterns.	• Little change. • Industry deeply affected by public sector cuts during 2008–2013 recession. • More honesty required in public sector spending programmes.[a)]
2	Intense competition for work.	• Margins under pressure.[b)] • Impact of five years of downturn. • Reverse auctions driving down subcontract prices to unsustainable levels.[c)]
3	Inability to respond to increased demand.	• Shortage of skilled workers in the industry.[d)]
4	Lack of competency testing of firms/workers entering the industry.	• Great improvement due to Construction Skills Certification Scheme (CSCS) scheme. • CHAS (or equivalent) registration test for firms has raised health and safety standards.
5	Lack of training.	• Firms urged to make apprenticeship commitments.[e)] • Lack of female students and shortage of funding for colleges could lead to future skills shortage.[f)]
6	Mistrust between the participants in construction projects.	• Collaborative working yet to be widely adopted in the industry.[a)] • Universities continue to perpetuate the divisive industry model of separate disciplines.[a]
7	Inadequate capital base (i.e. most contractors are under-capitalised).	• Most of the industry works on credit. • Over-valued work in progress and lack of working capital still endemic. • Perpetuated by low-margin/high-risk industry model.
8	Adversarial attitudes.	• Many supplier frameworks do not encourage collaboration.[a)] • Risk is still passed down the supply chain.[a)] • Unfair payment practices still common especially late and reduced payments to subcontractors.
9	Claims-conscious contractors.	• Partnering is skin deep with avoidance of risk and profit maximisation to the fore.[a)] • Some clients abandoning frameworks in favour of competitive tendering.[a)]
10	High levels of insolvency.	• Still high compared with other industries. • Large proportion of firms employing less than five people. • Peak period 1st quarter 2009.

References

a) Wolstenholme (2009).
b) Construction News 2/9/2014.
c) Ross and Williams (2013).
d) The Guardian 14/10/2015.
e) CITB 29/1/2016.
f) Building.co.uk 14/8/2015.

Table 1.4 Latham suggestions.

	Latham suggestions	
	1994	**Now**
1	The need for a set of basic principles for modern contracts.	• This has not happened. • JCT, NEC, ICC and Fédération Internationale des Ingénieurs Conseils (FIDIC) contracts have developed in different ways.
2	Greater use of the New Engineering Contract, which could become a common contract for the whole industry.	• An extensive 'family' of contracts has developed under the NEC banner. • Initial take-up was slow in the United Kingdom compared to internationally. • NEC contracts are now widely used.
3	Improved tendering arrangements and more advice on partnering arrangements.	• Frameworks have caught on in the industry. • Competitive tendering has made a come-back during the 2008-13 recession.[a)]
4	Evaluation of tenders on quality as well as price.	• 2 and 3-envelope tenders now common. • Weighted evaluation based on price, quality and time now common.
5	Fairer treatment of subcontractors, with particular regard to tendering and teamwork on site.	• Reverse auctions are used in construction. • No evidence as to how widespread they are. • Can have the effect of driving down subcontractors' prices to unsustainable levels. • Main contractor-subcontractor relations on site largely governed by payment practices.
6	A real cost reduction target in construction of 30% by the year 2000.	• Only likely to have happened on Demonstration Projects.
7	Pay-when-paid contract terms to be outlawed.	• Conditional payment now prohibited.[b)] • Only allowable if a third party (e.g. the employer) is insolvent. • Anecdotal evidence that 'pay-when-paid' is still common in the industry.
8	Adjudication to be the normal method of dispute resolution.	• An 'adjudication industry' has grown up post-Latham which is, unsurprisingly, populated by the legal profession. • Adjudication may be considered an expensive form of rough justice. • For small subcontractors, not to be entered into lightly, as losing can be costly.
9	Fair contract terms backed up by legislation.	• Unfair Contract Terms Act 1977 was in place prior to Latham. • Proposed changes under the Consumer Rights Act 2014 affect 'consumers' not 'contractors'. • Standard forms of contract are 'fair' because they are agreed multi-laterally. • Non-standard contracts are usually written in favour of the party offering the contract.

