



Factors Affecting Safety Behavior Of Workers At Pt. Toba Pulp Lestari, Tbk

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Abstract

Safety behavior refers to the actions taken by workers to minimize the risk of accidents and maintain safety in the workplace. These behaviors include compliance with safety protocols, the use of personal protective equipment (PPE), proactive reporting of hazardous conditions, and participation in activities that promote workplace safety. This study aims to identify the factors influencing safety behavior among workers at PT. Toba Pulp Lestari, Tbk in 2023. The

research is quantitative with a cross-sectional approach. Data analysis includes univariate analysis, bivariate analysis using the chi-square test, and multivariate analysis using logistic regression ($\alpha = 0.05$). The univariate analysis results show that the majority of workers have good knowledge (96.6%), demonstrate safe actions (98.7%), hold positive perceptions (99.3%), receive support from co-workers (87.9%), and have active supervisory roles (96.6%). Additionally, most workers exhibit safe behavior (97.3%). The chi-square test results indicate no significant relationship between knowledge (p -value = 0.592), attitude (p -value = 0.772), and perception (p -value = 0.813) with safety behavior. However, the variables of co-worker support (p -value = 0.001) and supervisory role (p -value = 0.000) show significant relationships. Multivariate analysis reveals that the supervisory role is the most influential factor on safety behavior. It is recommended that the company focus on strengthening knowledge, attitudes, perceptions, co-worker support, and the supervisory role to build a better safety culture in the workplace.

keywords : Safety Behavior, Workers, Occupational Health and Safety

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Introduction

Safety and Health at Work is one of the main concerns in manufacturing companies. These companies continuously strive to protect their workers from various accidents and job-related diseases. Companies with more than 100 employees, especially in sectors such as manufacturing, mining, and oil and gas, are required to regularly evaluate the implementation of the Occupational Health and Safety Management System (SMK3) to reduce the risks of workplace accidents and occupational diseases (Ministry of Manpower PP 50, 2012). Heinrich (1980) estimated that 85% of accidents result from unsafe work behavior. Based on this, it can be said that human behavior plays a significant role in causing accidents.

To achieve a successful workplace safety and health program, a behavioral safety improvement approach is more effective. One reason for this is that individuals are more likely to exhibit positive behavior when working towards achieving a goal, rather than focusing on avoiding failure. The search for errors or failure can have a negative impact on the entire process. By emphasizing safety behavior, workers become more positive about the process and are more likely to participate (T. Chen et al., 2022).

Factors influencing safety behavior in the workplace include organizational culture, worker competence, and the working environment (Hermanto et al., 2023). For example, in the aviation industry, safety behavior among mechanics can be influenced by safety climate and safety leadership (Aktas & Kagnicioglu, 2023).

The role of supervisors or leaders in influencing workers' safety behavior contributes to the development of safety management systems in industries such as mining in China (Niu et al., 2022). Factors such as knowledge, attitude, motivation, communication, availability of facilities, and supervision all influence worker safety behavior, as seen in a company producing nets and mining in Cirebon, Indonesia (Aeni & Fermania, 2020).

The perception and attitudes of workers regarding occupational health and safety (K3) also play a crucial role in influencing safety behavior, as observed in a train maintenance company in Madiun. The influence of perception is stronger than that of attitude, as perceptions have a more



significant effect on safety behavior (Damayanti, 2023). In the construction industry in Quanxi, China, the role of colleagues in promoting safety behavior can either directly or indirectly affect workers' safety behavior, depending on group dynamics (H. Chen et al., 2022).

PT. Toba Pulp Lestari, a company producing pulp with a capacity of 575 tons per day and employing 1,147 workers, is located in the village of Sosorladang, sub-district Parmaksian, North Sumatra, in the Lake Toba area, as per Article 3 of Act Number 06 dated June 19, 2019.

In line with its vision to be the preferred supplier for customers and employees, PT. Toba Pulp Lestari has implemented SMK3 since 2005. As of 2021, the company achieved a "Satisfying" and "Gold Flag" rating from the government, with 94.5% of the 166 required criteria met. This recognition is awarded every three years based on external audits in collaboration with a third-party K3 certification body. PT. Toba Pulp Lestari's K3 performance target aligns with its vision and mission to achieve zero accidents.

