

The Role of Safety Awareness in Mediating the Effect of Leadership on Operational Safety at PT Kereta Api Indonesia (Persero) Regional Division I North Sumatra

Ibnu Ikhlas Sirait, Muhammad Toyib Daulay, Kholilul Kholik

Abstract

This study aims to identify and analyze the role of safety awareness in mediating the influence of leadership on operational safety at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra. This study is motivated by the importance of operational safety in railway activities, which involve human resources, facilities, infrastructure, procedures, and safety management systems. Leadership is a key factor in promoting safe work behavior, while safety awareness plays a role in fostering employees' ability to recognize potential hazards, understand risks, and take preventive actions. This study employs a quantitative approach. The population consists of 609 employees in the operational units of PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra. The sample comprises 86 respondents, determined using the Slovin formula. The sampling technique used was purposive sampling, and data were collected through the distribution of a questionnaire using a Likert scale. The data analysis technique used was Partial Least Squares-Structural Equation Modeling (PLS-SEM) with the assistance of the SmartPLS 3.0 program. The results of the study indicate that leadership has a positive and significant effect on operational safety, with a coefficient value of 0.239, a t-statistic value of 3.509, and a p-value of 0.000. Leadership also has a positive and significant effect on safety awareness, with a coefficient of 0.363, a t-statistic of 5.977, and a p-value of 0.000. Furthermore, safety awareness has a positive and significant effect on operational safety, with a coefficient of 0.364, a t-statistic of 4.556, and a p-value of 0.000. The results of the indirect effect test indicate that safety awareness mediates the effect of leadership on operational safety, with a coefficient of 0.132, a t-statistic of 3.607, and a p-value of 0.000.

Keywords: Leadership, Operational Safety, Safety Awareness

Ibnu Ikhlas Sirait¹
e-mail: pribumi27@rocketmail.com

Muhammad Toyib Daulay², Kholilul Kholik³
e-mail: boboy_daulay@yahoo.com², kholilulkholik@dosen.pancabudi.ac.id³
3rd International Conference Epicentrum of Economic Global Framework (ICEEGLOF)
Theme: Cross-Sector and Cross-Disciplinary Strategies for Achieving the SDGS
<https://proceeding.pancabudi.ac.id/index.php/ICEEGLOF>

Introduction

Rail transportation is a mode of transport that plays a vital role in supporting public mobility and the distribution of national logistics. Railways have complex operational characteristics because they involve rolling stock, infrastructure, human resources, technology, procedures, and safety management systems that must operate in an integrated manner. Therefore, operational safety is a critical aspect that must be prioritized to ensure railway operations proceed safely, orderly, and under control. In the context of railways, Law No. 23 of 2007 on Railways regulates railway operations, infrastructure, rolling stock, railway traffic, accident investigations, and safety provisions in railway activities (Republic of Indonesia, 2007).

Operational safety depends not only on the adequacy of equipment and infrastructure but is also significantly influenced by human factors. Employees involved in operational activities are required to understand safety procedures, recognize potential hazards, comply with work regulations, and take safe actions in every operational activity. This is in line with Ministry of Transportation Regulation No. PM 69 of 2018 on the Railway Safety Management System, which emphasizes the importance of safety management through a planned and structured railway safety management system (Ministry of Transportation of the Republic of Indonesia, 2018).

Operational safety remains a major concern at PT Kereta Api Indonesia (Persero) Regional Division I North Sumatra. As of January 2025, the PT KAI Divre I North Sumatra region had 402 at-grade crossings, consisting of 121 crossings with barriers and 281 crossings without barriers. In 2024, there were 59 accidents at level crossings, resulting in 24 fatalities, 17 serious injuries, and 16 minor injuries. As of January 2025, there were still 4 accidents resulting in minor injuries (ANTARA News, 2025).

