A new conceptual framework to improve the application of occupational health and safety management systems

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Abstract

The benefits of using occupational health and safety management systems (OHS MS) have been typically restricted to large scale, multi-site organisations, often from the manufacturing sector. Transferring these benefits to smaller businesses has been fraught with difficulty, with the mechanics and bureaucracy of the system itself sometimes becoming overwhelming. A conceptual framework to ensure that an OHS MS has been carefully constructed and customised to the individual organisation is presented here to bring together the merits of the three main control strategies that have emerged for dealing with workplace hazards namely: safe place, safe person and safe systems. The overarching intention is to simplify the implementation process and make the benefits of OHS MS more obvious. This paper also argues that unless the hazard profile of the organisation has been accurately determined and appropriately addressed; and the type of business operation has been understood and analysed to appreciate which factors have the greatest impact on health and safety; compliance auditing will have little impact on the organisation’s overall safety performance.

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1. Introduction

The identification of hazards and their corresponding control measures provides the foundation for a safety program and essentially determines the scope, content and complexity of a successful occupational health and safety management system (OHS MS) (Mearns and Flin, 1995). If this stage is performed poorly, the ability of the OHS MS to protect health and safety will be limited, and the OHS MS may even degenerate into a “paper system” (Saksvik and Quinlan, 2003). One of the problems with the risk management process is that often only a simplified version of the full process is invoked, without considering the entire context of workplace hazards. Psycho-social hazards are commonly overlooked, as are problems related to the way in which work is structured and organised (Johnstone, 1999).

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A more complete analysis may result after considering the potential hazards associated with each of the key elements that combine together to create an organisation in the first place. These comprise:

- the *people* to whom a duty of care is owed;
- the *physical workplace* that people use or convert in order to produce goods and/or services; and
- the *management* employed to organise and direct the transformation of resources into organisational outputs.

These three components exist within an external environment that also impacts on the nature of the organisation, but is sometimes beyond its control. Hazards in the workplace may emerge from within, or from changes to, any of these three elements; at the interfaces between these elements; or at the boundaries with the external environment (see Fig. 1).

Recognition of these three critical areas as individual factors emerges as a recurring theme in the literature, yet there has been a general tendency to focus on one particular area rather than consider the total hazard landscape. A number of authors, however, have encouraged the consideration of these three main areas without necessarily bringing this concept together as a framework, which has provided the opportunity for this research (Edwards, 1988; McIeroy et al., 1988; Stephenson, 1991; Cox and Tait, 1998b).

A systematic examination of these three areas enables a unique “hazard profile” of the organisation to be determined. It should be noted that not all these hazards will appear in every organisation, so the following examples are given purely to illustrate how the framework may be applied. The term “hazard profile” is used here to indicate the particular blend of characteristics within a given work environment that have the potential to cause harm or loss to those whom a duty of care is owed.

2. The context of workplace hazards

2.1. Focusing on the physical workplace

The potential for harm to develop from the hardware used or the operating environment may involve among other things: mechanical, structural and process design failures; confined spaces; dangerous goods and hazardous substances; sources of ignition; materials handling and storage; access and egress; electrical hazards; radiation; working from heights; biohazards; and moving vehicles and equipment such as forklifts.

On the interface between the physical workplace and the people component lie ergonomic hazards. Examples here include noise; vibration; lighting/glare; unguarded machinery such as exposed pinch points; workstation design; slippery surfaces; manual handling issues and poor amenities.

Hazards emerging on the interface between the physical workplace and the management may be related to poor decisions concerning the operation of equipment or facilities, for example – failure to test protective equipment and alarms; failure to maintain equipment in good working order where the intention exists to
close down an organisation; or where unsafe shortcuts have been taken to ensure continuity of output or increased levels of production.

Hazards originating from interactions between the external physical environment and the physical workplace may be related to climate, for example: heat and humidity causing heat stress, exposure to the cold; or ultraviolet (UV) radiation in the case of outdoor workers. Mechanical failure may also result from exposure of equipment to the elements, as in the case of brittle failure or metal fatigue.

Other influences from the external environment may include a depressed economic climate which may impact the choice of equipment, the frequency of maintenance or the ability to purchase adequate protective equipment. The stringency of regulations in force may also affect the standard to which the physical workplace has been built, and the type of plant or equipment selected. This effect may be more obvious in businesses operating over several jurisdictions where differences in legislation may apply.

