



OPTIMISING SAFETY: INVESTIGATING THE NEXUS OF SAFETY MANAGEMENT, SAFETY CLIMATE AND SAFETY PERFORMANCE IN MALAYSIAN LOGISTICS COMPANIES

MOHD AZRIL ISMAIL*, AINA MASYTA WARIS, NUR UMMI KAMALIA MOHD KAMAL, NOR SHAFIKAH ZAINI, KAMAL IMRAN MOHD SHARIF AND MOHD GHOZALI HASSAN

School of Technology Management and Logistics, College of Business, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia.

**Corresponding author: azril@uum.edu.my*

ARTICLE INFO	ABSTRACT
<p>Article History: Received: 23 May 2024 Accepted: 18 July 2024 Published: 20 August 2024</p> <hr/> <p>Keywords: Safety performance, safety climate, safety management practices, logistics.</p>	<p>Safety management is crucial within the logistics sector, addressing workplace safety issues by highlighting deficiencies in safety practice comprehension as a root cause of safety performance challenges. Logistic companies often lack robust safety management practices, with workers perceiving the safety climate as ineffective. This study employs a quantitative research approach, utilising surveys distributed to 107 respondents, including operators and truck drivers from various Malaysian logistics companies. Data analysis using IBM SPSS version 29, including reliability, validity, and normality tests, reveals a significant association between safety performance, safety management practices, and safety climate. Results indicate a positive correlation between a strong safety climate and enhanced safety performance, emphasising the importance of fostering a safety-conscious culture to reduce accidents and improve safety outcomes. The study aims to identify and analyse elements influencing safety performance, examine the relationship between safety management practices and safety climate, and propose strategies to enhance workplace safety. Strategic interventions to strengthen the safety climate are essential for achieving safety excellence in Malaysia’s logistics operations.</p>

© UMT Press

Introduction

Confirming the safety of personnel, assets, and the environment remains paramount within the dynamic and high-stakes domain of container terminal operations. As essential nodes in the global supply chain, logistic companies in Malaysia play a vital role in facilitating the continuous flow of goods. Given the complexities and necessities inherent to such operational environments, this study investigates the nuanced interplay among safety management practices, safety climate, and safety performance within Malaysian logistic companies.

A lack of understanding regarding workplace safety leads to a lack of confidence in safety

leadership, weakening the effectiveness of safety initiatives within the safety climate framework. This erosion of trust results in complacency and disengagement among employees. Additionally, poor communication and feedback mechanisms further destabilise safety conditions within organisations. Ineffective communication between top and lower management often exacerbates occupational safety issues (Vu *et al.*, 2022).

Furthermore, deficiencies in safety management practices contribute to organisational safety performance problems. A significant issue is a recurrent inadequacy in safety training, which frequently fails to address

specific hazards related to goods handling and emergency response protocols (Naji *et al.*, 2021).

Literature Review

This section provides an in-depth analysis of the existing literature concerning the interaction among safety management practices, safety climate, and safety performance within logistics companies in Malaysia. The correlation between these factors has gathered considerable attention across diverse sectors, from industrial workplaces to major accident hazard process industries. Numerous studies have explored this correlation to assess organisational efficacy in preventing workplace incidents and accidents (Kim *et al.*, 2021). Key elements such as safety policies, procedures, training programs, and compliance monitoring are crucial in safety management practices. Safety policies provide a framework for ensuring all safety-related activities align with regulatory standards and organisational goals. Procedures outline specific steps for safe operations while training programs ensure employees have the skills to handle various hazards. Compliance monitoring involves regular audits and inspections to ensure adherence to safety protocols (Kim *et al.*, 2021).

In the context of safety climate, critical components include management commitment, communication, employee involvement, and safety feedback mechanisms. Management commitment reflects the extent to which leadership prioritises safety while effective communication ensures that safety information is accurately disseminated throughout the organisation. Employee involvement fosters a sense of ownership and accountability for safety practices and safety feedback mechanisms enable continuous improvement by identifying and resolving safety issues (Noor Arzahan *et al.*, 2022). On the other hand, safety performance is often measured using indicators such as accident rates, incident reports, near-miss occurrences, and employee perceptions of safety. These indicators provide quantitative and qualitative data on the effectiveness of safety initiatives and

help identify areas for improvement. The study's questionnaires incorporate these elements to comprehensively assess the interplay between safety management practices, safety climate, and safety performance, providing a robust framework for analysing safety outcomes within Malaysian logistics companies.