Additionally, in the first four months of 2026, there were 15 incidents at level crossings, 12 of which occurred at unguarded locations. This situation indicates that operational safety within the PT KAI Divre I North Sumatra region still faces significant challenges, particularly at level crossings that pose a high risk of accidents (RMOL Sumut, 2026). These data and the nature of the problem are also consistent with the research paper that identifies operational safety at PT KAI Divre I North Sumatra as the primary research variable.

Efforts to improve operational safety cannot be limited to infrastructure improvements, technical training, and safety campaigns alone. These efforts must also be supported by leadership capable of guiding, supervising, motivating, and fostering safety awareness among employees. Safety leadership plays a role in shaping safe work behavior because leaders can influence how employees perceive risks, comply with procedures, and participate in safety activities. Quansah, Zhu, and Guo (2023) explain that safety leadership has a significant relationship with safety performance because leadership can influence employees' safety behaviors and outcomes.

Safety-oriented leadership is a key factor in promoting operational safety. Leaders serve not only as those who give instructions but also as role models in practicing safe work behavior. When leaders demonstrate a commitment to safety, provide clear guidance, monitor the implementation of procedures, and address potential risks, employees are more motivated to comply with safety rules. Thus, effective leadership can contribute to improving operational safety in railway activities.

In addition to leadership, safety awareness is also a crucial aspect in supporting operational safety. Safety awareness relates to employees' ability to recognize potential hazards, understand the consequences of risks, and take preventive actions before incidents occur. Permana, Islami, and Tranggono (2025) explain that safety awareness is a key factor in building a safety culture, as awareness of risks can encourage safer work behavior.

In this study, safety awareness is positioned as a mediating variable between leadership and operational safety. Effective leadership can enhance employees' safety awareness through guidance, supervision, communication, and setting a good example. Furthermore, high safety

awareness can encourage employees to work more carefully, follow procedures, identify risks, and take preventive measures. Thus, the influence of leadership on operational safety occurs not only directly but also indirectly through increased safety awareness.

Based on this discussion, this study is important to analyze the role of safety awareness in mediating the influence of leadership on operational safety at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra. This study is expected to provide a theoretical contribution to the development of safety management research, particularly regarding the relationship between leadership, safety awareness, and operational safety. Additionally, this study is also expected to provide practical insights for the company in formulating strategies to improve operational safety based on leadership and employee safety awareness.

Literature Review

1. Operational Safety

a) Definition of Operational Safety

According to Marsman et al. (2024), operational safety can be defined as the condition in which safe operations are achieved through the management of environmental factors, human resource competencies, organizational structure, and worker well-being, thereby enabling operators to maintain situational awareness, understand risks, make appropriate decisions, and take actions that support safety.

b) Operational Safety Indicators

Based on the Safety and Human Performance framework by Marsman, Vlasblom, and Minnema (2024), operational safety indicators can be described as follows.

1) Operational Environment

The operational environment consists of working conditions, equipment, systems, and on-site situations that affect an employee's ability to perform their job safely.

2) Human Resource Competency

Human resource competency refers to the abilities, knowledge, skills, training, communication, and readiness of personnel to carry out operational tasks in accordance with safety procedures.

3) Organizational Factors

Organizational factors include organizational support in the form of leadership, a safety culture, task allocation, work schedules, and procedures that help operators work safely.

4) Operator Well-Being

Operator well-being refers to the physical and mental condition and work-life balance of operators, which affect their concentration, alertness, and ability to make safe decisions.

5) Awareness, Understanding, Decision-Making, and Safe Actions

This indicator reflects an operator's ability to recognize risky situations, understand potential hazards, make appropriate decisions, and take actions in accordance with safety procedures.

2. Safety Awareness

a) Definition of Safety Awareness

Safety awareness is an individual's ability to recognize potential hazards, understand the consequences of risks, and proactively take safe actions before an incident occurs (Permana et al., 2025). This concept emphasizes that safety depends not only on rules or procedures but also on conscious behavior and individual responsibility regarding workplace risks.

b) Indicators of Safety Awareness

Permana et al., 2025, in the context of Safety Awareness, with the following indicators:

1) Awareness of Potential Hazards

Operational staff are able to identify high-risk areas or situations before an incident occurs. For example, recognizing accident-prone crossings or equipment conditions that could potentially fail. This awareness helps prevent accidents before risks materialize.