Finally, hazards may result from changes or modifications to the physical workplace such as when new equipment is installed. Storms, natural disasters or terrorism may also create changes to the hardware and operating environment, triggering emergency situations.

2.2. Focusing on people

Hazards may be generated from within the “people” section of the organisation, not only from the individuals themselves, but also from the way in which people relate to others; or as a result of interactions between people and the physical workplace, management and/or the external environment.

Harm arising from within the people component of the organisation may stem from singular or combined psychological, biological or socio-cultural factors. Examples may include:

- discrimination on the basis of gender, sexuality, religious beliefs, pregnancy, disability, or family care requirements;
- bullying, sexual or racial harassment, horseplay, practical jokes or “initiation rites” (Cowie et al., 2002; Djurkovic et al., 2004);
- violence initiated from within the workplace, for example in the case of patients abusing health care workers in the mental health industry or violence initiated from the public against workers, as in the case of armed theft (Mayhew, 2005);
- conflict, mistrust and antagonism where workplace relationships have broken down (Tidwell, 1998; Australian Government: Comcare and the Safety Rehabilitation and Compensation (SRC) Commission, 2004);
- impaired judgement resulting from cases of substance abuse or workers experiencing grief or loss; (Elkington, 2001; Canadian Centre for Occupational Health and Safety, 2002);
- contagious illnesses and disease; and
- communication problems, including instances where people are at risk because they are working in isolation or where language barriers exist.

Examination of the interface between the people component and the hardware and operating environment may reveal hazards associated with poor design, human error and the limitation of humans as information processors. This may include:

- working memory overload – for example Miller found that five to nine unrelated items can be successfully retained in the working memory “desktop” at one time and workplace tasks that require more may be problematic (Miller, 1956);
- code incompatibility – codes are used to store information received by the senses: tasks involving verbal/phonetic codes and visual/spatial codes are better suited to operate together than activities employing two common codes such as speaking and writing which are both verbal (Avery and Baker, 1990a);
- perception errors – the interpretation of stimulus may be affected by mental predisposition or expectation (Avery and Baker, 1990b; Geller, 2001b);
- recall errors and the transferral of information from short-term to long-term memory may be influenced by mood, state, motivation, association and context at the time of learning (Geller, 2001b);
• “tunnelling of attention” and misplaced priorities brought on by stressful circumstances (Avery and Baker, 1990b,c) and
• breakdown of selective attention – the ability to decipher important information amidst multiple stimuli, or the breakdown of focused attention where concentration is required, under conditions of fatigue (Avery and Baker, 1990b).

On the interface between the people component and management strategies and methodology are hazards concerning the way in which work is organised (Bohle and Quinlan, 2000). Examples include stress and/or fatigue resulting from shift work arrangements, overtime, monotonous tasks or the pace of production activities (LaDou and Coleman, 1998). Stress may also result from the following (Holland, 1986; Petersen, 1988; Dollard and Knott, 2004):
• role ambiguity/role conflict;
• responsibility for actions without the necessary authority;
• career uncertainty; and
• lack of perceived control over a situation.

Analysis of the interface between people and the external environment may reveal hazards resulting from the influence of customs, norms and social culture. Examples include the social acceptability of wearing of personal protective equipment; expectations about the length of time spent at work away from the family; or the willingness to be assertive when rights have been violated.

Low morale underpinned by resistance to change would be an example of a hazard arising from changes to the people sector of the organisation. This low morale and associated workplace stress may be indicated by unusually high turnover rates and absenteeism levels (Cowie et al., 2002; Dollard and Knott, 2004).

2.3. Focusing on management issues

Hazards generated from within management may derive from lack of leadership, commitment or competence (Deming, 1986a). Failure of management to acquaint themselves with their legal OHS obligations or keep informed of changes may also place workers at greater risk of illness and injury. Hazards may also develop in response to the culture of the organisation, for example if reporting of incidents were discouraged, or the extent to which safety is valued by the organisation (Geller, 1994; Richardson, 1997; Hopkins, 2000).