Safety Performance

According to Kim *et al.* (2021), safety performance involves correcting the safety protocols and utilising appropriate Personal Protective Equipment (PPE) while safety participation involves actively engaging in safety-related initiatives to enhance workplace safety.

Safety performance encompasses the actions, behaviours, and procedures undertaken by individuals and organisations to establish and uphold a safe and secure work environment (Noor Arzahan *et al.*, 2022). This includes following safety guidelines, adhering to regulatory standards, participating in safety initiatives, and demonstrating an overall dedication to foster and preserve workplace safety (Shaikh *et al.*, 2020). It encompasses both proactive measures to prevent accidents and incidents and reactive responses to address safety hazards and concerns. Within organisational management and employee behaviour, particularly in industries prioritising workplace safety, safety performance is important in daily operations.

Furthermore, safety performance can be summarised within a comprehensive safety management framework, with its outcomes influenced and gauged by various factors such as safety management practices, organisational safety culture, safety training initiatives, provision of safety equipment, incident investigation procedures, evaluation of safety training effectiveness, and statistical measures of accidents (Sultana *et al.*, 2019). It serves as a means for organisations to evaluate leadership effectiveness and is conceptualised through aspects like safety equipment provision, safety procedures, safety management strategies,

accident investigation outcomes, safety training initiatives, and organisational safety culture (Naji *et al.*, 2021).

Safety Management Practices

In the existing literature, safety management practices have received considerable attention as pivotal components in fostering workplace safety. Numerous studies have explained various safety management practices that enhance safety performance and mitigate accidents and injuries. For instance, Wong *et al.* (2020) identified safety training, safety communication, and safety motivation as significant predictors of employee safety behaviour, underscoring the crucial role of safety-offence points systems, safety supervision, and safety training in influencing the utilisation of personal protective equipment (PPE). Moreover, their subsequent work (Wong *et al.*, 2021) emphasised the effectiveness of safety training, communication, and supervision in reducing accidents and injuries within industrial settings.

Auyong *et al.* (2016) defined safety management practices as a comprehensive set of policies, procedures, and initiatives organisations adopt to ensure the safety and well-being of their workforce and stakeholders. These encompass hazard identification and assessment, risk mitigation measures, safety training and education provision, and cultivating a safety culture emphasising continuous improvement and accountability. Implementing such practices effectively prevents workplace incidents, minimises associated costs, and enhances overall organisational performance.

Safety management practices imply systematic and strategic measures undertaken within organisations to safeguard employee well-being and maintain a secure and safe work environment. These practices typically involve a managerial commitment to safety, provision of safety training, adherence to safety protocols, and active involvement of employees in safety endeavours. The primary objective is to nurture a safety-centric culture, mitigate workplace

hazards, and promote overall health and welfare of individuals within the organisation (Vu *et al.*, 2022).

Safety Climate

Safety climate stands as a pivotal concept in workplace safety management, attracting significant attention for developing and utilising comprehensive measurement scales. Defined as employees' perceptions regarding organisational policies, practices, and procedures about safety, safety climate is a barometer for gauging the importance of safety within a workplace (Shea *et al.*, 2021). It encapsulates how employees perceive the prioritisation of safety within their organisation, reflecting the extent to which safety is valued, endorsed, and acknowledged in the workplace.

In essence, safety climate encompasses the collective perceptions of employees regarding the expectations, values, and emphasis placed on safety in the workplace. It mirrors the broader safety culture within an organisation and holds the potential to influence employee safety awareness, attitudes, and behaviours, thereby contributing to the prevention of injuries (Probst *et al.*, 2019). As defined by Wagner *et al.* (2019), safety climate pertains to the aggregated perceptions, attitudes, and beliefs concerning safety within an organisation, particularly within the workplace domain. This encompasses how employees perceive safety regulations, procedures, and practices communicated by management, colleagues, and supervisors.

