

ANALYSIS OF WORK SAFETY MONITORING BASED ON THE THEORY OF PLANNED BEHAVIOR ON WORK SAFETY OF WORKERS IN PALM OIL FACTORIES

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ABSTRACT

High-risk industries, such as palm oil mills, require the optimal implementation of occupational safety and health (OSH) procedures. However, workers' compliance with OSH procedures is still inadequate. This study aims to analyze the relationship between workplace safety monitoring and workers' OSH behavior based on the Theory of Planned Behavior (TPB). The study employs a quantitative, cross-sectional design and involves 120 PT Sumber Tani Agung workers.

Data were obtained through observation instruments, namely the K3 Field Monitoring form, completed by supervisors of each division, and a K3 occupational safety and health behavior questionnaire, completed by workers. Data analysis was performed using the Spearman correlation test in SPSS 25. The results showed a strong relationship between safety monitoring and workers' safety and health behavior ($r = 0.851$, $p < 0.001$). These results reinforce the idea that external control through direct supervision plays an important role in fostering a positive safety culture in high-risk work environments.

Keyword: Work safety monitoring, occupational health and safety, Theory of Planned Behavior, palm oil industry

INTRODUCTION

According to (Ketenagakerjaan, 2012), occupational safety and health (OSH) are essential for maintaining worker welfare and business continuity, particularly in high-risk sectors like the palm oil industry. The regulation aims to prevent workplace accidents and occupational diseases. However, the number of reported workplace accidents has increased from 234,270 in 2021 to 370,747 in 2023, over 60% of which occurred in the plantation sector.

Despite the existence of safety procedures and personal protective equipment (PPE), workers often fail to comply with safe behavior. Implementing workplace safety monitoring is a strategic approach to improving compliance through observation-based interventions and other methods. The Behavior-Based Safety (BBS) approach relies on directly observing worker behavior and providing constructive feedback (Yang et al., 2024). Supervisors conduct these observations with a focus on compliance with work procedures, risk identification, and PPE implementation.

According to the Theory of Planned Behavior (TPB), tracking workplace behavior can help establish intentions and encourage safe practices. (Kandi, 2022) study shows that combining TPB and behavior-based safety approaches improves employee safety perceptions and participation. (Tambunan et al., 2021) found that worker knowledge and involvement greatly influence the success of occupational safety and health management systems in the palm oil industry. On the other hand, implementing monitoring in this sector requires internal audits,

regular training, and using digital technology to improve monitoring efficiency (Tambunan et al., 2021); (Tarigan, 2021); (Khairunnisa, 2023). Although organizations have occupational safety and health structures, a behavior-based approach supervised by occupational safety monitoring requires further study.

This study aims to examine how division supervisors perceive occupational safety in the field. This method is expected to provide an unbiased picture of workers' occupational safety and health (OSH) behavior and help strengthen sustainable intervention programs in the palm oil factory industry.

METHODS

This study used a quantitative method with a cross-sectional design. The research subjects were all 120 employees of the palm oil factory at PT Sumber Tani Agung, selected using total sampling. Data were collected through questionnaires about work safety behavior filled out by workers and field monitoring/observation by supervisors from each division using K3 Field Monitoring instruments.

The K3 Field Monitoring Instrument was developed based on the Theory of Planned Behavior (TPB), which includes three main dimensions: attitude, subjective norm, and perceived behavioral control. Both data collection tools use a 1–5 Likert scale. The independent variable is work safety monitoring, and the dependent variable is work safety and health behavior. Data analysis was performed using SPSS software, version 25. Normality tests were conducted using the Kolmogorov–Smirnov method. Since the results of the normality tests indicated that the data did not follow a normal distribution ($p < 0.05$), the relationship between variables X and Y was analyzed using the Spearman correlation test. A relationship was considered statistically significant if the p-value was less than 0.05.

RESULTS

1. Respondent characteristics

Information on the characteristics of respondents collected from this study includes the frequency distribution of age, latest education, length of work and field of work as follows:

Table 1. Frequency Distribution of Respondent Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Age	20-30 years	16	13%
	31 - 40 years	39	32,5%
	> 40 years	65	54,2%
Education Level	Senior High School	108	90.0%
	Diploma (D3)	4	3.3%
	Bachelor's degree or equivalent	8	6.7%
Length of Employment	1-10 years	41	34,2%
	11-20 years	39	32,5%
	>21 years	40	33,3%
Job Position	Sorting	15	12.5%
	Processing	39	32.5%
	Maintenance/Electrical	39	32.5%
	Boiler Operator	5	4.2%
	Laboratory	4	3.3%

Driver	3	2.5%
Security	15	12.5%

Source: Output SPSS 25 (2025)

As illustrated in Table 1, the 120 respondents involved in this study exhibited the following distribution of characteristics based on age. The majority of respondents were over 40 years old (54.2%), followed by the 31-40 age group (32.5%), and only 13.3% were aged between 20-30 years. This suggests that the majority of the factory's workforce is in the productive age group and possesses substantial work experience. Regarding educational attainment, it is noteworthy that 90% of the respondents have completed high school or an equivalent certification, while a mere 6.7% have attained a university education. This finding is indicative of the fact that the majority of workers have received a secondary education, a common occurrence in the manufacturing sector. With respect to the duration of employment, the distribution of respondents is relatively balanced, with a proportion of 34.2% reporting a tenure of 1-10 years, 32.5% indicating 11-20 years, and 33.3% stating more than 21 years. This finding suggests a balanced distribution of work experience, which may influence their perceptions and attitudes towards work safety. Regarding their occupational roles, the predominant proportion of respondents were affiliated with the process/processing and maintenance/electrical departments, constituting 32.5% each. Comparable percentages were observed in the categories of sortation and security (12.5% each), while other domains such as laboratories, boiler operators, and drivers collectively accounted for a negligible proportion. This finding suggests that the sample is reasonably representative of the factory's workforce structure.

