

An hourglass is the central visual element, oriented vertically. The top bulb is mostly empty, while the bottom bulb is filled with blue sand. In the narrow neck of the hourglass, several architectural drawings and blueprints are visible, appearing to be falling from the top bulb into the bottom bulb. In the bottom bulb, a large, bold pound sterling symbol (£) is superimposed over the sand.

Managing the Risk of Delayed Completion in the 21st Century

A Summary Report

Acknowledgements

The CIOB is grateful to all respondents who gave their time and effort in completing the survey. We would also like to thank all those who participated on the Time Management working committee. They are:

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Sarah Peace

Rachael Peters

Keith Pickavance

David Tyerman

Rachael Peters passed away shortly after this research was completed. Rachael was responsible for many of the CIOB's recent surveys and pieces of research and without her hard work and dedication this research would not have been possible. She will be missed, but not forgotten, by all those fortunate enough to have known her.

Introduction

This research into the methods by which time is managed by the construction industry, conducted in December 2007 and January 2008 by The CIOB, is, as far as we are aware, the first of its kind.

The essence of the research was to understand industry performance in managing time on construction projects, in particular the techniques used and the competence of those engaged in the process. The thesis of the research was that, despite the development of sophisticated critical-path network software tools, little had changed in the practice of time-management since the development of the bar chart nearly 100 years ago. This thesis was expounded by members of the project team on the basis of their own experiences of the failure of many projects, through delays, time-based claims and disputes.

The main purpose of this research is to raise awareness in the industry of time-management issues, to identify current levels of understanding of time management, gauge members' opinions on the current standards of education and training of planning engineers and project schedulers and to determine the degree to which available technology is used in time management.

The research also helps to identify the:

- Degree of incidence of unresolved delay in different types of building and building contracts.
- Degree of understanding in the industry of project control techniques by different disciplines.
- Need and support for education, training and accreditation of project schedulers.

The survey required respondents to answer probing questions and to submit commercially sensitive information. We approached 400 companies and received 73 responses, of which 35 were anonymous. It is reasonable to assume that the results of this survey are based on data provided by 73 companies on over 2000 projects. Of the 73 respondents, 68 needed to read, write or consider construction schedules.

Executive Summary

It is the experience of those responding to the survey that:

- The design team is rarely consulted by the contractor about time-management strategy.
- The more complex the project the less likely it is to be completed on time.
- A high proportion of complex projects are likely to be completed more than six months late.
- The type of construction contract and procurement method has no discernable effect on the incidence of delayed completion.
- The contractor is usually held to be predominantly at fault for delayed completion.
- Records of resources used and work performed are usually inadequate for effective time control.
- Very few projects are currently managed by reference to modern methods of time control.
- Delayed progress is not often notified promptly or widely.
- Improved facilities for the education, training and accreditation of planning engineers and project schedulers are needed.

It is the conclusion of those conducting the survey that:

- Projects that suffer from disputes about delay also suffer from poor time control.
- Too many projects suffer from delayed completion.
- Time efficiency is rarely considered at the design stage.
- Contracts do not encourage effective time control.
- Time control is generally left to the contractor.
- There is a shortage in the industry of planning engineers and project schedulers.
- The professional status of planning engineers and project schedulers needs to be recognised.
- Few professionals understand the contribution that planning engineers and project schedulers make to effective time control.

As a result of the responses, The CIOB infers that there is a connection between the incidence of delayed completion of complex projects and:

- Economic failure of contracting organisations.
- The sufficiency of planning engineers and project schedulers in the industry.
- An understanding amongst other professionals of the contribution that planning engineers and project schedulers make to effective time control.

Conclusions

Time modelling, using computers to develop a framework for predicting consequences that could be managed technically and objectively, have been available for about 50 years. However, it is only in the last 10 years that software has become available which can quickly facilitate objective measurements of project deliverables (as opposed to subjective evaluations by project personnel) except in the most unusual circumstances.

Developments in hardware, software and communications services in the last decade have now made it virtually impossible to efficiently conduct any business without the use of computers and electronic services. The construction industry uses those facilities intensively in many areas including, design, manufacture, procurement, assembly and finance. In fact it uses them in virtually every field other than time management, which currently does not use the available technology effectively, if at all.

