INTEGRATED SAFETY MANAGEMENT SYSTEM:
EMPOWERING WORKERS TO IMPROVE HEALTH
AND SAFETY IN CONSTRUCTION

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This paper presents a systematic approach to incorporate worker input and self-assessments into the safety management system in construction, enhancing safety and wellbeing. Traditional safety management systems primarily have focused on compliance and reaction to safety hazards. The proposed approach integrates the concept of a “safe employee” and the “I-SAFE ME model” (a self-assessment tool and measures introduced in this paper), emphasizing workers' proactive participation and accountability in safety planning and compliance, into a broader integrated safety management system (ISMS). The I-SAFE ME model allows workers to self-assess factors impacting their safety, health, assigned tasks suitability, and readiness for work. This shift will improve workplace safety, worker satisfaction, wellbeing, and project delivery outcomes, encouraging a culture of shared responsibility and teamwork. The proposed approach extends the concept of safety beyond hazard identification and control to include broader health and wellbeing aspects, often overlooked in traditional safety management practices, by encompassing various project elements regarding construction workers. The expected outcome is to fill the existing construction safety policies and procedures gap and support adherence to OSHA regulations and standards.

\textit{Keywords:} Safe employee, I-SAFE ME model, Self-assessment, Construction safety.

1 INTRODUCTION

The high accident rate in construction and the emergence of new technologies necessitate innovative safety management approaches (BLS 2020, Tender \textit{et al.} 2022, Malomane \textit{et al.} 2022). Safety and health in construction are managed through a collaborative effort of the employer, employees, safety professionals, regulatory bodies, and other stakeholders (Zhao \textit{et al.} 2016, Jeschke \textit{et al.} 2021, OSHA 2023). Current safety and health standards and safety management systems recognize the significance of the workers' participation in workplace safety management (Yi and Langford 2006, Wanberg \textit{et al.} 2013, OSHA 2023). However, there is a lack of a methodical approach to integrating the workers' input into the construction project safety and health planning and control stages (Zou 2011, Akinlolu \textit{et al.} 2022, Kim \textit{et al.} 2022). Occupational Safety and Health Administration (OSHA) standards and existing safety management frameworks assign construction workers roles and responsibilities such as encouraging them to participate in safety management programs, compliance with policies and standards, and attending training (OSHA 2023), which makes workers' role in safety management to be reactive, voluntary and incentivized.

Traditionally, construction safety management has been compliance-based, focusing primarily on avoiding unsafe acts and conditions; training workers to conduct safe operational practices
The construction safety training extensively covers potential hazards related to the workplace, task execution, and managing materials; but assessing and quantifying risks associated with employees' physiological and psychological wellbeing is not prioritized enough (Nwaogu et al. 2020, Cheung et al. 2023). These training and safety management approaches are also ineffective in workers' participation in work planning, lacking workers' contribution to proactive safety management (Alkaissy et al. 2022, Emuze 2023). Incorporating emphasis on physiological and psychological awareness and preparedness for work into construction safety management will allow workers to voice potential risks in the work planning phase. This strategy will shift workers' roles within the safety management system from reactive to proactive, preventing workplace accidents and injuries. Worker involvement in safety planning not only makes workers accountable for their safety and wellbeing but also allows for identifying and mitigating safety risks before they become hazards (Zaniboni et al. 2016, Cooper 2000). Yi and Langford (2006) concluded that integrating safety planning into project work planning improves construction safety and worker satisfaction.

Considering the high rate of safety accidents and injuries in construction, it is critical to proactively manage potential safety hazards and workers' health problems in all phases of project delivery, including project planning and control phases (Da Silva et al. 2019), in order to ensure the safety of the initial input resources. Construction resources can be categorized into project site, work processes and procedures, construction materials, machinery, equipment, tools, and, importantly, workers or employees. The construction industry and occupational safety and health regulatory agencies established detailed standards and procedures minimizing the safety hazards of construction resources (OSHA 2023), but for workers' accountability and contribution, there is a lack of structured approach and standards. In addition, current standards do not address mental health and wellbeing, nor do best practices in most construction operations.

