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Building a safety culture: the importance of 'shared mental models'

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Abstract
The rhetoric from managers of construction organizations about the importance of OHS is heard again and again. Some managers move beyond the rhetoric to implement OHS management systems, supported by a programme of OHS training and audits. Yet in the face of deadlines or budgetary pressures, managers at all levels of construction organizations often change their priorities to pursue performance in traditional areas of cost, time and quality – at the expense of OHS. Whilst it would be rare for a manager to openly diminish the importance of OHS, where these managers place OHS in relation to other organizational priorities at times of high pressure creates employees' perceptions about how important OHS really is. This paper discusses research currently underway in the Australian construction industry into the role played by managers at different levels in creating OHS sub-cultures in construction organizations. The paper explores how the existence of these sub-cultures should be identified and managed to create shared mental models of OHS within participating organizations.

Keywords

INTRODUCTION

Management influence on OHS
Traditional OHS efforts focused on technical and engineering aspects but over the past thirty years, considerably more attention has been paid to how management and organizational factors impact upon OHS performance (Flin 2003). Early examples of this approach were investigations by Simonds and Shafai-Sahrai (1977) and Smith, Cohen, Cohen and Cleveland (1978). The attention given to management and organizational factors has become so significant that Hale and Hovden (1998) have referred to it as the "third age of safety." Various management actions have been observed in organizations demonstrating good OHS performance. These are summarised below:

1. *Management commitment to OHS*. Early studies revealed that employees' perceptions of managers' commitment to OHS were a major factor in the success of an organization's OHS programme (Zohar 1980). Management commitment has been referred to as a necessary condition for a safe workplace (Shannon et al 2001).
2. *Worker participation in the OHS process*. Employees close to the work are recognized to be in the best position to make suggestions about OHS improvements and teams have been found to make better OHS decisions than individuals (Culvenor 2003). The encouragement of upward communication and involvement in decision-making also has an empowering effect, providing employees with authority, responsibility and accountability (Vassie and Lucas, 2001). Although participative managers must also take care not to abrogate their managerial responsibility for OHS (Roy, 2003).
3. *Provision of OHS training.* In order to actively participate in the OHS process, it is critical that employees are provided with adequate OHS training. OHS training programmes should be carefully designed after a comprehensive assessment of the organization's needs, i.e. what OHS knowledge, skills and abilities are missing that are required to enable employees at all levels to perform their jobs safely?
4. *Hiring practices.* Where organizations establish recruitment criteria that are designed to ensure the selection of people who are safety conscious, organizational OHS performance is reported to be better. Also, when, the organization actively strives to communicate organizational OHS values

and commitment to prospective employees, it is more likely to recruit employees with compatible OHS attitudes and expectations.

5. *Reward systems.* Incentive programmes that reinforce desired OHS behaviours are a feature of organizations with good OHS performance. Vredenburgh (2002) suggests that rewards can include informational (e.g. feedback), social (e.g. praise/recognition) and tangible (e.g. bonuses/awards) reinforcement for desired OHS behaviour.

6. *Communication and feedback.* Clear and consistent communication of OHS expectations is vital to OHS performance. The provision of constant feedback to employees about their OHS performance is also critical because many serious OHS incidents occur as a result of actions that are routinely undertaken but which, in most instances, do not result in injury.

One striking feature of research into managerial and organizational determinants of OHS performance is the consistency with which these management actions have been linked to high levels of OHS performance (Varonen and Mattila 2000). This consistency demonstrates that managers' actions are an extremely important factor in determining an organization's OHS performance.

Multi-level analysis of management behaviour

Recent research has examined the role played by different levels of management in shaping OHS performance and, consequently, there is a growing understanding of the need to pay attention to managerial actions at all levels within the organization. Senior managers play a key role in establishing an organization's OHS policy, setting strategic objectives for OHS and allocating organizational resources to the overall management of OHS. It is critical that managers at this level are seen to take OHS seriously, demonstrating their commitment to OHS through their actions. However, 'grass roots' employees are likely to have little direct contact with senior management and the role played by middle managers and first line supervisory personnel is equally critical. Where middle managers or supervisors do not behave in a manner which is consistent with espoused organizational OHS policy or value statements, these policies and values are unlikely to be put into practice.

