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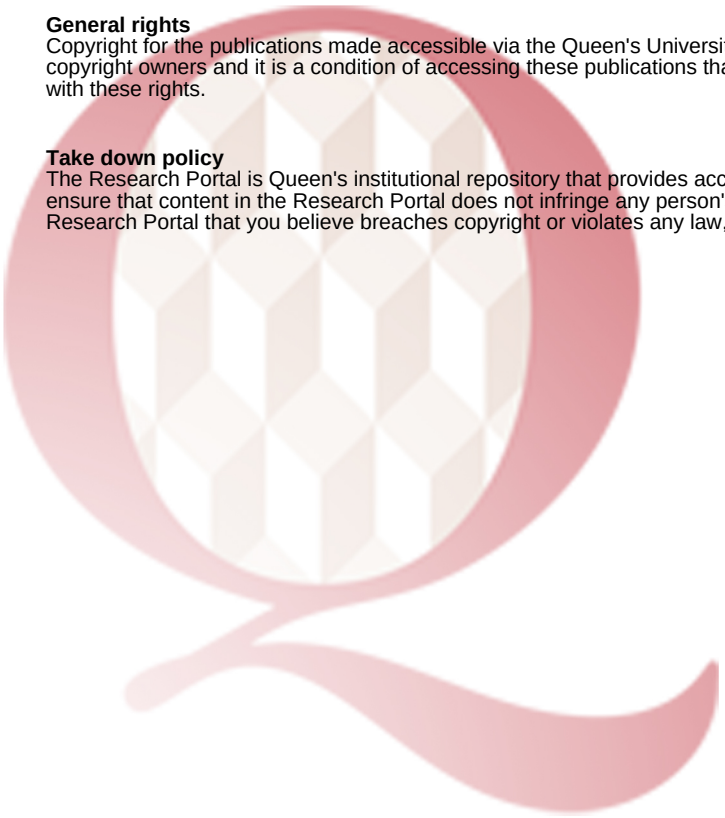

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MEETING THE REQUIREMENTS OF THE CDM REGULATIONS: IDENTIFICATION OF CRITICAL SUCCESS FACTORS OF SMALL TO MEDIUM SIZED CONTRACTOR' COMPLIANCE IN THE UK CONSTRUCTION INDUSTRY

John P. Spillane[1], Mark Noonan[1], Lukumon O. Oyedele[2], Jason von Meding[1] and Ashwini Konanahalli[1]

[1]*School of Planning, Architecture and Civil Engineering, David Keir Building, Stranmillis Road, Queen's University Belfast, Belfast, Northern Ireland, BT9 5AG, UK*

[2]*School of Architecture, University of Lincoln, Brayford Pool, Lincoln, Lincolnshire, LN6 7TS, UK*

ABSTRACT

The Construction Design and Management (CDM) Regulations (2007) is one of the most important set of health and safety regulations in the construction industry today. The aim of this research is to examine critical success factors for CDM compliance in small to medium size contractors in the UK construction industry. The objectives of the research include the identification of critical barriers in doing so along with the identification of success factors where CDM is incorporated. A mixed method approach is adopted in the identification and categorisation of the various factors encompassing a literature review, interviews and questionnaire survey. The key finding which emerge is the lack of knowledge and understanding with regards the CDM regulations with the recommendation to encourage small and medium contractor compliance through illustrating the benefits attainable. The practicality of the research is evident based on the significant uptake in the CDM by larger contractors, yet the research indicates that further insight and guidance is required to educate and inform those working within small to medium sized contractors in the UK. Where such acknowledgement and compliance is adopted, it is envisaged that this sector will benefit from reduced incidents and accidents, increased productivity while ultimately leading to a safer and more productive industry as a whole.

Keywords: Health and Safety; Site Management.

INTRODUCTION

The construction industry is inherently dangerous, with a large proportion of individuals fatally or seriously injured on an annual basis, thus compounding the high

[1] j.spillane@qub.ac.uk

risk mentality of the industry (Spanswick 2006). Research indicates that the construction sector is the most dangerous, with the highest incident rate resulting in at least three days of absence from work (6000 workers per 100,000), with agriculture, hunting and forestry (4500 workers per 100,000), followed by transport and communication along with the manufacturing sector (both around 3700 workers per 100,000) (European Agency for Safety and Health at Work 2013). Within the United Kingdom (UK), the trend follows a similar vein, where again the construction industry is the biggest culprit where industry absenteeism due to accidents or incidents come into question. The Health and Safety Executive (2013) compounds this point by articulating that five percent of the workforce are employed within the sector, yet the construction sector accounts for twenty eight percent of all fatalities.