While it is apparent that some projects are managed very well indeed, it has to be recognised that survey respondents found that the quality of time-management on construction projects is generally poor. Over half of the respondents were familiar with only a master schedule being used, with no short term planning. Such schedules would typically be in bar chart form with no linked sequencing. In their experience, managers consequently would be unable to measure the impact slippage or the imposed changes on the works. Therefore managers would not be able to manage the effects of the delay on project completion, except intuitively.

The growth in training, education and skill levels within the industry in the use of time-management techniques has not kept pace with the technology available. Conversely, there is a trend towards developing contracts which are increasingly punitive if not executed efficiently, with good quality time-management and project controls.

It is apparent that the construction industry experiences:

- Increasing demand for efficient and technologically complex solutions in shorter time scales and within tighter financial constraints.
- High demand for an accurate completion date by many commercial and public benefit projects.
- A growing trend for employers to require the contractor to take more of the risk that is traditionally taken by the employer.
- A growth in the use of Design and Build (D&B), Guaranteed Maximum Price (GMP) and Engineer Procure and Construct Contracts (EPC).
- Potentially devastating financial consequences of the failure to manage time in construction projects.

The research shows that there are grounds for concern that the absence of competent network-based scheduling on construction projects impacts adversely on the effective management of time.

Training, Education and Accreditation

The continuous pursuit of excellence in construction management is key to greater effective collaboration, the continued satisfaction of the industry's client requirements, and the sustained delivery of successful projects in the 21st century.

With a view to reducing the incidence of delayed projects, The CIOB will provide standards in effective time control by facilitating education and accreditation. We will promote an increased awareness of the importance of project planning and scheduling in the industry. We will also provide:

- A career structure for project planners and schedulers.
- Standards, education and qualifications in project scheduling.
- Training in effective time control for other professionals in the industry.

Principal Findings of the Research

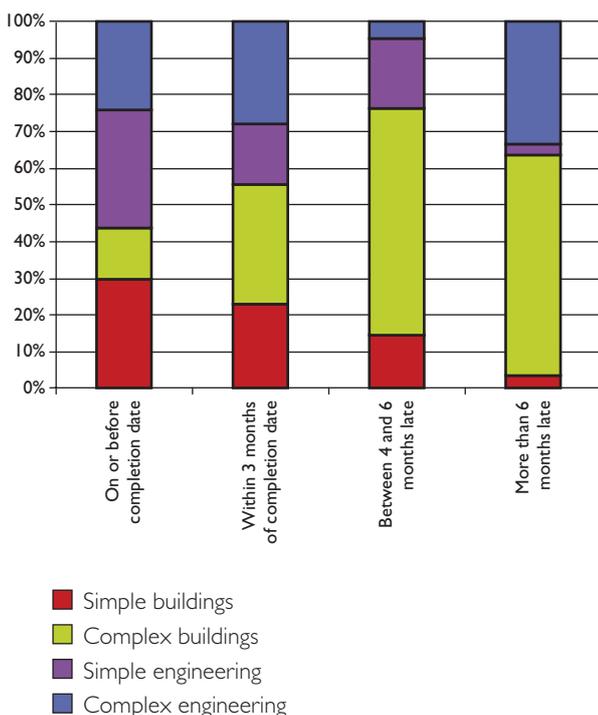
1 The design team is rarely consulted by the contractor about time-management strategy

Only a very small minority of respondents were familiar with the intended construction process being developed as a result of discussions between interested parties, coupled with a written method statement. The experience of the remainder was that the planned sequence was determined in a less precise or manageable way. This would tend to reduce the construction management team's commitment to carrying out the work in accordance with the schedule.

The research indicates that the design team (the architect, structural engineer and mechanical engineer) is only likely to be consulted about the construction methodology in 10% of projects. None of the respondents had experience of the electrical engineer being consulted.

The common experience of those concerned with the planning and management of construction projects, seems to be that the complexity of a project is defined by its services' content, and that the more complex the project the more likely it is to be delayed. Bearing this in mind, it is surprising that project designers were not consulted more often in the determination of time-related strategies for projects.