Addressing this gap in current safety management practices necessitates an innovative system (Tender et al. 2022, Malomane et al. 2022). Such a safety and health management system should encompass various project phases and consider all aspects of a construction project. This broader perspective would allow for systematic risk identification, improved safety performance, and encouraging a positive safety culture. Therefore, this paper proposes incorporation of workers input into the safety management and introduces the “safe employee” concept and the “I-SAFE ME model” to enable workers to provide their input in the project planning phase, improve accountability and wellbeing and provide a base for decision-making in construction.

2 METHODOLOGY

This study's methodology outlines a systematic framework to integrate worker input and self-assessments into construction projects' safety management systems (SMS), enhancing safety and wellbeing. The proposed strategy categorizes the components of the safety management system into three principal domains: 1) input resources, 2) planning, control, and continuous improvement, and 3) regulatory compliance and documentation. This structure facilitates a deeper understanding of workers’ role in safety improvement and the importance of self-assessment in the process. Figure 1 illustrates the proposed integrated safety management framework illustrating the main components of ISMS derived from construction management literature and OSHA standards, classifying the framework components into three separate domains. Traditional safety management systems and safety standards overlooked the areas related to construction workers, such as the safe employee concept, the worker safety and health recommendations section, and the worker self-assessment records.
Existing safety management practices seek to improve worker safety behavior through a safety culture offering incentives and recognition. However, this approach lacks the significant contribution needed to improve health and safety outcomes, as suggested in the framework presented in Figure 1.

2.1 Safe Employee

The concept of a “safe employee” is integral to the I-SAFE ME model described below. Workers' roles have traditionally been limited to compliance with safety regulations and participation in training sessions. However, to proactively manage safety in construction, workers' roles should evolve to become active contributors to safety management. The responsibility of a safe employee extends beyond adherence to safety practices and reporting unsafe conditions in the workplace.

A fundamental aspect of the role of a safe employee is self-assessment and taking preventive measures. This involves assessing their physical and mental fitness and understanding their limitations and potential risks associated with their assigned tasks and work environment. Self-assessment allows workers to identify their vulnerability to specific hazards and take appropriate measures. Moreover, it includes routine self-monitoring for signs of stress, fatigue, or health problems that may affect workplace safety and performance or their wellbeing. Workers should be educated on recognizing these signs, seeking help, taking necessary action, and communicating them in the work planning phase and early stages.
A safe employee understands that their safety is not only the responsibility of their employer but also lies within their own capability to recognize, evaluate, and control workplace hazards and take necessary action for their wellbeing and the wellbeing of coworkers. The self-assessment proposed in this paper is described as the I-SAFE ME model below.

2.2 Safety and Health Recommendations

As part of their self-assessment safe employees will have a mandatory opportunity to safety- and/or health-related recommendations during the work planning stages. Personalized safety and health recommendations can significantly enhance the wellbeing of workers and the overall safety culture within an organization. They can serve as essential resources for workers to handle potential health and safety concerns effectively and proactively.

2.3 Self-Assessment Records

Self-assessments can be crucial in empowering workers to take charge of their safety and wellbeing. Keeping records of these self-assessments has additional benefits. These records allow workers to identify their strengths and weaknesses and request changes in the work plan accordingly. Workers can also track their own improvements over time with these records. Data from these records can be used to improve safety measures and optimize work plans, enhancing project safety and worker wellbeing.

2.4 I-SAFE ME Model

Developing a standard approach that can be applied across the construction industry is essential to incorporate the safe employee concept, safety and health recommendations, and self-assessments into the safety management system. Workers’ participation in self-assessment surveys results in measurable outcomes. Therefore, this paper presents the I-SAFE ME model to enable workers to proactively participate in project safety and work planning by self-assessing their physical and psychological needs and compatibility to perform assigned tasks presented in Figure 1.