In order to abate this onerous and grim statistic, there are numerous approaches one can adopt when trying to mitigate or preferable eliminate the occurrence of serious accidents or incidents within the construction sector. Levitt and Parker (1976) consider the input of top management while Toole (2002) deliberates the implications borne by site management professionals in the mitigation of such results. One of the main reasons one should strive to reduce accidents/incidents within the industry, besides the desire for humanitarian considerations (Bakri, et al. 2006), is the cost attributable to such instances within the industry (Laufer 1987; Everett and Frank 1996). Haslam, et al. (2005) identifies various contributing factors in construction accidents including workplace issues, suitability of materials selected and problems arising from workers or other team members.

To help address some of these shortcomings while also aiding in the abatement of accidents and injuries in the construction sector, a number of tools and techniques have been adopted including the review of ergonomics (Schneidera and Susia 1994), motivational strategies (Helander 1991) and the use of advanced robotics (1991). However, Suraji, et al (2001), Behm (2005) and Gambatesea, et al. (2008) all concur that the design process at inception is of paramount importance and can be attributed to forty two percent of accidents on site. To address the deficit in management perception and comprehension, the Construction Design Management (CDM) regulations 1994 were introduced and came into force on 31st March, 1994 (CDM, 1994). In 2007, CDM was revised where the Construction (Health Safety and Welfare) Regulations 1996 were also introduced and amalgamated with CDM 1994 (CDM 2007). With the introduction of CDM there have been a number of issues including role recognition, risk assessment, awareness on-site and awareness of risk (Baxendale and Jones 2000) while with the process of compliance, particularly in smaller works, has been less than effective (Griffith and Phillips 2001). Baxendale and Jones (2000) document that the majority of principle contractors are aware of and acknowledge the duties on which they must abide by under CDM, but there is a gap in knowledge with regard to this aspect with small and medium contractor compliance, particularly within the United Kingdom.

With this dearth in knowledge identified, coupled with the significance of the research and topic in question, it is essential to identify the critical success factors of small to medium contractor compliance with CDM 2007. Through the use of a sequential mixed methodology encompassing a desk-based literature review, semi-structured interviews and an industry specific questionnaire survey, a number of critical success factors emerge and are discussed further. It is envisaged that small to medium sized contractors, that is, contractors employing less than fifty employees, should acknowledge and implement the findings herein with a view to improving their CDM

compliance with the ultimate goal of improving, not only the safety record within their respective organisation, but improving that of the construction sector as a whole within the UK.

HEALTH AND SAFETY IN CONSTRUCTION

Health and safety in the workplace, particularly in the construction sector, is of paramount importance, regardless of profession, industry or location. Therefore all involved should be informed of the potential risks. Brodie (1994) states that with effective management of health and safety there is the need to build a collaborative network with all stakeholders in the construction industry. Traditionally, the responsibility of on-site health and safety resided with the main contractor, but this emphasis has now permeated throughout the various stakeholders on-site. However, there is still significant ownership of risk imposed on the principal contractor, which then reverberates through the management structure on-site.

There is now a belief that architects and engineers who design structures should play a role in the safety, health and welfare of those enlisted with the responsibility of constructing the structures in question. Manuele (1997) believes that architects and engineers should be designing to eliminate or avoid a hazard and that this emphasis should be given higher priority than simply controlling the hazard or protecting the workers from the hazard. With this belief that the various stakeholders to a project should positively contribute to the overall health and safety of those enlisted in its construction, Korman (2001) reemphasizes the importance of including construction safety issues and buildability during the inception and initiation stages of a project, thus maximising the consideration given. Gambatese (2003) furthers the importance of such considerations by articulating that all design requirements within the construction sector should consider and acknowledge the possible interventions made can have both a positive and negative outcome in improving the safety of operatives on-site.

There is also the belief that a number of decisions regarding worker safety on construction sites are being made outside of the construction site environment in question. Jeffery and Douglas (1994) reviewed the safety performance of the UK's construction industry and contended that in terms of the causation of on-site accidents, there is a positive association between the design decisions that are made by the architects and the engineers off-site and that of safe construction practises. Szymberski (1997) articulates that the ideal scenario is for construction safety to be of prime consideration when the project is in the conceptual design stage. In order to underpin this ethos, the Construction (Design and Management) regulations are introduced, particularly with the emphasis on the safety of those enlisted with the task of constructing the various projects in question.

