Construction design and management safety regulations in practice—progress on implementation

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Abstract

A brief review of accident history and the introduction of health and safety legislation in the UK is included. The main requirements of the Construction (Design and Management) Regulations are reviewed together with enforcement by the Health and Safety Executive. The problems associated with implementing the Regulations are addressed, based on findings from practitioners. Client involvement is discussed in relation to the timing of appointments and the assessing of competence for principal contractors. Designer involvement is analysed in relation to awareness and assessment of risk, the recognition of the planning supervisor’s role and transfer of requirements to operational safety on site. Finally, an approach to design and management is recommended with increased client and designer involvement. © 1999 Elsevier Science Ltd and IPMA. All rights reserved.

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1. Introduction

At the time of carrying out the investigation the Construction (Design and Management) Regulations (CDM) been in force for about two years. The aim was to undertake a review of the industry with regard to the practical implementation of these regulations. Any key lessons learnt and areas for further consideration which may assist in the practical implementation by the duty holders are noted. The initial premise is that clients and designers have been slow in taking up their responsibilities. There is, therefore, a concentration on the approaches of the client and the designer to health and safety as seen from the contractors’ point of view.

The methodology of the research was to have structured interviews with principal contractors (10) and planning supervisors (10) from small and medium organisations. This was backed up by an in-depth case study of a principal contractor in order to extract detailed time and cost data. The roles of the parties involved are briefly defined within the review of the regulations that follows.

2. Accidents and their costs

Construction work covers many activities, techniques, materials and hazards and it is this diversity that increases the probability of accidents’ occurring. There is a commonality of accidents within the industry and the factors that can contribute indirectly to an accident. An accident may be defined as “any unplanned event that resulted in injury or ill health of people, or damage or loss to property, plant, materials or the environment” [1]. The main cause of accidents is shown in Table 1.

A recurring theme is that people are killed during simple, routine work and in many cases a clear lack of planning contributed to the tragedy. An underlying belief is that the majority of accidents are not caused by careless workers but by failures in control which ultimately is the responsibility of management. Improved health and safety management systems are assumed to make good financial sense and should be part of the
cost conscious culture of companies dedicated to efficiency and profitability. It has been recognised that a reduction in the level of accidents would be the principal quantifiable benefit of new construction design and management regulations. It was also estimated that on small to medium sized sites a reduction in accidents of 33% could be achieved and that the estimated benefit to the industry would be £220 million each year [3].

3. Health and safety regulations

Existing health and safety regulations are a continuum of a larger legal framework of law. The Health and Safety of Work Act (1974) established the Health and Safety Commission (HSC) giving it the power to propose health and safety regulations and to approve codes of practice. The Health and Safety Executive (HSE) was also set up to enforce health and safety laws. The Act moved emphasis to individuals and their duties rather than being concerned with premises. It is the primary safety legislation in the UK and the Act under which most subsequent health and safety regulations have been made.

Subsequently under the influence of European legislation which obliges member states to “pay particular attention to encouraging improvements, especially in the working environment, as regards health and safety of workers” (article 118A of the Treaty of Rome) further regulations have been implemented.

These are known as the Framework Regulations as they create broad and general duties on employers, employees and the self employed. The aim is to improve health and safety management and to make more explicit what is required from employers. A more systematic and better organised approach to health and safety is being encouraged. Therefore a company that is operating a health and safety management system encompassing the duties under the Health and Safety at Work Act and the Framework Regulations should be able to comply with any future safety directives that are enforced.

The next section briefly reviews the construction design and management regulations in the UK. Readers who are familiar with these requirements can continue to the next section.

4. The construction design and management regulations

The Construction (Design and Management) Regulations 1994 came into effect on the 31st March 1995 and implements EC Council Directive 92/57/EEC which relates to the provision of minimum health and safety requirements at temporary or mobile construction sites. The regulations are considered to be more demanding than the minimum requirements of the directive.