(Continued)

Table 1.4 (Continued)

	Latham suggestions	
	1994	**Now**
10	Insolvency protection by means of trust funds.	• Generally, no action except under the NEC. • A trust can be created under NEC Secondary Option Y, where there is a Project Bank Account (PBA). • The PBA is established and maintained by the main contractor. • Named suppliers/subcontractors sign a Trust Deed or Joining Deed and are paid by the project bank. • The Trust Deed provides insolvency protection.

References

a) Wolstenholme.
b) Construction Act 1996 Section 113.

One of the key issues considered by the Latham report was the productivity of the industry, and Sir Michael clearly considered that this is linked to the quality of design preparation and information. Inefficiency creeps in where designs are incomplete, or information given to the contractor is conflicting or too late to allow proper planning of production. The adoption of BIM will help to reduce these inefficiencies as the information exchanged between project participants will be quicker and more up-to-date. However, the full benefits of BIM will not be felt below Level 4 (iBIM) because:

- Only a federated model will allow seamless data exchange and clash detection.
  - Without a fully developed BIM model, other forms of design representation (such as digital or hard copy drawings) will be needed for those parts of the design that are not included in the model.
- Without a fully synchronised design, clashes will be inevitable resulting in the sort of design changes and variations that Latham complained of.

An issue of major importance is conflict in the industry both between clients and contractors and between contractors and their subcontractors. Latham suggested that considerable efficiencies can be gained by:

- Making changes in *procurement practice* and *contract conditions*.
- Introducing *tighter restrictions over set-off*.
- The *introduction of adjudicators as a normal procedure for settling disputes.*

Since 1994, procurement practice has changed considerably, with much more emphasis placed on developing frameworks, greater use of D&B and the adoption of far more stringent pre-qualification arrangements for both main contractors and subcontractors. Conditions of contract have also evolved since Latham with the JCT, New Engineering Contract (NEC) and Infrastructure Conditions of Contract (ICC) families having been

considerably extended and modernised. Latham also concluded that the *most effective form of contract in modern conditions should include:*

1. *A specific duty for all parties to deal fairly with each other, and with their subcontractors, specialists and suppliers, in an atmosphere of mutual cooperation.*
   Update:
   (a) 'Mutual cooperation' clauses are common in some contracts – such as NEC3 – and in partnering contracts including PPC2000[1] and CPC2013.[2]

   References
   [1] ACA Standard Form of Contract for Project Partnering
   [2] Contract for use with Complex Projects, First Edition 2013 published by CIOB

2. *Taking all reasonable steps to avoid changes to pre-planned works information. But, where variations do occur, they should be priced in advance, with provision for independent adjudication if agreement cannot be reached.*
   Update:
   (a) Incomplete designs and variations remain common in the industry.
   (b) Some standard forms of contract provide for the pricing of variations on the basis of a contractor's quotation (JCT SBC2024, for instance).
   (c) NEC3 provides for 'compensation events' to value changes to the Works Information.

3. *That subcontractors should undertake that, in the spirit of teamwork, they will coordinate their activities effectively with each other, and thereby assist the achievement of the main contractor's overall programme. They may need to price for such interface work.*
   Update:
   (a) There is no formal contractual arrangement for subcontractors to coordinate their activities in such a way.
   (b) Good subcontractors do this informally.

The conclusions of the Latham Review were clearly extensive and led to the formation of the Construction Industry Board. This was subsequently replaced by the Strategic Forum in 2001 which also included the Construction Task Force, established in 1997 by the then Deputy Prime Minister John Prescott. The task force was responsible for the 1998 Egan Report whose chair, Sir John Egan, was appointed as the Strategic Forum's first chairman.

The Strategic Forum ceased to be a government-funded body in 2002 when it became an independent industry group. However, it has been the subject of much criticism for failing to speak on behalf of the entire industry.

In 2002, the Strategic Forum published *Accelerating Change* (the second of the eponymous Egan reports). One of its targets was that 50% of projects should be undertaken by integrated teams and supply chains by 2007. Despite some progress being made, this target was never achieved.

The present-day structure and working practices of the construction industry owe a considerable debt to the Latham Review:

- Some of the Latham recommendations were included in the Housing Grants, Construction and Regeneration Act (HGCR) 1996 which, *inter alia*, made conditional payment

(such as pay-when-paid) illegal and conferred the right on an injured party to suspend performance for non-payment.

