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The Effect of Digitalisation of Safety Accountability Program (SAP) on the Improvement of Occupational Safety System

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Abstract

PT Putra Perkasa Abadi site PT Bukit Asam Tbk is a company engaged in the mining sector with business processes including topsoil removal, overburden removal, haul road maintenance, road construction, pit service, equipment rental, coal getting and coal hauling. The purpose of the study is to analyze the influence of SAP digitalization on the improvement of the occupational safety system, identify the benefits and challenges in the process of digitizing the occupational safety system, and formulate strategies and recommendations to optimize the implementation of the digitalization of the occupational safety system. This research method uses a qualitative approach with data collection methods through literature studies, field observations, in-depth interviews, document analysis, and surveys. One of the steps taken to improve the implementation of the work safety system is the digitalization of the Safety Accountability Program (SAP) of Partners. Based on data obtained through primary data sources from 30 respondents, namely supervisors from 9 Partners of PT Putra Perkasa Abadi site PT Bukit Asam Tbk, and analysis using the Likert scale, it was concluded that SAP digitalization has a great influence on the role of management with an average score of 91, Conditions and workplaces with an average score of 93, awareness and quality of workers with an average score of 91, project performance with an average score of 92. Research Results: SAP digitalization has been proven to improve the effectiveness of occupational safety systems through increased efficiency, data accuracy, and better decision-making. However, there are several challenges faced, such as resistance to change and system integration. Recommended strategies include improved training, effective communication, and the development of adequate IT infrastructure. This means that, overall, it is very influential in improving the safety system of PT Putra Perkasa Abadi's partner, PT Bukit Asam Tbk with an average score of 92.

Keywords: Work Partner, Occupational Safety System, Digitalisation, Safety Accountability Program, Likert Scale

INTRODUCTION

PT Putra Perkasa Abadi is one of the largest mining service companies in Indonesia, with 12 operational sites. One of these is the PT Bukit Asam Tbk site (PPA-BA), which engages in open-pit coal mining. The principal business processes of PPA-BA include top soil removal, OB removal, hauling road maintenance, road construction, pit service, equipment rental, coal getting and coal hauling activities. In order to facilitate the full range of mining activities and other operations, PPA-BA collaborates with a number of mining service companies specialising in labour supply, construction, maintenance units, transportation and so forth. The activities carried out present a significant risk of occupational accidents, which is a matter of concern and priority for PPA-BA and its partners. The implementation of an occupational safety system is a key aspect of PPA-BA's approach to occupational safety, and this is a mandatory requirement for its partners.

The system, as theorised, is a series of components that work together and interact in order to achieve certain goals (Soeheman et al., 2008). In essence, occupational safety is an endeavour to guarantee the wellbeing of employees, both physically and mentally, as well as the efficacy and integrity of work equipment within the workplace (Sutarto 2008); (Yulistina and Caroline 2020). An alternative perspective posits that occupational safety is a state of affairs wherein employees are able to work in a

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secure manner and are not subjected to mishaps while engaged in their occupational duties (Wirawan 2015); (Syafruddin et al. 2022). The term "safety in the workplace" is used to describe conditions that are safe or free from danger or loss in the workplace (Indonesia 2016); (Muna and Isnowati 2022). The criteria for occupational safety system factors are divided into 4 factors, including the role of management, working conditions and environment, awareness and quality of workers, and project performance (Sutarto 2008), for further details, please refer to Table 1.

Table 1. The Occupational Safety System Factor Criteri

Role of management	Establishment of OHS Advisory committee
	Counselling and explanation of OHS
	Organisation of Job Training and Briefing
	Penalties for not using safety equipment
	Leaders are not yet aware of OHS
	Leaders consider OHS costly
	Leaders consider that the results of OHS are not directly realised
	Leaders perceive OHS as hindering the production process
Conditions and workplace	Availability of safety equipment
	Safe and large workplace
	Work tools in proper condition
	Fire suppression equipment available
Awareness and quality of workers	Discipline in the use of safety equipment
	Compliance with work procedures
	Adequate work experience
	Discipline in attending vocational training
Project performance	Time efficiency
	Cost efficiency
	Improved quality of work output
	Improved work activities

Source: (Sutarto 2008)

The occurrence of accidents can be attributed to a multitude of factors, including a lack of risk control, inadequate planning, unsuitable working conditions, a deficiency in safety training, the use of unsafe equipment, employee negligence, and an inappropriate workplace layout (Culvenor et al. 2007); (Lyon, Walline, and Popov 2019). The Safety Institute of Australia suggests that understanding the causes of accidents is the first step in preventing accidents, so it is necessary to understand the problem before solving it (Toft et al. 2012). An occupational accident is an unpredictable, uncontrollable, and undesirable event that occurs during work, caused directly or indirectly by unsafe acts and/or unsafe conditions that result in the cessation of work (Abdullah 2009); (Akbar et al. 2022).