2) Understanding the Consequences of Risk

Individuals realize that any unsafe action can result in property damage, injury, or disruption to operational safety. Consequently, this understanding makes personnel more cautious in every work activity and improves compliance with safety procedures.

3) Taking Proactive Action

Employees do not merely wait for instructions but actively take safety measures, such as reporting risks, addressing potential hazards, and following emergency procedures. Consequently, this proactive behavior reflects a safety culture that has been internalized by individuals and supports the organization's overall operational safety.

4. Leadership

a) Definition of Leadership

Leadership, particularly in the context of operational safety, is the ability of individuals in leadership positions to influence, guide, and direct subordinates so that their work behavior aligns with organizational goals, including compliance with safety procedures (Quansah et al., 2023).

b) Leadership Indicators

Leadership indicators (Quansah et al., 2023) are:

1) Guidance and Supervision

Leaders provide clear instructions regarding work tasks and procedures, including the safety measures that must be implemented. Consistent guidance helps employees understand safety priorities and reduces the likelihood of errors.

2) Exemplifying Safe Behavior

Leaders demonstrate compliance with safety rules and operational procedures to set an example for subordinates. Disciplined and safe leadership behavior has a positive influence on subordinates' compliance and fosters a culture of safety.

3) Effective Communication

Good leadership involves open and transparent communication regarding operational risks, past incidents, and preventive measures. Effective communication ensures that all members of the organization share a common understanding of safety and operational procedures.

4) Motivation and Support

Leaders provide rewards, recognition, or encouragement to employees who practice safe work habits. This motivation encourages employees to adopt proactive behaviors, increase safety awareness, and reduce the likelihood of incidents.

Conceptual Framework

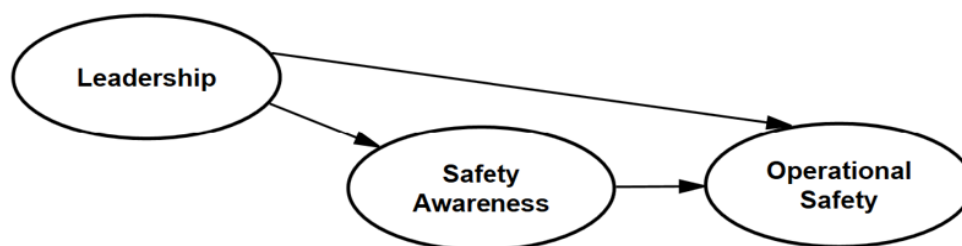


Figure 1. Conceptual Framework

Research Hypotheses

- H₁: Leadership has a positive effect on operational safety at PT Kereta Api Indonesia (Persero) Regional Division I North Sumatra.
- H₂: Leadership has a positive effect on safety awareness at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.
- H₃: Safety awareness has a positive effect on operational safety at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.
- H₆: Leadership has a positive effect on operational safety through safety awareness at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.

Research Methodology

Type of Research

The type of research used is quantitative research. According to Sugiyono (2022), quantitative research is defined as a method grounded in the philosophy of positivism, used to study a specific population or sample; sampling techniques are generally conducted randomly; data collection uses research instruments; and data analysis is quantitative/statistical in nature, with the aim of testing predetermined hypotheses. This quantitative research was conducted to examine the influence of leadership and work culture on operational safety through safety awareness at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.

Research Location and Timeframe

The research was conducted at PT Kereta Api Indonesia (Persero) Regional Division I of North Sumatra, located at Jalan Prof. H. M. Yamin No. 13, Gg. Buntu, Medan Timur Subdistrict, Medan City, North Sumatra. The research was carried out over a period of 3 months, from April to July 2026.

