

Impact of Safety Leadership on Safety Climate in Process Industry Workers: Literature Review

Titus Halomoan Mg^{1*}, Zulkifli Djunaedi²

¹Departemen Keselamatan dan Kesehatan Kerja, Fakultas Kesehatan Masyarakat, Universitas Indonesia, titushalomoan@yahoo.com

²Departemen Keselamatan dan Kesehatan Kerja, Fakultas Kesehatan Masyarakat, Universitas Indonesia, zul@ui.ac.id

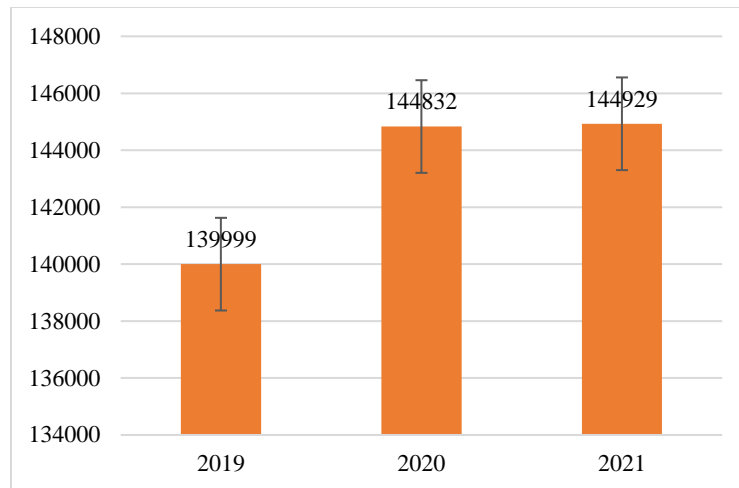
*Corresponding Author: E-mail: titushalomoan@yahoo.com

ARTICLE INFO	ABSTRACT
<p>Manuscript Received: 30 Sept, 2024 Revised: 01 Nov, 2024 Accepted: 03 Nov, 2024 Date of Publication: 9 Dec, 2024 Volume: 7 Issue: 12 DOI: 10.56338/mppki.v7i12.6322</p>	<p>Background: Safety climate concerns individual perceptions of safety policies, procedures, practices and behavior in the work environment. The low safety climate increases the risk of work accidents. Improvement safety climate, one of which can be done by increasing safety leadership, which is safety leadership bring policy direction and commitment regarding the importance of occupational safety and health. This research aims to determine the effect safety leadership to safety climate in process industry workers.</p> <p>Method: This research uses the "PRISMA" or preferred reporting items for systematic reviews and meta-analyses. In searching for relevant research using database google scholar and Scindirect, with keywords "safety leadership", "safety climate" And "process industry worker".The total number of journals that meet the inclusion and exclusion criteria is 4 journals indexed Q1.</p> <p>Results: The results of this study show that there is a direct influence between safety leadership to safety climate in a positive direction. The influence is in a positive direction indicating that there is an increase safety leadership influence on safety climate which is better. There is an indirect influence between safety leadership to safety performance with through safety climate.</p> <p>Conclusion: Safety leadership influences improving the safety climate for process industry workers. These findings can be used as reference material for improving the safety climate as well as safety performance in process industry, to reducing the possibility of work accidents.</p>
KEYWORDS	
<p>Safety Leadership; Safety Climate; Process Industry Worker</p>	

Publisher: Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Palu

INTRODUCTION

Safety climate concerns individual perceptions of safety policies, procedures, practices and behavior in the work environment (1) which reflects that safe work rules are a necessity (2). Safety climate in practice, it is an important method for companies to predict workers' safe behavior, so as to avoid the possibility of work accidents and work-related diseases (3). Where cases of work accidents and work-related illnesses in Indonesia continue to increase. The following is data on cases of work accidents and work-related illnesses collected by the Ministry of Manpower of the Republic of Indonesia in 2022, which is published in (4), which can be seen in Figure 1, as follows.