Supervisory personnel are particularly influential because they "filter" organizational OHS messages and shape employees' beliefs about how committed managers are to OHS. Put simply, supervisors communicate what "management really wants." Research shows us that, while senior managers plays a very important role in the OHS process, supervisors also have very strong, direct influence on subordinates' OHS behaviour (See Simard and Marchand 1994; 1995; 1997). Interestingly, Simard and Marchand (1995) found that senior management actions did have a positive effect on employees' OHS behaviours but that this effect was an *indirect* one. Macro-level factors positively influenced employees' OHS behaviour, but this relationship occurred *through* supervisors' adoption of participative safety management approaches within work groups. As such, the role played by supervisors in OHS management warrants closer examination in the Australian context.

Mechanisms of managerial influence

The concept of safety culture provides one explanation for how managerial/supervisory actions are translated into OHS performance. Researchers suggest that OHS performance is shaped by an organization's socially transmitted beliefs and attitudes towards OHS. The concept of safety culture is one vehicle for the transmittal of beliefs and attitudes about OHS. Safety culture is often regarded as a sub-set of organizational culture, which has been defined as the beliefs and values of the organization, which act as prescriptions for the way in which organizational members should work (Harrison 1972). Safety culture, then, refers to organizational beliefs and values pertaining to OHS. Schein (1992) suggests that the way in which managers instruct and reward employees, allocate their attention and behave under pressure are key factors shaping an organization's safety culture. Perceptions of managers' behaviour and attitudes in relation to OHS guide the OHS behaviour of organizational members and ultimately shape the OHS performance of the organization. The safety culture concept is predicated upon the existence of shared assumptions and beliefs about the importance of OHS. The safety culture concept has been criticized for its over-simplification of complex organizational environments (Back and Woolfson 1999). In most organizations it is likely that, rather than having a uniform safety culture, there are numerous sub-cultures. Clearly, if safety culture is to be usefully deployed as a management concept, there is a need to examine how safety cultures come to be shared within and between people at various organizational levels.

The stated values and behaviours of managers are influential in shaping the values and behaviours of their subordinates. For example, Maierhofer et al (2000) demonstrate two ways in which managers influence subordinates' OHS behaviour. First, they found evidence of internalization, whereby managers' OHS values were adopted by their subordinates. This suggests that employees are susceptible to influences that can change their beliefs about OHS. Managers act as powerful role models exercising substantial influence upon their subordinates. When managers clearly and explicitly annunciate their strong OHS values and reinforce these values with consistent behaviour, it appears that employees take on similar values. Second, Maierhofer and her colleagues found a strong relationship between managers' OHS behaviour and that of their employees. This is explained in terms of employees' desire to emulate behaviour that has led to the success of their managers. The implication of these findings is that desired OHS values and behaviours must be enacted across different hierarchical levels of an organization.

Group level safety drivers
Further research undertaken by Zohar and colleagues sheds light on the mechanism through which supervisors' behaviours influence subordinates' OHS behaviour. Zohar's research has revealed that supervisors' actions are a key determinant in the creation of subordinates' beliefs about the importance of OHS to the organization (Zohar 2002). Furthermore, members of a workgroup develop shared perceptions about the relative priority of OHS, based upon the interactions they have with their supervisors. These shared perceptions, which Zohar calls 'group safety climates' are found to differ considerably between workgroups within the same organization. (Zohar 2000). Thus, groups whose supervisors are highly committed to OHS develop stronger and more positive OHS climates than groups whose supervisors are less committed to OHS. Moreover, group safety climates are believed to have an impact on group OHS performance. For example, in one study, group safety climates, measured at one point in time, was found to predict the incidence of minor (first aid only) incidents experienced by the workgroup for up to six months thereafter: i.e., the stronger the climate, the lower the incidence of injuries (Zohar 2002).

Zohar suggests that the existence of group-level climates explains why some workgroups within an organization consistently demonstrate lower levels of OHS performance than others, even when their levels of risk exposure are the same.

