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The Influence of Safety Leadership and Safety Climate on Safety Behavior is Mediated by Safety Motivation in Sugar Factory Employees

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ABSTRACT

The sugar industry has complex production processes and involves various risks, including the high potential for employee accidents. To reduce this risk, the implementation of an effective work safety programme is required. This reserach aims to analyse the effect of safety leadership and safety climate on safety behaviour mediated by safety motivation in sugar factory employees. The method used is quantitative with data collection through questionnaires. The population of this study were all sugar factory employees in Indonesia, with a sample of 100 respondents selected using random sampling technique. Data analysis was carried out using Path Analysis in the SEM-PLS programme. The results showed that Safety Leadership and Safety Climate positively influence the Safety Behaviour of sugar factory employees. In addition, Safety Motivation mediates the influence of Safety Leadership and Safety Climate on Safety Behaviour, which indicates that Safety Motivation can strengthen the influence of these two factors on the safety behaviour of sugar factory employees. This reserach provides important implications for sugar factory management to pay more attention to aspects of motivation and safety climate to improve safety behaviour in the workplace.

Keywords: Safety Leadership , Safety Climate , Safety Behavior , Safety Motivation

INTRODUCTION

In an industry, employees are considered a very valuable asset because they are responsible for the implementation of the production process, which is the main activity for the company. Without a smoothly running production process, the company will not be able to achieve its operational goals and will experience a decline in performance (Riniwati, 2016). Employees act as the main driving force that ensures organizational goals can be achieved, and the success or failure of an organization depends heavily on employee contributions and performance (Indahsari & Damayanti, 2020). Thus, human resource management is crucial in ensuring that the factors influencing employee performance are properly managed, enabling the production process to operate effectively and efficiently. According to (Astuti & Zaenab, 2020),

one of the key factors affecting employee productivity is the work environment and occupational safety and health insurance. If employees feel safe and work in a conducive environment, employees will be more productive (Azizah & Faras, 2024). So employee safety must be a top priority for the industry because work accidents can not only endanger employees, but can also reduce work productivity.

Meanwhile, the sugar industry has a complicated and dangerous production process, so employees involved in sugar factory production face a high risk of occupational accidents. Employees in the production and installation departments of sugar factories often work directly with mechanized machinery. Each stage in the production process is assisted by modern equipment, which although increases efficiency, also brings risks to workers' safety and health (Astuti & Zaenab, 2020). To minimize these risks, sugar factories require the implementation of an effective work safety program. One important element of a safety program is creating a strong safety culture among employees, which can trigger safety behaviors. Safety behavior refers to actions that employees take to protect themselves and others from hazards in the workplace. Safety behavior will help employees avoid the risk of accidents and create a sense of security at work, thereby increasing productivity (Rahman et al., 2023).

To achieve employees who understand safety behaviors, various factors can influence, including safety leadership, safety climate, and safety motivation. A leader is an individual who is able to influence the behavior of others to achieve a specific goal. Safety leadership refers to leader behaviors that encourage and support employee safety behaviors (Ningtias et al., 2020). Leaders who are effective in workplace safety will demonstrate a commitment to safety, set a good example in following safety procedures, and be actively involved in workplace safety activities. In addition, the safety climate can influence workers' behavior and engagement in safety practices. Safety climate refers to employees' perceptions of the priority of safety in the workplace. Zohar (1980) in (Ningtias et al., 2020) defines safety climate as employee perceptions of policies, procedures, practices, and overall safety interests and priorities. A positive safety climate is characterized by the perception that workplace safety is valued and prioritized by management and co-workers, which then influences individual safety behavior.

Furthermore, effective safety leadership and a positive safety climate can encourage safety motivation among employees. Safety motivation is the drive that makes employees want to behave safely at work. A good work environment acts as a motivation for employees, making employees feel comfortable and excited at work, which in turn improves their performance. An unhealthy work environment can be an additional burden for employees, reducing productivity. In contrast, a clean and hygienic environment not only reduces the additional burden but also increases work enthusiasm and motivation, which is reflected in better safety behavior (Ningtias et al., 2020). Therefore, understanding factors such as safety leadership, safety climate, and safety motivation and their interactions can help companies design effective safety programs.

Previous research by (Rahman et al., 2023) demonstrated a significant relationship between safety leadership and safety climate on safety behavior. The study revealed that safety leadership has a path effect of 0.550 on safety behavior, while safety climate has a path effect of 0.447. Additionally, a study by (Heryati et al., 2019) found that safety climate impacts safety behavior both directly and indirectly. The direct effect shows that safety climate directly influences employee safety behavior, and part of this influence is mediated by safety motivation.