2 The more complex the project the less likely it is to be completed on time



The respondents' experience of over 2000 projects was that certain types of project have a reasonable chance of being completed on, or before the completion date, using traditional methods of time-management and without modern methods of time control. These include, low-rise offices, and commercial, industrial, housing, schools and educational buildings, shops and shopping malls.

On the other hand, it was also the respondents' experience that more complex projects have a poor chance of being completed on time without advanced methods of project control being employed. These include hospital, clinic and health-related buildings, prisons and security, stadia, sports-related, railway and high-rise projects.

3 Complex projects are likely to be seriously delayed when managed without the benefit of effective project control

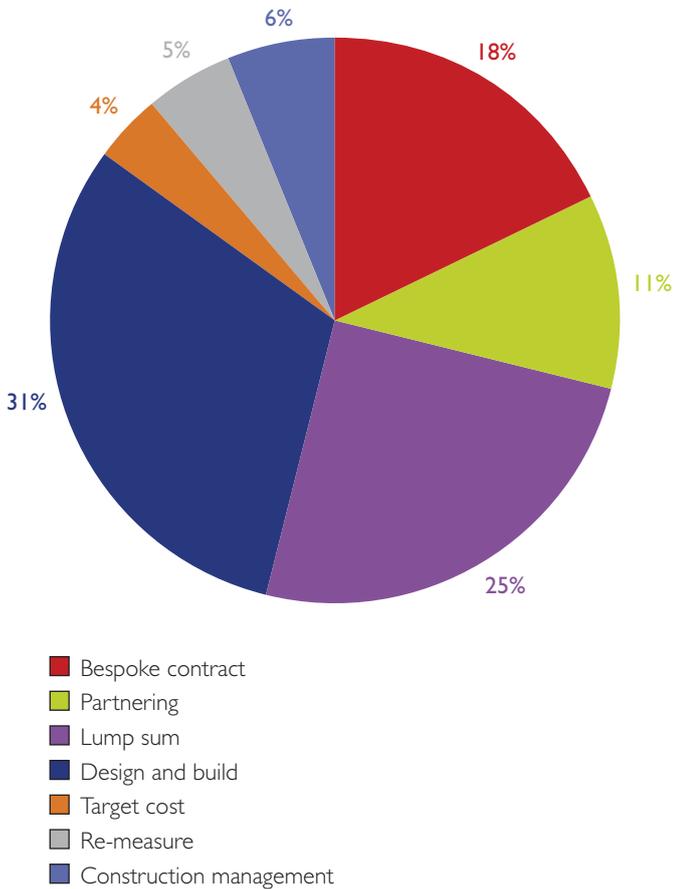
High-rise building projects necessarily have more complex services, security, vertical circulation systems and construction logistics, which therefore require a high standard of pre-planning and project control if success is to be achieved. The performance of such projects covered in the survey was not good; only a third were completed on or before the completion date, and 18% were completed more than six months late.

When taken in the round, engineering projects tended to fare less well than the generality of building projects. A little over half of those reported upon were completed on or before the completion date, while 18% were finished more than 6 months late.

The best performing engineering projects were those that tended to be simpler and/or repetitive. The worst performers were those with complex services including power plants and oil and gas projects. The worst performer of all was airports; while only a small sample of two such projects was included in the survey responses, both these projects were completed more than six months late.

4 The type of construction contract and procurement method has no discernable effect on the incidence of delayed completion

Method of procurement



Specially prepared contracts, written by, or on behalf of the employer accounted for 18% of those reported on. Only 25% were being constructed under what used to be known as a traditional form of contracting: a lump-sum contract. Partnering contracts accounted for only 11% of projects underway, but by far the greatest percentage of projects, 31%, were being constructed under design and build contracts.

Bearing in mind the incidence of delayed completion across the board, it can reasonably be concluded that whilst different types of contract may shift the risk for default from one party to another, changes in the allocation of contractual obligations alone cannot secure timely completion.

5 The contractor is usually held to be predominantly at fault for delayed completion

In two-thirds of the projects reported upon, the respondents found that the costs of delayed completion were predominantly at the risk of the contractor:

This perception is consistent with an industry where design and build, and bespoke forms of contracts, are the predominant forms of contracting, as the trend in both is to transfer more risk to the contractor than is apparent in other contracting forms.