The I-SAFE ME model represents factors that significantly influence worker safety and wellbeing. Each letter of the acronym represents a specific aspect that workers must self-evaluate before starting their tasks or earlier in the planning phase. The assessment can be performed on a weekly basis or whenever new sets of tasks are impending. The purpose of weekly assessments is to align them with short-interval schedules, allowing for timely adjustments in the work plan. Workers' assessment for new tasks ensures compliance with OSHA standards and helps to measure the preparedness of workers and ensure safety in performing the assigned tasks. Completing the self-assessment survey produces verifiable proof after each evaluation, showing the worker's dedication to safety and reinforcing accountability through maintaining self-assessment records.

2.5 The I-SAFE ME Model Validation and Application

The subsequent efforts will be focused on:

- Introducing the model to organizations and individuals
- Providing necessary training and tools
- Guide employees in setting SMART goals and on the model application approach
- Conducting pilot studies to improve the I-SAFE ME model and framework

I-SAFE ME model elements should be quantified via an assessment scale and measures, with the cumulative self-assessment points meeting the safety minimum. Occupational safety and health
professionals, psychologists, construction professionals and other experts will determine the appropriate measures and the minimum threshold for the I-SAFE ME model assessment (Table1).

Table 1. The I-SAFE ME model for construction safety and health self-assessment.

<table>
<thead>
<tr>
<th>Components</th>
<th>Description</th>
<th>Measures and Resources</th>
<th>Employee Self-Assessment Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>I- Illness Awareness</td>
<td>Become aware of health conditions impacting performance and vice versa, track progress</td>
<td>Assigned task suitability and support resources availability</td>
<td>Report concerns for adjustment in workplan</td>
</tr>
<tr>
<td>S - Stress Management</td>
<td>Evaluate work-related stress levels and provide mental health support</td>
<td>Regular work stress-level surveys, access to mental health resources and support programs</td>
<td>Using the Cohen et al. (1983) perceived stress scale (PSS) or a similar scale, to assess work-related stress levels</td>
</tr>
<tr>
<td>A - Alcohol &amp; Drugs Monitoring</td>
<td>Monitor and manage substance use</td>
<td>Random drug testing, substance abuse hazard training, adherence to substance use policies</td>
<td>Self-declaration about substance use</td>
</tr>
<tr>
<td>F - Fatigue Management</td>
<td>Measure fatigue levels and manage workload effectively</td>
<td>Monitoring work hours, mandatory rest periods, efficient shift scheduling</td>
<td>Recording fatigue levels and work hours</td>
</tr>
<tr>
<td>E - Ergophobia and Assigned Task Assessment</td>
<td>Understand and address task-related apprehensions, and evaluate job suitability and security.</td>
<td>Regular check-ins, skill improvement training, counseling support</td>
<td>Self-assessment of task-related concerns and job suitability/security considerations</td>
</tr>
<tr>
<td>M - Medication Impact</td>
<td>Understand the impact of medication on job performance</td>
<td>Understanding of potential side effects and the assigned task suitability</td>
<td>Self-reporting medication use side effects on job &amp; assigned task performance</td>
</tr>
<tr>
<td>E - Energy Intake and Environment Impact</td>
<td>Sufficient energy intake and body protection in various environmental conditions</td>
<td>Information about energy needs and body protection related to specific tasks, awareness (like extreme heat or cold)</td>
<td>Self-evaluation of energy intake, body protection uses, considering the demands of tasks and environmental conditions.</td>
</tr>
</tbody>
</table>

3 CONCLUSION

In summary, this paper presented a systematic approach to incorporating workers' input in safety management systems in construction. This system integrates the “safe employee” concept under the safety assured input resources category into the safety management system characterized by active worker involvement and stating the proactive employee responsibility in safety planning and control.

The “I-SAFE ME model” is essential to the ISMS regarding workers' contribution and accountability, allowing workers to self-assess various factors impacting their safety and job readiness. This model also signifies the importance of worker health and wellbeing consideration, often overlooked in traditional practices. Moreover, it provides workers access to resources needed to maintain their wellbeing.

The ISMS encourages a culture of shared responsibility, with workers taking an active role in safety management and work planning. It empowers workers to contribute effectively and proactively to their safety and provides quantifiable measures of their contributions and overall worker satisfaction. Future work is planned to further develop and implement this model and to validate this framework to improve safety and health in construction.
References