This research introduces a novel focus on the sugar industry, examining variables such as safety leadership, safety climate, and safety motivation in relation to employee safety behavior, which have not been previously studied. The objective of this study is to analyze how safety leadership and safety climate impact employee safety behavior, with safety motivation acting as a mediator. Through understanding this relationship, it is hoped that sugar companies can implement more effective strategies to improve safety and create a positive safety culture throughout their production.

RESEARCH METHODS

The method in the study uses quantitative methods, which is a scientific method that emphasizes data collection in the form of numbers or numerical data to be tested, analyzed, and presented statistically. This approach aims to measure phenomena, relationships, or certain variables objectively and measurably. Quantitative methods utilize statistical techniques to analyze data and produce findings that can be scientifically accounted for (Priadana & Sunarsi, 2021). The data collection technique used in the study was through a questionnaire. The study population included all sugar factory employees in Indonesia, with a sample of 100 respondents selected using random sampling techniques. Sample criteria include permanent employees of sugar factories who work in production and have at least one year of work experience in sugar factories. The collected data were analyzed using Path Analysis with the SEM-PLS program. This method was chosen to test the complex relationship between the variables studied.

RESULTS AND DISCUSSION

Measurement Model (Outer Model)

The Outer Model or Outer Measurement is also known as the measurement model. The outer model test aims to determine the relationship between latent variables and their indicators. This outer model test was carried out using the PLS Algorithm procedure. The stages of analysis on the outer model are measured by validity and reliability testing (Sholihin & Ratmono, 2021).

Table 1. Outer Loading

	Safety Motivation	Safety Behavior	Safety Climate	Safety Leadership
SL1	0.726			
SL2	0.789			
SL3	0.816			
SL4	0.819			
SL5	0.794			
SL6	0.718			
SC1		0.842		
SC2		0.895		
SC3		0.785		
SC4		0.784		
SC5		0.791		
SC6		0.747		
SB1			0.826	
SB2			0.801	
SB3			0.752	
SB4			0.787	
SM1				0.910
SM2				0.837
SM3				0.732
SM4				0.761

From table 1 above, it can be seen that all indicators that make up each variable have met the requirements of convergent validity. This can be seen from the loading factor value which is greater than 0.70 for each indicator. Convergent validity indicates that the indicators consistently measure the variable in question, with a high loading factor value indicating a strong relationship between the indicator and the latent variable being measured.

Table 2. Average Variances Extracted

Safety Motivation	0.622
Safety Climate	0.524
Safety Leadership	0.520
Safety Behavior	0.702

From table 2, it is known that all indicators that make up each variable have met the discriminant validity requirements. This is evidenced by the square root value of the average variance extracted (AVE) which is greater than 0.50. This shows that each indicator is able to explain more than half of the variability, thus ensuring that the indicators are valid in measuring the intended construction. Good discriminant validity ensures that the latent variables being measured differ from each other sufficiently.

Table 3. Discriminant Validity

	Safety Motivation	Safety Behavior	Safety Climate	Safety Leadership
Safety Motivation	0.662			
Safety Behavior	0.530	0.792		
Safety Climate	0.514	0.566	0.612	
Safety Leadership	0.484	0.558	0.558	0.646

Based on table 3 above, it can be seen that all indicators that make up each variable in this study have met discriminant validity, because the cross loading value shows that the correlation value between the construct and its indicator is greater than the correlation value between the construct and other indicators.

Table 4. Composite Reliability

	Cronbach's Alpha	Composite Reliability
Safety Motivation	0.621	0.711
Safety Climate	0.764	0.771
Safety Leadership	0.730	0.807
Safety Behavior	0.802	0.871

The data in the table above shows that all variables are declared reliable because the composite reliability value is greater than 0.70 and the Cronbach's alpha value is greater than 0.60.

Structural Model (Inner Model)

Inner model evaluation is carried out to assess the influence between latent variables and is used to test hypotheses. The influence between latent variables can be seen from the R-square value. The greater the R-square value, the greater the influence of exogenous latent variables on endogenous latent variables and the significance of the structural path parameter coefficient (Jamu, 2018).