Population and Sample

Sugiyono (2021): A population is the domain of generalization consisting of objects or subjects possessing specific qualities and characteristics defined by the researcher for study, from which conclusions are subsequently drawn. The population and sample in this study consist of all employees in the operational units of PT Kereta Api Indonesia (Persero) Regional Division I of North Sumatra, totaling 609 individuals.

According to Sugiyono (2021), a sample is a subset of the population that shares the same characteristics as the population. This sample is used to represent the larger population in a study. Sampling in this study was conducted using the Slovin formula, namely:

$$n = \frac{N}{1+N(e)^2}$$

Explanation:

n = Sample size / total number of respondents

N = Population size

E = Tolerable sampling error percentage;

e = 0.1.

Therefore, the sample size for this study is:

$$n = \frac{609}{1+609(0,1)^2}$$

n = 86

Sampling Technique

This study used purposive sampling, a technique based on specific criteria aligned with the research objectives. The sample was selected from all employees in the operational units of PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.

Pursive sampling was chosen because this study required respondents who truly understood operational activities, safety procedures, work culture, and the application of safety awareness in daily work activities. Not all employees are directly involved in operational

activities; therefore, the researcher established specific criteria to ensure that the data obtained were relevant to the research variables.

The sample criteria for this study are as follows:

- 1) Employees working in the operational units of PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.
- 2) Employees directly involved in operational activities or those supporting operational safety.
- 3) Employees with at least one year of service are considered to have a good understanding of work procedures, organizational culture, and operational safety standards.
- 4) Employees who are willing to serve as respondents and complete the research questionnaire in full.

With these criteria, the research sample is expected to provide objective answers that reflect real-world conditions in the field. This approach also helps the researcher obtain data from respondents with firsthand experience regarding leadership, work culture, safety awareness, and operational safety at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra. The sample size for this study was determined based on the number of employees in the operational units who met these criteria and were willing to participate as research respondents.

Research Data Sources

The data source used in this study is primary data.

Results

Outer Model Analysis

The *Outer Model* analysis, using the *PLS algorithm*, yielded the following:

Validity Test

Table 1. Outer Loadings Values

	Leadership	Operational Safety	Safety Awareness
X1.1	0.833		
X1.2	0.879		
X1.3	0.876		
Y.1		0.739	
Y.2		0.885	
Y.3		0.805	
Z.1			0.843
Z.2			0.811
Z.3			0.875

Source: Smart PLS Output, 2025

Based on the values in Table 1 above, the results of the outer model test using factor loadings/outer loadings show that all indicators for each variable have loadings ≥ 0.70 . This indicates that each indicator is measured validly and reliably. Therefore, it can be concluded that all items in the questionnaire meet the validity criteria, as shown in the following figure.

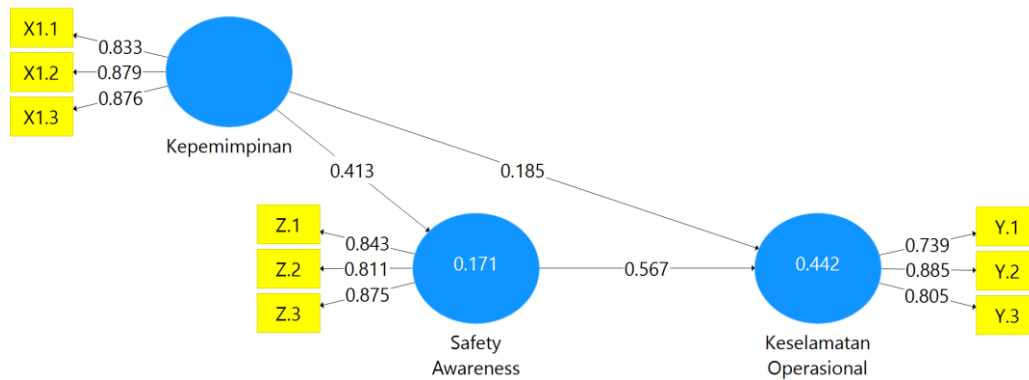


Figure 2. Outer Loadings

Reliability Test

Table 2. Construct Reliability and Validity Test

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Leadership	0.829	0.844	0.897	0.744
Operational Safety	0.742	0.765	0.852	0.659
Safety Awareness	0.798	0.807	0.881	0.711

Source: Smart PLS Output, 2025

From Table 2 above, the reliability test results show that the Cronbach's Alpha and Composite Reliability values for all constructs are above 0.70. This indicates that all indicators have high internal consistency and are reliable for measuring their respective constructs. Therefore, the research instrument is deemed reliable and suitable for use in structural equation modeling.