The company actively engages all workers, both office-based and field-based, in observing unsafe actions and conditions during operations.

Based on surveys and observations conducted at PT. Toba Pulp Lestari between January 2023 and August 2023, 22 reports of unsafe actions were identified, many of which involved workers not adhering to proper safety behavior. For example, 7 workers and contractors were found not wearing the required personal protective equipment (PPE). Four workers claimed that occasional lapses in PPE use wouldn't immediately lead to danger, while three contractors stated that they only forgot to wear PPE when there was no supervisor or colleague to remind them. Additionally, three workers walked on pedestrian paths without following instructions because they weren't being observed by a supervisor.

Further unsafe actions included three contractors driving unsafely (one case involved transporting people over the car's capacity), two workers smoking in the factory area, and two heavy lift operators using the wrong lifting equipment to speed up work. In another case, two workers were found working in a tank while liquor was still flowing, due to the rush to meet production targets.



During this period, one incident required first aid, and another required medical assistance. Despite these findings, the reporting system based on safety officers' observations still faces challenges in accurately capturing unsafe actions.

The factors influencing workers' safety behavior at PT. Toba Pulp Lestari are related to knowledge, attitude, perception, resources, colleagues, supervisors, leadership, and family support. The supervisory role, particularly in leadership positions, plays a crucial part in shaping safety behavior.

In implementing K3, PT. Toba Pulp Lestari has a homogeneous workforce with shared beliefs, and workers generally feel satisfied with their work when following safety protocols. Over the past decade, the company has launched several K3 programs, including setting K3 values, providing training rooms, fire extinguishers, fire alarms, and worker competency training. Additionally, the company offers rewards, penalties, family support programs, and a dedicated budget for K3 initiatives. However, despite these efforts, unsafe actions still occur, with an average of 29 unsafe actions and 13 accidents per year from 2019 to 2023.

Given these observations and findings, the researcher is interested in analyzing the factors that influence worker safety behavior at PT. Toba Pulp Lestari.

Methods

This study uses a quantitative method with a cross-sectional design. The study was conducted at PT. Toba Pulp Lestari, Tbk, from October 2023 to October 2024. The study population consists of all production workers at PT. Toba Pulp Lestari, totaling 1,147 employees (both permanent and contract workers). Of these, 723 are permanent workers and 424 are contractors. Using the Slovin formula, the sample size was determined to be 297, including 187 permanent workers and 110 contract workers at the PT. Toba Pulp Lestari factory. This study utilized primary data collected through interviews and documentation. The data were analyzed using the chi-square test, followed by multiple linear regression analysis.



Results

Description of Study Variables

This study was conducted at PT Toba Pulp Lestari, Tbk, with 297 respondents who are production workers at the company. The characteristics of the respondents in this study include age, education, employment status, job position, work area, and length of service. Based on the data obtained from the completed questionnaires, the following results were obtained:

Table 1. Frequency Distribution of Respondent Characteristics at PT Toba Pulp Lestari, Tbk

Variables	Amount	Percentage (%)
Age		
Age (18-24 years)	21	7.1
Age Productive (25-34 years)	109	36.7
Age Productive Middle (35-44 years)	80	26.9
Age Productive Advanced (45-54 years)	72	24.2
Age Approach Retirement (55 years) to on)	15	5.1
Education		
SMP	2	0.7
SLTA	114	38.3
D3	77	25.8
S1	102	34.2
S2	2	0.7
Worker Status		
Permanent	187	62.8
Contract	110	36.9
Position Work		
Helper	51	17.1
Operator	96	32.2
Leader	104	34.9
Superintendent	19	6.4
General	27	9.1
Working Area		
Wood Yard	47	15.8
Energy	34	11.4
Chemical Products	32	10.7
Fiberline	44	14.8
General	140	47



Variables	Amount	Percentage (%)
Length of work		
1-5 years	95	32.5
6-10 years	72	23.5
>10 years	130	44

The distribution of results regarding the frequency of the knowledge variable among workers at PT. Toba Pulp Lestari Tbk is related to the existing hazards and risks in the workplace. This is in connection with safety behavior, which can be observed as follows:

Table 2. Frequency Distribution of Knowledge Variables among Workers at PT. Toba Pulp Lestari Tbk