Source: Ministry of Manpower of the Republic of Indonesia, 2022

Figure 1 Data on Work Accident Cases and Occupational Diseases 2019-2021

Based on Figure 1, the number of work accidents and work-related illnesses in Indonesia, compiled by the Ministry of Manpower, continues to increase from 2019 to 2022. It can be seen from the number of work-related accidents and illnesses in 2019 that there were 139,999 incidents, increasing in 2020 to the figure 144,832 incidents, then cases of work accidents and work-related illnesses increased again in 2021 to 144,929 incidents.

The importance of implementing a safe climate as an effort to form workers' habits of working by paying attention to occupational safety and health (5). Research that has been carried out reveals that it is a low safety climate increasing the risk of work accidents (6), where workers are more committed and comply with occupational safety and health rules (2). There are many influencing factors safety climate among others, the influence of workload factors, hazard risk perception (7), depressive conditions, work environment (6) as well as safety leadership (8), (9), (7).

Safety climate can be applied to the process industry, as a measure to prevent work accidents (6). Where the process industry is an industry that can be categorized as work with a high risk of work accidents (10). Workers are faced with the risk of fire, explosion, high temperatures and explosive gases (11). In 2021, a fire occurred at the Tehran Refinery, after it was investigated that the main cause was slop leakage. However, failure to implement work safety standards and lack of monitoring compliance with work safety rules contributed to the occurrence of these accidents (12). Improving the safety climate one of which can be done by increasing safety leadership. Safety leadership bringing policy direction and commitment regarding the importance of occupational safety and health (8). With the involvement of all aspects, including workers, management commitment, and management leaders in enforcing safety and health, it creates a safe climate and reduces the possibility of work accidents.

METHOD

This research is a type of literature review research using the "PRISMA" method approach. (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (13). In selecting research journals by referring to inclusion criteria and exclusion criteria. The inclusion criterion in this study is influence safety leadership to safety climate on process industry workers, jurnal published after 2019 and quantitative research method. Exclusion criteria are jurnal published before 2019, addition to quantitative research and subjects other than process industry workers. Journals were selected from 2019 to follow dynamic scientific developments regarding research topics. In searching for relevant research using database google scholar dan sciencedirect, with keywords "safety leadership", "safety climate" And "process industry worker". The following are the stages of research using the "PRISMA" method (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), can be seen in Figure 2, as follows.

