

The effectiveness of the implementation of a construction safety management system for the maturity safety culture in construction SOES

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Abstract

The construction industry is considered a dangerous sector, with a higher injury and fatality rate compared to the other sectors. In Indonesia, within the last decade alone, accidents in constructions have increased dramatically. The book "The Accident Prevention" also reveals that 80% of work accidents are caused by unsafe actions and conditions. As construction safety encompasses the safety of people who work in the construction projects and the community around the construction site, the work safety system should be a significant concern in suppressing the high number of accidents within the construction industry.

This study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines in exploring the ways to improve the work safety system within the construction industry. The scoping review framework is developed using Population, Exposure and Outcome (PEO) framework, where the population in question is the construction workers in Indonesia, exposed to the occupational accident safety system, and the outcome measured is the exposure and application of the work accident safety system as a basis for the literature review.

This study expects that the safety culture within construction companies in Indonesia can be improved through understanding the hazard risks and a good safety management system implementation, that eventually would lead to create a better sense of security to the workers and increase the work productivity in Indonesia's construction industry.

Keywords: *safety management system, safety culture, construction industry, occupational accident prevention*

INTRODUCTION

As the construction services sector is among the industry sectors with a high workplace accident risk, measures to improve the sector's work safety are needed. Within the discourse on occupational accidents in the construction sector, Indonesia has issued laws and regulations concerning work safety, such as UU No. 1/1970, UU No. 13/2003 in conjunction with PP No. 50/2012, and UU No. 18/1999 and its implementing regulations. However, the practice of implementing and enforcing the norms, standards, guidelines, and criteria (NSPK) in the construction industry is still relatively low (1).

With a larger growth potential in the coming future, factors leading to work

accidents within the construction industry must be anticipated. In the previous evaluations, one of the leading causes of work accidents in the industry comes from human resources-related factors, including the lack of competency leading to unsafe workplace actions and conditions (3). H. W. Heinrich, in his book entitled 'The Accident Prevention,' reveals that 80% of work accidents are caused by unsafe acts, and 20% are caused by unsafe conditions. Existing data shows that less than a quarter (22%) of the construction workforce has a certification concerning their expertise on the job and job safety, meaning that there are still a lot of workers who did not get appropriate training and certification before working in construction sites. This data

shows that safety has not been considered a critical culture to be cultivated within the construction industry.

Studies from Howarth et al. (2000) and Endroyono & Tugiono (2007) also showed that even in developed countries like the United Kingdom and the United States, fatal accidents in the construction industry still occur, with the accident fatality rate of 2,95 and 11 cases per 100,000 workers respectively. In countries in Asia, the number of work accidents in the construction sector is also quite large, where the construction work fatality rate reaches 40 cases per 100,000 workers in India (Will, 2004) and even larger in Malaysia, with 11 cases per 1000 workers (“RCOSH” Kuala Lumpur, 2001). In Indonesia, the number of work accident occurrences has also been increasing from year to year, in which the construction sector still accounts for the highest accident rate compared to the other sectors (figure 1) (Arifuddin et al., 2019).

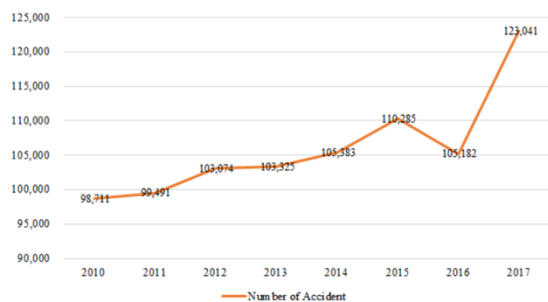


Figure 1. Number of work accidents in indonesia

Table 1. Accident rates comparison between Industry sectors in Indonesia

Sector	Accident rate
Mining	2.6%
Forestry	3.8%
Transportation	9.3%
Construction	32%
Industry	31.6%
Other	21.3%
Total	100%

Construction work safety itself is defined as a scope that includes the safety of people who works on construction projects, the safety of the public in the midst of carrying out the construction projects, the safety of the properties procured for the construction

project, as well as the safety for the environment around the construction project (Suraji & Endroyo, 2009). Meanwhile, according to Occupational Health and Safety Assessment Series (OHSAS) 18001:1999, an accident stands for unexpected events leading to illness, injury, death, and other damages and losses (4).