It is evident that the occurrence of occupational accidents can result in direct and indirect losses for the company, while for workers, occupational accidents can cause injuries and even death. Therefore, PPA-BA, a company engaged in high-risk work activities, places significant emphasis on the implementation of a robust safety system. This system serves as the foundation for the company's decision-making process. In 2023, the number of mining accidents in Indonesia reached 217 incidents,

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with the category of minor accidents accounting for 104 incidents, 65 severe accidents, and 48 deaths (https://modi.esdm.go.id/kecelakaantambang). It can be reasonably concluded that mining activities continue to present a significant risk of occupational accidents and mining accidents (Bonnie and Pinontoan 2008).

The reduction of these risks is contingent upon the implementation of a Safety Accountability Programme (SAP) by PPA-BA. The SAP is a programme designed to oversee and maintain safety in the workplace. Furthermore, the implementation of SAP is anticipated to enhance the occupational safety system at PPA-BA. The objective of the SAP is to ensure that all supervisors employed by PPA-BA and all 9 Work Partners engaged in various operational activities, including labour supply, construction, maintenance, transportation, and so forth, complete the requisite forms.

The submission carried out by the PPA-BA supervisor is carried out through an online-based application, thereby enabling supervision and follow-up to be conducted in real time. However, SAP submissions by the PPA-BA Work Partner supervisor were previously still carried out manually, which was deemed to be less efficient in conducting supervision and follow-up. Consequently, the PPA-BA digitised SAP online-based work partners, thus enabling real-time supervision and follow-up (see Figure 1).

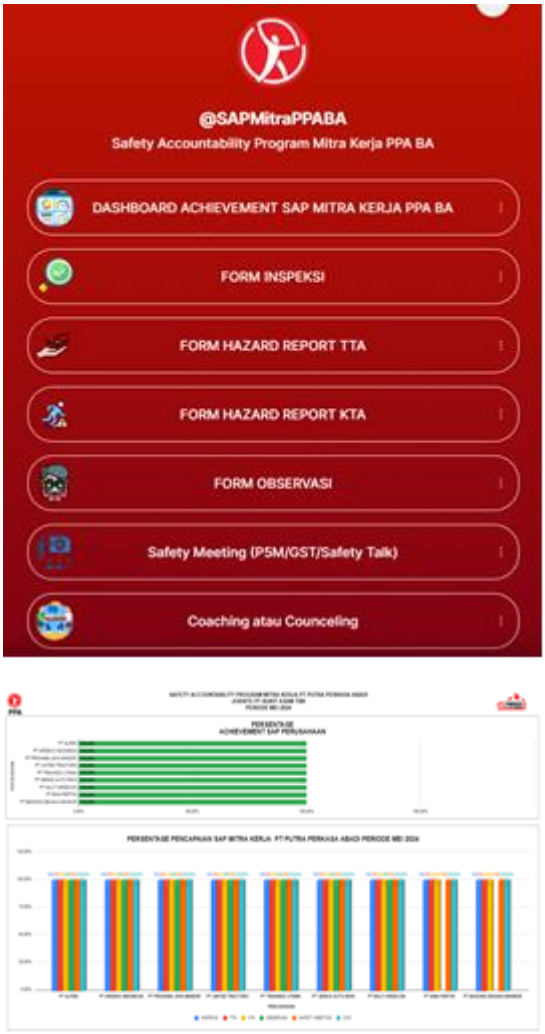

Figure 1. The Digitisation of the Safety Accountability Program (SAP) for Work Partners – PPA BA

Nevertheless, the impact of utilising online SAP Work Partners on enhancing the occupational

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safety system remains to be quantified with regard to its efficacy. The effectiveness of the programme was evaluated by surveying 30 respondents from PPA-BA Work Partners, including supervisors. The data was obtained from primary sources and analysed using a Likert scale. The findings of this study will serve as a basis for evaluating the implementation of SAP digitalisation of PPA-BA Work Partners, thereby enabling SAP to optimise its contribution to the improvement of occupational safety systems.

