

The influence of occupational health and safety signs on safe behavior among oil palm factory workers at PT. Sewangi Sawit Sejahtera

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ABSTRACT

The installation of safety signs in the palm oil factory of PT. Sewangi Sawit Sejahtera is still insufficiently attended to by the workers, as evidenced by the presence of several outdated safety signs that are no longer clearly visible, rendering the conveyed messages unclear. The general objective of this study is to determine the Influence of Safety Signs on Workers' Safety Behavior at the Palm Oil Factory of PT. Sewangi Sawit Sejahtera in 2021. The significance of this research lies in its role as a platform for exchanging information and providing education on workplace accident prevention. This study adopts a Quasi-Experimental Non-Randomized Control Group Pretest and Posttest Design, involving 40 workers in the factory. The research was conducted between August and September 2021. The findings indicate a significant impact on workers' safety behavior before and after the intervention in the Experimental group, as evidenced by the significance level of the paired t-test. Logistic Regression analysis reveals that the most influential variable on safety behavior is the presence of safety signs, followed by tenure, supervision, and age. Therefore, it is recommended that efforts be made to enhance socialization activities and training to improve workers' knowledge regarding workplace safety and health, along with repairing or replacing unclear or damaged safety signs within the company premises..

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INTRODUCTION

According to the International Labour Organization (ILO), the latest estimates indicate that approximately 2.9 million workers die each year due to work-related accidents and occupational diseases (Hämäläinen et al., 2009; J. Li et al., 2020; Stoesz et al., 2020). In 2016, around 360 million workers globally experienced non-fatal work-related injuries (Descatha et al., 2020). In 2022, the Indonesian Workers' Social Security Agency (BPJS Ketenagakerjaan) recorded 265,334 cases of work-related accidents in Indonesia. This number increased by 13.26% compared to the previous

year, reaching 234,270 cases. The trend of increasing work-related accidents in Indonesia has been observed from 2017 to 2022, with a record high of 234,270 cases in 2021 (Megasari, 2022). BPJS Ketenagakerjaan data also indicates a continuous increase in work-related accidents in Indonesia since the COVID-19 pandemic in 2020, with around 200 thousand cases reported by November 2022.

Unavoidable work-related accidents such as natural disasters account for 3% of cases. Additionally, 14% of accidents are attributed to the conditions of the work environment, equipment, and workers not adhering to established company regulations (Ivascu & Cioca, 2019; Kurnianto et al., 2023). Work-related accidents caused by workers not practicing safe behavior, including lack of knowledge and willingness to use Personal Protective Equipment (PPE), account for 73% of cases. Therefore, companies need to prevent work-related accidents by administratively emphasizing safety signs as reminders or providing information regarding workplace hazards (Aprianto et al., 2023; Diannita et al., 2020; Kusumastutie et al., 2024). Safe behavior among workers ensures their protection from workplace hazards, a responsibility that companies must fulfill to foster a safe work environment (Diannita et al., 2020). This includes providing safety equipment and facilities such as Personal Protective Equipment (PPE) and installing Occupational Safety and Health (OSH) signs in the workplace (Jusuf et al., 2017; Manurung et al., 2021; Singh, 2017). Based on several previous studies, the need for risk improvement strategies in the workplace has been revealed. One emphasized strategy is the comprehensive use of Personal Protective Equipment (PPE) to reduce potential hazards and ensure worker safety. PPE includes specialized gear such as helmets, goggles, gloves, safety shoes, and protective clothing. By providing appropriate PPE, employers can significantly reduce the risks associated with specific tasks or work environments. For example, helmets protect workers' heads at construction sites, while gloves protect against chemical exposure or injuries in laboratories or manufacturing facilities. In addition to PPE, compliance with operational standards is also crucial in risk reduction efforts. Operational standards consist of a set of guidelines and protocols established by regulatory bodies or industry associations to ensure safe work practices. These standards often cover aspects such as equipment handling, machine operation, electrical safety, and emergency procedures. By adhering to these standards, organizations can create a safer work environment and minimize the occurrence of accidents or injuries. (Dafa et al., 2022; Elsa Afrilia et al., 2022; Manajemen et al., 2022).