Coefficient of Determination (R^2)

When evaluating a model using PLS, the process begins by examining the R-squared value for each latent dependent variable. The table below presents the estimated R-squared values using SmartPLS.

Table 3. R-Square Results

	R-Square	Adjusted R-Square
Safety Awareness	0.171	0.165
Operational Safety	0.442	0.434

Source: Smart PLS, 2025

Table 3 shows the R-squared values for both dependent variables. For the safety awareness variable, the R-squared value is 0.171. This means that leadership accounts for 17.1% of the variation; the remainder is attributed to other variables outside the model. The R-squared value for operational safety is 0.442, meaning that leadership and safety awareness account for 44.2%; the remainder is attributed to other variables outside the model.

Structural Model Testing (Inner Model)

Hypothesis Testing

Direct Effects Between Variables

Direct effects between variables can be seen in the *path coefficient* values. The data analysis results show that the direct effect values are presented in the following table.

Table 4. Path Coefficients (Direct Effects)

	Original Sample	T Statistics	P-Values	Conclusion
Leadership -> Operational Safety	0.185	2.754	0.006	Accepted
Leadership -> Safety Awareness	0.413	5.835	0.000	Accepted
Safety Awareness -> Operational Safety	0.567	8,576	0.000	Accepted

Source: Smart PLS Output, 2025

Table 4 shows the following direct effect values:

1. Leadership has a positive and significant effect on operational safety, with a t-statistic of 2.754 (above 1.96) and a p-value of 0.006 (below 0.05). This means that leadership has a significant effect on operational safety because the p-value is below 0.05. These findings are consistent with previous research, which also found that leadership has a positive and significant effect on operational safety (Sukwika & Sutrisno, 2021).
2. Leadership has a positive and significant effect on safety awareness, with a t-statistic of 5.835 (greater than 1.96) and a p-value of 0.000 (less than 0.05). This means that leadership has a significant effect on safety awareness because the p-value is less than 0.05. These findings are consistent with previous research, which also found that leadership has a positive and significant effect on safety awareness (Hendriyanto et al., 2025).
3. Safety awareness has a positive and significant effect on operational safety, with a t-statistic of 8.576 (above 1.96) and a p-value of 0.000 (below 0.05). This means that leadership has a significant effect on operational safety because the p-value is below 0.05. These findings are consistent with previous research, which also found that leadership has a positive and significant effect on operational safety (Ramadhani, 2021).

Indirect Effects Between Variables

The indirect effects between variables can be seen in the *specific indirect effects* values. The results of the data analysis on indirect effects are presented in Table 5 below.

Table 5. Specific Indirect Effects

	Original Sample	T Statistics	P Values	Conclusion
Leadership -> Safety Awareness -> Operational Safety	0.234	4.853	0.000	Accepted

Source: Smart PLS, 2025

Table 5 shows the indirect effects between variables, namely: leadership has a positive and significant effect on operational safety through safety awareness, with a t-statistic value of 4.853 (above 1.96) and a significance level of 0.000 (below 0.05). This means that safety awareness acts as a mediating variable between leadership and operational safety.

Conclusion

1. Leadership has a positive effect on operational safety at PT Kereta Api Indonesia (Persero) Regional Division I North Sumatra.
2. Leadership has a positive effect on safety awareness at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.
3. Safety awareness has a positive effect on operational safety at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.
4. Leadership has a positive effect on operational safety through safety awareness at PT Kereta Api Indonesia (Persero) Regional Division I, North Sumatra.