The fundamental principles on which the CDM Regulations are based are as follows:

1. Safety is to be considered systematically, stage by stage, from the outset of the project.
2. All members who contribute to the health and safety on a project are to be included.
3. Proper planning and coordination must be undertaken from the outset of the project.
4. Provision of health and safety is to be within the control of competent persons.
5. Communication and the sharing of information between all parties must be included.
6. A formal record of safety information for future use must be made.

The CDM Regulations bring health and safety management, on an obligatory basis, into the planning and design of construction work. Thus the contractor is no longer left with the sole responsibility of health and safety during construction.

4.1. Clients

The philosophy of improving health and safety management by way of the regulations starts with an obligation to establish a team that will have the competence and resources to manage the project without any undue risk to health and safety. The appointment of a planning supervisor is central to a client’s responsibilities. The planning supervisor should be appointed as early as possible to allow adequate time to address issues during the planning and design stage, including the preparation of the pre-tender stage health and safety plan.

4.2. Planning supervisors

The post of planning supervisor is a new statutory requirement, which imposes duties but gives no powers. This appointment made by the client has the role of coordinating the design and planning from a health and safety viewpoint, with the aim of ensuring that risks identified in the construction of the project including those associated with maintenance or demolition are eliminated or minimised.
4.3. Designers

Designers may include architects, consulting engineers, surveyors, specifiers, principal contractors and specialist subcontractors. The term ‘design’ has a wide definition under the regulations; it includes drawings, details and specifications. The main requirement of designers is to deal with health and safety issues by designing them out “so far as is reasonably practicable”, that is, by balancing the risk against the cost of averting it.

4.4. Principal contractors

A client who intends to appoint a principal contractor has to be satisfied that the contractor has the competence to carry out or manage the construction work and has adequate resources to comply with the requirements imposed under the statutory provisions. Once the principal contractor is appointed the pre-tender health and safety plan will be developed into a working project document, ensuring that it has all the necessary information for securing the health and safety of all those carrying out construction work and those who may be affected by it.

4.5. Contractors

Contractors’ duties under the CDM Regulations are in support of those imposed on the principal contractor. Similarly they have responsibility for the health and safety of their own employees and others affected by their work under the existing health and safety legislation. The key duties are to give the principal contractor information on; risk assessments, how they propose to carry out the work and what steps they will take to control and manage any risks.

4.6. The health and safety plan

The construction phase health and safety plan should set out the arrangements for securing health and safety for everyone carrying out the construction work and all others who may be affected.

4.7. The health and safety file

The contents of the health and safety file will vary depending on the type of building and the future risks that have to be managed. The HSE have listed the following as typical information which could be included in the file:

1. Record or ‘as built’ drawings used and produced throughout the construction process.
2. Details of the design criteria.
3. General details of the construction methods and materials used.
4. Details of equipment and maintenance facilities within the structure.
5. Maintenance procedures and requirements for the structure.
6. Manuals produced by specialist contractors and suppliers which outline operating and maintenance procedures and schedules for plant and equipment.

4.8. Enforcement of the regulations

The stated policy of the HSE is to promote and explain the CDM Regulations, to encourage and support duty holders while being firm about the need to comply. The initial intention is to secure compliance through giving advice. However, in serious situations, Improvement Notices or even Prohibition Notices will be considered. Examples of where such action may be taken, particularly with complex or high risk projects, are:

1. Failure by a client to appoint a planning supervisor or a principal contractor.
2. Failure to ensure a pre-tender health and safety plan is prepared. Failure of a designer to provide adequate information at the design stage.
3. Failure to provide information on high risk aspects in a pretender plan, for example, contaminated land.
4. Failure by a client to ensure that an appropriate construction phase plan has been prepared before construction begins.
5. Failure by a principal contractor to include high risk aspects in a construction phase plan, e.g. work with toxic materials.
6. Failure by a principal contractor to take reasonable steps to exclude unauthorised access to a high risk site.