The activities of the PT. Sewangi Sawit Sejahtera Oil Palm Processing Factory cover a total concession area of 18 hectares. The factory started operations in 1993 with a capacity of 40 tons per hour and is one of the companies with Domestic Investment (PMDN) status. The factory achieved an average processing rate of 35-38 tons per hour using raw materials from core and parent plantations, operating for 15-20 hours per day in the second semester of 2017, depending on the received Fresh Fruit Bunches (FFB) supply.

Based on an initial survey conducted at the PT. Sewangi Sawit Sejahtera Oil Palm Factory in the Tapung District of Kampar Regency in 2021, it was found that four workers did not use complete Personal Protective Equipment (PPE) despite being provided with safety signs upon entering the workplace. Interviews with workers at the oil palm factory's workshop station revealed insufficient attention to the installation of OSH signs. This was evident during observations by researchers, as some OSH signs appeared outdated, making their messages unclear. Additionally, the placement of OSH signs was deemed less strategic. Furthermore, no training or socialization regarding OSH signs had been conducted for workers, leading to inadequate promotion efforts within the oil palm factory to encourage accident prevention.

Observations by researchers found that out of seven workers, ten did not use complete PPE, such as helmets, gloves, and SNI-standard safety shoes. At the loading ramp station, workers were observed not wearing gloves and engaging in conversations and occasional joking with colleagues while working. During the workplace cleaning process, workers used flowing water

without safety precautions, posing risks of accidents. Work-related accidents in the oil palm industry can occur due to factors such as machine technology used in production. The processes involved in machine technology can create unsafe conditions, including close proximity between machines and workers, slippery floors, high temperatures, workers engaging in playful behavior during tasks, lack of safety reminders in the work environment, and inadequate supervision from responsible parties.

Based on the accident data obtained, three workers experienced minor injuries, including facial, left hand, and right hand injuries, in 2018. Similar incidents occurred in 2019, with two workers experiencing injuries to their left and right legs, while in 2020, four workers suffered minor injuries, including a torn eyelid and minor burns on various parts of the body. Given the aforementioned points and referring to the theory that the provision of OSH signs plays a crucial role in promoting safe behavior among workers by ensuring the use of PPE, adherence to Standard Operating Procedures (SOPs), and compliance with company policies, further research is needed to analyze the Influence of Occupational Safety and Health (OSH) Signs on Safe Behavior Among Workers in Oil Palm Factories at PT. Sewangi Sawit Sejahtera. This research contributes to the scientific understanding of the impact of safety signs on workers' behavior and provides practical recommendations for decision makers to enhance workplace safety in the palm oil factory. It serves as a platform for exchanging information, raising awareness, and guiding interventions to prevent workplace accidents and promote a safer working environment.

