Abstract 4

Construction safety: Development of an assessment tool to reduce risk on building sites

BIGGS, HC.

BIGGS, S.E.

WISHART, D.E.

Centre for Accident Research and Road Safety – Queensland (CARRS-Q),

Queensland University of Technology,

Victoria Park Rd, Kelvin Grove, Qld, 4059

h.biggs@qut.edu.au

Australian construction and building workers are exposed to serious workplace risks - including injury, illness and death - and although there have been improvements in occupational health and safety (OHS) performance over the past 20 years, the injury and fatality rate in the Australian construction industry remains a matter of concern. The concept of safety culture is rapidly being adopted in the industry, including recognising the critical role that organisational leaders play in overall safety performance. This paper reviews recent research in construction safety leadership and provides some examples and applications relevant to risk reduction in the workforce. By focusing on developing safety competency in those that fulfil safety critical roles, and clearly articulating the relevant safety management tasks, leaders can positively influence the organisation's safety culture. Finally, some promising research on Safety Effectiveness Indicators (SEIs) may be an industry-friendly solution to reducing workplace risks across the industry, by providing a credible, accurate, and timely measure of safety performance.

Paper 4, Construction safety: Development of an assessment tool to reduce risk on building sites

In Australia, the construction industry has adopted an interest in the concept of safety culture in reducing serious workplace risks, including illness, injury and death. Traditionally, the construction industry has measured risk through lag indicators such as accident statistics and worker's compensation claims (Mohammed, 2002). Although there has been a continuing decrease in the injury rates, this sector still suffers more injuries and ill-health than the Australian average, and it is the third highest industry behind transport and storage and road freight transport. Of the 295 working fatalities in 2006-2007, 52 were in the construction industry, and this pattern has been consistent over the previous 4 years (Safe Work Australia, 2009). As a result, the sector has one of the highest workers' compensation premium rates in Australia. However, there is increasing recognition within the industry that the concept of safety culture is useful for understanding how the behaviours and actions of organisational leaders can influence the safety of frontline workers (Dingsdag, Biggs & Sheahan, 2007).

The concept of safety culture emerged after an enquiry in the nuclear power industry (IAEA, 1991), and reflected a move away from individual causes of accidents towards more systemic explanations (Reason, 1997). In a report to the UK Health and Safety Commission, the Advisory Committee on the Safety of Nuclear Installations (ASCNI, 1993, p23) defined the safety culture of an organisation as "...the product of individual and group values, attitudes, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management".

The academic literature has studied safety culture primarily from the social psychological and organisational psychological traditions, proposing a number of models relating to safety knowledge, attitudes, beliefs in individuals and groups, as well as exploring

the relationships between organisational policies, management behaviours and individual safety behaviours (Guldenmund, 2000; Zohar, 2010). And, whilst the literature is still considerably fragmented on a number of issues (Cooper, 2000; Guldenmund, 2000), it is commonly agreed that the organisation's leaders are critical to both the development and maintenance of positive safety culture (Hopkins, 2006; Mohammed, 2002; Zohar, 1980). Furthermore, it is becoming increasingly obvious to scholars that leaders' commitment to safety needs to be demonstrated to the workforce through identifiable and measurable behaviours (Dingsdag et al., 2007).

Leadership and Safety Critical Roles

The Cole Royal Commission investigated the Australian Building and Construction industry and revealed that the industry occupational health and safety (OHS) performance was in dire need of improvement (Cole Royal Commission, 2003). Although there have been improvements in OHS performance over the past 20 years, the injury and fatality rate in the Australian Construction Industry remains a matter of concern (ASCC, 2006).

In seeking avenues to improve OHS performance and safety culture, one possibility is to improve the management of safety by increasing levels of safety competency within key industry roles. Under current legal frameworks, construction companies are required to ensure that people in charge of works are competent to manage OHS obligations; however, there has been to date, no nationally based or accepted framework that specifically articulates who needs to do which safety critical tasks and what competencies they require to engage the tasks. Recent research in Australian construction companies identified that roles across the organizations were critical to driving safety culture. All parts of the companies were involved in promoting safety, from the managing director, CEO or general manager to the foreman or supervisor on site (Biggs, Dingsdag, Sheahan & Stenson, 2005). A range of 39 safety critical competencies were subsequently identified as industry-mandated for optimum safety