On the interface between management and the people section are hazards arising from a lack of consultation, poor supervision and wilful violations from people in response to over specification of procedures or generally poor procedures. Decisions to use contracting personnel as opposed to permanent employees may inadvertently generate hazards due to workforce instability and lack of local knowledge (Quinlan and Mayhew, 2001).

Examining the interface between management and the physical workplace may highlight hazards where there has been a failure to understand the process or where too many “defences in depth” have been applied. This may create problems in emergency situations if the purpose of defence mechanisms has been obscured or if their impact on other sections of the process has not been properly understood (Deming, 1986a; Reason, 1997). Other hazards may emerge due to the selection of particular work practices or the structuring of organisational activities (Bohle and Quinlan, 2000).

Negative influences from the external environment on management strategies and methodology may include cases where adversarial relationships have developed between the local regulatory authority and industry, which may restrain the willingness to document workplace hazards and potentially inhibit the consultation process. The level of unionism and the ability to call upon external support may also influence the power balance between management and the workers, which may also impact upon management attitudes and readiness to deal with safety and health related issues in the workplace.

Hazards related to changes on a managerial level may originate from the failure to communicate revisions to work methods and procedures, or failure to consider those affected or impacted by changes. Also included
here are hazards linked to too much flux and instability within the workforce, for example when the downsizing or restructuring of a business is occurring.

3. Techniques for dealing with hazards in the workplace

Once the hazard profile of an organisation has been determined, an assessment of how well the prevention and control strategies applied match the hazard profile of the organisation may be evaluated, together with the effectiveness of the various approaches that manage them. The three main approaches that have emerged for dealing with the corresponding hazards are referred to here as: safe place, safe person and safe systems (see Fig. 2). A broad outline of some of the options available within each strategy has been given for illustrative purposes, and a general critique of the relative merits and limitations of each strategy provided. This exercise highlights one of the key attributes of an OHS MS – the ability to manage a multitude of complex hazards.

3.1. Safe place strategies

Safe place strategies are underpinned by the risk assessment process and the application of the hierarchy of controls up to the point where alterations are made to the existing physical environment. Safe place strategies also include arrangements for abnormal emergency situations, as well as monitoring and evaluation to assess the efficacy of solutions applied and peer review of modifications. These techniques are most effective when the hazards are predictable and there is an abundance of information available about the potential problems. The flexibility and adaptability of this approach represent some of its greatest merits, however it is not without its limitations.

The length and intensity of the risk management process is a major shortcoming of this approach and complications have resulted from attempts to short-circuit the process (Taouk et al., 2001). For example, the evaluation stage needs to be conducted with sufficient time to allow for the most appropriate solutions to be identified and implemented (Gadd et al., 2004). Without adequate planning provisions to enable the full risk management process to be conducted, issues may be dealt with superficially on the basis of expedience, rather than eliminating problems from the source. Many risk assessments seem to resolve themselves by selecting the existing controls.

Perception of risk is a highly contentious issue as it will vary from individual to individual and can lead to inconsistency in the risk analysis stage (Cox and Tait, 1998a). The perception of risk may be influenced by the following factors (Fleming and Lardner, 1999; Geller, 2001a; Adams, 2003):

- what is known about the risk, including future implications;
- the actual level of control over the situation;
- situational awareness and understanding of outside influences;
- the depth of task knowledge;


Fig. 2. Strategies for dealing with complex hazards.
whether the potential consequences relate to everyday experiences, require specialist knowledge or are the subject of speculation; 

- experience and the frequency of previous task performance; 

- the potential to imagine vivid, gruesome or frightening outcomes; and 

- personality-dependent risk taking attributes.

Complacency can be very dangerous where the task is routinely performed – leading to risk habituation. Activities with low level consequences but high levels of frequency are prone to being underestimated. This “normalisation of dangers” may be overcome by ensuring the involvement of objective team assessors during the risk assessment stage (Fleming and Lardner, 1999).

Uncertainty or underestimation attached to the values used in quantitative risk assessments may lead to a false sense of confidence in the outcomes of the risk assessment process. Therefore, the risk assessment process is more reliable when handling problems of a predictable nature, or where substantial evidence has been collected to support assertions (Standards Australia, 2004).