RESEARCH METHOD

The research method employed in this study is the Quasi-Experimental Non-Randomized Control Group Pretest and Posttest Design. The research commenced with an initial measurement of safe behavior in two groups: the control group and the experimental/intervention group. The experimental group received education regarding Occupational Safety and Health (OSH) signs, while the control group did not. Two weeks after the education session, a posttest was conducted on both groups to observe behavior changes. This research was conducted at the PT. Sewangi Sawit Sejahtera Oil Palm Factory in Tapung. The study took place from August to September 2021. The total population of workers at the PT. Sewangi Sawit Sejahtera Oil Palm Factory is 82 employees. A sample size of 40 workers was selected, with 20 workers assigned to each group: control and experimental. The procedure for sampling utilizes the Non-Probability sampling technique of purposive sampling, specifically selecting workers who meet the criteria as research samples until the required sample size is achieved. Primary data were collected through questionnaire interviews, covering variables such as OSH signs, age, length of employment, and supervision. Secondary data were obtained from the company's administrative department and included the number of workers and company profiles. Data processing after collection involved several steps using computer software. Firstly, data editing was performed to ensure validity. Secondly, data coding categorized information into specific groups. Thirdly, data processing involved inputting it into a computer database. Fourthly, data cleaning was conducted to rectify errors. Finally, data tabulation was performed to facilitate further analysis. Data analysis in this study was divided into three main stages. Firstly, univariate analysis was used to describe the frequency distribution of research variables, including safe behavior organizational factors such as OSH signs and supervision, as well as individual factors like age and length of employment. Secondly, bivariate analysis aimed to assess significant differences between the intervention and control groups after intervention using the X² test. Lastly, multivariate analysis was conducted to connect several independent variables with one or more dependent variables using Multiple Logistic Regression, while considering confounding and interactions between variables. This analysis provides a comprehensive understanding of the factors influencing safe behavior in the workplace, assisting in formulating more effective intervention strategies to enhance worker safety and health at PT. Sewangi Sawit Sejahtera Tapung.

RESULTS AND DISCUSSIONS

Overview of the Research Subjects

The research was conducted at the palm oil mill of PT. Sewangi Sawit Sejahtera in Tapung District, during August-September 2021. The research subjects represent the respondents in the study. The subjects of this research were the workers at PT. Sewangi Sawit Sejahtera palm oil mill in Tapung District. The initial measurement was conducted on August 23, 2021, by administering a pretest to 2 groups: the control group and the experimental/intervention group, each consisting of 20 individuals. Subsequently, only the experimental group received an intervention in the form of a briefing on K3 signs. Within 2 weeks, on September 6, measurements (posttests) were conducted for both groups. The measurement of the influence of K3 signs on safe behavioral actions was conducted using a questionnaire.

Table 1. Frequency distribution of respondent characteristics based on age and length of employment in the experimental and control groups

Characteristics of Respondents	control		Eksperimen		Total
	N	%	N	%	
Age					
20-40 year	9	45.0%	9	45.0%	18 (45.0%)
41-55 Year	11	55.0%	11	55.0%	22 (55.0%)
Length of Employment					
< 6 Year	3	15.0%	1	5.0%	4 (10.0%)
6-10 Year	5	25.0%	5	25.0%	10 (25.0%)
>10 Year	12	60.0%	14	70.0%	26 (65.0%)
Supervision					
Present	9	45.0%	1	5.0%	10 (25.0%)
Absent	11	55.0%	19	95.0%	30 (75.0%)

Based on Table 1, it shows that the group receiving intervention in the form of a presentation on K3 signs, the majority are aged 40-55 years, namely 22 people (55.0%), with work experience above 10 years, namely 26 people (65.0%). And the majority of respondents stated that there was no supervision, totaling 30 people (75.0%).

Univariate Analysis Univariate

analysis is used to describe the research variables in the control and experimental groups, namely safe behavior, age, work experience, K3 signs, and supervision. Below is the table of the values of independent and dependent variables in the control and experimental groups regarding the influence of Health and Safety Signs on safe behavior in the palm oil factory PT. Sewangi Sawit Sejahtera.

Table 2. Average values of dependent and independent variables regarding the influence of Health and Safety signs on safe behavior among workers in the palm oil factory PT. Sewangi Sawit Sejahtera

Variable	Group			
	Control		Exsperimen	
	Mean	SD	Mean	SD
Safe Behavior				
*Pretest	5.00	1.487	5.65	2.700
*Posttest	4.45	1.538	7.70	1.625
Safety Signs_K3	3.45	1.432	4.55	1.099
Age	39.90	8.589	39.25	9.176
Length_of_Service	12.95	6.817	14.80	6.014
Supervision	3.85	1.531	6.10	1.294

In Table 2, the average safe behavior scores in the pretest show a significant difference between the control group (5.00) and the experimental group (5.65), with the experimental group having a higher score. A greater improvement is also observed in the experimental group from pretest to posttest, where the experimental group has a high posttest score (7.70), while the posttest safe behavior score for the control group is 4.45. Additionally, the average scores for K3 signs in the experimental group (4.55) are also higher than the control group (3.45), while the average age (39.25 vs. 39.90), work experience (14.80 vs. 12.95), and supervision (6.10 vs. 3.85) also show noticeable differences between the two groups.