- A statutory right to the adjudication of a dispute was also included in the HGCR Act 1996, which enables a dispute to be referred to an independent third party for resolution within a short timetable. Whilst the decision of the adjudicator is binding, the matter may be later resolved through litigation or, where the contract provides, arbitration.
- The Considerate Constructors Scheme[9] resulted from the work of the Construction Industry Council 'Latham Review Implementation Forum' in late 1994, the aim being to improve the image of the industry. This is a voluntary scheme founded with the objective of improving the relationship of construction companies with their neighbours, the public and the environment when running their sites.
  In 1997, the (now Chartered) Institute of Building took responsibility for the implementation of the Scheme which was officially launched in June 1997. It is a non-profit-making, independent scheme whose members voluntarily register and agree to abide by the Code of Considerate Practice.

1.5 The Egan Reports

In common with Latham, there were two 'Egan' reports – *Rethinking Construction* was published in July 1998 and *Accelerating Change* in 2002. The first report informed the later Wolstenholme Report in 2009.

1.5.1 Rethinking Construction

Rethinking Construction[10] represented the work of a special task force which was set up by the government to identify the scope for improving quality and efficiency in construction. The task force was chaired by Sir John Egan, hence the popular title for the report – the Egan Report.

The Egan Report, at 40 pages, is certainly not as comprehensive as its predecessor, the Latham Report, but it was no less searching and probably considerably more controversial. It contained many 'home truths' but may also be said to have contained unfair criticisms, particularly with respect to comparisons with factory-based manufacturing industries, such as the motor industry.

Latham looked at designing an infrastructure for the industry aimed at removing the inefficiencies and inconsistencies, especially in terms of client briefing, better design management and more coherent project strategies. In *Rethinking Construction*, there was no industry 'blueprint' for change but the Construction Task Force, which produced the report, took the lead on a number of new initiatives including:

- Movement for Innovation (known as m4i) – a board of members whose task was to coordinate a number of demonstration projects, to disseminate best practice information and to oversee industry-wide benchmarking.
- The Construction Best Practice Programme which provided information for firms wanting to improve their performance.

- Inside UK Enterprise the idea behind which was for top-performing companies to have an 'open day' where other firms could visit and find out how things are done by the 'host' company.

The Egan Report undoubtedly recognised both the good and bad in construction and sought to build on those aspects of the industry which are excellent in a worldwide context. However, on balance, the conclusion of the report was that the industry as a whole is underachieving, and there should be radical change in key areas of its performance. These include quality, productivity, cost and time certainty and health and safety.

In the Executive Summary, the Egan Report made the following observations:

- The UK construction industry at its best is excellent. Its capability to deliver the most difficult and innovative projects matches that of any other construction industry in the world.
- There is deep concern that the industry as a whole is underachieving. It has low profitability and invests too little in capital, research and development and training. Too many of the industry's clients are dissatisfied with its overall performance.
- If the industry is to achieve its full potential, substantial changes in its culture and structure are also required to support improvement. The industry must:
  - provide *decent and safe working conditions and improve management and supervisory skills* at all levels and
  - design projects for ease of construction, making maximum use of standard components and processes.
- The industry must replace competitive tendering with *long-term relationships based on clear measurement of performance and sustained improvements in quality and efficiency*.

The Egan Report identified five key drivers of change needed to set the agenda for the industry:

1. Committed leadership.
2. A focus on the customer.
3. Integrated processes and teams.
4. A quality-driven agenda.
5. Commitment to people.

Among the year-on-year targets proposed by Egan were:

- 10% reduction in construction time from client approval to practical completion.
- 10% increase in productivity.
- 20% reduction in the number of reportable accidents.
- 10% increase in turnover and profits of construction firms.

One of the problems with the Egan Report was that the emphasis was placed on the 'top end' of the industry, whereas Latham looked at the fundamental problems of the entire industry. So, whilst Egan led to the development of several good ideas and worthwhile aims, the concepts were bound to take some time to filter down to the lower echelons of the industry. Over 20 years on, they clearly have not!