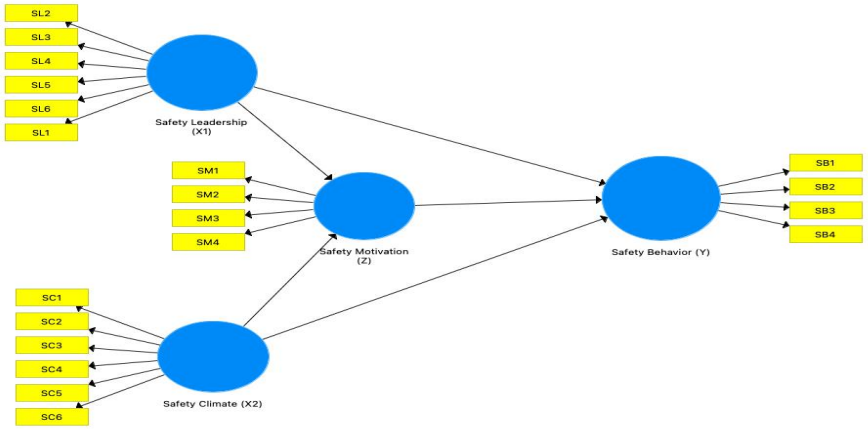

Figure 1. Structural Model

Based on data processing with SEM-PLS 3.0 Professional, the following R-square values are generated:

Table 5. R-Square

	R Square	R Square Adjusted
Safety Behavior	0.454	0.437

From the table above, it is known that safety factors that affect safety behavior; safety leadership, safety climate, safety motivation have a significant influence on the safety behavior of sugar factory employees with an R-square value of 0.454 or 45.4%.

Hypothesis Testing

Hypothesis testing is a process or step in research in which proposed hypotheses are tested to see if the data obtained support or reject the hypothesis. Hypothesis testing is evaluated using the t-statistic and p value.

Table 6. Path Coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Safety Climate -> Safety Behavior	0,275	0,297	0,099	2,780	0,005
Safety Leadership -> Safety Behavior	0,295	0,292	0,083	3,531	0,000

The Path Coefficients test will serve as a reference for conducting hypothesis testing in this study, with the established criterion that the hypothesis is accepted if the P value is less than 0.05, and rejected if the P value is greater than 0.05. The test results for the hypotheses proposed in this study are as follows:

1. H1: Safety Leadership positively impacts Safety Behavior among Sugar Factory Employees, with a t-statistic of 2.780 and a P value of 0.000, indicating $P < 0.05$, thus the hypothesis is accepted.
2. H2: Safety Climate positively impacts Safety Behavior among Sugar Factory Employees, with a t-statistic of 3.531 and a P value of 0.005, indicating $P < 0.05$, thus the hypothesis is accepted.

Mediation Evaluation

Mediation analysis involves testing the direct effect between the dependent variable and the mediating variable, as well as the indirect effect between the independent variable and the dependent variable through the mediating variable.

Table 7. Mediation Test

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Safety Motivation -> Safety Leadership -> Safety Behavior	0,246	0,237	0,111	2,227	**0,026**
Safety Motivation -> Safety Climate -> Safety Behavior	0,354	0,370	0,116	3,044	**0,002**

According to Baron and Kenny, testing for a mediation effect involves three stages. The first stage tests the impact of the independent variable on the dependent variable, which must be significant with a t-statistic greater than 1.96. The second stage examines the effect of the independent variable on the mediating variable, which must also be significant with a t-statistic greater than 1.96. The third stage evaluates the impact of the mediating variable on the dependent variable, which must again be significant with a t-statistic greater than 1.96 (Rapali & Soelaiman, 2019). The mediation test results for the hypotheses proposed in this study are as follows:

1. Based on the results of testing the construct variable safety leadership on safety behavior through safety motivation as a mediating variable which has a t-statistic value of 2.227 and a p-value of 0.026, H3 is accepted because the t-statistic is greater than 1.96 and the p-value is smaller than 0.05.
2. Based on the results of testing the construct variable safety climate on safety behavior through safety motivation as a mediating variable which has a t-statistic value of 3.044 and a p-value of 0.002, H4 is accepted because the t-statistic is greater than 1.96 and the p-value is smaller than 0.05.

Discussion

Safety Leadership has a positive effect on Safety Behavior in Sugar Factory Employees

The hypothesis testing results indicate that Safety Leadership positively affects Safety Behavior among Sugar Factory Employees, thus the hypothesis is accepted. This signifies that leadership practices emphasizing workplace safety significantly enhance employees' safety behavior. It underscores the critical role and implementation of effective, supportive safety policies by leadership in fostering a strong safety culture within the sugar factory environment.