The purpose of the study was to analyze the effect of the digitalization of the safety accountability program (SAP) on the improvement of the occupational safety system at PT Putra Perkasa Abadi's partners at the location of PT Bukit Asam Tbk, identify the benefits and challenges faced in the process of digitizing the occupational safety system and formulate strategies and recommendations to optimize the implementation of the digitalization of the occupational safety system.

RESEARCH METHODS

The term "method" is derived from the Greek word "methodos," which means "the way" or "method." In the context of scientific endeavours, the method pertains to the problem of how to work, namely how to work in order to be able to understand the object that is the target of science (Koentjaraningrat, 1985), research is defined as a series of planned activities aimed at collecting data to provide answers to certain problems and then find the desired conclusion (Bakry, 1994). This research employs a descriptive methodology, which entails the investigation of independent variables without any comparison or correlation with other variables. Consequently, the variables under examination are considered to be independent. The objective of this research is to provide an accurate description of the characteristics of individuals, conditions, symptoms, or specific groups. Additionally, it aims to determine the frequency or distribution of a symptom (Abubakar 2021). This research employs quantitative data types and analyses. Quantitative research is defined as research that collects data in numerical form or quantified qualitative data. For example, quantitative research may employ a measurement scale.

This research employs primary data, which is defined as data derived from the first source or the main respondent who serves as the object of research (Maduningtias et al. 2022). The data collection technique employed in this study involved the administration of a questionnaire to PPA-BA Work Partners, with a total of 30 respondents. A questionnaire is a list of questions prepared by the researcher and presented to the respondent. The questionnaire comprises questions that are necessary to address the research problems. The questionnaire employed in this study was of the closed questionnaire type, which is defined as a questionnaire whose questions have answer choices. The respondents were required to select one of the provided answer options for each question, with no option to provide alternative responses (Abubakar 2021); (Sahir 2021).

The data were subjected to analysis using the Likert scale, which was devised by Rensis Likert in 1932 as a means of measuring attitudes. The scale comprised a series of questions or statements, which were presented to the respondents for their agreement or disagreement (Hair, Bush, and Ortinau 2003). The scale employed is a modified Likert scale comprising four scales, namely very disagree, disagree, agree, and very agree (Hartanto 2017); (Simamora 2022).

Table 2. Likert Scale Rating

Description	Rate
Very agree	4
Agree	3
Disagree	2
Very Disagree	1

Source: Hartanto (2017)

The results of the questionnaire were then calculated using the following formula to determine the average questionnaire score: Modified Amanah (2013).

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Description:
RSP = Average assessment score
n = Total score obtained
N = Total maximum score

Once the average questionnaire score has been calculated, the assessment score criteria are then determined, as illustrated in Table 3.

Table 3. Assessment Score Criteria

Criteria	Average score interval
Very Affected	82 - 100
Affected	63 - 81
Not Affected	44 - 62
Very Unaffected	25 - 43

Source: Modified Sugiyono (2019)

The assessment score criteria are comprised of four distinct categories: "very affected," "affected," "not affected," and "very unaffected." The determination of these criteria is to ascertain the impact of digitalisation of the safety accountability programme (SAP) on the enhancement of the occupational safety system at the Work Partners of PT Putra Perkasa Abadi site of PT Bukit Asam Tbk

RESULTS AND DISCUSSION

The Likert scale is employed to analyse primary data derived from the responses to questionnaires completed by PPA-BA Working Partners. The sample comprises 9 Working Partners and 30 respondents. The number of respondents is based on the number of Work Partner supervisors who work in the PPA-BA area. The results of the analysis will be used to determine the effect of digitalisation of the safety accountability programme (SAP) on improving the work safety system at the Work Partner of PT Putra Perkasa Abadi site PT Bukit Asam Tbk.

A total of four variables and 20 indicators were employed in the assessment, with the results presented in Table 4.