5. Results from the research

The next part of the report is based on a research programme including in-depth interviews with planning supervisors and construction managers associated with small and medium sized enterprises and a detailed construction company case study.

5.1. Competence and resource allocation

The initial task for a principal contractor is to demonstrate competence to a prospective client. The
standard means of adjudicating competence is by assessing responses to a pre-tender questionnaire. The validity of this method in isolation may be suspect and responses received may not necessarily reflect the true structure and strategy of a company with regard to health and safety. Planning supervisors surveyed in the research, whenever possible, preferred to confirm the responses received by visiting principal contractors and carrying out an informal interview. Pre-tender questionnaires are being given where the level of detail is disproportionate to the scale and complexity of the project. This has resulted, on several occasions, in smaller sized contractors declining to tender for work.

Assessment of adequate health and safety resources was found to be linked with that of competence and for a small to medium sized company the employment of a safety adviser serves to reinforce those resources. An indication from the research, being given by clients, is that a check on financial resources is seen to confirm adequate health and safety resources.

5.2. Health and safety plan preparation

The findings indicate that initially principal contractors had encountered difficulty in preparing construction phase health and safety plans. An explanation offered for a variation in content and quality of the plans is that the industry has not yet adopted a common format, although responses are found to be broadly based on the HSE’s guidelines. These guidelines state that the plan should deal with the following:

1. The arrangements for the management of health and safety of the construction work.
2. The monitoring systems for checking that the health and safety plan is being followed.
3. The health and safety risks, to those at work, to others arising from the construction work and from other work in premises where construction work may be carried out, are assessed.

Similarly no common format was found for the preparation of written risk assessments, the majority having a format based on generic risk assessments provided by safety advisers. Evidence from planning supervisors is that the CDM Regulations have focused principal contractors on their duties under the Management of Health and Safety at Work Regulations, 1992.

5.3. Training needs

The study has indicated a high awareness of the CDM Regulations amongst management in all companies. All companies, with the exception of the smallest sized company, have sent personnel on CDM related courses. The positive attitude taken by the companies studied in relation to management training is not mirrored in respect to operative training. Two of the companies have sent a small number of craftsmen on safety awareness courses as part of the requirement of the Construction Skills Certification Scheme. The scheme is a mechanism by which employers can display the competence of its work force. However, it is voluntary and since its launch only 2000 operatives have joined the scheme which amounts to less than 1% of a skilled work force potential of 600,000 [4].

The small amount of operative training may indicate a failure by principal contractors in respect to complying with the CDM Regulations. A view found was that membership of construction training groups are an effective means by which companies can train and increase awareness amongst operatives. A high proportion of companies interviewed were members of such a group.

5.4. Development of a health and safety management system

The development of a formal health and safety management system is seen as essential for control of risk. Within a company, the pooling of knowledge and experience was found to be a key aspect of risk control. Participation complements control in that it should encourage the ownership of health and safety systems by employees at all levels. It was also recognised that participation establishes an understanding that the organisation as a whole and those working in it benefit from a good health and safety performance.

A comprehensive system can be made up of a variety of formal and informal means of communication by which there is an adequate flow of information throughout the organisation. Organisations can make use of three interrelated methods: visible behaviour by managers, the written word and face to face discussion. The findings of this research indicate that the principal contractors are making use of these means of communication and that safety policies have statements on the management of health and safety. However there is no clear indication that an integrated system had been adopted within the companies’ culture. The two companies with quality assurance systems have an advantage in that quality and safety were considered to be related. The HSE [5] in its guide to successful health and safety management comments that organisations who have adopted a total quality management philosophy achieve particularly high standards of health and safety performance.
5.5. Cost of implementing the regulations

In the consultative document for the Regulations the HSC estimated the cost to the construction industry which is shown in Table 2. The percentage of industry output costs for planning supervisors and principal contractors was therefore estimated to be 0.5% of the value of industry output. This figure is comparable with the case study where the cost of compliance was calculated to be 0.45% of the companies’ turnover. The case study company costs as a proportion of project value, ranged from 0.29% to 3.68%. The on-cost for smaller sized projects was more substantial as the cost of developing the health and safety plan was often disproportionate to the value of the project. There was no indication that plans were less effective, only that the relative overheads were increased.