In recent years, construction companies have realized that work accidents can also bring losses to the organization, as workplace accidents can also affect financing issues within the company. This issue is discussed in Bird’s (1974) study about the Accident Cost Iceberg theory (figure 2), which shows that the total hidden costs associated with work accidents are more significant than the associated costs towards the completion of the project. From this theory, most hidden costs lie within the fines imposed on organizations when an accident happens. These hidden costs include the costs incurred by the company for victims other than those borne by the insurance, visitations, compensations, site cleaning costs, equipment and facilities repairing costs, reduced productivity, expenses related to the cessation of work, and so on. Thus, preventing work accidents would also be the best management strategy for reducing financial damages in construction companies (2).

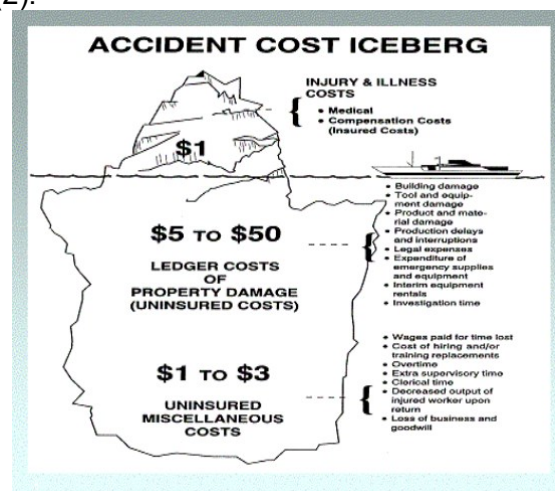


Figure 2. Iceberg Model of Accident Costs

In addition to financial losses, work accidents can lead to other losses, including societal losses and human suffering. The

social costs include loss of productive time in case of injured workers, opportunity costs for the family members supervising or caring for the victims, and increased burden on government services such as police, fire, health services, law enforcement facilities, and so on. In contrast, human suffering includes the death of workers in case of a fatal accident, illness, disability, and loss of livelihood.

Thus, the presence of a Construction Safety Management System (PP No. 14/2021) and an Occupational Safety and Health Management System (SMK3) (PP No. 50/2012) is a manifestation of law enforcement to ensure and guarantee

compliance with the systems and the safetyculture of the construction industry in Indonesia (4). From the various regulations available, the author will focus on implementing the Construction Safety Management System as outlined in PermenPUPR No. 10/2021. This regulation was drafted to guarantee construction safety with an integrated management system. In one of the studies (Arifuddin et al., 2020), it was found that the maturity of pre-construction safety planning was still low, and another study (Machfudianto et al., 2020) showed that the maturity of Indonesia's safety culture already showed a reactive level (5). This is explained in the following diagram:



Figure 3. Construction Safety Management System (SMKK)

In the coming future, it is hoped that new regulations in the field of construction safety and health will likely be issued, alongside the increasing awareness of the workers in the construction sector in the hope of implementing work safety and reducing the number of work accidents in Indonesia.

1. Safety Culture

Safety culture is how an organization understands, values, and prioritizes safety. Safety culture can also be described as how an organization behaves in the context of work safety, even when unsupervised. The word "culture" in the organization can be interpreted as a way of doing things within the organization because culture provides a context for action that binds together the

different components of an organizational system in pursuit of corporate goals (7). Rousseau (1988) defines culture as “a way of thinking, behaving, and believing that members of a social unit have something in common (8)”. Safety culture is a particular case of such a culture, where safety concerns those who work for the organization.

On the one hand, safety has always had a place in organizational culture, which can then be referred to as safety culture. Still, it is only through a particular stage of development that an organization can take safety seriously enough to be labeled as a safety culture. Implementing certain systems in the implementation of a safety culture will then form a safety culture, which as a result, will lead to proper safety performance (6).

Therefore, implementing a safety culture in the company can reflect a real commitment to safety at all levels of the organization.