In order to develop safety-supportive climates within workgroups, it is critical that managers/supervisors are *consistent* in the way that they emphasise (or de-emphasise) OHS in their interactions with employees. Climates are formed on the basis of the day-to-day interactions and observations of managers/supervisors behaviour. Over time, managers' or supervisors' behaviour is observed to form a pattern. Positive and strong safety climates will develop only to the extent that managers/supervisors are consistent in what they say and do in relation to OHS. Thus, similar events or situations should elicit similar OHS responses from managers/supervisors reflecting a stability in the importance placed upon OHS. Where the manager/supervisors' OHS behaviour is perceived by employees to be contingent upon the circumstances, for example if a manager/supervisor changes their behaviour when facing production pressure, the resulting safety climate will be weak (Zohar and Luria 2004).

Competing objectives – threats to OHS performance
All organizations (and their managers) face multiple goals. Managers of construction projects are no exception. Indeed, in construction, cost, time and quality performance are two of the most important indicators of project success. Production targets must be met, costs must be constrained within budgets and quality issues must be managed to ensure customer satisfaction and shareholder value. OHS is therefore only one – albeit a very important - facet of organizational performance to which managers/supervisors must pay attention. Unfortunately, production and cost pressures can sometimes compete with OHS goals and, if managers are not careful, employees' perceptions of performance pressures in other areas can lead them to believe that cutting corners with respect to OHS is an expected part of their job (Hofmann and Stetzer 1996). Furthermore, taking OHS "short cuts" can become a normal way of working where competing performance pressures exist when the consequences of unsafe working are perceived to be 'rewarding.' Such rewards could include receiving praise for completing a job earlier than expected or receiving a productivity bonus. It is therefore important that managers and supervisors intervene to counterbalance some of these perceptions. Managers/supervisors play an important role in shaping

employees' beliefs about importance of OHS relative to other organizational goals. For example, a manager/supervisor who never mentions OHS is likely to be perceived by subordinates as being much more concerned with production and relatively unconcerned about OHS. Yet, busy managers and supervisors often suffer from 'role overload' – a known type of work-related stress. Role overload is associated with a narrowing of focus upon immediate issues at hand and an inability to see the 'big picture.' Role overload can also impede people's ability to comprehend their weaknesses or fallibilities (bounded rationality) leading them to oversimplify complex situations or be over-confident in the face of danger. In such situations it is crucial that managers and supervisors have a crystal clear appreciation of the importance of OHS relative to other organizational goals and communicate this unequivocally to the employees they manage. Supervisors and managers must maintain a constant focus upon the health and safety aspects of the work processes they oversee and make clear the fact that OHS is not to be compromised in favour of other organizational objectives. This requires that managers and supervisors demonstrate strong OHS leadership.

Thus, OHS leadership involves defining the perceptions and expectations of others aswell as challenging any assumptions that undermine OHS. Such assumptions could include the belief that 'accidents just happen,' 'it won't happen to me' or 'its okay to take risks in order to get the job done.' Good OHS leaders also encourage employees' active participation in OHS decision-making and lead by example. Interventions focusing on safety leadership activities and behaviour modelling have been effectively used to improve OHS (O'Toole 2002) and Zohar (2002) has successfully used a leadership intervention to modify supervisors' OHS practices, strengthen group safety climates and improve OHS performance.

Scott Geller suggests that leadership in OHS is a function of the recognition and communication of OHS (See Figure 1 below). Clearly effective OHS leaders must also have good relationships with their employees in order to engage in two-way OHS communication and provide appropriate recognition for OHS performance.
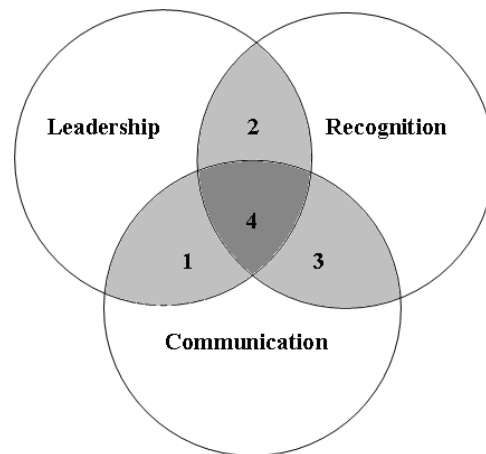
1. Leaders *communicate* safety issues effectively.
2. Leaders *recognise* desired safety performance.
3. *Recognition* is *communicated* effectively.
4. Leaders *recognise* desired safety performance effectively through a variety of communication channels.