5.6. Instilling a safety culture

Peters and Waterman [6] commented that the culture of an organisation consists of the following:

1. A shared view of a higher purpose or meaning to the daily activities of each ordinary employee.
2. Written and unwritten codes of behaviour and conduct in the organisation.
3. Stories or ‘legends’ about events from the firm’s history.

The owner managed companies included in the research have developed strong cultures despite the often cyclical nature of the industry. The strength of safety culture is not as clear; success depends on how strongly the owners exert a positive influence in relation to health and safety. Levit [7] has written that a leader who believes in safety gives direct evidence of this by holding all managers accountable for the safety of their subordinates and by being willing to commit real and substantial organisational resources to training and monitoring safety related activities. In doing so, the owners have to establish safety accountability within the organisation, train site managers in safety supervisory techniques, train site operatives in safe working practices, and require the detailed preplanning of work.

A further exploration of the development of a safety culture will be of interest. Also any economic impact on business when safety regulations are not complied with requires further research. High accident rates may have an impact on the reputation of all concerned, including clients, designers and contractors. The implementation of the regulations will develop over a period of time and any improvements can be measured.

6. An approach to design and management

The aim of the CDM Regulations is to bring about a culture change in the construction industry by requiring all those involved in the development and construction process to consider health and safety issues. The following discussion now considers to what degree this has taken place and speculates on future improvements.

6.1. Client involvement

Once a client has taken a decision to commission a project the initiative lies with the client to apply the CDM Regulations. The aim of improving health and safety management through the Regulations starts with the obligation to establish a professional team that will have the competence and resources to manage the project without any undue risk to health and safety.

The appointment of a planning supervisor is central to the client’s responsibilities and is to be done “as soon as practicable”. The client has to take steps to make reasonable enquiries or seek advice as to the competence of the person to fulfil the role of planning supervisor. A knowledge of health and safety legislation relative to the construction industry, evidenced by qualifications in occupational health and safety and attendance on recognised training courses, is one means of assessing competence. However, assessment by Knowledge alone may not be sufficient—the tasks of the planning supervisor make it imperative that they have relevant experience of design and appreciate the dynamics of the design process and construction practice.

6.1.1. Timing of appointments

The clients’ ability to comply with the CDM Regulations often depends on prior knowledge. For example, a one-off client who has little contact with the construction industry may not be able to judge

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<th>Table 2 Estimate cost of implementing the CDM Regulations (1991 figures) Based on Joyce [3].</th>
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<td><strong>£m per year</strong></td>
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competence. A client of this type is unlikely to have the first contact with a planning supervisor. They are more likely to make contact with a designer who in turn should assess the client’s requirements for the proposed project and give information on the duties under the CDM Regulations.

Discussions with planning supervisors indicate that the client appoints the designers of a project prior to the appointment of a planning supervisor. Designers are then often asked to advise on and recommend the appointment of a planning supervisor. Multi-disciplinary practices are now offering a ‘one shop stop’ of design, management and planning supervision. Quantity surveying practices are linking with architectural practices to offer planning supervisor and cost management services. In the transitional period of introducing the Regulations the design was often at an advanced stage or even completed prior to the appointment of a planning supervisor. The task in this instance would be limited to reviewing design changes during construction and completing the health and safety file, thus reducing the content and impact of the health and safety plan.