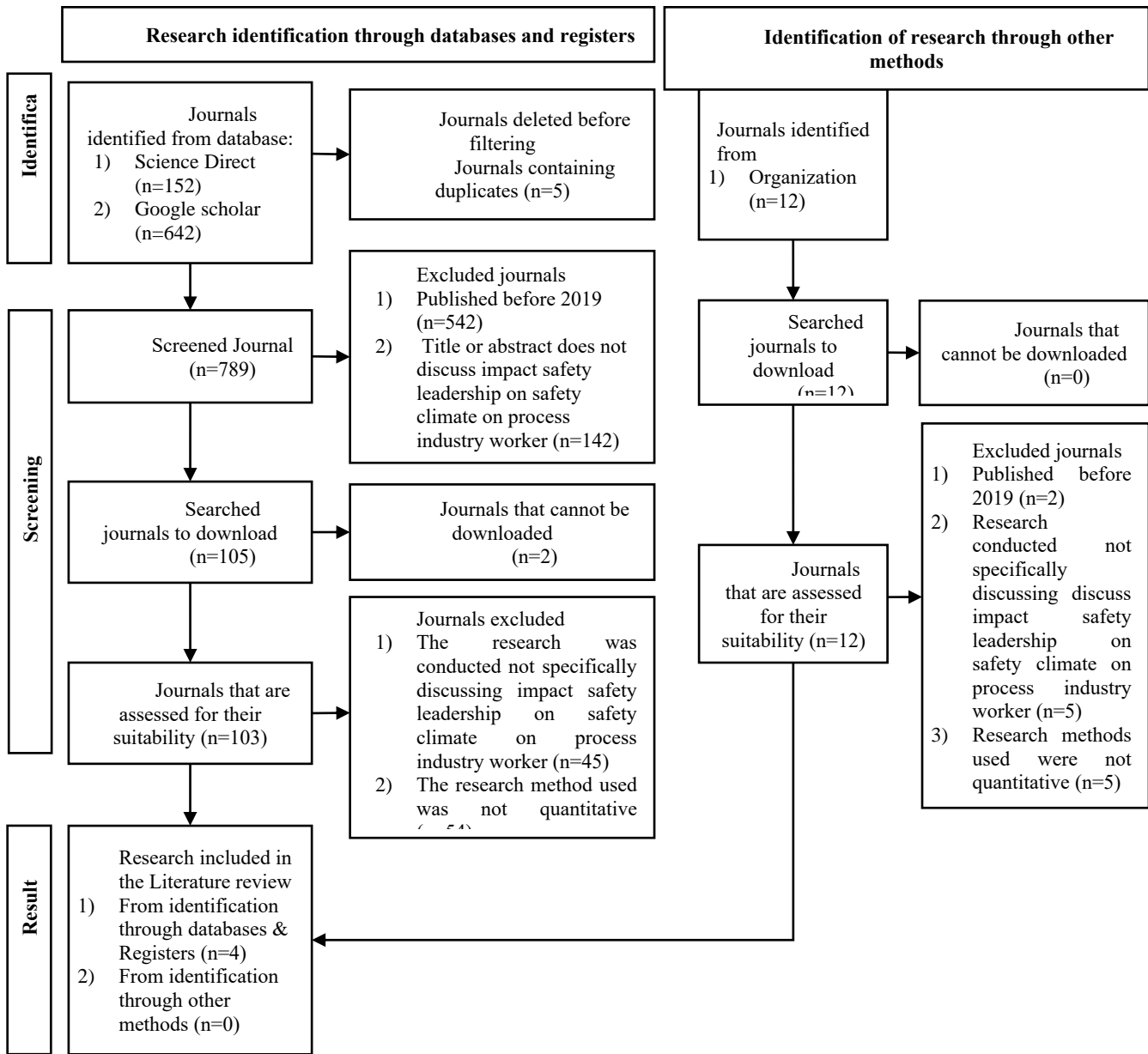


Figure 2. Research Stages Using the "PRISMA" Method

Based on Figure 2 research stages using the "PRISMA" method, the journals identified in database sciencedirect of 152 and on database google scholar as many as 642, but 5 journals were excluded due to duplication. Next is screening in 789 journals with exclusion criteria, by excluding 542 journals because they were published before 2019, and excluding 142 journals because the abstract did not clearly explain the impact of safety leadership to safety climate. However, there are 2 journals that cannot be downloaded, so there are 103 journals remaining. Screening was carried out using inclusion criteria, excluding 45 journals because they did not clearly discuss influence safety leadership to safety climate, and excluded 54 journals because they did not use quantitative methods. So the screening results from journals are sourced from the database science direct And google scholar as many as 4 journals.

As a result of identification using other methods, there are 12 journals sourced from organizations, with all journals available for download. Screening was carried out, excluding 2 journals because they were published before

2019, excluding 5 journals because they did not clearly explain the impact of safety leadership to safety climate in process industry workers. Excluding 5 journals, because the research method does not use quantitative research methods. So there are no journals sourced from other methods.

RESULTS

Based on the research results, there were 4 (four) journals with all of these journals indexed as Q1. The following is a summary of research journals, which can be seen in Table 1, as follows.