Bivariate Analysis

Normality Test A normality test is conducted to determine whether the variables under investigation have a normal distribution or not. The normality test is necessary to answer whether the sample requirements for representativeness are met, so that the research results can be generalized to the population (Hadi, 2020). This normality test uses the one-sample Shapiro-Wilk test technique because the number of respondents is less than 50, thus considered normal if the p-value ≥ 0.05 .

Table 3. Normality test for dependent and independent variables regarding the effect of health and safety signs on safe behavior

Variable	Mean	Std.Deviasi	Shapiro-Wilk	Kolmogorof-Smirnov ²
Safe Behavior				
*Pretest	5.00	1.487	0.920	0.137
*Posttest	4.45	1.538	0.926	0.223
Safety Signs_K3	3.45	1.432	0.906	0.209
Age	39.90	8.589	0.945	0.139
Length_of_Service	12.95	6.817	0.914	0.163
Supervision	3.85	1.531	0.917	0.207

Based on the normality test results in Table 4.3, for the variables of safe behavior pretest and posttest, the obtained p-values are $0.920 > 0.05$ and $0.926 > 0.05$, respectively, indicating that all data are normally distributed. The normality test for the variable of health and safety signs is $0.906 > 0.05$, indicating a normal distribution. The age variable has a value of $0.945 > 0.05$, the work experience variable has a value of $0.914 > 0.05$, while the supervision variable with a value of $0.917 > 0.05$ is normally distributed. Below is an overview of safe behavior in the control and experimental groups in Table 4.

Table 4. Overview of safe behavior before intervention in the control and experimental groups

Objek	Group	Average	Average 95% CI		SD
			lower	upper	
Control	*Pretest	5.00	-7.59	2.059	0.332
Experimen	*Pretest	5.65	-7.45	2.045	0.604

From Table 4 above, it can be seen that the average score of safe behavior before the intervention in the experimental group is higher with a value of 5.65, while the control group has a score of 5.00. It can be concluded that the score of safe behavior in the experimental group is greater than the control group.

The Influence of Occupational Health and Safety Sign Intervention on Improving Workers' Safe Behavior

This analysis is used to determine the impact of the intervention on the change in knowledge scores after the intervention in the form of a presentation on Occupational Health and Safety signs. This can be seen in Table 5 below:

Table 5. The influence of occupational health and safety sign intervention on improving workers' safe behavior

Group	N	Mean	Std. Deviation	Sig. (2-tailed)
Exsperiment	20	7.70	1.625	0.001
control	20	4.45	1.538	0.299

From Table 4 above, it can be seen that the average score of safe behavior before the intervention in the experimental group is higher with a value of 5.65, while the control group has a score of 5.00. It can be concluded that the score of safe behavior in the experimental group is greater than the control group.

The Influence of Occupational Health and Safety Sign Intervention on Improving Workers' Safe Behavior

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Table 6. The influence of occupational health and safety sign intervention on improving workers' safe behavior

Age	Safe Behavior		Total
	There is no improvement in safe behavior.	There is improvement in safe behavior.	
20-40 year	8 72.7%	10 34.5%	18 45.0%
41-55 Year	3 27.3%	19 65.5%	22 55.0%
Total	11 100.0%	29 100.0%	40 100.0%
	Length of Service		
< 6 year	3 27.3%	1 3.4%	4 10.0%
6-10 year	4 36.4%	6 20.7%	10 25.0%
> 10 year	4 36.4%	22 75.9%	26 65.0%
Total	11 100.0%	29 100.0%	40 100.0%
	supervision		
No supervision	6 54.5%	4 13.8%	10 25.0%
Supervision available	5 45.5%	25 86.2%	30 75.0%
Total	11 100.0%	29 100.0%	40 100.0%