RESEARCH DESIGN

In order to acquire the relevant information for discussion, a progressive mixed methodology is adopted. This includes a literature survey, four detailed semi-structured interviews and finally a comprehensive industry specific question survey. With respect to the literature survey, this provided ample opportunity to investigate the relevant literature in the identification of factors for consideration in the questionnaire survey.

Qualitative analysis

To complement the literature survey process and to ensure an exhaustive list of factors for analysis, four detailed industry specific interviews are undertaken incorporating CDM co-ordinators and representatives from various small and medium contracting firms in addition to site management professionals. This provided an opportunity to confirm the validity of the factors identified in the literature while also aiding in unearthing supplementary factors not identified in the literature. Using mind mapping software, each of the four interviews is mapped and analysed accordingly using hieset and domain analysis to aid in the dissemination of the information. Once complete, each of the maps is combined to give an overview of the comments of the participants while also assisting in the identification of supplementary factors in conjunction with the points noted from the literature survey.

Quantitative analysis

In total, 39 factors were identified and included in the questionnaire survey where 40 responses with usable data were collected. The resulting questionnaire data is reviewed incorporating factor reduction, where the list of factors is merged based on similarities in the dataset, resulting in a coherent and consolidated list of core factors for discussion. Each of the resulting overarching concepts is then discussed, providing a platform on which to provide reasoned conclusions, with implications for practice provided. Table 1 documents each of the variables in question along with the scores assigned; where 1: Strongly Disagree, 2: Disagree, 3: Neither agree nor Disagree, 4: Agree, 5: Strongly Agree. Each of the factors is ranked based on the overarching perceptions of the respondents from Strongly Agree (5) to Strongly Disagree (1).

	Score Assigned				
	1	**2**	**3**	**4**	**5**
H&S Co-ordinators are reluctant to offer guidance on a specific H&S issue	0	10	7	13	10
Residual risks are regularly communicated to site managers	0	12	11	13	4
All clients have an appropriate level of understanding of CDM	8	8	5	9	10
CDM integrates all necessary management techniques	1	11	16	7	5
Quality of design is influenced by the use of the CDM Regulations	3	9	12	13	3
CDM makes projects harder to construct	2	12	13	11	2
It is the duty of the contractor to ensure clients are aware of CDM	8	7	8	12	5
People avoid complying with the CDM Regulations	5	7	16	9	3
CDM covers all individuals involved in construction	2	16	12	8	2
CDM Regulations are well communicated by the planning supervisor	6	7	19	6	2
CDM Co-ordinator has a positive impact on Health and Safety	3	15	14	4	4
CDM sufficiently address risk management	3	14	14	7	2
CDM contributes to successful project delivery	2	16	13	8	1
CDM 2007 covers all aspects of Health and Safety in construction	5	11	15	8	1
All small/medium contractors personnel should have a refresher course on CDM	4	15	13	6	2
CDM Co-ordinators reduce accident rates in construction projects	7	14	9	6	4
CDM is addressed at multi-discipline design team meetings	7	10	14	8	1
You have been on a site where there has been a serious accident	16	1	9	10	4
CDM ensures the 'Right information for the right people at the right time'	4	16	14	3	3
CDM Regulations 2007 will reduce the number of accidents on site	4	18	14	2	2
Proper procedures prevented accidents on-site	13	10	10	3	4
Clients duty to ensure compliance with workplace regulations	11	15	7	3	4
CDM should be incorporated into the Building Regulations	12	12	8	6	2
All Small/medium contractors personnel attend a course in CDM Compliance	10	15	10	3	2
Health and Safety material/documentation should assist in CDM compliance	9	15	13	3	0

Comprehension of CDM by small/medium contractors is essential	15	9	10	4	2
CDM will improve Health and Safety in small/medium contractors	13	13	8	5	1
Is it essential that all clients have a strong understanding of CDM?	12	13	10	5	0
CDM should be enforced in conjunction with the Building Regulations	16	12	6	5	1
Principal contractor provides welfare facilities in line with CDM 2007	14	14	9	2	1
Individuals would benefit from additional CDM training	17	14	7	2	0
It is the duty of main contractor to ensure sub-contractors are trained in CDM	17	16	5	1	1
Duty of Principal Contractor to ensure compliance with workplace regulations	19	12	7	1	1
Communication of the CDM Regulations is key to project success	17	19	3	0	1
The Principal Contractor should introduce practical safety initiatives	23	10	5	1	1
Main contractors duty to provide induction training for individuals visiting site	22	12	4	2	0
It essential to liaise with Site Manager/Site Supervisor	27	6	4	2	1
Site induction for all individuals visiting construction sites is essential	24	11	3	2	0
Sub-contractors must provide risk assessments for projects that they work on	27	9	2	2	0

