

# OCCUPATIONAL SAFETY AND HEALTH OF COAL MINING SECTOR USING SIKAP IN EAST KALIMANTAN, INDONESIA

SULTAN, M.<sup>1\*</sup> – SETYADI, D.<sup>2</sup> – RAMDAN, I. M.<sup>1</sup> – HAVILUDDIN<sup>3</sup>

<sup>1</sup> Faculty of Public Health, Mulawarman University, Samarinda City, Indonesia.

<sup>2</sup> Faculty of Economics and Business, Mulawarman University, Samarinda City, Indonesia.

<sup>3</sup> Faculty of Engineering, Mulawarman University, Samarinda City, Indonesia.

\*Corresponding author

e-mail: muhammadsultan812[at]gmail.com

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**Abstract.** The work accident and potential hazard reporting system is important to improve the performance of occupational safety and health (OSH). A work accident and potential hazard reporting system is needed in the form of the SIKAP (Information System for Occupational Accidents, Occupational Diseases and Potential Hazards) application which is expected to be able to improve OSH performance in the coal mining sector. The research design used is a Mixed Method with the Embedded Design type. The research sample was 167 workers in the mining unit, while the informants consisted of workers and those responsible for the company's OSH unit. The selection of worker informants was carried out using Purposive. The effect of digitalization of work accident reporting on OSH performance was analyzed using the Safe-T Score (STS) test. Based on the results of mathematical calculations using the STS formula, the STS value is  $-0.59 < -2$ , which means that the company's OSH performance has increased after using the SIKAP application through worker participation. The company's OSH performance has increased twofold to reduce cases of work accidents. This is indicated by a decrease in the number of work accidents from 20 cases before using the application to 10 cases after using the SIKAP application. Digitalization of reporting of work accidents and potential hazards using the SIKAP application has an impact on the OSH performance of the coal mining sector in East Kalimantan.

**Keywords:** accident prevention, coal mining, OSH performance, SIKAP application

## Introduction

The problem of work accidents in the workplace continues to occur until now, which is marked by workers experiencing minor, serious injuries, and even death. The attention of the Indonesian Government through Law Number 13 of 2003 concerning Manpower emphasizes that every worker has the right to obtain protection and work safety in the workplace. This is done to provide safety guarantees and improve the health of workers optimally. The coal mining sector is making various OSH efforts to protect its workers so that they remain healthy and productive in accordance with Government Regulation Number 50 of 2012 concerning the Implementation of the Occupational Safety and Health Management System. A joint commitment is needed between the government, company management, and workers in making efforts to prevent work accidents in coal companies. One of the activities to prevent work accidents in coal mining is to report every accident that occurs and the potential danger. Coal companies are obliged to report work accidents and potential dangers, both minor, serious accidents or injuries, and accidents that result in death. This obligation is regulated in laws and regulations, including Law No. 1 of 1970, Law No. 13 of 2003, Government Regulation No. 50 of 2012, Presidential Regulation No. 7 of 2019,

Regulation of the Minister of Manpower of the Republic of Indonesia No. 03 of 1998, Regulation of the Minister of Manpower No. 5 of 2018, Regulation of the Minister of Energy and Mineral Resources Number 26 of 2018, and other regulations.

Work accident reporting is a medium that can detect potential hazards early and find the root cause of work accidents, making it easier for management to prevent similar work accidents (Heraghty et al., 2018). Work accident reporting is not only the company's obligation, but also the worker's obligation. Workers are obliged to report work accidents and potential hazards to support the implementation of the mining safety management system as regulated in the Decree of the Director General of Minerals and Coal, Ministry of Energy and Mineral Resources of the Republic of Indonesia Number 185.K/37.04/DJB/2019. The company's OSH performance is determined by worker participation in reporting every potential hazard because it affects the company's management decision-making in efforts to control work accidents (Sneddon et al., 2013). However, low worker participation in reporting work accidents and potential hazards for various reasons (Sultan, 2023). Such conditions will affect the company's OSH performance in controlling work accidents and potential hazards in the coal mining sector. Worker non-compliance in reporting work accidents is caused by various factors, including the continued perspective of individual workers who consider minor accidents or injuries to be commonplace and therefore do not need to be reported. The low moral responsibility of workers regarding OSH is also one of the causes of low levels of workers in reporting work accidents (Petitta et al., 2017). Support from OSH officers at the work site also affects worker compliance in reporting unsafe behavior and work accidents (Casey et al., 2015). In addition, the quality of the reporting forms available in the company also affects the behavior of workers and management in reporting work accidents (Molinero-Ruiz et al., 2015).

