Integrating Occupational Health and Safety Systems into a Project Management System

Torky Althaqafi, Dr Barry Elssy

The University of Adelaide, South Australia

Abstract
This article evaluates the benefits of integrating the Occupational Health and Safety Management System (OHSMS) into project management by using information technology. The importance of this research will lie in the achievement of better financial result, higher Occupational Health and Safety (OHS) standards, and in fulfilling all the requirements of the legislation. There are few practical examples in the literature that explain how a project can be utilised to organise an integrated project management system incorporating OHS. Therefore, the research question is... How much more effective would it be if we more closely integrated the OHSMS into project management?

Keywords
Project Management, Occupational Health and Safety, Integration

I. Introduction
Most of organisations use the concept of project management to plan, organise, execute, and control the progress of their projects in order to achieve satisfactory completion. In fact, the main reasons for project management are to satisfy the stakeholders within a specified timescale, scope, budget, and specified quality. Therefore, the project management addresses all opportunities and problems related to a project, and determines the needs and benefits from that project. As a result, the project management has three general objectives; time, cost, and quality [1]. People are involved in project management in order to manage and meet the requirements of a project and deliver its objectives. Sometimes that involvement leads to accidents, and the incredible pain and associated suffering of serious injury. Every year, around two million people lose their lives because of work-related injury and diseases, which means over three people dying every minute around the world due to the failure of health and safety precaution in the workplace [2]. According to the World Health Organisaion’s Global estimate, 1.7 million of those deaths are due to occupational health and safety disease, which caused by exposure to workplace hazards as shown in [2].

II. Literature review
In order to identify the gaps and conflicts between safety management and project management this literature review focuses on the cost of accidents, causes of accidents, main issues related to the accidents, recommendations, and research direction. Along with that, a basic explanation about safety and project management processes has been identified from the literature review.

A. Cost of workplace accidents
The costs of workplace accidents in projects have a major impact on projects and organisations by losing productivity, absenteeism, labour turnover, medical expenses, plant or equipment loss, fines and legal expenses, public image, and other losses [3]. The costs of construction incidents are usually divided into “direct” and “indirect” costs. The direct costs of a project accident are those paid by employers and directly measured in their financial terms, while indirect costs are the uninsured costs and translated into financial equivalents [4, 5]. Those categories of direct and indirect have been used by many authors and researchers in order to analyse the cost of accidents [6-8].

Table 1: Analysis of direct and indirect costs of construction incidents

<table>
<thead>
<tr>
<th>Costs</th>
<th>Direct Costs</th>
<th>Indirect Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medical care</td>
<td>Costs of injuries (e.g., First aid expenses and cost of investigations)</td>
</tr>
<tr>
<td></td>
<td>Compensation</td>
<td>Cost of wage losses</td>
</tr>
<tr>
<td></td>
<td>Entitlements (e.g. home help, attendant care, and travel assistance)</td>
<td>Production losses (e.g. loss of skill and goodwill)</td>
</tr>
<tr>
<td></td>
<td>Damage to materials and equipment.</td>
<td>Associated costs (e.g. replacement of injured employee, overhead costs of working stop, and replace damaged equipment)</td>
</tr>
</tbody>
</table>

B. Causes of accidents
The main causes of those accidents have been linked directly with pressures from management, and involve such diverse areas policies, standards, financial restrictions, lack of safety commitment, restricted training, knowledge and information, poor quality control, and lack of interaction between workers, workplace, equipment and materials [9, 10]. The accidents have also been linked indirectly to behaviours, social pressures, and attitudes to risk taking, to trade customs, financial pressure, and industry tradition [10].

C. Main Issues
Occupational health and safety accidents can be prevented through effective safety management, but the same type of accidents periodically re-occur in industry because the industry fails to learn from previous incidents, and does little to prevent it from re-occurring [11]. Top management also makes inappropriate
decisions when there is a lack of reliable and complete assessment from the beginning of a project, which could be threatening the existence of an organisation [12]. Dejoy [13] illustrates that the issues of work-related accidents have been linked with incorrect attribution of accident causes by top management, which could lead in turn to inappropriate safety management, such as programs and policies that amplify rather than solve the accident causes. Hislop [14] also claims that organisations are transferring risk rather than identifying and minimizing hazard and resolution processes. Therefore, project planning is necessary to success, but top management needs to be aware of their safety planning and integrate it within their project plan from start to end in order to have an appropriate safety management system in the project life cycle.

D. Safety Management Process
Occupational health and safety management system (OHSMs) is an approach which actively encourages the removal of occupational health and safety hazards and risks before they reach the workplace, by evaluating new products, equipment, substances, and processes for their potential hazards [15]. The OHSM has been numbered into four groups; these groups follow the dynamic planning cycle in order to ensure continual improvement of OHS performance when all sections of the safety processes are completed [16].

Figure 1 shows that the OHSMS model has four elements in order to implement the system in organisations effectively. The elements are listed below:
1- Commitment and Policy
2- OHS Planning,
3- OHS implementation & Measurement, and
4- OHS Management Review & Improvement.

Commitment and policy are needed to ensure that stakeholders are committing to occupational health and safety along with identifying OHS’s objectives and targets. OHS planning is required to fulfill OHS policy, objectives, and targets. Next, the OHS planning needs to be implemented and measure by developing capabilities and measuring OHS performance, and take preventive and corrective action. Lastly, the OHS performance needs to be reviewed and show continual improvement [16].