Knowledge About Danger	F	Percentage (%)
Enough	10	3.4
Good	287	96.6

The distribution of results regarding the frequency of the attitude variable among production workers at PT. Toba Pulp Lestari Tbk who perform actions in accordance with safety behavior can be observed as follows:

Table 3. Frequency Distribution of Attitude Variables

Attitude	F	Percentage (%)
Unsafe Action Attitude	3	1
Safe Action Attitude	294	98.7

The distribution of results regarding the frequency of the perception of danger/risk variable among production workers at PT. Toba Pulp Lestari Tbk who take actions in accordance with safety behavior can be observed as follows:

Table 4. Frequency Distribution of Perception of Danger/Risk

Perception Danger / Risk	F	Percentage (%)
Negative	2	7
Positive	295	99.3



The distribution of results regarding the frequency of the coworker role variable in relation to safety behavior among production workers at PT. Toba Pulp Lestari Tbk can be observed as follows:

Table 5. Frequency Distribution of Coworker Role

The Role of Coworkers	F	Percentage (%)
Unsupportive Coworkers	35	11.8
Work colleague Support	262	88.2

The distribution of results regarding the frequency of the supervisory role variable in relation to safety behavior among production workers at PT. Toba Pulp Lestari Tbk can be observed as follows:

Table 6. Frequency Distribution of Supervisory Role

Role of Supervisor	F	Percentage (%)
Inactive Supervisor Role	10	3.4
Active Supervisor Role	287	96.6

The distribution of results regarding the frequency of the safety behavior variable among production workers at PT. Toba Pulp Lestari Tbk can be observed as follows:

Table 7. Frequency Distribution of Safety Behavior

Safety Behavior	F	Percentage (%)
Unsafe Behavior	8	2.7
Safe Behavior	289	97.3

Description of Cross-Tabulation Between the Knowledge About Danger Variable and the Safety Behavior Variable

Table 8. Relationship Between Knowledge About Danger/Risk and Safety Behavior

Knowledge	Safety Behavior				Total		p Value
	Unsafe Behavior		Safe Behavior		f	%	
	f	%	F	%			
Enough	0	0	10	100	10	100	0.592
Good	8	2.78	279	97.2	287	100	
Total	8	2.69	289	97.3	297	100	



Description of Cross-Tabulation Between the Attitude Variable and the Safety Behavior Variable

Table 9. Relationship Between Attitude and Safety Behavior

Attitude	Safety Behavior				Total		p Value
	Unsafe Behavior		Safe Behavior				
	f	%	F	%	f	%	
Unsafe Action Attitude	0	0	3	100	3	100	0.772
Safe Action Attitude	8	2.72	286	97.2	294	100	
Total	8	2.62	289	97.3	297	100	

Description of Cross-Tabulation Between the Perception of Danger/Risk Variable and the Safety Behavior Variable

Table 10. Relationship Between Perception of Danger/Risk and Safety Behavior

Perception Danger / Risk	Safety Behavior				Total		p Value
	Unsafe Behavior		Safe Behavior				
	f	%	F	%	f	%	
Negative Perception	0	0	2	100	2	100	0.813
Positive Perception	8	2.71	287	97.2	295	100	
Total	8	2.62	289	97.3	297	100	

Description of Cross-Tabulation Between the Coworker Role Variable and the Safety Behavior Variable

Table 11. Relationship Between Coworker Role and Safety Behavior

The Role of Coworkers	Safety Behavior				Total		p Value
	Unsafe Behavior		Safe Behavior		f	%	
	f	%	F	%			
Unsupportive Coworkers	4	11.4	31	88.5	35	100	0.001
Supportive Coworkers	4	1.52	258	98.5	262	100	
Total	8	2.62	289	97.3	297	100	

Description of Cross-Tabulation Between the Supervisory Role Variable and the Safety Behavior Variable

Table 12. Relationship Between Supervisory Role and Safety Behavior

Role of Supervisor	Safety Behavior	Total	p Value
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	Unsafe Behavior		Safe Behavior			
	F	%	F	%	F	%
Inactive Supervisor Role	5	50	5	50	10	100
Active Supervisor Role	3	1.04	284	98.9	287	100
Total	8	2.62	289	97.3	297	100