2. Analisis Deskriptif

Table 2. Analisis Deskriptif

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Occupational Safety Monitoring (X1)	120	30	50	38,97	8.086
Occupational Safety Behavior (X2)	120	33	55	48,23	5.164
Valid N (listwise)	120				

Source: SPSS 25 (2025)

According to Table 2, which displays the results of the descriptive analysis, the mean value of the Occupational Safety Monitoring (X1) variable is 38.97, with a standard deviation of 8.086 and a score range of 30 to 50. The Occupational Safety and Health Behavior (X2) variable has a mean of 48.23 and a standard deviation of 5.164 within a score range of 33 to 55. These results suggest that the implementation of safety monitoring by supervisors and workers' safety behavior are fairly good, though there is variation among individuals.

Table 3. Uji Normalitas

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		120
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	2.92876415
Most Extreme Differences	Absolute	.197
	Positive	.197
	Negative	-.149
Test Statistic		.197
Asymp. Sig. (2-tailed)		.000 ^c
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Source: SPSS 25 (2025)

According to Table 3, the normality test using the Kolmogorov-Smirnov method indicates that the significance value (Asymp. Sig.) is 0.000. Since this value is less than 0.05, it can be concluded that the data are not normally distributed. Thus, the analysis of the relationship between the variables will use a nonparametric test: Spearman's correlation.

Table 4. Uji Korelasi Spearman

		Correlations		
			Occupational Safety Monitoring	Occupational Safety Behavior
Spearman's rho	Occupational Safety Monitoring (X1)	Correlation Coefficient	1.000	.851**
		Sig. (2-tailed)	.	.000
		N	120	120
	Occupational Safety Behavior (X2)	Correlation Coefficient	.851**	1.000
		Sig. (2-tailed)	.000	.
		N	120	120

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS 25 (2025)

According to Table 4, the results of the Spearman correlation test indicate a strong, significant relationship between work safety monitoring (variable X) and work safety and health behavior (variable Y). The correlation coefficient is 0.851, and the significance value is 0.000 ($p < 0.01$). Since the p-value is less than 0.05, the relationship between the two variables is statistically significant. A correlation coefficient of 0.851 indicates a strong positive relationship: the higher the quality of workplace safety monitoring conducted by supervisors, the better the workplace safety and health behavior demonstrated by workers. Therefore, workplace safety monitoring plays a crucial role in fostering positive workplace safety and health behavior within the palm oil factory environment.

DISCUSSION

The results of the study indicate a strong relationship between implementing occupational safety monitoring and occupational safety and health behavior among palm oil factory workers, with a correlation coefficient of 0.851 ($p < 0.001$). The study shows that the more regularly and routinely supervisors or managers implement high-quality safety monitoring or observation, the better the occupational safety behavior demonstrated by factory workers.

The occupational safety monitoring approach directly applies the Behavior-Based Safety (BBS) concept. BBS uses regular observation of workplace behavior to prevent accidents and improve compliance with procedures. This monitoring serves as both a control tool and a means of communication that emphasizes management's attention to safety (Chan et al., 2021).

The presence of supervisors who actively monitor and provide feedback can foster a stronger safety culture. Conversely, a lack of supervision can lower workers' perception of safety's importance (Nitzl et al., 2016). Studies have also shown that direct involvement from management and supervisors strengthens workers' positive attitudes toward safety and increases their commitment to following work procedures (Fang et al., 2015). According to the Theory of Planned Behavior (TPB), workplace safety monitoring reinforces perceptions of behavioral control, or the extent to which workers feel they can control their safety actions. (Zohar & Luria, 2003) revealed that a high level of control over personal safety increases the intention to engage in safe behavior.

According to the Theory of Planned Behavior, occupational safety and health supervision plays a role in reinforcing the perception of behavioral control, or the extent to which individuals feel they can control their safety actions. (Zohar & Luria, 2003) found that a high level of control over personal safety increases the intention to engage in safe behavior. Thus, integrating on-site occupational safety monitoring with the TPB has proven successful in identifying and improving safe behavior in the workplace. This aligns with recent studies (Khairunnisa, 2023), which emphasize the significant impact of behavior-focused safety supervision in high-risk industries, such as palm oil mills.

CONCLUSION

This study shows that occupational safety monitoring plays an important role in shaping the occupational safety and health behavior of workers in high-risk industries such as palm oil mills. Structured and continuous monitoring can improve worker compliance with occupational safety and health procedures and strengthen a culture of safety at work. This approach also highlights the importance of managerial and leadership involvement and support in creating a safe work environment that fosters positive behavioral changes among workers. Therefore, the integration of field monitoring, which is an integral part of the occupational safety and health strategy, must be maintained and enhanced within the company's operational policies.

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