1.5.2 Accelerating Change

This report – the second Egan Report – presented the first year's work of the Strategic Forum for Construction (2002), which replaced the defunct Construction Industry Board that was set up following the Latham Report.

Accelerating Change identified ways of increasing the pace of change following the recommendations in *Rethinking Construction*, reported on the progress made to date and set out a strategic direction with targets. The report identified three main drivers to accelerate change in construction and introduce a culture of continuous improvement in the industry:

- The need for client leadership.
- The need for integrated teams and supply chains.
- The need to address 'people issues', especially health and safety.

The vision and aspirations set out in *Accelerating Change* emphasised the need for collaboration between the whole supply chain, including clients and manufacturers. The report represented a *manifesto for change* for all involved in construction, including government, schools and further/higher education and professional bodies.

1.5.3 Post-Egan

Despite identifying the problems, proposing solutions and stimulating debate about construction industry practices and procedures, most of the reports published over the years have had little influence on either government or the industry. The Egan reports are no different.

In the Foreword to the 2009 Wolstenholme Report, Sir John Egan identified that post-1998, there has been no revolution in the way the industry works, but what has been achieved is *a bit of improvement* and, at least, *people are now measuring performance*. In this context, Wolstenholme identified a number of blockages that need to change, as discussed later in this chapter.

The Egan Report probably had more publicity than the Latham Report and certainly there has been plenty of action as a result of the report, including the introduction of key performance indicators and demonstration projects exemplifying best practice. However, action does not necessarily mean results, and it is debatable whether the Egan reports have led to significant industry-wide change. There has been change nonetheless, particularly with regard to Egan's five key drivers:

1. **Committed leadership**: The UK government has certainly pushed forward its agenda to modernise and improve its procurement methods and supply chain integration, but with a certain lack of unity and unified direction.
   Since 2016, the government has also mandated the adoption of BIM Level 2 in all public-sector projects which has clearly influenced the way that the upper echelons of the industry operate.
   A similar agenda has been adopted by major industry clients and this has created a greater sense of unity of direction in both public and private sectors. Some clients have also taken a much more enlightened approach to the balance of risk in construction.

2. **Customer focus:** There is now much more emphasis on end-user satisfaction in the industry largely driven by the adoption of BIM and other digital technologies, including digital twins.
   Such advances have been enhanced by the evolution of Cloud collaboration platforms and standard messaging interfaces (SMS, WhatsApp, Snapchat, etc.) that address the communication gap between project teams and end-users identified by Egan.
3. **Integrated processes and teams**
   The Heathrow T5 project is a prime example of integrated project working – no doubt inspired by Egan – where a totally integrated project team was created between the client (BAA) and its entire supply chain.
   This was designed to reduce conflict, incentivise collaboration and foster positive problem-solving behaviour. Major risks traditionally undertaken by designers and contractors were retained by the client who took out project-wide insurance. Other risks were pooled into a programme-wide 'risk pot' which was managed by the entire project team.
   One of the largest infrastructure projects ever undertaken in Europe – London Crossrail – also developed a collaborative relationship with its principal contractors and the extended supply chain. This involved working with the supply chain in order to benchmark and achieve a 54% performance improvement for the completion of the stations and tunnelling work.
4. **A quality-driven agenda:** Improving quality is not simply about reducing defects and rework but also includes enhancing profit and driving improvement.
   Post-Egan, quality is seen as an outcome in construction that includes health and safety, reputation, the work schedule and time management, reduction of waste and the environmental impact of the project.
   Construction is a safer industry post-Egan – an agenda largely driven by major clients and large contractors – and it is demonstrably evident on most sites that there has been a significant improvement in the safety culture despite the industry retaining its reputation as statistically one of the most dangerous.
5. **Commitment to people:** A greater commitment to decent working conditions, fair wages and high standards of health and safety has been evident in the 20-or so years post-Egan but this is not reflected at all levels of the industry.
   Greater commitment to training has also been sporadic, but shining examples such as the Laing O'Rourke Apprenticeship + Programme are to be applauded.

The effectiveness of post-Egan initiatives is examined by Morton and Ross (2007) and, in particular, by the Wolstenholme Report (2009).