Figure 1: Communicating and recognizing safety performance (Source: Geller 2001

Various aspects of leadership have been linked to OHS behaviour and performance. For example, Hofmann and Morgeson, (1999) reported that the quality of the relationships between group members and their managers (Leader-Member Exchange) predicted safety communication, safety commitment and accidents. That is, where relationships between managers and the employees they manage were good, employees were more likely to raise legitimate OHS concerns and internalize the organization's OHS values and less likely to be involved in a work-related accident. When managers are perceived to be supportive, employees feel

freer to engage in safety-related communication and are more likely to comply with the organization's OHS procedures. Similar results are reported by Parker, Axtell and Turner (2001) who found that supportive supervision predicted safe working for up to 18 months. It is therefore critical that senior managers convey support to middle managers who, in turn can act as a conduit for support for supervisors and employees.

Research has also demonstrated a link between safety-specific transformational leadership and safety performance (Barling et al 2002). Zacharatos et al (2005) suggest the following ways in which transformational leadership would enhance OHS performance. These are:
1. Leaders high in idealized influence would convey the value of safety through their personal experience;
2. Those high in inspirational motivation would convince their followers that they could attain levels of safety not previously considered possible;
3. Intellectually stimulating leaders help followers think about safety and develop new ways to achieve high safety levels; and
4. Individualized consideration would be evident through leaders' real concern about their followers' safety at work (Zacharatos et al 2005, p80).

Importance of shared mental models of OHS
The importance of transmitting OHS messages between organizational levels to create a shared set of organizational OHS values, assumptions and beliefs (i.e. a safety culture), has already been mentioned. Managers are removed from the day-to-day pressures of production and may assume employees share their beliefs about OHS when they do not. These mismatches serve to undermine management-employee communication, confidence and trust – all key features of a positive safety culture. One threat to OHS performance is a lack of inter-level understanding about the importance of OHS (Clarke, 1999). For example:
- where two groups wrongly perceive agreement between their own view and the view of the other;
- where two groups hold negative stereotypes about each other's' view; and/or
- where two groups have inaccurate perceptions of the other's view (See Figure 2 below).

Figure 2: Agreement-Accuracy-Congruence model of cross-level OHS perceptions
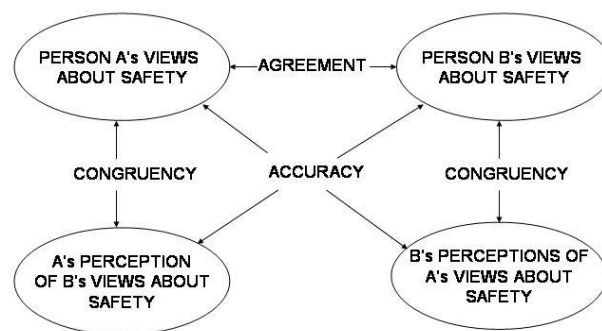
In an analysis of rail workers in the UK, Clarke (1999) reports that, although managers believed they were communicating the importance of OHS to supervisors effectively, supervisors perceived that management was primarily interested in operational efficiency. Supervisors, in turn, communicated to train drivers that, although management said they placed a high priority upon OHS, the efficient running of trains was more important. Conversely, employees perceived themselves to be more highly committed to OHS than managers within the organization. This 'disconnect' led to employee OHS behaviour that was inconsistent with management's expectations.

In the context of a construction project, this 'disconnect' is likely to be even more pronounced because productive work (i.e. construction) is organizationally and geographically separate from a company head office where OHS policy decisions are made. Mental models (or collective minds) have been defined as 'psychological representations of the environment and its expected behavior.' They serve as a basis for future event prediction and making choices between different courses of action. Prussia (2003) investigated mental models of safety in a steel manufacturing organization and reports differences in perceptions of accident causation between managers and employees. For example, managers felt that when there was more pressure to ignore safety rules and guidelines, employees developed cavalier attitudes. Managers believed that employees were significantly more cavalier than employees believed themselves to be and employees estimated the frequency with which they engage in safe work behaviours to be much higher than the frequency attributed to them by managers. Prussia (2003) suggests that these differences promote blame-casting regarding OHS and can prevent managers and employees from effectively working together in the interests of OHS.