A further drawback with risk management methodology is that its application may unveil long lists of problems requiring capital expenditure and there is the possibility that funds set aside to address safety program issues may be transferred across to other, seemingly more urgent projects (Winder and Makin, 2006).

Therefore, safe place strategies strive to ensure that the existing physical environment is harm-free and the strength of this methodology lies in its practical and portable application and the intent to remove predictable hazards from their physical source. The shortcomings of this approach are mainly associated with the mechanics of the process itself and the fact that the action deals with what already exists rather than the planning stage.

3.2. Safe person strategies

Safe person strategies involve all those techniques that focus on:

- equipping the person with the knowledge of skills to avoid creating dangerous scenarios in the first instance or with the ability to deal with unsafe situations should they arise; 

- communicating awareness of situations that have the potential to cause harm; or 

- with the recovery of a person after an illness or injury experience whether it be physical or psychological.

Due to the complexity of issues associated with the human factor, a wide range of treatment options have been listed here including:

- pre-employment screening and the use of employee selection criteria; 

- training needs analysis for competency, awareness and refresher training; 

- continuing education, networking and role development; 

- the communication of equity and anti-harassment policies; 

- sensitivity to diversity such as cultural differences; special consideration of the needs for younger, pregnant and older workers; 

- awareness of fatigue, circadian rhythms and attention spans to ensure the careful planning of rosters and shiftwork; 

- employee assistance programs; 

- health promotion and vaccination programs; 

- health surveillance; 

- perception surveys and suggestion/feedback initiatives; 

- the use of personal protective equipment; 

- rehabilitation programs; 

- the use of performance appraisals; and 

- the application of behavioural-based safety (BBS) (Krause and Hidley, 1989; Geller and Steven, 1999; Krause, 2001).
In summary, safe person strategies have the advantage of being able to deal with potential hazards of a more complex and irregular nature, and this is reflected in the broad range of treatment options available. Where the elimination of hazards is not a viable option, methods for coping with the possibility of danger provides a sensible alternative, and in some cases this may simply involve creating awareness of the potential for problems to arise (Pollock, 1999). Furthermore, not all workplaces are “fixed”, many workers are required to travel to various locations where the nature of the physical work environment may be unknown or their purpose may be to make the area safe. Examples include repair and maintenance work, asbestos removalists, and emergency service workers. In these instances it is may be necessary to draw upon competency skills, training, the ability to routinely perform informal risk assessments and the strength of their situational judgement. Safe person strategies are therefore particularly useful for non-routine and specialist work environments, and allow for more latitude in the decision making process (Makin and Winder, 2006). However, it must be acknowledged that these strategies are vulnerable to the complexities of human nature.

3.3. Safe system strategies

A safe systems approach addresses many hazards associated with lack of leadership and direction and as a result many of the options available are preventive by nature – such as creating a safety policy; establishing safety criteria for the selection of suppliers, raw materials, design and equipment. Provisions for organisational learning where control measures have failed, such as carrying out incident investigations, are included. Both preventive and reactive strategies need to be in place to manage safety and health effectively, and one of the merits of a systems approach are the cues and prompts that it provides to facilitate both of these responses (McSween, 1995).

A safe system approach usually requires the provision of regular feedback and open communication to further a deeper understanding of the work process and the impact of key variables (Ragan and Carder, 1994). However, there are continuing problems with the use of measures for safety failures such as illness and injury statistics for assessing safety performance, as they may be linked with organisational politics and the need for managers to save face. Under-reporting presents a major threat to safety program improvements because it is difficult to understand a situation when the facts have been distorted or worse, absent. A culture of trust, respect and transparency must be in place before a systems approach will work effectively (Vincoli, 1991; Hudson, 2001). One of the redeeming features of a systems approach is that when a problem has been identified, examination of the system can redirect unwelcome attention away from managers or workers, reducing the opportunity for blame and encouraging solutions that benefit the organisation as a whole.