1.6 The Wolstenholme Report

Following a study of the impact of the Egan No 2 Report *Rethinking Construction,* Constructing Excellence published *Never Waste a Good Crisis* in October 2009. The Review Team was led by industry practitioner Andrew Wolstenholme of Balfour Beatty.

1.6.1 Egan Targets

The strategic targets identified in *Accelerating Change* are now well out of date, of course, but the 2009 Wolstenholme Report sought to establish what progress had been made since 2002 which also informs us today of how reactionary the construction industry is and how long it takes to change the status quo. First, the Egan targets set in 2002:

- By the end of 2004
  - 20% of construction projects by value to be undertaken by integrated teams and supply chains.
  - 20% of clients to adopt the principles of the Clients' Charter.
  - 10% annual improvement by adopting the Clients' Charter.
- By the end of 2007
  - These figures rising to 50%
- By the end of 2006
  - 300 000 qualified people to be recruited to the industry.
- By 2007
  - 50% increase in applications for built environment courses.
- No later than 2010
  - A certificated fully trained, qualified and competent workforce.

1.6.2 Wolstenholme Conclusions

Seven years on from *Accelerating Change*, Wolstenholme concluded that:

- Some progress had been made post-Egan but *not nearly enough*.
- Few of the Egan targets had been fully met whilst *most fell considerably short*.
- In many cases where improvement had been made, *commitment to Egan's principles was only skin-deep*.
- In the housing sector, there is *limited understanding of how value can be created through the construction process*.
- In the 10 years prior to the 2008 banking crisis and subsequent recession, *the industry has been sheltered by a healthy economy* with no incentive *to strive for innovation*.

The economic crisis facing the country post-2008 was seen by Wolstenholme as an opportunity for the construction industry to change its ways in the face of both private and public sector spending cuts and a long period of recovery from the recession.

In particular, the report suggested that *the era of client-led change is over,* and it is now time for the supply side (i.e. the industry itself) *to demonstrate how it can create additional economic, social and environmental value* through the principles of *innovation, collaboration and integrated working* espoused in *Rethinking Construction*.

The challenge for clients was to find ways to *reward suppliers* [such as contractors, specialists and consultants] *who deliver value-based solutions* through a more professional approach to their procurement of construction services.

1.6.3 Wolstenholme Blockers

In 2008, Wolstenholme gathered cross-industry opinion through an online survey about progress since Egan with the aim of contextualising data gathered about the construction industry Key Performance Indicators and Constructing Excellence demonstration projects. The findings were used to inform the Review Team and helped to identify and understand a number of 'blockers' that were thought to be preventing the industry from responding to change:

- Business and Economic Models.
- Capability.
- Delivery Model.
- Industry Structure.

The 'blockers' were then used to have a dialogue with the industry through a series of multi-disciplinary workshops and consultations with industry experts.

Wolstenholme's observations regarding the industry structure are of particular interest in the context of this book. Small and medium enterprises (SMEs) – firms employing less than 80 people – dominate the industry numerically, of course, but the large firms *still struggle to compete on a global level,* unlike some of the big UK multi-disciplinary design companies.

The implication here is that the UK market is still important for the large UK contractors who may be forced to tender for smaller, domestic, contracts than they would normally like, especially in a recession, as Ross and Williams (2013) observe.

The large number of small firms in the industry brings benefits and disadvantages. The industry is flexible and can cope with variations in workload to the extent that, when times are hard, lots of small firms 'go to the wall'. However, the lack of vertical integration observed by Wolstenholme means that subcontracting dominates the industry, and this creates horizontal interfaces that produce *yet another barrier to the free flow of information and innovation*.

A further observation by Wolstenholme is the lack of unity in the UK construction industry which has a relatively low profile at government level. This is despite the extent of capital spending in the public sector and the contribution that the industry makes to the overall economy.

The industry lacks real leadership, has few champions and has no coherent sense of direction compared with, say, aerospace, energy or the automobile industries. Wolstenholme felt that the appointment of a Chief Construction Adviser to the government in late 2009 was a step in the right direction.

1.6.4 Summary

In summary, the Wolstenholme Review Team concluded that the lack of progress in the industry is due to:

- Absence of a single, coherent voice for the industry.
- Lack of joined-up thinking by government and other key stakeholders.
- Too many industry bodies.