Worker practices to report work accidents and potential hazards, especially in the coal mining sector, are important because it is one type of industry that has a high risk of causing work accidents. Potential hazards in coal mining areas can come from location factors, mining methods, and the work systems applied. Company X has been operating since 2005 until now using the surface mining method (open pit). At every stage of coal mining activities, there are various potential hazards such as injuries from attacks by venomous insects and wild animals, falling from a height, being buried by landslides, falling and being hit by vehicles that are operating during the mining and transportation production process and other potential hazards. The company management has and is implementing OSH hazard control efforts to reduce the risk of work accidents in the workplace such as routine worker health checks, safety patrols, safety induction, safety talks and special training for OSH officers. However, there were still 14 cases of work accidents experienced by workers during the August-November 2023 period. Work accidents experienced by workers were reported to OSH officers and their colleagues using a manual reporting form. Reported and recorded work accidents are like an iceberg phenomenon because it is possible that many cases of minor accidents experienced by workers are not reported.

The activities of reporting work accidents and potential hazards that have been carried out by coal mining companies so far have several weaknesses, including not being able to present information that is up to date, connected, integrated and synchronized, so that it is one of the factors that makes it difficult for company management to carry out OSH efforts quickly and accurately. Digitalization of work accident reporting is needed that can present information on work accidents and

potential hazards that are connected, integrated and synchronized to improve the company's OSH performance (Sultan et al., 2023). In addition, the SIKAP application can prevent the practice of manipulating work accident data, making it easier to prevent similar accidents in the future (Sultan et al., 2024). The Indonesian government through the Ministry of Energy and Mineral Resources of the Republic of Indonesia and the Ministry of Manpower of the Republic of Indonesia continues to support the coal mining industry to implement a digital reporting system as an effort to implement good mining practices. However, this support has not been accompanied by the provision of a digital system for reporting work accidents and potential hazards that apply massively, especially in coal companies that are still actively operating. A digital system for reporting work accidents is needed so that potential OSH hazards can be controlled to a safer level.

The availability of a digital-based information system in the workplace will make it easier for workers to report any potential hazards and work accidents that occur. However, this is still difficult to realize because there is no digital-based information system in the coal mining sector. The unavailability of an integrated reporting system will make it difficult for company management to control work accidents (Jagnoor et al., 2020). The use of technology in the workplace will help workers to always behave safely at work to avoid work accidents (Kashevnik et al., 2019). The progress of a company is determined by the availability of data and information in an integrated, up to date (real time), and cross-functional system (Matta et al., 1998). Improving the company's OSH performance requires a comprehensive approach by involving workers and company management consistently and sustainably. Based on these problems, research is needed that aims to improve OSH performance in the coal mining sector. The information system for reporting work accidents and potential hazards in the form of the SIKAP application is one of the efforts to support the availability of one data to facilitate company management in the coal mining sector to achieve zero accidents.

## Materials and Methods

This study uses a combination of qualitative and quantitative design (Mixed Method) with the Embedded Design type, namely the researcher prioritizes the quantitative method, while the qualitative method is carried out to complement or enrich the results obtained in the quantitative method (Vebrianto et al., 2020). The research sample was 167 workers in the mining unit, while the informants consisted of workers and those responsible for the company's OSH unit. The selection of worker informants was carried out using Purposive Sampling with the criteria of actively working for at least one year, utilizing the SIKAP reporting application during the study, being able to communicate effectively and being willing to be interviewed. The study was conducted in October 2023 based on a research permit issued by the Faculty of Economics and Business, Mulawarman University Number: 202/UN17.1.36.1/DT/2023. The data and information collected were analyzed using the Safe-T Score (STS) test to assess the effect of the SIKAP application as a medium for reporting work accidents on the OSH performance of the coal mining sector in East Kalimantan, Indonesia.