Therefore, it can be seen that safe system strategies build safety in at the concept stage and are most effective when delivered within a suitable culture. However, OHS MS have been particularly criticised for becoming “paper tigers”, which has often resulted in their benefits being restricted to large scale manufacturers with routine, continuous operations (Saksvik and Nytro, 1996). Problems with OHS MS may also occur when the proposed corrective action continually results in piecemeal changes to the procedures rather than searching for higher order solutions that address either the physical or conceptual core issues. Constant changes to procedures results in end users losing confidence in the system. Furthermore, it is important not to over specify the system. It is important to appreciate the difference between applications where human judgement and experience add value and where consistency and replication are necessary (Winder and Makin, 2006). These criticisms represent an opportunity to restore OHS MS to their intended purpose – to provide one the most preventive means of delivering OHS benefits to the workplace, wherever it might be. Implicit in this intention are the fundamental concepts of planning, understanding the process, making adjustments where necessary, and continual evaluation of outcomes (Standards Australia, 2001).

4. The building blocks of an OHS MS

By applying the Deming “Plan, Do, Check, Act” cycle across the three strategically different approaches to safety, a number of building blocks for an OHS MS emerge – see Table 1 (Deming, 1986b; Standards Australia, 2001).
An examination of Table 1 reveals that the framework presented includes a balance between strategic elements that involve planning for the future; implementation elements which may involve either routine tasks or require specialist skills; provision for contingency arrangements where prevention and control strategies have failed; and checking elements that involve measurement and monitoring which may be used for feedback purposes to improve the process.

Many of the elements of traditional OHS MS structures may be viewed as prevention and control measures to address hazards commonly encountered in large organisations, for example – lack of direction and focus may be addressed by having a well formulated policy and measurable objectives; the need to provide training and perform a training needs analysis addresses lack of skill and competency; and the requirement to update procedures and having access to the latest legislation addresses hazards associated with using out of date information. Often the OHS MS structure separates these common hazard control measures from those that are unique to the particular industry or operation, grouping them into a generic requirement to identify and control all workplace hazards. This approach may have disguised the true value and purpose of some of the typical OHS MS elements, and provided detailed guidelines on how to manage only some of organisations’ hazards.

### 4.1. Application of the safe place, safe person, safe systems framework – preliminary pilot study results

To illustrate the practical application of the safe place, safe person, safe systems framework, a pilot study was conducted using an assessment tool based on each of the elements given in Table 1. For each of the building block elements, a definition and scope was developed. During the pilot study, which was conducted on a medium sized plastics manufacturing facility, it was found this information was easier to convey when presented in two formats: one to explain what the requirements entail; and the other to concisely communicate the risk presenting to the organisation should these elements be overlooked. A preliminary assessment was then conducted to determine whether or not each element applied to the pilot site. This would allow the framework to be customised to the individual organisation. In the pilot study, it was found that all but one of the elements applied – Customer Service – Recall/Hotlines, on the grounds that it was an intermediate product and there were no direct dealings with the end users. However, had another smaller site been selected for the pilot study, it is foreseeable that many more elements would not have applied and this would have illustrated this customisation aspect more vividly.