According to Clarke (1999), work safety culture is defined as an individual's perception of various aspects of safety in the work environment, such as work safety procedures and safety aspects. Meanwhile, Bailey & Soane (as cited in Sutawijaya & Widyanty, 2021) refers to work safety culture as measurable from employee-driven satisfaction, where the effectiveness of its implementation will be more appropriate to be assessed from an employee's perspective [9]. Fernández-Muñiz (2007) defines safety culture in two ways: as a set of values, perceptions, attitudes, and patterns of behavior regarding safety that members of an organization share and as a set of policies, practices, and procedures related to reducing employee exposure to Occupational risks, implemented at every level of the organization, reflect a high level of awareness and commitment to the prevention of accidents and work-related illnesses [10]. Occupational Health and Safety (K3) itself is also defined in PP No. 50 of 2012 as all activities to ensure and protect the safety and health of workers through efforts to prevent work accidents and occupational diseases.

Following the development of the management theory perspective and the total

loss control issues related to occupational accidents, Bird and Loftus (as cited in Becker et al., 2015) adapted Heinrich's Domino theory to show how management influences the causes of accidents. This model highlighted that poor management control would lead to poor human resources factors (such as the lack of appropriate training) and a poor work environment (such as poorly maintained machinery).



Figure 4. The Domino Theory

Figure 4 illustrates Heinrich's theory of causation model, **The Domino Theory** (7). The theory describes an accident as one of the five sequential factors that result in an injury or loss. The figure illustrates how the behavior regarding the accident factors is similar to that of a toppling domino, where if one falls, the other will drop as well.

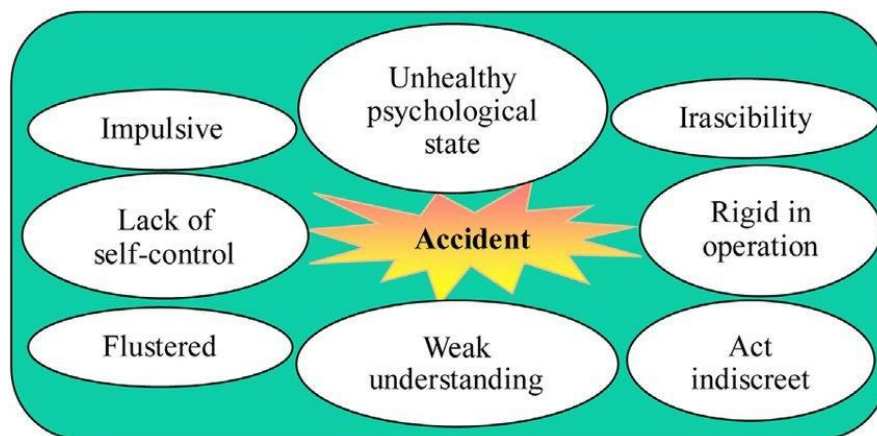


Figure 5. The Accident-Proneness Theory

Figure 5 provides an overview of **The Accident-Proneness Theory** (11), which focuses on personal factors related to the cause of accidents. This is based on the assumption that if several individuals are

placed in similar conditions, some of them will have a greater chance of experiencing an accident than others. According to this theory, these people have stubborn characteristics

that increase their likelihood of being involved in an accident.

Therefore, an effective safety culture is one of the critical elements of any business strategy because it has many positive effects on other areas of business performance. It also shows that safety culture does not operate only by itself but affects and is influenced by other organizational processes or systems.

2. Safety Management System

A safety management system is an integrated organizational mechanism designed to control risk and health and safety performance in ongoing and future work and ensure compliance with the laws and regulations. In principle, a good safety management system includes a quality management system that is a fully integrated and cohesive system centered on policies, strategies, and procedures that provide internal consistency and harmonization (7). The development of such a system should be seen as a practical way of creating awareness, understanding, motivation and commitment of all personnel within an organization, as well as optimizing the organization's own health and safety

performance. This way, safety should be everyone's responsibility. However, because safety management depends on many organizational activities and divisions, it is required that each activity is reviewed and integrated into a holistic process.

Safety management also relates to security-related practices, roles and functions (13). It is considered a sub-system of the whole organizational management and is carried out through its safety management system. In practice, safety management is the policies, strategies, procedures, and activities implemented or followed by organizational management that target safety for its employees by complying with applicable laws and regulations. In essence, managing safety in the construction industry is similar to managing productivity, quality, or other functional areas of operation. Ironically, managerial control, which is the management of safety, which should be able to prevent accidents, is still one of the leading causes of work accidents in this industry. Therefore, a safety management system is needed as a mechanism that is integrated within the organization and designed to control hazards that can affect the health and safety of construction workers.