Acknowledged as a valuable diagnostic tool for identifying and addressing safety-related concerns within organisations, safety climate assessment ultimately aims at enhancing safety performance. It encompasses various factors, including communication, support, adequacy of procedures, work pressure, provision of personal protective equipment, interpersonal dynamics, adherence to safety protocols, frequency of safe behaviours, attitudes toward safety, management commitment to safety, provision of safety training and consultation, supervisory roles,

risk propensity, availability of safety resources, evaluation of safety protocols and work-related risks, adherence to safety procedures, employee engagement, and peer influence (Han *et al.*, 2021).

Research Methodology

This research aims to enhance the safety performance of logistics companies operating in Malaysia. The analysis employs a quantitative research methodology to systematically investigate and quantify the factors influencing safety performance within this sector. Quantitative research involves collecting and analysing numerical data to identify patterns, relationships, and trends. In improving safety performance in logistics companies, this approach allows for the measurement and statistical analysis of key variables such as safety management practices, safety climate perceptions, and accident or incident rates (Auyong *et al.*, 2016).

This research methodology typically involves using structured surveys or questionnaires to gather data from logistics companies' employees, managers, and other relevant stakeholders. In this study, researchers categorised all respondents as logistics operators to represent their companies. These surveys assess perceptions of safety management practices, attitudes towards safety, and observations of safety climate within the organisation. Additionally, quantitative analysis techniques such as regression analysis, correlation analysis, and statistical modelling are employed to identify significant predictors of safety performance and evaluate the strength of relationships between different variables. By utilising a quantitative research approach, this study aims to provide empirical evidence and quantitative insights into the factors influencing safety performance within logistics companies in Malaysia. This rigorous methodology enables researchers to generate reliable, data-driven findings that inform evidence-based interventions and strategies to improve workplace safety in this sector.

The sampling technique used in this research is crucial for ensuring the representativeness and reliability of the findings. This study adopts a stratified random sampling technique to ensure that various subgroups within the logistics sector are adequately represented. Stratified random sampling involves dividing the population into distinct subgroups or strata based on specific characteristics such as job role, company size, or geographic location. A random sample is drawn from each section, ensuring that each subgroup is proportionately represented in the final sample. This technique helps to reduce sampling bias and increases the precision of the estimates by ensuring that all relevant subgroups are included in the analysis (Probst *et al.*, 2019).

In this study, the researchers identified key strata within the logistics sector such as different type of logistics operators, including truck drivers, warehouse staff, and administrative personnel as logistics operators. By doing so, the researchers ensured that the perspectives of a diverse range of employees were captured. The surveys were distributed via email and Google Forms, targeting these different strata to gather a comprehensive dataset. This approach enhances the generalizability of the findings and provides a nuanced understanding of how different roles within logistics companies perceive and experience safety management practices and safety climate.

This stratified random sampling technique allows the study to draw more accurate and representative conclusions about the factors influencing safety performance in the Malaysian logistics sector. The detailed analysis of this diverse dataset allows for identifying specific areas where safety improvements are needed and helps formulate targeted strategies to enhance overall safety performance.

This research aims to enhance the safety performance of logistics companies operating in Malaysia. This analysis employs a quantitative methodology to systematically investigate and quantify the factors influencing safety performance within this sector. Quantitative research involves collecting and analysing of

numerical data to identify patterns, relationships, and trends. In improving safety performance in logistics companies, this approach allows for the measurement and statistical analysis of key variables such as safety management practices, safety climate perceptions, and accident or incident rates. Additionally, quantitative analysis techniques such as regression analysis, correlation analysis, and statistical modelling can be employed to identify significant predictors of safety performance and evaluate the strength of relationships between different variables.

By utilising a quantitative research approach, this study aims to provide empirical evidence and quantitative insights into the factors influencing safety performance within

logistics companies in Malaysia. This rigorous methodology enables researchers to generate reliable data-driven findings that inform evidence-based interventions and strategies to improve workplace safety in this sector.