An informed client who has a history of commissioning projects would be expected to have a knowledge of their duties under the CDM Regulations and appoint designers and a planning supervisor at the same time. As was found in the case study, informed clients, such as local authorities, had taken a stance of initially passing the planning supervisor’s duties on to principal contractors. This contradicts the intention of the regulations in that the planning supervisor is to review the design. In an instance where the client is a local authority or public agency it is anticipated that they should have already employed a suitable person to undertake the planning supervisor’s role.

6.1.2. Competence of principal contractors

Planning supervisors who assess the competence of principal contractors via an interview are in a minority: the use of questionnaires by clients attempting to determine competence is far more commonplace. Many of these questionnaires are distributed by planning supervisors already appointed by clients. However the clients still need to ask themselves whether this is a practical or useful method of obtaining information. The Approved Code of Practice to the CDM Regulations asks for reasonable enquiries to be made which are tailored to match the size and complexity of the project in question. Often the questionnaires are extensive and require unnecessarily detailed answers. The purpose of standard guides should be as a reference for practitioners who then have the task of adapting pertinent information into a form that is relevant to a particular project.

6.2. Designer involvement

Designers play a key role within the construction project in ensuring how the health and safety of those who are to construct, maintain and repair a building are considered during the design process. A client appointing a designer has to be reasonably satisfied as to the designer’s competence. It has already been suggested that qualifications are not the sole criteria by which competence should be assessed. Designers also need to indicate a knowledge and understanding of how risks and hazards to health and safety can arise in construction and how they can be avoided or reduced through design.

6.2.1. Awareness of risk

Traditionally designers have been under no obligation to inform contractors of hazards resulting from the design. The contractors have been deemed to have sufficient experience to assess how the design is to be constructed and produce any risk assessment appropriate under the Management of Health and Safety at Work Regulations, 1992. Preventative health and safety measures are the norm for a constructor and now preventative design should be the norm for designers. The Approved Code of Practice requires the designer to weigh the risk to health and safety produced by a feature of the design against the cost of excluding that feature by:

1. designing to avoid risks to health and safety
2. tackling the cause of risk at source, or if this is not possible
3. reducing and controlling the effects of risk by means aimed at protecting anyone at work who might be affected.

Cost is to be counted not just in financial terms but also in terms of fitness for purpose, aesthetics and buildability. The challenge facing designers is the ability to seek out and find other construction methods that give the same or similar results than a more inherently high risk option.

Understanding the creation and existence of hazards and an appreciation of risk, should emphasise the need for competent designers who can draw from their own experience and published information, to comply with their duties.

6.2.2. Risk assessment

Another finding of the research is that designers are slow to respond to the need for risk assessment and the subsequent requirement that this information be passed on to the planning supervisor. An example from the case study showed a confusing assessment
and detracted from the purpose of a health and safety plan.

Health and safety plans required under the CDM Regulations should be job specific and give necessary information to contractors working on the project. The plans should deal with the significant risks to health and safety and not include trivial risks that a competent contractor is aware of. Keeping the wording of health and safety plans simple and highlighting only the major risks should increase the possibility of the information being used and acted upon by site management.

6.2.3. Role recognition

An example of bad practice given was that of the principal contractor being asked to take on the role of planning supervisor after the completion of the design phase. In this situation the lead designer would be better placed to take on the role of planning supervisor. An appropriate title for this merged role could be ‘principal designer’ who would then have direct responsibility for ensuring that hazards were identified, risks assessed and design work co-ordinated.

Such practice has been discouraged by the Construction Industry Council recommendation that the planning supervisor should have separate terms of engagement, with a separate identifiable fee from the designer. The RIBA guidance [8] on the CDM Regulations advises “the roles of lead designer and planning supervisor are complementary but distinct and you must keep this in mind. If you agree to act as planning supervisor as well as architect for the project make sure that you hold two separate appointments, each of which defines the services you will perform and the arrangements for payment do not allow the two appointments to become merged or blurred”. In practice, it is not always necessary to have such independent roles and the need for independence is not a requirement of the CDM Regulations. The HSE has always envisaged that the role of planning supervisor would be discharged by people from the existing construction professions, with no need for a new planning supervisor profession.