0.000

Multivariate Test

Table 13. *Logistic Regression Analysis Output*

	B	Std. Error	Wald	df	Sig	Exp (B)
Constant	-4,330	1,521	8,103	1	0.004	0.013
Role of Supervisor	4,888	1,314	13,840	1	0,000	132,634
The Role of Coworkers	-0.465	1,335	0.121	1	0.728	0.628

From the regression equation above, it is evident that the supervisor role variable in this study has a significant influence on safety behavior, with a p-value of 0.000 (p-value < 0.05). As the supervisor's role in promoting safety behavior increases, safer behavior among workers also increases.

Discussion

Influence of Knowledge About Danger on Safety Behavior

Knowledge is the result of understanding and is obtained from a person's awareness of a specific object or situation. Without knowledge, a person cannot make decisions or take appropriate actions to resolve issues effectively. Knowledge about danger refers to awareness and understanding of potential risks or conditions that can cause accidents, injuries, or loss in the workplace. This knowledge includes information about safety protocols (SOPs) that workers must follow in various situations. For example, how to handle heavy tools, use personal protective equipment (PPE), or follow emergency evacuation procedures. Good knowledge of SOPs enhances adherence to safety protocols. Understanding how to identify hazards and assess the level



of risk is crucial to safety behavior, as it involves the ability to predict the consequences of unsafe actions and anticipate conditions that could increase the risk of accidents.

Workers with good knowledge are capable of identifying surrounding dangers and can perform their work in accordance with established safety procedures. Based on statistical tests using the chi-square method, a p-value of 0.592 (greater than $\alpha = 0.05$) indicates no significant relationship between knowledge and safety behavior. This result aligns with research by Alivia et al. (2023), which showed no correlation between knowledge and unsafe behavior at PT. PLN (Persero) Service Unit Makasar City Power Customers (Ananda et al., 2023). A study by Koiriyah et al. (2023) also found no significant connection between knowledge and health safety work behavior (p-value = 0.29) (Isni et al., 2023).

However, research by Fara et al. (2017) showed a significant relationship between knowledge and safety behavior (p-value = 0.014) among civil engineering workers at PT. Indonesia Power UP Semarang. This is supported by Mubarik Dita et al. (2019), who found that workers with good knowledge (84.8%) were more likely to display safe behaviors (p-value = 0.001) (Dita et al., 2019). Similarly, research by Adam and Wiga (2022) showed a significant relationship between knowledge level (p-value = 0.000) and safety behavior among workers at PT. Trasindo Murni Perkasa in East Kalimantan.

Despite having good knowledge of workplace risks, employees at PT. Toba Pulp Lestari, Tbk still exhibit safety violations, such as rushing to complete tasks, neglecting safety procedures, or failing to complete work permits. Some workers carry PPE but choose not to use it, even during moments when safety precautions should be adhered to.

Influence of Attitude on Safety Behavior

Attitude plays a significant role in determining how individuals or groups behave according to safety principles in the workplace. Attitude is a key factor in deciding whether someone will follow or ignore safety protocols. A person with a positive attitude toward workplace safety is more likely to adhere to standard operational safety procedures (SOPs). They consciously and



consistently take actions to prevent accidents and protect themselves and their colleagues. Conversely, a negative attitude can lead individuals to ignore safety rules, increasing the risk of accidents.

Statistical tests using chi-square analysis yielded a p-value of 0.772 (greater than $\alpha = 0.05$), indicating no significant relationship between attitude and safety behavior. This result contrasts with a study by Adam and Wiga (2022), which found a significant relationship between attitude and safety behavior (p-value = $0.003 < 0.05$) among workers at PT. Trasindo Murni Perkasa in East Kalimantan. The biological significance test revealed that workers with poor attitudes were 5.403 times more likely to experience work accidents compared to those with positive attitudes (Maulana & Welyusafadilla, 2022).

Workers at PT. Toba Pulp Lestari, Tbk generally display positive attitudes towards safety. This is evident in their adherence to safety behavior, such as checking equipment before work, conducting safety briefings, and reporting unsafe conditions to supervisors. However, some workers still do not fully implement safety behavior, especially when working alone or without supervision, such as ignoring SOPs for smoking control or exceeding speed limits.