Table 1: List of factors and scores assigned from questionnaire survey

From the four detailed industry interviews and subsequent industry specific questionnaire, through a process of factor reduction using principle component analysis with Eiganvalues greater than 1 and Varimax rotation, three critical success factors emerge and are identified as follows;

DISCUSSION

Additional training on CDM regulations

The first pointed noted throughout the interviews and on reduction of the factors for discussion, is the need for additional training on the CDM regulations at the small and medium sized contractor level. Within this group in the questionnaire, various factors exemplify the importance of training on CDM regulations with all of the interviewees stating that there is a distinct lack of knowledge with this regard. Through additional training, it is perceived that this approach would increase the likelihood of achieving a positive safety culture though developing knowledge and understanding (Zohar 1980; Coyle, et al. 1995). Baxendale and Jones (2000) further exemplify the need for additional training by documenting that there is only a small amount of operative training, which indicates a failing when complying with the requirements of CDM regulations. In order to overcome this shortfall, the interviewees and questionnaire respondents all concur that additional training on the various elements of the CDM regulations as fundamentally important, not only for benefit of those on-site, but also to aid compliance by small and medium sized contractors.

Establish/maintain clear lines of communication

One of the most important factors in health and safety management is clear lines of communication. In order to sustain such a position, one must establish and then maintain this desired outcome. Each of the four interviewees all concurred that this is one of the most prominent critical success factors in the implementation and proactive management of the CDM regulations, especially between small/medium sized contractors and principle contractor/developers on-site. This is further exemplified where Mackenzie, et al. (1999) articulates the importance of communication of health and safety in the design phase, with concerns voiced on the implementation of the CMD regulations in this respect. Cheetham (2000) provides further grounding by articulating the importance of the need to improve site safety through the use of the CDM regulations. But in order to ensure effective implementation by all parties concerned, it is essential that clear and constant line of communication are established

and maintained throughout a project, particularly during the appointment process of small and medium sized contractors. During this process, it is imperative that each of the potential sub-contractors identified, are made aware of the importance of, and the prerequisite requirement of CDM regulation compliance, should they be appointed. During the appointment process, questionnaire respondents voiced concern with this aspect, where the majority of respondents either 'strongly agreed' or 'agreed' with this viewpoint. Furthermore, to exacerbate the point in question, where respondents were posed the question 'CDM Regulations are well communicated by the planning supervisor', the results indicated that respondents disagreed, thus compounding the importance of this critical success factor and that of communicating the requirements under the CDM regulations.

Identify the benefits of CDM regulations implementation

The third critical success factor for the effective application of the CDM regulations in small and medium sized contractors within the UK is through the identification and articulation of the benefits of such practices to those who are required to adopt the procedure in question. Through highlighting the importance of the CDM regulations, again Baxendale and Jones (2000) exemplify this point. Langford, et al. (2000) articulate the benefits of CDM regulation compliance but it is the expression and dissemination of this information to small and medium sized contractors which is of paramount importance. From the results of the questionnaire survey, it appears that the respondents correspond with this viewpoint; however, the results indicate that they feel that this duty should not be the responsibility of the principle contractor, but of the small and medium sized sub-contractors themselves. Griffith and Philips (2001) further articulate the need to demonstrate the benefits of CDM regulations implementation, particularly with respect to small building works – an environment predominantly covered by small and medium sized contractors. In this example, research indicated that health and safety responsibilities were downplayed or more worryingly, simply disregarded by those who are in most need of acknowledging and adhering to the regulations in question.

CONCLUSIONS

Through this paper, the importance of the Construction (Design and Management) regulations is articulated, with particular emphasis placed on that of small and medium sized contractors within the UK. With the construction industry continuing to be plagued by accidents and incidents, every effort must be made to reduce this trend where possible. On reviewing the mixed methodology adopted in this research, a number of critical success factors emerge and can be summarised as one; additional training on CDM regulations, two; establish/maintain clear lines of communication, and three; identify the benefits of CDM regulations implementation. By providing small and medium sized contractors with the information contained herein, it is envisaged that the results will aid in the application of the CDM regulations by those who can benefit from its implementation the most – small and medium sized contractors within the UK construction sector.

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