Despite identifying the many problems facing the industry, Wolstenholme was able to suggest a number of themes for future action:

1.	Understand the built environment	• Promote sustainability • Incentivise the creation of value
2.	Focus much more on the environment	• Embrace carbon efficiency • Encourage a 'green' recovery from recession
3.	Find a cohesive voice for the industry	• Greater collaboration between industry bodies and professional associations • Expand sector coverage of the UK Contractors Group or Construction Industry Council
4.	Adopt new business models that promote change	• Discourage short-term thinking • Incentivise long-term value creation
5.	Develop a new generation of leaders	• Especially at the top of the industry • Find leaders who can change culture and behaviours
6.	Integrate education and training	• Greater collaboration between professional bodies and the education sector • Better understand how built environment disciplines inter-relate
7.	Procure for value	• Procurement practices should focus on best value • Encourage bids based on innovative solutions
8.	Suppliers to take the lead	• Industry firms should demonstrate how they can create additional value • Encourage lean processes • Move away from lowest price tendering, negative margins and claims

1.6.5 Post-Wolstenholme

If Latham and Egan posed challenges for the construction industry, Wolstenholme's list of suggestions for future action was somewhat daunting!

In common with the Simon Committee report on building contracts 65 years earlier, Wolstenholme called for cultural change *to integrate and embrace the complex picture of how clients and contractors interact*.

Industry culture is clearly important to the way things operate but it is not easy to manipulate, change is slow, and, as Wolstenholme observed, there is *no cohesive voice for the industry*.

Some commentators also argue that the industry should, in fact, be viewed as three separate industries:

- Residential building
- Non-residential building and
- Engineering construction.

It could be said that each 'industry' has its own culture, with different types of clients, different approaches to design and different supply chain interactions. Each produces different

products with different contributors using different processes, so it is important to recognise these differences and take them into account when determining policy and proposals for change.

Such differences make recommendations and policies directed to a single industry ineffective. It is also problematic that construction is very important to the gross domestic product (GDP) of the country (around 8% in the United Kingdom), but this means that policymaking is subject to political whim and public debate.

Post-Wolstenholme policies in the United Kingdom have, however, moved away from the culture debate towards improved productivity through better procurement and the use of BIM. This is evident through widespread use of procurement frameworks and the government mandate for Level 2 BIM as a minimum standard on public-sector projects. Pan-industry take-up is patchy, however, especially at the lower end of the industry, but great strides are evident, especially on major projects.

1.7 The Farmer Review

The Farmer Review was commissioned by the Construction Leadership Council in 2016 to review the United Kingdom construction labour model.

Mark Farmer, CEO of Cast Consultancy, an independent specialist construction consultancy, was also asked to look into alternative business models and new ways of working that could better support present and future skills availability in the industry. A further aspect of the review was to investigate the scope for greater use of off-site construction.

1.7.1 Farmer Conclusions

The review, entitled *Modernise or Die*, concluded *inter alia,* that the critical symptoms resulting in the poor performance of the industry included low productivity, low predictability of time, cost and quality, structural and leadership fragmentation and an industry trading on low margins with adversarial pricing models.

Modernise or Die was also critical of training, the size and demographics of the industry workforce and a lack of collaboration, investment and innovation in the industry.

One of the three main root causes of the industry's problems was found to be that the industry and its clients usually have non-aligned interests and that traditional procurement protocols and deep-seated cultural resistance to change reinforced the status quo.

The review highlighted that the industry and its labour model have reached a critical point, and that the industry could see a 20–25% decline in the available workforce by the mid-2020s. The review suggested that the industry is chronically under-invested and requires a wholesale and coordinated 'special measures' approach to drive transformational change that the industry is unlikely to initiate itself.

It was felt that clients would be the driving force for change and that public and private sector clients, government and the industry itself would need to work together to prevent the industry becoming seriously debilitated and unable to face the challenges of the future.