(Dingsdag, Biggs, Sheahan and Cipolla, 2006). Focus groups and interviews identified proficiency and understanding of each of the Safety Tasks (for example, undertake project risk assessment) that an individual in a specific position should be able to demonstrate. These safety critical positions within the industry that have a significant impact on safety culture were mapped, and the behaviours and competencies required to successfully drive a positive site safety culture were identified. Essentially, the safety framework identified, in detail, what process should be followed when completing particular tasks; the knowledge, skill and behaviour required to complete the task effectively; and what cultural outcomes should be achieved if the task is completed effectively (Biggs, Sheahan & Dingsdag, 2006). The framework also provided some initial recommendations to industry on training, mentoring and employee motivation. Further, the safety framework provides specific actions that reflect the Office of the Federal Safety Commissioner's (2007) advice on steps for leadership in safety critical positions in the construction sector. Leaders should understand how behaviour works, define what behaviour is required, and develop and support such behaviour by ensuring a supportive work environment. Leadership initiatives and the matrix of cultural competencies, developed through extensive consultation with industry, government and unions are useful staring points for definable activities, actions and processes. However, unless these activities, actions and processes are effective and consistent, workplace safety will not improve. The current research describes the ongoing development of a tool to measure how effectively safety is understood and enacted.

From PPI's to SEI's

Other than lost time injuries (LTIs) or similar 'negative' 'lag' performance indicators, reliable, comparable and easily undertaken performance indicators are not available. An evaluation of Positive Performance Indicators (PPIs) as an OHS performance measuring tool, based on a brief overview of its limited uptake in Australian industry, suggests that it does

not reliably measure OHS performance. Establishing a credible, accurate and timely standard for allowing industry-wide measurement of OHS performance remains the key to moving forward in improving OHS by the Australian Government (Federal Safety Commissioner's 2005-2006 Progress Report, 2006). Consequently, using the starting point of the previously developed 39 safety management competencies, Biggs, Dingsdag and Kirk (2009) explored the potential of a new concept in safety measurement which they have described as *safety effectiveness indicators(SEI's)*. From an initial pool of 39 competencies, 13 management

Table 1

Safety Management Tasks developed into Safety Effectiveness Indicators

Number	Safety management task
1	Carry out project risk assessment
2	Carry out workplace and task hazard identification, risk assessments and control (JSAs/SWMSs)
3	Plan and deliver toolbox talks
4	Consult on and resolve OHS issues
5	Challenge unsafe behaviour/attitude at any level when encountered
6	Recognise and reward people who have positively impacted on OHS
7	Deliver OHS training in the workplace
8	Carry out formal incident investigations
9	Carry out formal inspections of workplace and work tasks
10	Evaluation research and prepare reports on OHS issues, performance and improvement strategies
11	Monitor sub-contractors activities
12	Evaluate OHS performance of subcontractors
13	Work with staff to solve safety problems

tasks could be used to operationalize the SEIs, as shown in Table 1, and are designed to be used in a workbook format (Biggs, Dingsdag, Kirk, & Cipolla, 2010). At present, the research is examining the scope and nature of the SEI's to understand how best to capture these steps quantitatively. In consultation with industry partners, each SEI will be examined as a binary quantitative scale (e.g. yes, the indicator element exists, or no, it doesn't) to ensure that that the system will be easily to understand and implement and importantly, it should be easy to see that progress is being made to improve safety (e.g. yes, it has or no, situation is unchanged). It is expected that a system that is used by all on site and that has immediacy of measuring safety effectiveness, will encourage industry adoption and allow cross referencing to lag indicator measures of safety performance.

Conclusion

The challenge for the industry is to assist in developing reliable, comparable and constant indicators that measure safety performance without the drawbacks commonly attributed to PPIs: The indicators must be easily measured and comparable for benchmarking purposes within sections of an organization and across industries without being subject to random variation. For the construction industry specifically, they must be able to be implemented uniformly from project site to project site notwithstanding the disparate sectors of the industry, the variability of the work undertaken and the diverse risk contexts these generate. Further, they must be simple to implement so that they are not capital and human resource intensive. They must not be so complex that they are time-consuming to administer and collate and they must measure effectiveness instead of simply measuring a number of events which have no demonstrated effect on safety performance. The development of safety effectiveness indicators aspires to assist industry in meeting these goals, with a view to risk reduction and ultimately reducing the prevalence of injuries in the construction and building sectors.

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