Recommendations

Based on the research findings and conclusions, the recommendations of this study are as follows.

1. s of Leadership on Operational Safety

PT Kereta Api Indonesia (Persero) Regional Division I North Sumatra is advised to continue enhancing the role of leadership in supporting operational safety. Leaders need to provide clear work instructions, conduct consistent supervision, and ensure that every employee understands and follows applicable safety procedures. Leadership that is firm, communicative, and safety-oriented can help reduce the potential for work errors and improve the quality of operational execution in the field.

2. Leadership's to Safety Awareness

Company leaders are advised to be more active in fostering employee safety awareness through safety communications, regular briefings, and modeling safe work behavior. Leaders serve not only as supervisors but also as role models for employees in implementing workplace safety. With effective leadership, employees will be more aware of potential hazards, understand job risks, and be motivated to act safely.

3. Safety Awareness Regarding Operational Safety

Companies are advised to make improving safety awareness a priority in operational safety management. Employees need to receive regular training, safety briefings, safety simulations, and risk assessments so they can identify potential hazards and take preventive measures before accidents occur. The higher the employees' safety awareness, the better the implementation of operational safety in the workplace.

4. Leadership in Operational Safety through Safety

Companies are advised to optimize the role of leadership in improving operational safety by strengthening safety awareness. Leaders need to establish clear communication regarding the importance of safety, motivate employees to work safely, and ensure that every employee understands the consequences of unsafe actions. Thus, effective leadership can enhance employees' safety awareness and ultimately support the achievement of operational safety.

5. ing a Work Culture Focused on Operational Safety Through Safety Awareness

Companies are advised to strengthen a safety-oriented work culture to improve employee safety awareness. A work culture that emphasizes discipline, procedural compliance, open communication, and risk reporting will encourage employees to be more safety-conscious. This awareness can then reinforce the comprehensive implementation of operational safety within the environment of PT Kereta Api Indonesia (Persero) Regional Division I North Sumatra.

6. : Recommendations for Future Researchers

Future researchers are advised to expand on this study by incorporating additional variables that may influence operational safety, such as job competence, safety training, workload, work motivation, procedural compliance, safety communication, or safety management systems. Future research could also use a larger sample size and expand the scope of the study to other regional divisions of PT KAI or to other transportation sectors. Additionally, future researchers may employ a mixed-methods approach combining quantitative and qualitative methods so that the research results not only demonstrate statistical relationships between variables but also provide a more in-depth description of real-world conditions in the field.

References

- [1] ANTARA News. (February 14, 2025). KAI Sumut Closes 35 Illegal Railroad Crossings. ANTARA News. <https://www.antaranews.com/berita/4648717/kai-sumut-tutup-35-perlintasan-liar>.
- [2] Anwar, Y. (2016). The influence of transformational leadership, competence, compensation, and commitment on organizational culture and its implications for faculty performance. *Kontigensi: Scientific Journal of Management*, 4(2), 104–115.
- [3] Arisa, P., Daulay, M. T., & Rahayu, S. (October 2025). The Role of Work Motivation in Mediating the Influence of School Principal Leadership on Teacher Performance at SMP