1.7.2 Recommendations

The Farmer Review made ten headline recommendations for action by government, industry and its clients, suggesting that:

1. The Construction Leadership Council should take a strategic role in implementing the recommendations of the review.
2. The Construction Industry Training Board (CITB) should be reviewed and reformed to provide a skills and training model more aligned to the future needs of the industry and its clients.
3. That industry, clients and government should work together to improve relationships and increase levels of investment in research and development (R&D) and innovation.
4. Government should act to stimulate innovation in the use of pre-manufactured solutions, especially in the housing sector.
5. Should a voluntary approach fail to achieve the step change the industry needs, government should consider introducing a charge on construction industry clients. The charge would be up to 0.5% of construction value unless clients could demonstrate how they were supporting skills development, pre-manufacturing or other forms of innovation and R&D in the industry.

The recommendations of the Farmer Review are not indistinct from the conclusions of other industry reports over the years. Where *Modernise or Die* differs is that the review was published at a time when the industry was rapidly reaching a crisis point in its current labour and skills provision.

The review highlights the fact that the current labour model is not sustainable and that different approaches to satisfying the needs of industry clients are required. In this respect, the Farmer Review highlighted several innovative approaches which, although at the top end of the industry, indicate how innovation, R&D and investment can contribute to making the industry more efficient and better able to meet the time, cost and quality predictability demanded by its clients.

1.7.3 Farmer Initiatives

The initiatives suggested by the Farmer Review include:

- **The use of factory-in-a-box technology**: This idea was developed by design and management consultant Bryden Wood for pharmaceuticals multinational GlaxoSmithKline plc (GSK). Shipping containers, packed with building components in reverse order for reassembly, can be shipped anywhere including to emerging markets in Africa and Asia.
- **The construction of a volumetric factory**: Major contractor Laing O'Rourke has constructed a purpose-built factory to support DfMA, to drive greater efficiencies in the use of resources and to help reconfigure traditional approaches to design, manufacturing, assembly, testing and commissioning of buildings.
- **The Singapore Building Control Authority**: This initiative works with industry to change the design and construction process, to increase construction productivity and to encourage the adoption of DfMA and prefabricated pre-finished volumetric construction.

1.7.4 Post Farmer

In July 2017, the Department for Business, Energy and Industrial Strategy[11] wrote to the then chair of the Construction Leadership Council (CLC), Andrew Wolstenholme OBE,[12] setting out the government's response to the Farmer Review.

The letter confirmed that the government had incorporated the review's findings and recommendations into policy development. It also confirmed the influence the review had had on the Housing White Paper to support increased housing supply and that it had helped inform the review of the CITB and proposed reforms to make it more responsive and focused.

In the annex to the letter, the view was expressed that the construction industry should step up to the challenges posed by the Farmer Review and that the CLC should have strategic oversight over the agenda set out in *Modernise or Die*.

Additionally, it was confirmed that the government was keen to see closer working relationships between the construction industry, its clients and government. In this regard, government is supporting more consistency in its procurement practices through the further development of BIM. Further commitments of support were also given concerning:

- Development of better models of client commissioning.
- Building longer-term collaborative relationships.
- Use of technology to improve performance and productivity.
- Development of the government's modern Industrial Strategy and working towards an understanding of the industry's priorities, removing barriers to innovation and development of a shared innovation programme.
- Improving industry image, recruitment and apprenticeships.

More tangible developments leading from the Farmer Review are set out in Chapter 5 – *Modern Methods of Construction* and in Chapter 21 – *High Speed 2* – where it can be seen that much progress has been made in bringing off-site production into mainstream construction.

A further example is the new His Majesty's Prisons (HMP) Five Wells Prison, opened in 2022, for which 80% of the design was standardised by embracing a Design for Manufacturing and Assembly (DfMA) approach. Only 20% of the project required site-specific design and the benefit of off-site manufacturing led to 30% savings on site-based resources. The project, which was delivered 22% faster than traditional construction, comprised 15 183 precast concrete components and some 60 000 sub-components.

Such developments have facilitated great improvements in productivity, time savings and the environmental impact of construction activity as well as providing the means to produce high-quality factory-made components in the face of the current crisis in the availability of skilled site labour in the industry.

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Notes

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11 Now split into the Department for Energy Security and Net Zero, the Department for Science, Innovation and Technology and the Department for Business and Trade).
12 Former Chief Executive Officer of Crossrail and now Group Technical Director of Laing O'Rourke.