Hartley [17] proposed four stages in order to carry out a project: initiation, planning, execution and control, and completion. All project activities can be captured and effectively managed. Figure 2 describes these four stages, and shows how they unfold over time as the project progresses [17].

Fig. 2 : The phases of project management life cycle (Adopted from [17])

There are nine competencies in the project life cycle: integration, scope, time, cost, quality, human resource, procurement and contracts, risk, and communication. These competencies tend to evolve over time through each stage [17]. It is possible for each competency to map against all stages in the project life cycle. An example has been provided by Hartley [17] in Table 5 which explains how each competency is carried out during a project life cycle.

III. Finding and Recommendation
The Royal Commission into the Building and Construction Industry was established by the Australian government in 2001-2003 in order to report upon alleged misconduct in the construction industry in Australia. On February 2003, The Royal commissioner released his final report along with 212 recommendations in order to enhance the effectiveness of the industry safety, taxation law compliance, and employee protection [18]. The Commission [18] pointed out that, in specific reference to OHS, that too often, competition forces the project industry to work against health and safety in the workplace, as the industry struggles to complete projects on time and budget. Therefore, safety is neglected by top management in its projects. The commission [18] suggested that organisations must change their culture and behaviour, and force the industry to work for occupational health and safety. In recommendation 17, the commission advised that safety should become equally important with budget and time [18].

Badri, Nadeau & Gbodossou [12] point out that industrial accidents have continued to cause capital losses, human suffering, social problems, and environmental issues. They also described that the high level of project accidents is linked with the characteristics of project work, communication problems, lack of safety culture, and the low educational level of workers. As a result, they acknowledge that “excluding occupational health and safety (OHS) from project management is no longer acceptable” [12] and therefore, organisations must be forced to include occupational health and safety within the project management system.

Another study found that both researchers and practitioners have acknowledged that more integration, coordination, and communication are required to enhance project health and safety performance [10]. The occupational health and safety issues can be prevented by providing effective safety and risk management practices to project management [19]. Therefore, organisations could integrate safety management systems into their project management to enhance their safety performance.
Table 2: Mapping project management competencies (Adopted from [17])

<table>
<thead>
<tr>
<th>Initiation</th>
<th>Planning</th>
<th>Execution &amp; Control</th>
<th>Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration</td>
<td>Strategic alignment</td>
<td>Project plan</td>
<td>Performance and control reports</td>
</tr>
<tr>
<td>Scope</td>
<td>Scope identification</td>
<td>Scope refinement</td>
<td>Change control</td>
</tr>
<tr>
<td>Time</td>
<td>Forecasting</td>
<td>Schedule development</td>
<td>Schedule control and reporting</td>
</tr>
<tr>
<td>Cost</td>
<td>Cost forecasting</td>
<td>Budget development</td>
<td>Cost control and development</td>
</tr>
<tr>
<td>Quality</td>
<td>Quality specification</td>
<td>Quality planning and assurance</td>
<td>Quality control and improvement</td>
</tr>
<tr>
<td>Human Resource</td>
<td>Capability determined</td>
<td>Resources assigned</td>
<td>Performance monitored</td>
</tr>
<tr>
<td>Procurement and contracts</td>
<td>Procurement planning</td>
<td>Procurement &amp; solicitation planning</td>
<td>Source selection &amp; contract administration</td>
</tr>
<tr>
<td>Risk</td>
<td>Identification</td>
<td>Assessment &amp; analysis</td>
<td>Management &amp; action</td>
</tr>
<tr>
<td>Communication</td>
<td>Stakeholder identification</td>
<td>Strategy development</td>
<td>Performance report</td>
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IV. Recommendation to integrate Safety management into project management

Several studies related to safety and project management have suggested that having full integration between safety management and project management is essential to reduce gaps and confusions in the workplace of projects [20, 21]. They found that most organisations implement their safety plans just for avoiding government fines, and the implementation of safety plans is seen as an extra activity. However, they realized that safety management must be integrated with project planning and control [22].

Saurin et al [20] presented a model for safety planning and control to be carried out in industrial construction projects. They found that the model delivered a significant contribution to the projects by improving safety performance. They also identified that having a systematic integration of safety management into the core processes of project management (such as design, cost management, procurement, and cost management) is essential to improve occupational health and safety.

Haslam et al. [23] investigated and studied 100 individual construction accidents in order to identify the key factors of the accidents. At the end of their research they point out that “Safety needs to be owned and integrated across the project team, from designers and engineers through to skilled trade personnel and operatives.”

Previous research clearly indicates the need for an effective system for the integration of OHS into management planning, therefore, this research will focus on enhancing safety management in projects by proposing a model of integration safety management processes into project management processes.

V. Conclusion

In order to achieve the research objectives, a proposal model for an effective integration is needed. Figure 3 shows how to integrate safety management processes into project management processes. Usually, in the actual practise, organisations carry out the safety management and project management in parallel, employing with separate teams for each process. There is a regular meeting between both teams during projects to discuss and review safety performance. Safety teams are responsible for creating an OHS policy and a safety plan, then execute and measure, and finally, review and improve the safety plan. However, the safety teams are not 100% associated with all functions and applications in projects. Therefore, this proposal model presents a significant contribution by integrating safety management processes along with project management processes. The Initiation phase of a project will include the OHS policy and stakeholders’ commitment from safety management. The planning phase will cover OHS planning. Then, when the project is executed, the project teams are responsible for implementing and measuring the OHS plan. Lastly, during completion of the project, the teams are responsible for reviewing and improving the OHS plan for the next project.

Fig. 3: A proposal model to integrate Safety Management into Project Management

References