6.2.4. Awareness on site

A recent report by the Department of Trade and Industry [9] states that “the regulations have simply led to increased paperwork and created a market for a new profession of planning supervisors charging for largely unnecessary services”. As early as 1995 Nattrass [5] commented on the need to minimise bureaucracy and keep CDM plans and enquiries in proportion to the complexity and risk of the particular project and integrated with existing procedures. Clients and the professions have not always taken heed of this advice and health and safety plans often do not high-

light the critical hazards and risks. The health and safety plan is in danger of becoming a document that is not used on site for operations’ management. This view is confirmed by a UCATT trade union survey [10] which found that 55% of site operatives interviewed had not had access to the project health and safety plan.

7. Conclusion

The CDM Regulations are aimed at improving the overall management and coordination of health and safety throughout all stages of a construction project with the aim of reducing the number of serious and fatal accidents and causes of ill health that occur in the industry. The principal contractors interviewed have shown an awareness of their duties and introduction of the regulations has acted as a stimulus to demonstrate compliance in relation to health and safety. Risk assessments are now having to be prepared by contractors but there is evidence of disparity in their format and content.

Compliance with the CDM Regulation is a learning curve for all the duty holders and even for the enforcers. Pre-tender safety plans have assisted in focusing attention on prevention or control of risks prior to commencement of work on site. Difficulty has been encountered by small to medium sized principal contractors in the preparation of construction phase health and safety plans. However, planning supervisors have generally adopted a policy of working with principal contractors and assisting them in developing a format for the plan which will satisfy the requirements of the Regulations.

7.1. Recommendations for an improved performance

1. The timing of appointments is critical to the process. Clients, together with their designers, must appoint a planning supervisor during the initial stages of a project. The planning supervisor then has to ensure that all design work has been considered and reviewed from a health and safety perspective.

2. A possible solution to the repetitive task of providing competence information would be to set up an accreditation body to audit the health and safety management systems of principal contractors. Compliance with health and safety regulations is obligatory but success in proving competence is based on displaying the way in which it is integrated into the day to day activities of the company.

3. Enquiries with regard to competence should be in proportion to the nature and complexity of the
specific project. Adoption and development of existing data for the general assessment of principal contractors’ competence would lessen the burden on contractors having to return identical information to numerous clients.

4. The activities included in the risk to health and safety section of the plan are of critical importance to principal contractors. These factors must be clearly set out and backed up by designer risk assessment to give an indication of preventative action to be taken. The principal contractor will then be able to develop health and safety management for site operations.

5. There may be advantages in merging the roles of the planning supervisor and principal contractor. This will create fewer lines of communication and should lessen the potential for contractual disputes over the content of the health and safety plan.

6. The creation of a safety culture that motivates site operatives needs to be created. There is a danger that site operatives underestimate the inherent risks in their work because they have not been trained to recognise hazards. Having risks highlighted in the health and safety plan will assist the principal contractor in developing training needs.

7. Training needs for site operatives has to be given more consideration. Small and medium sized companies require membership of a health and safety group as an effective and economical means for organising on-going training.

The regulations were introduced with the intention of creating an integrated approach to health and safety through the increased involvement of clients and designers. Eighteen months after the implementation of the regulations some duty holders are still addressing the issue of compliance. A finding of the research was that some clients were discharging responsibility for the regulations directly on to principal contractors. Designers were not always taking a significantly different view regarding the buildability of the structure and information on risk was not passing down to the operatives on site. The aim of the CDM Regulations is to reduce the number of accidents and this is being clouded by practitioners unable to assess the requirements in proportion to the complexity and risks of specific projects. A review is required that moves the focus away from a paper bureaucracy towards a practical means by which principal contractors instil an awareness of risk to the health and safety of site operatives.

References