Table 1. Research Journal Summary

No	Author, Years	Title	Method, Instrument	Result	Interpretation
1	Yujingyang Xue, Yunxiao Fan, Xuecai Xie, 2020	Relation between senior managers' safety leadership and safety behaviour in the Chinese petrochemical industry	Quantitative path analysis, questionnaire	P-value < 0,05	Safety leadership influence to safety climate
2	Kwangsu Moon, 2024	Effect of a Safety leadership Training Including Coaching on Safety Performance and Climate in Wood-processing Companies	Quantitative path analysis, questionnaire	P-value < 0,05	Leadership training has an effect on improving safety management
3	Dawei Wang, Wenxu Mao, Chaoyue Zhao, Feng Wang, Yixin Hu, 2023	The cross-level effect of team safety-specific transformational leadership on workplace safety behaviour: The serial mediating role of team safety climate and team safety motivation	Quantitative path analysis, questionnaire	P-value < 0,05	Safety leadership has a positive effect on safety compliance and safety participation
4	Amanda Ulfdotter Samuelsson, Pernilla Larsman, Martin Grill	For the sake of safety: A time-lagged study investigating the relationships between perceived leadership behaviours and employee safety behaviours	Cross sectional study, questionnaire	P-value < 0,05	Safety leadership has a positive effect on safety commitment behaviours

DISCUSSION

Based on the results of a literature review of 4 journals indexed Q1, regarding influence safety leadership to safety climate in process industry workers. In the context of workplace safety, the role of safety leadership is very important in building the safety climate worker industry process (14) (15) (16) (17) . Safety leadership refers to the process carried out by a leader in influencing the achievement of work safety and the formation of a work safety culture (14).

There are 2 (two) styles of safety leadership in influencing workers, namely transformational leadership and transactional leadership (18). Leaders who adhere to a transformational style tend to care more about safety and safety

vision than transactional leadership styles, these leaders are more active in improving safe behaviour at work (16). However, whether leadership with a transformational or transactional style is able to influence workers to behave safely when working (18).

Besides that, his role is to become a role model and role model regarding work safety values, thereby showing more compliance behaviour and participation of process industry workers in work safety (14) (19). Workers will provide a lot of support regarding work safety programs, when a leader sincerely provides support and active participation in work safety commitments (14). Form support safety leadership by participating in work planning, work preparation and supervising workers, it has a positive effect on worker compliance regarding work safety (20). This refers to the reciprocity theory which states that workers have a sense of responsibility for work safety, when their workers receive support from their superiors regarding safety behaviour in the workplace (21) (22). This is related to the leadership function which provides safety coaching, and safety controlling as subfactors of safety leadership, which can influence workers to increase compliance with occupational safety and health regulations (23).

The leader's committed behaviour in enforcing work safety rules is visible from attitudes and behaviour and often provides guidance on the importance of work safety, inspiring workers to behave safely at work (24) (25). Apart from having a direct influence on its formation safety climate, safety leadership is able to influence workers' safe behaviour through safety climate as moderating effects (14). Leaders who enforce safety rules and prioritize work safety create a climate where workers feel cared for in terms of work safety (17) thereby inspiring workers to work by paying attention to work safety rules. This is in line with research that has been conducted that leadership can influence work safety behaviour (26).

Apart from its influence in the formation of safety climate, safety leadership also influences better safety performance (27) (8). Safety leadership is the key to improving safety performance, considering its role in building a safety vision, strengthening work safety culture and influencing workers to work safely (8) (28) (29,30). Safety leadership refers to monitoring safety performance as a control and comparing it with company goals, as well as correcting deviations (8) by using its authority as safety leadership, enforcing workers to comply with work safety rules and engineer work safety techniques.

Recommendations for Future Research

From the research results, it was found that the role of leaders can be carried out as an effort to increase worker compliance with occupational safety and health regulations as well as management's commitment to occupational safety and health. A review of other factors that might influence the safety climate in industrial processes is needed.

CONCLUSION

Based on the research results, it is concluded that there is an influence between safety leadership on safety climate in process industry workers. These findings can be used as reference material for improving the safety climate as well as safety performance in process industry, to reducing the possibility of work accidents.