<table>
<thead>
<tr>
<th>Safe place</th>
<th>Safe person</th>
<th>Safe systems</th>
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<tbody>
<tr>
<td>Baseline risk assessment</td>
<td>Equal opportunity/anti-harassment</td>
<td>OHS policy</td>
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<tr>
<td>Ergonomic assessments</td>
<td>Training needs analysis</td>
<td>Goal setting</td>
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<tr>
<td>Access/egress</td>
<td>Inductions – contractors/visitors</td>
<td>Accountability</td>
</tr>
<tr>
<td>Plant/equipment</td>
<td>Selection criteria</td>
<td>Due diligence review/gap analysis</td>
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<tr>
<td>Materials storage/handling/disposal</td>
<td>Work organisation</td>
<td>Resource allocation/administration</td>
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<tr>
<td>Amenities/environment</td>
<td>Accommodating diversity</td>
<td>Procurement with OHS Criteria</td>
</tr>
<tr>
<td>Electrical</td>
<td>Job descriptions</td>
<td>Supply with OHS consideration</td>
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<td>Noise</td>
<td>Training</td>
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<tr>
<td>Hazardous substances</td>
<td>Behaviour modification</td>
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<td>Biohazards</td>
<td>Health promotion</td>
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<tr>
<td>Radiation</td>
<td>Networking, mentoring, further education</td>
<td>Consultation</td>
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<td>Installations/demolition</td>
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<td>Legislative updates</td>
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<td>Preventive maintenance</td>
<td>Employee assistance programs</td>
<td>Procedural updates</td>
</tr>
<tr>
<td>Modifications – peer review/commissioning</td>
<td>First aid/reporting</td>
<td>Record keeping/archives</td>
</tr>
<tr>
<td>Security – site/personal</td>
<td>Rehabilitation</td>
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<td>Emergency preparedness</td>
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<td>Plant inspections/monitoring</td>
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<td>Audits</td>
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<tr>
<td>Risk review</td>
<td>Review of personnel turnover</td>
<td>System review</td>
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</table>
A risk ranking exercise was then performed using a set of potential risk factors and possible prevention and control strategies which were developed for each element and set out as a series of prompts. The applicable elements were then ranked according to the risk on a scale of one to four with 4 = High; 3 = Medium-High; 2 = Medium; 1 = Low. It was also important to provide positive feedback, so elements which were handled with expertise were allocated a risk ranking of zero, with 0 = Well Done. These rankings were then used to assess the hazard profile of the organisation without any prevention and control strategies applied – before interventions, and also the residual risk after the prevention and control strategies have been implemented. The point of this exercise was to demonstrate the inherent risk areas for individual organisations and illustrate where vulnerability exists should current prevention and control strategies fail. For example, in the pilot study, electrical testing needed to be conducted on plant and machinery in some instances whilst the machines were running. This was a high risk exercise, so in the hazard profile it was rated as high. However, contractors had been used to carry out this task that had a long period of experience and history with the facility, and had a high degree of local knowledge. Therefore, once interventions were used to manage the situation, the residual risk was reduced to low. By having a “before” rating of high and an “after” rating of low, the point was conveyed to the organisation that should the personnel currently being used for this task change, so would the risk presenting to the business and so this was an area of potential vulnerability. In another example, the facility had an emergency plan documented in accordance with the local OHS regulations. Emergency assembly points had been identified and key management personnel trained. However, the contact list had not been updated and employees working in the plant had not had a emergency drill for more than 18 months, so the effectiveness of the interventions applied was minimal, resulting both the “before” and “after” ratings being high. These are shown in Figs. 3–5.

These rating scores were then summed and distributed across the three main areas where hazards may arise to provide a visual representation of where the organisation was most exposed to breaches of duty of care, both before and after risk treatment options have been applied. Such information may be helpful when communicating to attract resources, and also for promoting transparency and providing feedback to workers. An example of this application is illustrated in Fig. 6.

![Safe Place Risk Rankings](image-url)  

**Fig. 3.** Pilot study: impact of interventions on risk ranking scores for “Safe Place”: without interventions and with interventions in place.
In this particular pilot study, the distribution of risks across the three areas were very similar before and after interventions were applied – with the residual risk shrinking only slightly in the safe person area. As this was a qualitative assessment, the percentages have only been included to help read the diagrammatic repre-

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Fig. 4. Pilot study: impact of interventions on risk ranking scores for “Safe Person”: without interventions and with interventions in place.

Fig. 5. Pilot study: impact of interventions on risk ranking scores for “Safe System”: without interventions and with interventions in place.

In this particular pilot study, the distribution of risks across the three areas were very similar before and after interventions were applied – with the residual risk shrinking only slightly in the safe person area. As this was a qualitative assessment, the percentages have only been included to help read the diagrammatic repre-
sentation and care should be taken not to attach undue significance to the actual numbers. This exercise was an important illustration to the business as it was under a period of restricted cash flow, so there was little opportunity to address the problems related to the physical environment, machinery and work environment. In an attempt to manage the situation, the operations personnel had relied typically on “safe person strategies” by utilising a high level of personnel competence, experience and skill. Whilst this was admirable, the fact remained that the physical work environment and plant posed a significant threat to the overarching safety and welfare of the workers, and this risk would be even higher if key management personnel were to leave. Furthermore, the organisation had elected to handle most of its risks informally on an “as needs” basis. There was little documentation and few formal triggers and cues to remind personnel when actions were necessary. Therefore, the residual risk in the safe systems area remained significant, and the lack of documentation could be detrimental to the organisation should they find themselves in a litigation situation as there would be little objective evidence to demonstrate the precautionary measures they were taking.