Figure 6. Construction Safety Factors (SMKK)

According to PermenPUPR No. 50/2021, the Construction Safety Management System (SMKK) is part of the construction work management system to establish work safety in the construction industry. It also includes fulfilling security, safety, health, and sustainability standards that guarantee construction engineering

safety, workforce safety, health, and public and environmental safety (figure 6) (14).

This construction safety management system should then be a concern of all stakeholders. Currently, the construction industry in Indonesia employs more unskilled workers than in Australia, even though regulations in Indonesia are relatively more lenient. In addition, based on a preliminary

survey conducted by the author of the K3 representatives from five State-Owned Enterprises (BUMN) in Indonesia, 43% of them still lack an understanding of the exact scope of SMKK. This shows that project managers in Indonesia still tend to have lower expectations regarding implementing safety procedures and their impact on the construction workforce. The implementation of SMK3 is still often neglected and needs special attention. This is shown by the commonness of the occurrence of construction work accidents, as each construction project has different characteristics and circumstances affecting the working conditions. As such, when the implementation of the work safety procedures and regulations in Indonesia is improved and becomes more well-targeted, it will also improve the workforce's spirit and productivity (12).

In the implementation of safety management itself, there are Total Safety Management (TSM) risk management principles, formulated as Risk Management (RM), that must be integrated into decision-making and other processes within the organization. RM must also be based on accurate and participatory risk information so that the needs of all stakeholders can be considered (15). In addition, the management commitment factor, safety system, supervisor involvement, worker involvement, and the organization's safety climate then become the 5-factor model as a reference for implementing the construction industry safety climate (16).

Aside from that, within the implementation of safety management, safety performance can be achieved by implementing the following points effectively (17):

- 1) Implementation of safety regulations.
- 2) Leadership.
- 3) Safety planning.
- 4) Compliance with safety regulations.
- 5) Performance measurement.
- 6) Risk assessment.
- 7) Safety inspection.
- 8) Safety culture.

3. SMKK PermenPUPR No. 10/2021

The PermenPUPR No. 10/2021 issued by the Ministry of Public Works and Human Settlements concerns the SMKK Guidelines. SMKK is a part of the construction management system aimed to ensure the realization of construction safety, which requires every service user and service provider to implement construction services to apply and comply with SMKK. The application of SMKK must also meet applicable security, safety, health, and sustainability standards, guaranteeing construction engineering safety, occupational safety and health, public safety, and environmental safety.

In practice, construction projects generally have limited resources (in the form of human resources, materials, costs, tools, and project administration), which often results in the Construction Management System (CMS) implementation needing to be addressed from the initial stages of construction work. For this reason, regulatory adjustments are needed from organizations to comply with PermenPUPR No. 10/2021 and guarantee proper CMS. Adjustments to these regulations can be in the form of creating work safety operational procedures, which will help organizations achieve the following goals [19]:

- 1) Improving the effectiveness of planned, measurable, structured, and integrated occupational safety and health.
- 2) Prevent and reduce workplace accidents and work-related illnesses by involving elements of management, workers or laborers, and labor unions.
- 3) Creating a safe, comfortable, and efficient workplace to boost productivity within the organization.

If the management can implement workplace safety regulations effectively, there will be an increase in the understanding of hazard risks and the importance of implementing a safety management system that leads to improving the safety culture in the company. Positive changes in safety culture will then create a sense of security for the workers and thus increase work productivity. In the end, implementing a good construction safety management system can also help companies obtain good business results.

CONCLUSION

Over the last few years, the Construction Safety Management System, otherwise known as SMKK, has been developing rapidly, and there is an increasing understanding of how vital a proper implementation of this safety management system is within the industry. An exemplary SMKK implementation is also expected to reduce the risk of accidents in construction projects. And so, the combination of good understanding and good execution of SMKK can change the safety culture in construction companies in a positive way.

Through this research, gaps are still found between ideal conditions based on literature studies and current conditions that occur in construction projects, including an understanding of workplace safety that needs to be improved, as well as the implementation of PermenPUPR No. 10 of 2021 concerning SMKK. That is why it is hoped that through this research, we will present an integrated construction safety management system that can simplify and consolidate laws and regulations regarding construction safety systems in Indonesia.

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