In Table 6, it can be observed that there is a significant influence between age and safety behavior with a significance value of the Fisher Exact Test at 0.040, which is less than 0.05. The increase in safety behavior is more pronounced in the age group of 40-55 years, totaling 65.5%. Additionally, the results indicate a significant influence between tenure and safety behavior with a significance value of the Fisher Exact Test at 0.027, also less than 0.05. The increase in safety behavior is more prominent among workers with tenure exceeding 10 years. Supervision at the PT. Sewangi Sawit Sejahtera palm oil factory also has a significant impact on safety behavior with a significance value of the Fisher Exact Test at 0.040, less than 0.05. The improvement in safety behavior tends to be greater with better supervision.

Multivariate Analysis

Several variables are suspected to be confounding factors to the intervention variable in this study (Stuebe & Bonuck, 2011). These variables include age, tenure, and supervision. To determine the most influential variable on workers' safety behavior, a Logistic Regression analysis was conducted.

Table 7. Presents the results of the multivariate logistic regression test

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Age	.668	1.132	.348	1	.555	1.950	.212	17.911
Length_of_Service	1.004	.669	2.253	1	.133	2.730	.736	10.128
Safety_Signs_K3	3.034	1.334	5.168	1	.023	20.777	1.519	284.125
Supervision	1.286	1.206	1.136	1	.286	3.617	.340	38.455
Constant	-5.625	2.553	4.854	1	.028	.004		

a. Variable(s) entered on step 1: Usia, Masa_Kerja, Rambu_rambu_K3, Pengawasan.

The Safety Behavior = 0.004 + 1.950(Age) + 2.730(Tenure) + 20.777(Safety Signs) + 3.617(Supervision).

The variable that has the most dominant influence on Safety Behavior is the Health and Safety Signage variable, with a Wald value of 5.168, followed by Tenure (2.253), Supervision (1.136), and Age (0.348). Analysis of safety behavior before the intervention regarding Health and Safety Signage at PT. Sewangi Sawit Sejahtera indicates that safety behavior before the intervention tends to be higher in the experimental group than the control group, with an average safety behavior score before the intervention in the experimental group being 5.65, while in the control group it is 5.00. This indicates the importance of efforts to prevent workplace accidents and create a safe working environment. Although the company has implemented preventive measures such as providing Personal Protective Equipment (PPE) and Health and Safety Signage, the implementation of Health and Safety Signage is still not optimal in shaping workers' safety behavior. Health and Safety Signage, as an effective visual medium, needs to improve its placement and clarity of information to maximize the promotion of workplace safety and health. The formation of safe behavior in workers must also be supported by adequate facilities and infrastructure. Facilities and infrastructure, including the provision of PPE, play a crucial role in shaping workers' safety behavior. Active supervision by company management also plays a crucial role in improving workers' safety behavior, with the average supervision score in the experimental group being 6.10, while in the control group it is 3.85. Effective supervision influences workers to work safely and comply with company policies. The results of logistic regression analysis indicate that the variable that has the most dominant influence on safety behavior is Health and Safety Signage, followed by tenure, supervision, and age, with Wald values of 5.168, 2.253, 1.136, and 0.348, respectively. Therefore, it is important for the company to periodically update and improve the installation of Health and Safety Signage, provide Health and Safety Signage training to workers, and strengthen supervision and communication regarding workplace safety and health (Goetzl et al., n.d.; Mohammadfam et al., 2016; Richter et al., 2020). This will have a positive impact on creating a safe and comfortable working environment for all workers. The implementation of programs and policies that consider all these aspects is important to improve workplace safety and health in the company (Carducci et al., 2018).