Influence of Perception About Danger/Risk on Safety Behavior

Perception of danger or risk significantly influences how an individual or worker responds to safety threats in the work environment. Danger perception is how someone perceives, understands, and evaluates potential risks or hazards around them. This perception drives the actions they take to protect themselves. A strong perception of danger makes workers more aware of risks and more likely to take precautions. For instance, workers aware of the risks associated with working at heights are more likely to follow safety protocols and use personal protective equipment (PPE).

On the other hand, workers who perceive low or no risk may become lax in following safety protocols, increasing the likelihood of accidents. Based on statistical tests using chi-square, a p-value of 0.813 (greater than $\alpha = 0.05$) indicates no significant relationship between perception and



safety behavior. However, research by Devi et al. (2021) showed a significant relationship between perception and safety behavior in waste sorters ($p\text{-value} = 0.003 < 0.005$) (Devi et al., 2021).

At PT. Toba Pulp Lestari, Tbk, different perceptions about risk still exist between workers and supervisors. For example, workers who rush to complete tasks may neglect safety procedures, such as failing to confirm whether a work permit has been fully approved.

Influence of Coworker Roles on Safety Behavior

Coworkers play an important role in creating a supportive safety environment through supervision, mutual reminders, and collaboration to prevent accidents. Workers who are aware of the importance of safety can act as "informal supervisors" for their colleagues. They can remind others to use PPE, follow safety protocols, and avoid risky situations. Peer reminders are often more effective than reprimands from supervisors, as there is equality among colleagues. Workplace safety culture is often driven by group norms. If a group of workers consistently prioritizes safety, individual workers tend to adopt the same behaviors. Conversely, if safety is not a priority for most of the group, unsafe behavior can spread.

Statistical analysis using chi-square yielded a $p\text{-value}$ of 0.001 (less than $\alpha = 0.05$), indicating a significant relationship between coworker roles and safety behavior. Research by Muhammad Sayyid Humam (2019) found a correlation between coworker roles and safety behavior among workers at PT. KAI Daop IV Semarang ($p\text{-value} = 0.039$) (Humam, 2019). Workers at PT. Toba Pulp Lestari, Tbk recognize the importance of their colleagues in maintaining safety, and teamwork is a core value emphasized across all roles.

Influence of the Supervisory Role on Safety Behavior

Supervisors play a critical role in directly supervising, guiding, and ensuring compliance with safety procedures on the job. They are responsible for monitoring workers' adherence to safety rules and operational standards. By demonstrating consistent and exemplary safety



behavior, supervisors serve as role models for their teams. When supervisors adhere to safety protocols, workers are more likely to follow suit.

Based on chi-square analysis, a p-value of 0.000 (less than $\alpha = 0.05$) indicates a significant relationship between the supervisor role and safety behavior. Logistic regression analysis confirms that the supervisory role has the largest influence on safety behavior, with a p-value of 0.000. This finding aligns with research by Muhammad Sayyid Humam (2017), which found a significant relationship between the supervisory role and safety behavior in maintenance workers at PT. KAI Daop IV Semarang (p-value = 0.005) (Humam, 2019). Research by Khalifatul Karimah (2017) also found a significant influence of the supervisory role on safety behavior among workers at PT BUMA at the KJA site (p-value = 0.031). At PT. Toba Pulp Lestari, Tbk, supervisors actively contribute to safety behavior by ensuring that all tools and equipment are checked, PPE is worn, work permits are completed, and safety signage is followed.

Conclusion

The research results show that the majority of workers have good knowledge (96.6%), safe action attitudes (98.7%), positive perceptions (99.3%), support from coworkers (87.9%), active supervisory roles (96.6%), and safe behavior (97.3%). The results of the chi-square test indicated no significant relationship between knowledge (p-value = 0.592), attitude (p-value = 0.772), and perception (p-value = 0.813) with safety behavior. However, the variables of coworker support (p-value = 0.001) and supervisory role (p-value = 0.000) show significant relationships. Based on the multivariate test results, the supervisory role is the most influential factor affecting safety behavior. It is recommended that companies focus on strengthening knowledge, attitudes, perceptions, coworker support, and the supervisory role to build a stronger safety culture in the workplace.



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