It is very important that shared mental models of OHS be developed between different levels within organizations. The development of shared mental models of safety requires a cascading process of OHS leadership, whereby senior management clearly conveys OHS as a priority to middle managers, who convey this priority to supervisors who, in turn, demonstrate the importance of OHS in their day-to-day behaviour. Without such cascading leadership, it is likely that important OHS messages will not filter through the organization and translate into performance.

Current Australian research
Research is underway in Australia to evaluate perceptions of OHS within construction organizations. Data will be collected from frontline workers, supervisors (i.e, foremen and leading hands), project managers, and senior managers in companies' head or regional offices. The project will use a combination of survey methods and experimental research.

The first stage in the project is to undertake a questionnaire survey to assess the extent to which there is a shared understanding of OHS between people occupying different hierarchical levels within participating construction companies.. The questionnaire will be developed on the basis of an analysis of OHS incident reports and discussions with OHS personnel of participating organizations. Factors representing important OHS issues, (eg resourcing OHS, considering OHS in project planning, operatives' OHS skills etc) will be identified and listed. Respondents will be asked to indicate the extent to which they think each of these factors has an adverse impact on OHS performance. Respondents will then be asked to rate the extent to which they think the other groups consider these factors to be important, i.e. "what do you think is the opinion of project managers?" etc. Data will be analysed to identify mismatches or biases in perceptions of OHS between groups of participants.

Respondents' perceptions about safety commitment, the existence of pressures to cut corners, the prioritization of safety relative to productivity/cost and the safety leadership behaviour of their immediate supervisors will also be measured. These data will be compared against the OHS performance of workgroups to identify managerial/leadership behaviours associated with good or indifferent OHS performance.

In the second stage of the project, a safety leadership model and behaviour-based intervention will be developed, implemented and evaluated. A quasi-experimental design will be used in which construction projects will be "matched" according to the nature of work and level of OHS risk (as rated by a group of specialists). In experimental sites, the behaviour-change intervention (site manager/supervisory safety leadership training and evaluation) will be implemented. No intervention will be implemented in control sites. Following the intervention, project participants will be surveyed a second time to determine the extent to which there is inter-group consensus concerning OHS issues, the extent to which they perceive there is safety commitment, pressure to cut corners, prioritization of safety relative to productivity/cost and effective safety leadership. These scores will be compared to pre-intervention scores to determine the extent of any improvements.

The actual OHS performance of participating construction projects will also be monitored for six to twelve months after the experiment. The performance of control sites will be compared to that of experimental sites to determine any significant differences. This assessment will consider both output measures (eg minor first aid only incidents, near misses and lost time injury frequency rates) as well as process measures (number of site safety inspections, tool box talks, safety committee meetings etc).

The results of the research will provide a basis for development of safety leadership interventions in the construction industry.

CONCLUSIONS

Workplace OHS requires multilevel support and cooperation. Competing objectives within organizations can result in mixed messages and perceptions that OHS is contingent upon other factors, such as production pressure, cost etc. Unfortunately, in some organizations management commitment to OHS is lacking and OHS may be treated as secondary to other objectives. In these organizations, employees might accurately perceive that management does not value OHS.

However, sometimes people at different organizational levels have inaccurate perceptions about the importance of OHS to other levels within the organization. Management may be concerned about OHS and committed to its improvement but this might not be conveyed effectively to people at other levels within the organization. In such circumstances it is very important to ensure that clear and consistent OHS messages are conveyed throughout the organization. This is best achieved through a cascading OHS leadership approach. This should focus upon teaching managers, at all levels, how to:
- act as OHS role models;
- understand the OHS messages they convey to others;
- communicate their OHS expectations effectively;
- behave consistently with respect to OHS, irrespective of situational contingencies;
- and provide constant feedback to others regarding their OHS behaviour.

This cascading OHS leadership approach will aid the development of shared mental models of OHS and help to improve safety cultures within construction organizations.

In order for this approach to work, it may also be useful to educate managers and supervisors in the organizational implications of poor OHS performance. These extend well beyond the direct costs of safety incidents, such as lost production, increased insurance premiums, damaged equipment and increased administrative workload processing incident reports. A recent analysis of data from the 1995 Australian Workplace Industrial Relations Survey database revealed that workplace accident occurrence results in a perceived lack of influence and a distrust of management, both of which predicted job dissatisfaction, turnover intentions, and union involvement (Barling et al 2003). Viewed in this light, the issue of competing objectives is somewhat diminished.

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