The use of signs with clear and understandable information can enhance workers' awareness and compliance with safety regulations (Kumie et al., 2016). Another study conducted by Li et al. (2019) indicates that the presence of clearly visible and easily accessible safety signs can improve safe behavior, reduce the risk of workplace accidents, and increase awareness of the

importance of occupational safety. Additionally, research by Schall et al., (2018) suggests that signs containing relevant information and strategically placed can enhance workers' awareness and safe behavior, thereby reducing the risk of workplace accidents. These studies provide a deeper understanding of the importance of using safety signs to enhance safe behavior among workers in the palm oil industry (Patel et al., 2022). They demonstrate that clear, easily understandable safety signs strategically placed can contribute to increased awareness, compliance, and safe behavior among workers (Khairul Akmal Shamsuddin et al., 2015; H. Li et al., 2015). In the context of research at PT. Sewangi Sawit Sejahtera, the implementation of workplace safety signs has a positive impact on improving the safe behavior of palm oil factory workers. However, it is important to consider other factors such as employee training, supervision, and safety culture, which can also influence safe behavior. Therefore, further research and comprehensive evaluation are needed to fully understand the impact of safety and health signs and other contributing factors to workers' safe behavior in the palm oil industry. This research has significant practical implications, as it was found that the use of Health and Safety signages has a positive influence on workers' safe behavior. This highlights the importance of implementing clear and visible signs to enhance workplace safety. These findings provide a basis for companies to develop and install informative and visually appealing signages to reinforce safety practices. Moreover, the influence of age and years of service on safe behavior emphasizes the need for targeted training and support for younger or less experienced workers. The theoretical implications of this research contribute to the understanding of the relationship between visual cues and behavior change, particularly in the context of workplace safety promotion. Additionally, these findings can be utilized by organizations and policymakers to strengthen workplace safety programs and policies through the effective implementation of Health and Safety signages and improved supervision.

CONCLUSION

Based on the research findings on the influence of Health and Safety signages on safe behavior among workers in the PT. Sewangi Sawit Sejahtera palm oil factory, several significant findings were discovered. Firstly, the pre-intervention safe behavior exhibited higher average scores in the experimental group compared to the control group, indicating the effectiveness of the intervention. Secondly, the Health and Safety signages intervention had a positive impact on workers' safe behavior. Thirdly, age and years of service had a significant influence on safe behavior, where higher age and years of service tended to increase safe behavior. Fourthly, supervision also affected safe behavior, with higher levels of supervision contributing to an improvement in safe behavior. Lastly, logistic regression analysis showed that Health and Safety signages had the most dominant influence on safe behavior, followed by years of service, supervision, and age. These findings underline the importance of implementing Health and Safety signages and effective supervision in enhancing safe behavior in the workplace. The research findings on the influence of Health and Safety signages at PT. Sewangi Sawit Sejahtera palm oil factory have several important contributions. Firstly, the intervention using signages was effective in improving safe behavior. Secondly, age and years of service were found to influence safe behavior, with older and more experienced workers exhibiting better safety practices. Thirdly, supervision played a role in improving safe behavior. Lastly, the dominance of Health and Safety signages in influencing safe behavior highlights their importance in the workplace. Overall, the research emphasizes the significance of implementing signages and effective supervision to enhance workplace safety. The research on the influence of safety signs (rambu-rambu K3) on safe behavior among workers in the palm oil factory of PT. Sewangi Sawit Sejahtera has significant implications and contributions. This study has the potential to improve workplace safety by highlighting the importance of effective communication and signage in influencing workers' safe behavior. The findings provide valuable decision-making support for the management of PT. Sewangi Sawit Sejahtera in enhancing safety practices, including the design, placement, and maintenance of safety signs. Furthermore, the

research contributes to the field of occupational safety by providing empirical evidence on the influence of safety signs in the specific context of the palm oil industry. These implications can also offer practical recommendations for other industries aiming to enhance workplace safety through clear and visible safety signs.

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