After this ranking exercise had been completed, a management representative was then asked to select three elements that the organisation wanted to target for improvement. Only three elements were selected in recognition of the length of time it takes to implement a systematic approach to safety. These were: work organisation, incident management and access and egress. Then the organisation was requested to develop three questions related to outputs associated with each of the three elements targeted for improvement. The questions were to be phrased so that they would provide either a yes or no response, where a no response resulted, an explanation was to be entered. Hence there were a total of nine questions that the organisation would ask themselves every month for a period of four months. The answers were to be independently checked and a single process owner for each question was encouraged so there would be no confusion as to responsibilities for the actions. As a back drop to this, the organisation was provided with some guidelines on the selection of measurement criteria so they could have some means of gauging whether or not the actions that they were taking had been effective. In this pilot study, the organisation chose to continue monitoring lost time injuries, medical treatment injuries, first aid injuries and near misses. It was anticipated that once three elements had been improved, the organisation could then move on and target another three elements, and once they were improved the process could be iterated until eventually all the relevant elements had been sufficiently treated. The personnel involved with the pilot study found it to be a useful approach and were very co-operative throughout the exercise.

One of the most useful findings of the pilot study was the ability of the analysis to draw attention to the impact of work organisation and problems with resource allocation and administration. By separating the three areas – safe place, safe person and safe systems, the study was able to highlight the effect of the 12 h shift arrangements which exacerbated the problems with manual handling, solvent exposure and noise. Although the shift pattern was very much desired by the factory operators due to the extended break periods, there was greater potential for fatigue and prolonged exposure to solvents as well as noise. Hence, whilst not directly obvious to management due to their focus on the physical work environment, this issue was reconsidered and a decision made to investigate patterns in the timing of injuries to see if there was a correlation between injury frequency and the length of time on shift. Attention was also drawn to the restrictive cash flow for the
organisation which resulted in significant delays in dealing with problems related to the physical workplace. The analysis also highlighted that sufficient time to address safety and health issues had not been factored into daily workloads and responsibilities.

On a more optimistic note, areas that were handled well by the pilot site – such as inductions, consultation and first aid and reporting; were acknowledged. This positive reinforcement provided some incentive to take the other elements to the same level of achievement.

5. Conclusion

By utilising a systematic approach to safety, OHS MS optimise the overall co-ordination of prevention and control measures embodied in these three philosophies, and so offer much more than the traditional five treatment options advocated by the hierarchy of controls – elimination, substitution; isolation; administrative controls and lastly personal protective equipment (Winder and Makin, 2006). Upon examination it can be seen that these traditional treatment options are most effective for dealing with hazards of the physical environment and less for hazards of a human factors nature.

The conventional application of risk management plays a very important role in an OHS MS, but it is not the complete picture. Not only should hazards and risks be identified on a broader, organisational context, but they must be handled in an appropriate manner. Solutions must be planned for and outcomes measured. Evaluation of solutions must take place and the information captured to improve operations. Changes need to be communicated to those impacted by the change. Triggers need to be in place so people know when to conduct a risk assessment, how to conduct one effectively, who to involve and who to inform of the outcome. Risk assessments need to be performed by people with the necessary technical competencies who have contextual knowledge of the workplace as well as having skills in performing the risk assessment itself. It is important to know when the scope of the risk assessment is within the capabilities of those internal to an organisation, and when specialist assistance is required. OHS MS can help orchestrate all these activities so they are logically coordinated and sequenced to provide information within the timelines necessary.

OHS MS will gain widespread support when the value of its contribution to the daily running of an organisation is obvious to workers, and this will only be the case if there is effective and meaningful consultation, a culture of trust and the OHS MS has been designed to accurately capture the OHS needs of an organisation in terms of controlling critical processes, whilst allowing sufficient freedom to enable workers to exercise the experience, education, judgement and skills they have acquired as necessary. Not only should businesses be seen as "learning organisations" but also as "thinking organisations", reflected by an OHS MS that is commensurate with the organisational risk assessed at the physical, personal and managerial level. OHS MS need to demonstrate a full understanding of an organisation’s hazard profile by the application and co-ordination of appropriate prevention and control strategies. This then gives the OHS MS being used internal validity, which in turn allows compliance auditing against existing policies, plans, procedures and practices to be meaningful.

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