6 Records of resources used and work performed are usually inadequate for effective time control

Only 7% of the respondents who said they were familiar with keeping records had any experience of them being kept by automated or manual input into a relational database. This is despite the fact that such databases would enable reports identifying trends and showing the effects of progress and productivity to be produced easily. 40% of the respondents had experience of records being kept on a spreadsheet, either by direct entry or by transcription from paper records. While data can be viewed and extracted from such spreadsheets it requires some analysis of that data in order to be able to detect trends and calculate the effects of progress achieved.

However, more than half the respondents to this section of the survey, were used to seeing progress records being poorly produced and kept only on paper. This renders these records virtually useless for the purposes of promptly detecting trends, managing the effects of lack of progress and identifying the factual data relative to loss-causing events.

This poor record keeping may also contribute to the respondents' perception that, in the majority of projects, the contractor is usually held responsible for a large part of the cost of delayed projects.

7 Very few projects are currently managed by reference to modern methods of time control

In the experience of the respondents, progress was likely to be monitored against a schedule that had estimated durations, inadequate logic, no quality control and was not regularly updated. This would inevitably adversely affect the reliability of estimates of progress achieved; the gauging of the effect of that progress on completion; and the consequential effectiveness of reports on progress, if any.

Over a third of respondents were more familiar with the progress of activities being monitored against calendar dates without a calculation of the effect on successive activities, rather than on an updated project schedule that would predict the consequences of delaying events or slippage.

8 Delayed progress is not often notified promptly or widely

Only 20% of respondents said they were familiar with a delay to progress being declared notwithstanding that the contract required it. Just over a third of respondents declared that in their experience a delay to progress was only notified if it was likely to delay completion. Only 5% said that in their experience a delay to progress would be declared irrespective of the predictive consequences. When taken in the context of the way progress is estimated and the consequences predicted, it would seem notification of delay to progress is likely to be infrequent.

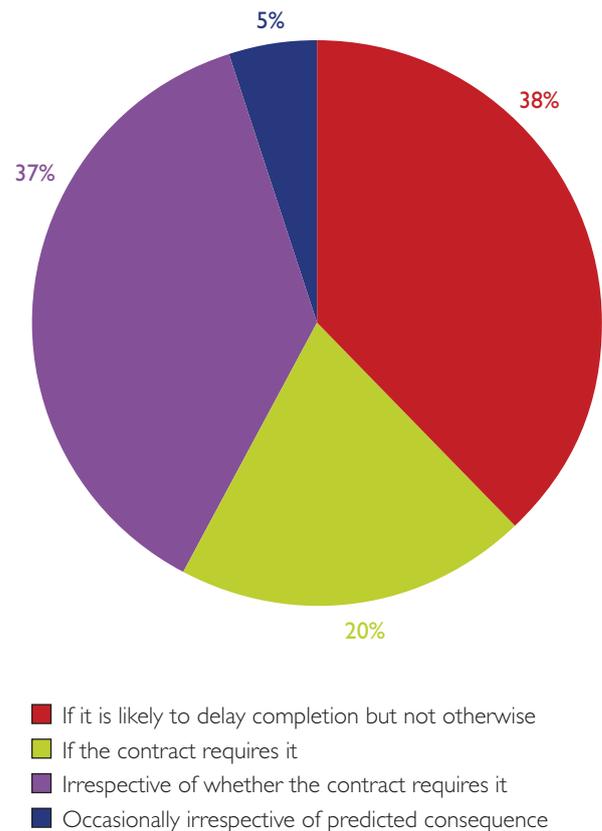
When asked why delay to progress was not reported promptly 21% of those responding gave a combination of two or more reasons. 41% said it was not notified because they might be able to 'catch up' the time lost. 10% admitted it was because they thought they might be able to blame another party for it. In 12% of cases delay to progress was not notified simply because the contract didn't call for it.

A third of respondents said that they failed to notify the delay because they didn't want to upset the client, and 5% because they didn't want to upset the contract administrator.

9 Improved facilities for the education, training and accreditation of project planners and schedulers are needed

Less than 20% of respondents thought that current standards of training and education of planning engineers and project schedulers was satisfactory. However, they were divided on whether education should be at pre-degree, degree, or post-graduate level.

On what occasion is an identified delay to progress notified





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