## Results and Discussion

The effectiveness test of the SIKAP application was conducted to measure the level of success of using the SIKAP application in improving OSH performance. The effectiveness of digitalization of reporting on OSH performance was measured by comparing the number of work accidents after and before using the SIKAP application. The results of the t-statistic test showed that digitalization of reporting was effective in improving the company's OSH performance ( $t=0.002$ ;  $<0.05$ ). The number of work accidents after and before using the SIKAP application were 10 and 20 cases respectively, resulting in an increase in performance of 2 times more optimal than before using the SIKAP application. The results of the significance test based on the T-statistic value showed that digitalization of reporting had a significant effect on the company's OSH performance. The direct effect of digitalization of reporting on OSH performance was 0.187, while the indirect effect of digitalization of reporting through worker participation on OSH performance was 0.269. These results mean that indirectly digitalization of reporting through worker participation has a significant effect on the company's OSH performance. Based on the results of mathematical calculations using the STS formula, the STS value is  $-0.59 < -2$ , which means that the company's OSH performance has increased after using the SIKAP application through worker participation. The company's OSH performance has increased twofold to reduce cases of work accidents. This is indicated by a decrease in the number of work accidents from 20 cases before using the application to 10 cases after using the SIKAP application.

The company where the research was conducted has created a written and documented OSH policy and posted it in places that are easily seen by workers such as information boards in the company office and at the work site. It was found that most of the reports of work accidents reported by workers through the SIKAP application were responded to and resolved by company management through the company's OSH officers. OSH officers on average need a response time of around 1-3 minutes to receive each report of work accidents and potential hazards reported through the SIKAP application for further processing. This shows that the company's OSH officers are very responsive in responding to every report of work accidents and potential hazards from workers when using the SIKAP application compared to before using the SIKAP application which required 1-2 days to follow up on reports from workers. The decrease in the number of work accidents is supported by the ability of human resources to follow up on reports through the SIKAP application. Workers stated that most of the OSH human resources owned by the company have proven to be able to resolve work accidents experienced by workers and are also able to control potential hazards reported in the SIKAP application so as not to wait for potential hazards to cause victims of work accidents. The speed of response time and the ability of OSH officers to resolve each report of work accidents show the optimal performance of the company's OSH after using the SIKAP application. The use of technology in the form of mobile applications helps workers, especially drivers, to behave safely at work to avoid work accidents (Kashevnik et al., 2019).

Workers gave a positive assessment of the use of the SIKAP application in reporting work accidents and potential hazards. Workers feel the ease of reporting and getting a faster response and improvement from OSH officers in handling every OSH problem reported. The same thing was also conveyed by OSH officers that the information submitted by workers through the SIKAP application also helps in efforts to prevent and control work accidents in the workplace. The problem of work accidents and potential

hazards in the coal mining sector cannot be resolved only by relying on worker participation and support from company management, but also requires government support. For example, the Russian Federation has prioritized the development of technology in the mineral resources sector because technological changes can overcome the challenges of global change in the mining sector which are so complex (Litvinenko, 2020). The high risk of accidents in coal mining requires consistent and continuous implementation of OSH management system to achieve Good Mining Practice (Maimunah et al., 2024). Companies that have potential hazards and the potential for near misses can be prevented by implementing OSH management system (Haas and Yorio, 2019).

## **Conclusion**

The implementation of the SIKAP application has significantly improved Occupational Safety and Health (OSH) performance in the coal mining sector of East Kalimantan, Indonesia. By digitalizing the reporting system for work accidents and potential hazards, the application has enhanced worker participation in accident prevention and hazard mitigation. The study findings indicate that the use of the SIKAP application has resulted in a twofold reduction in work accidents, decreasing from 20 cases before implementation to 10 cases afterward. This improvement highlights the effectiveness of digital reporting in strengthening workplace safety measures. The ability of OSH officers to respond quickly to reported incidents through the SIKAP application has further contributed to the improvement of safety standards. The study found that the response time for addressing reported accidents and hazards decreased from 1-2 days with manual reporting to just 1-3 minutes using the SIKAP application. This enhanced responsiveness has led to more proactive accident prevention and hazard control, reducing risks and improving overall workplace safety.

Additionally, worker compliance in reporting accidents and hazards has increased due to the ease of using the digital system. The application has addressed previous issues related to underreporting and delays in hazard communication, ensuring that workplace risks are promptly identified and mitigated. This aligns with global best practices in occupational safety, where digital solutions play a crucial role in enhancing safety performance and reducing workplace accidents. Moving forward, coal mining companies should continue integrating digital reporting systems like the SIKAP application into their safety management practices. Government support and policy enforcement will also be crucial in expanding the implementation of digital reporting tools to further improve OSH performance across the industry, aiming for zero accidents in the workplace.

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## **Conflict of interest**

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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