BIBLIOGRAPHY

1. Zohar D. Safety climate in industrial organizations: Theoretical and applied implications. *Journal of Applied Psychology*. 1980;65(1):96–102. Doi: <https://doi.org/10.1037/0021-9010.65.1.96>
2. Nguyen-Phuoc DQ, Truong TM, Ho-Mai NT, Mai NX, Oviedo-Trespalacios O. Safety climate and its contribution to safety performance in the food delivery industry. *Saf Sci*. 2025 Jan; 181:106687. Doi: <https://doi.org/10.1016/j.ssci.2024.106687>
3. Mai NX, Hoang LN, Nguyen-Phuoc DQ. Factors influencing safety compliance behavior among food delivery riders – an application of safety climate model. *Journal of Science and Technology Issue on Information and Communications Technology*. 2023 Sep 30;14–8. Doi: <https://doi.org/10.31130/ud-jst.2023.561E>
4. Indonesia KKR. *Profil Keselamatan Dan Kesehatan Kerja Nasional Indonesia Tahun 2022*. Jakarta Selatan; 2022.
5. Reese CD. *Industrial Safety and Health For Infrastructure Service*. New York: Crc Press; 2009.

6. Khoshakhlagh AH, Yazdanirad S, Hatamnejad Y, Khatooni E, Kabir S, Tajpoor A. The relations of job stress dimensions to safety climate and accidents occurrence among the workers. *Heliyon*. 2021 Sep;7(9):e08082. Doi: <https://doi.org/10.1016/j.heliyon.2021.e08082>
7. Oah S, Na R, Moon K. The Influence of Safety Climate, Safety Leadership, Workload, and Accident Experiences on Risk Perception: A Study of Korean Manufacturing Workers. *Saf Health Work*. 2018 Dec;9(4):427–33. Doi: <https://doi.org/10.1016/j.shaw.2018.01.008>
8. Wu TC, Chen CH, Li CC. A correlation among safety leadership, safety climate and safety performance. *J Loss Prev Process Ind*. 2008 May;21(3):307–18. Doi: <https://doi.org/10.1016/j.jlp.2007.11.001>
9. Kapp EA. The influence of supervisor leadership practices and perceived group safety climate on employee safety performance. *Saf Sci*. 2012 Apr;50(4):1119–24. Doi: <https://doi.org/10.1016/j.ssci.2011.11.011>
10. Djunaidi Z, Wirawan M, Susilowati IH, Khaliwa AM, Kanigara SA. Safety Climate Transformation in Oil and Gas Company Ownership Transition (Study Case from Multinational to National Company). *Saf Health Work*. 2024 Sep;15(3):292–9. Doi: <https://doi.org/10.1016/j.shaw.2024.04.009>
11. Thiel GP, Tow EW, Banchik LD, Chung HW, Lienhard JH. Energy consumption in desalinating produced water from shale oil and gas extraction. *Desalination*. 2015 Jun;366:94–112. Doi: <https://doi.org/10.1016/j.desal.2014.12.038>
12. Gholamzadeh K, Alauddin M, Aliabadi MM, Soltanzade A, Mohammadfam I. Comprehensive Failure Analysis in Tehran Refinery Fire Accident: Application of Accimap Methodology and Quantitative Domino Effect Analysis. *Fire Technol*. 2023 Mar 8;59(2):453–72. Doi: <https://doi.org/10.1016/j.jclinepi.2022.12.019>
13. Helbach J, Hoffmann F, Pieper D, Allers K. Reporting according to the preferred reporting items for systematic reviews and meta-analyses for abstracts (PRISMA-A) depends on abstract length. *J Clin Epidemiol*. 2023 Feb;154:167–77. Doi: <https://doi.org/10.1016/j.jclinepi.2022.12.019>
14. Xue Y, Fan Y, Xie X. Relation between senior managers' safety leadership and safety behavior in the Chinese petrochemical industry. *J Loss Prev Process Ind*. 2020 May;65:104142. Doi: <https://doi.org/10.1016/j.jlp.2020.104142>
15. Moon K. Effect of a Safety Leadership Training Including Coaching on Safety Performance and Climate in Wood-processing Companies. *Saf Health Work*. 2024 Sep;15(3):310–6. Doi: <https://doi.org/10.1016/j.shaw.2024.05.005>
16. Wang D, Mao W, Zhao C, Wang F, Hu Y. The cross-level effect of team safety-specific transformational leadership on workplace safety behavior: The serial mediating role of team safety climate and team safety motivation. *J Safety Res*. 2023 Dec;87:285–96. Doi: <https://doi.org/10.1016/j.jsr.2023.05.001>
17. Samuelsson AU, Larsman P, Grill M. For the sake of safety: A time-lagged study investigating the relationships between perceived leadership behaviors and employee safety behaviors. *Saf Sci*. 2023 Oct;166:106245. Doi: <https://doi.org/10.1016/j.ssci.2023.106245>
18. Martínez-Córcoles M, Stephanou K. Linking active transactional leadership and safety performance in military operations. *Saf Sci*. 2017 Jul;96:93–101. Doi: <https://doi.org/10.1016/j.ssci.2017.03.013>
19. Subramaniam C, Johari J, Mashi MS, Mohamad R. The influence of safety leadership on nurses' safety behavior: The mediating role of safety knowledge and motivation. *J Safety Res*. 2023 Feb;84:117–28. Doi: <https://doi.org/10.1016/j.jsr.2022.10.013>
20. Dahl Ø, Olsen E. Safety compliance on offshore platforms: A multi-sample survey on the role of perceived leadership involvement and work climate. *Saf Sci*. 2013 Apr;54:17–26. Doi: <https://doi.org/10.1016/j.ssci.2012.11.003>
21. Blau PM. *Exchange and Power in Social Life*. Routledge; 2017. Doi: <https://doi.org/10.4324/9780203792643>
22. Gouldner AW. The Norm of Reciprocity: A Preliminary Statement. *Am Sociol Rev*. 1960 Apr;25(2):161. Doi: <https://doi.org/10.2307/2092623>
23. Alban-Metcalf J, Alimo-Metcalf B. Reliability and validity of the “leadership competencies and engaging leadership scale.” *International Journal of Public Sector Management*. 2013 Jan 21;26(1):56–73. Doi: <http://dx.doi.org/10.1108/09513551311294281>
24. Oswald D, Lingard H, Zhang RP. How transactional and transformational safety leadership behaviours are demonstrated within the construction industry. *Construction Management and Economics*. 2022 May 4;40(5):374–90. Doi: <https://doi.org/10.1080/01446193.2022.2053998>