Table 4. Research Variables and Indicators

Factors	Variable	Indicator	Value	Description
Occupational Safety System	Role of management	Establishment of OHS Advisory committee	3	Agree
		Counselling and explanation of OHS	4	Very agree
		Organisation of Job Training and Briefing	4	Very agree
		Penalties for not using safety equipment	4	Very agree
		Leaders are not yet aware of	4	Very agree

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Factors	Variable	Indicator	Value	Description
		OHS		
		Leaders consider OHS costly	4	Very agree
		Leaders consider that the results of OHS are not directly realised	4	Very agree
		Leaders perceive OHS as hindering the production process	4	Very agree
	Conditions and work-place	Availability of safety equipment	4	Very agree
		Safe and large workplace	4	Very agree
		Work tools in proper condition	4	Very agree
		Fire suppression equipment available	4	Very agree
	Awareness and quality of workers	Discipline in the use of safety equipment	4	Very agree
		Compliance with work procedures	4	Very agree
		Adequate work experience	4	Very agree
		Discipline in attending vocational training	4	Very agree
	Project performance	Time efficiency	4	Very agree
		Cost efficiency	4	Very agree
		Improved quality of work output	4	Very agree
		Improved	4	Very

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Factors	Variable	Indicator	Value	Description
		work activities		agree

Source: Sutarto, 2008 and Analysis Results, 2024

The results of the Likert scale assessment, as presented in Table 4, were then subjected to analysis using the following formula:

$$RPS = \frac{n}{N}\ x\ 100$$

Source: Modified Amanah (2013)

Description:
RSP = Average assessment score
n = Total score obtained
N = Total maximum score

The objective is to determine the assessment score criteria based on the average score interval, as presented in Table 3. The assessment results can be found in Table 5.

Table 5. Results of Analysis of Assessment Score Criteria for the Effect of SAP Digitalisation on Improving Occupational Safety Systems

Factors	Variable	Average Score Interval	Description
Occupational Safety	Role of management	91	Very Affected
	Conditions and workplace	93	Very Affected
	Awareness and quality of workers	91	Very Affected
	Project performance	92	Very Affected
Average		92	Very Affected

The results of the analysis of the assessment score criteria in Table 5 indicate that the digitalisation of SAP Work Partners has a very significant effect on the role of management, with an average score of 91. It also has a notable effect on conditions and the workplace, with an average score of 93. Furthermore, it has a considerable effect on awareness and the quality of workers, with an average score of 91. Finally, it has a noticeable effect on project performance, with an average score of 92. Consequently, the results of the four variables indicate that the digitalisation of SAP Working Partners has a positive effect on the improvement of the occupational safety system at the Working Partner of PT Putra Perkasa Abadi site PT Bukit Asam Tbk, with an average score of 92. The results are further supported by Brennen and Kreiss (2016), which posits that digitalisation is the increased availability of digital data, made possible by advances in the creation, transmission, storage, and analysis of digital data. It has the potential to structure, shape, and influence the contemporary world. A study conducted by Rochman et al. (2020) with the title "Digitalisation Transformation of HAZOB Reporting to Improve Occupational Safety Performance in Companies" asserts that digitalisation transformation is necessary to convert the reporting business process from conventional to website applications or mobile apps. The results of this study indicate that there is an increase in occupational safety operational performance with the Hazob Reporting Digitalisation program.

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CONCLUSION

In order to facilitate the implementation of all mining and other work activities, PPA-BA has established collaborative relationships with a diverse range of mining service companies specialising in labour supply, construction, maintenance units, transportation, and other related fields. The activities in question are inherently risky, with a high potential for work-related accidents. Consequently, occupational safety is a significant concern and a priority for PPA-BA and its partners. The implementation of an occupational safety system at PPA-BA is a key aspect of the company's commitment to ensuring the safety of its employees. This system must be implemented by PPA-BA's partners as well. One of the strategies employed to enhance the implementation of the occupational safety system is the digitisation of the Work Partner SAP. The data obtained from 30 respondents, namely supervisors from 9 PPA-BA Work Partners, was analysed using a Likert scale. The results indicated that the digitalisation of the Safety Accountability Program (SAP) has a very significant effect on the role of management, with an average score of 91, conditions and the workplace, with an average score of 93, awareness and the quality of workers, with an average score of 91, and project performance, with an average score of 92. So that overall it is very influential on improving the occupational safety system at the PT Putra Perkasa Abadi site Partner of PT Bukit Asam Tbk with an average score of 92.

The importance of implementing a digitally integrated safety accountability system to improve safety performance in the work environment. Potential benefits that can be obtained from the digitization of the occupational safety system, such as increased efficiency, data accuracy, and better decision-making. The broader implications are related to the impact of digitalization on other aspects of occupational safety and health management in the industrial environment. Overall, this study provides insight into the important role of digitalization in improving occupational safety systems and accountability in the workplace. The results and recommendations presented in this document can be a reference for other organizations looking to adopt a similar approach.

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