These findings align with previous research by (Stiawan & Faidal, 2024), which demonstrated that Safety Knowledge, Safety Leadership, and Safety Citizenship Behavior significantly positively impact Safety Behavior at Lombang Sumene Beach. Another study by (Afifah, 2021) also found that effective safety leadership positively influences safety behavior, indicating that well-

implemented safety leadership practices lead to improved safety behavior and a more comfortable work environment for employees. Similarly, research by (Rahman et al., 2023) identified significant relationships between safety behavior and work accident variables (path value of 0.889), safety leadership and safety behavior variables (path value of 0.550), and safety leadership and work accident variables (path value of 0.530).

Safety Climate has a positive effect on Safety Behavior in Sugar Factory Employees

The results of hypothesis testing show that Safety Climate has a positive effect on Safety Behavior in Sugar Factory Employees which means the hypothesis is accepted. This means that employees' perceptions of safety conditions in their work environment significantly affect the safety behavior they show. The better the safety climate perceived by employees, the higher the likelihood of them adopting the desired safety behaviors in carrying out their daily tasks in the sugar factory. This shows the importance of creating and maintaining a safe and supportive work environment for employees so that they can actively participate in workplace safety efforts.

The results of this study align with previous research by (Abdillah & Rumita, 2015), which found that various elements of the safety climate—such as Communication & Support, Adequacy of Procedures, Work Pressure, Personal Protective Equipment, Relationships, and Safety Rules—have a significant collective impact on safety behavior. Additionally, (Sadili & Faidal, 2024) showed that Safety Awareness, Safety Climate, and Safety Citizenship Behavior significantly influence Safety Behavior. This was evidenced by the t-test results in Equation II, which reported a t-value of 1.473 and a significance level of 0.145 (greater than 0.05) with a regression coefficient of 0.142.

Similarly, research by (Setiawan et al., 2017) found that the safety climate among construction workers, across all seven dimensions, is negatively perceived and associated with poor safety behavior. In the El-Centro Apartment project, the safety climate was categorized as very low, with scores ranging from 1.30 to 1.59. The P values for the seven dimensions ranged from 0.017 to 0.047, indicating a significant relationship between the safety climate and safety behavior. Additionally, the odds ratios (OR) of 1.908 to 2.500 suggest that workers with a negative perception of workplace safety are 1.908 to 2.500 times more likely to exhibit unsafe behavior.

Safety Motivation mediates the effect of Safety Leadership on Safety Behavior in Sugar Factory Employees

Based on the results of testing the construct variable safety leadership on safety behavior through safety motivation as a mediating variable which has a t-statistic value of 2.227 and a p-value of 0.026, H3 is accepted because the t-statistic is greater than 1.96 and the p-value is less than 0.05. This means that the presence and positive influence of safety leadership on employees' safety behavior can be partially explained through the increase in their perceived safety motivation. When employees perceive leadership that supports and prioritizes safety in

the workplace (Safety Leadership), this increases their motivation to comply with safety procedures and perform expected safety behaviors. This safety motivation then positively influences how often employees demonstrate safety behaviors in their daily activities at the sugar mill.

Safety Motivation mediates the effect of Safety Climate on Safety Behavior in Sugar Factory Employees

Based on the results of testing the construct variable safety climate on safety behavior through safety motivation as a mediating variable which has a t-statistic value of 3.044 and a p-value of 0.002, H4 is accepted because the t-statistic is greater than 1.96 and the p-value is smaller than 0.05. That is, the safety climate perceived by employees influences their safety behavior through increased safety motivation. More specifically, this finding suggests that when employees perceive a good safety climate in their work environment, such as management support for safety, strong safety norms, and rewards for safety behavior, this increases their motivation to follow safety procedures and behave safely (Setiono & Andjarwati, 2019). This safety motivation then contributes positively to employees' safety behavior in carrying out their daily tasks in the sugar factory.

CONCLUSION

The results of hypothesis testing show that safety leadership and safety climate have a positive influence on the safety behavior of sugar factory employees. In addition, safety motivation mediates the effect of safety leadership and safety climate on safety behavior, which indicates that safety motivation can strengthen the influence of these factors on the safety behavior of sugar factory employees. When management demonstrates a strong commitment to safety and creates an environment that supports safety, employees are likely to behave more safely. Safety motivation plays an important role in strengthening the influence of leadership and safety climate on safety behavior. When employees are highly motivated to work safely, they tend to respond positively to good leadership and safety climate, which in turn improves employee safety behavior. This research highlights the importance of management's role in establishing a safe work environment and in motivating employees to comply with safety practices. This is not only important for individual safety but also for the sustainability of company operations. However, the study has limitations as the sample used only includes employees from sugar factories, so the results may not be generalizable to other industries. Therefore, further research is needed to examine the factors that influence safety behavior in the workplace.

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