25. Gravina N, Villacorta J, Albert K, Clark R, Curry S, Wilder D. A Literature Review of Organizational Behavior Management Interventions in Human Service Settings from 1990 to 2016. *J Organ Behav Manage*. 2018 Apr 3;38(2–3):191–224. Doi: <https://doi.org/10.1080/01608061.2018.1454872>
26. Clarke S, Taylor I. Reducing workplace accidents through the use of leadership interventions: A quasi-experimental field study. *Accid Anal Prev*. 2018 Dec;121:314–20. Doi: <https://doi.org/10.1016/j.aap.2018.05.010>
27. Wu TC, Chang SH, Shu CM, Chen CT, Wang CP. Safety leadership and safety performance in petrochemical industries: The mediating role of safety climate. *J Loss Prev Process Ind*. 2011 Nov;24(6):716–21. Doi: <https://doi.org/10.1016/j.jlp.2011.04.007>
28. Napitupulu BS, Widanarko B. Identification of Risk Factors for Work Stress Field Workers in Oil and Gas Industry: Literature Review. *Media Publ Promosi Kesehat Indones*. 2024;7(10):2465–71.
29. Ikhwanuddin RY, Djunaidi Z. Qualitative Analysis using HFACS Model on Factors Causing Risk-taking Behavior at Workplace. *Media Publ Promosi Kesehat Indones*. 2024;7(10):2506–13.
30. Dimasruhin F, Ramdhan DH. Analysis of Occupational Safety and Health at Oil Plus Filling Station Installations: Literature Review. *Media Publ Promosi Kesehat Indones*. 2024;7(11):2592–9.