- Negeri 1 Bandar Bener Meriah Regency. In *Proceedings of the International Conference on Islamic Community Studies* (pp. 5632–5640).
- [4] Bautista-Bernal, I., Quintana-García, C., & Marchante-Lara, M. (2024). Safety culture, safety performance, and financial performance: A longitudinal study. *Safety Science*, 172, Article 106409. <https://doi.org/10.1016/j.ssci.2023.106409>
 - [5] Ferine, K. F., Aditia, R., & Rahmadana, M. F. (2021). An empirical study of leadership, organizational culture, conflict, and work ethic in determining work performance in Indonesia's education authority. *Heliyon*, 7(7).
 - [6] Firmansyah, F., & Affandi, G. R. (2025). The Relationship Between Organizational Culture and Safety Awareness on Occupational Safety and Health (OSH) Compliance at PT X Makassar. *An-Nur Student Journal: Different, Meaningful, Noble*, 11(2), 51–61.
 - [7] Hendriyanto, N., Eduard, E., & Winoto, H. (2025). The Role of Safety Leadership in Enhancing OSH Awareness on Tanker Ships Through a Systematic Literature Review. *Journal of Occupational Health and Safety*, 1(1), 41–53.
 - [8] Hutabarat, S. D. B., Kholik, K., & Daulay, M. T. (October 2025). The Role of Job Satisfaction in Mediating the Influence of Leadership on Employee Performance at PTPN 4 Regional 1 Janji Rantauprapat Plantation. In *Proceedings of the International Conference on Islamic Community Studies* (pp. 5585–5594).
 - [9] Malau, G. A., & Kholik, K. (2025). Analysis of the Motivation of Work Motivation, Work Environment, and Work Culture on the Performance of Employees at the Medan City Transportation Department. *PUBLIC CORNER*, 20(01), 36–64.
 - [10] Marsman, L. A., Vlasblom, J. I. D., and Minnema, M. F. 2024. Operational pressure and the SHP framework: Connecting the dots for safety. *Journal of Physics: Conference Series*, 2716(1): 012071. doi:10.1088/1742-6596/2716/1/012071.
 - [11] MetroTV News. (May 4, 2025). KAI strengthens its culture of sustainable safety. MetroTV News. <https://www.metrotvnews.com/read/koGCddDm-kai-perkuat-budaya-keselamatan-berkelanjutan>
 - [12] Netherlands Aerospace Centre (NLR). (2025). Safety performance indicators (ICAO Safety Management Manual context). NLR. https://www.nlr.org/nl/newsroom/capability/safety-performance-indicators/?utm_source=chatgpt.com
 - [13] Permana, M. R., Islami, M. C. P. A., & Tranggono. (2025). Analysis of the effect of management commitment, safety compliance, and safety awareness on safety culture. *Journal La Sociale*, 6(4), 1267–1279. <https://doi.org/10.37899/journal-la-sociale.v6i4.1962>
 - [14] Quansah, P. E., Zhu, Y., & Guo, M. (2023). Assessing the effects of safety leadership, employee engagement, and psychological safety on safety performance. *Journal of Safety Research*, 86, 226–244. <https://doi.org/10.1016/j.jsr.2023.07.002>
 - [15] Ramadhani, M. R., Setiawan, A., & Suprpto, Y. (2021). The Effect of Safety Awareness Activities on Operational Safety at Sam Ratulangi International Airport, Manado. In *Proceedings of SNITP (National Seminar on Aviation Technology Innovation)* (Vol. 5, No. 2).
 - [16] RMOL Sumut. (May 11, 2026). 15 incidents in 4 months; KAI Sumut speeds up enforcement against unauthorized railroad crossings. RMOL Sumut. <https://www.rmolsumut.id/15-insiden-dalam-4-bulan-kai-sumut-kebut-penertiban-perlintasan-liar>
 - [17] Safitri, D. M., Septiani, W., Angraeni, A., & Alwinny, S. N. (2020). Improving Safety Behavior Through a Safety Culture Among Private Transjakarta Bus Operators. *Journal of Industrial Engineering*, 10(1), 66–77.
 - [18] Soni, R. I., Yuliana, L., & Zulfikar, I. (2025). Implementation of Occupational Safety and Health Culture in the Operational Activities of the PT Coates Hire Indonesia Workshop in Balikpapan. *Identifikasi*, 11(3), 698-705.

- [19] Sugiyono. (2022). Quantitative, Qualitative, and R&D Research Methods (26th ed.). Bandung: Alfabeta.
- [20] Sukwika, T., & Sutrisno, G. (2021). Safety leadership, OSH expert commitment, and accountability toward job satisfaction and safety performance. *Jurnal Khatulistiwa Informatika*, 5(2), 164–174.