Population and Sample Size

The study’s population consisted of 107 participants among logistics operators from various logistics companies in Malaysia, especially those heavily operated in Northern Peninsular Malaysia (Table 1). Selecting an appropriate research technique is vital as it dictates how data regarding safety performance, safety management practices, and safety climate will be gathered. The respondents in this research are shown below:

Table 1: Research respondents

Logistics Companies	
Companies	Logistics Operators
Eng Thai	8
Tiong Nam	13
Peti Kemas	8
J&T	10
Ninja Van	8
Skyline Logistics Express	8
Nur Ajwa Sdn. Bhd.	8
Boon Koon Vehicles	8
Nibong Tebal paper mill	9
Scope manufacturers	10
Viking	8
Venture Senai	9
Total	107

To collect the research data, researchers utilised Google Forms, distributing questionnaires to participants via email. The questionnaire comprised four sections: Demographics (Section A), Safety performance (Section B), Safety management practices (Section C), and Safety climate (Section D). Section A encompassed five questions pertaining to respondents’ demographic information, including age, gender, education level,

occupation, and years of experience. Section B focusing on safety performance, consisted of 39 questions exploring respondents’ perceptions of workplace safety and organisational safety responsibilities.

In Section C, which examined safety management practices, respondents were presented with 19 questions evaluating their adherence to safety protocols and knowledge. Lastly, Section D, comprising 37 questions,

examined participants’ perspectives and attitudes towards safety climate. Through distributing the questionnaire via Google Forms, we received responses from all 107 participants from logistics operators willing to participate in this study. This methodology enabled the systematic collection of data regarding safety performance, safety management practices, and safety climate within logistics companies in Malaysia.

Data Collection Method

This research study focuses on safety performance within Logistics Companies in Malaysia. Data collection is primarily conducted through a structured questionnaire. The research employs both primary and secondary data collection methods. The questionnaire utilises a Likert Rating Scale ranging from 1 to 5, where respondents are asked to indicate their level of agreement with a series of questionnaire statements. Structured into four parts, the questionnaire comprehensively assesses various aspects of safety performance, safety management practices, and safety climate within the operations of logistics companies in Malaysia.

Utilising the Likert Rating Scale enhances the questionnaire’s reliability and accuracy, ensuring that respondents’ perspectives are captured effectively. Overall, the survey instrument appears robust, providing a thorough

evaluation of the effectiveness of safety measures within logistics companies’ operations in Malaysia.

Data Analysis

In this research, statistical tools were employed to analyse the data. The data gathered from questionnaires underwent research coding and analysis using Statistical Software Package for Social Science (SPSS) Version 29. Various statistical techniques have been utilised, encompassing descriptive and inferential statistics, factor analysis, correlation analysis, and regression analysis to measure data accuracy and research findings.

Hypothesis testing, correlation analysis, regression analysis, and multivariate analysis are among the statistical methods applied in this study to explore relationships and patterns within the data. To assess the internal consistency and reliability of the questionnaire, researchers utilised Cronbach’s Alpha or Alpha Coefficient. This statistical measure helps determine the reliability of the questionnaire items. The reliability of the research instruments, as indicated in Table 2 is reflected in Cronbach’s Alpha values range from 0.957 to 0.976. These values signify a high level of internal consistency among the questionnaire items, indicating their reliability in measuring the constructs of interest.

Table 2: Result of reliability test

Variable	No. of Items	Cronbach’s Alpha
Safety performance	39	.970
Safety management practices	19	.957
Safety climate	36	.976

Analysis and Result

In this comprehensive analysis, researchers investigate the intricate patterns and significant findings derived from our research endeavour. Utilising the SPSS, researchers precisely analysed the data collected through a survey conducted among 107 respondents randomly

selected from various logistics companies in Malaysia. Section A of the questionnaire focused on demographic information, comprising inquiries regarding respondents’ age, gender, level of education, occupation, and years of experience. This demographic data provided

valuable insights into the characteristics of our sample population, facilitating a deeper understanding of the study context.

Throughout our investigation, researchers employed a 5-point Likert Rating Scale to gauge respondents' perceptions and attitudes, simplifying the interpretation of results and enhancing clarity. Our analysis yielded several key components, including demographic breakdowns, model summaries, reliability statistics, ANOVA tables, and coefficients.

These components collectively shed light on the relationships between variables, allowing us to draw meaningful conclusions and uncover insights into the factors influencing safety performance within logistics companies in Malaysia. By precisely examining these findings, researchers aim to contribute to the existing body of knowledge in workplace safety management, providing valuable insights that can inform policy decisions and organisational practices to enhance safety outcomes within the logistics sector.

Table 3: Respondents demographic profile

Profile	Frequency	Percentage (%)
Gender		
Male	79	73.8
Female	28	26.2
Age		
19-21 years old	9	8.4
22-26 years old	44	41.1
27-31 years old	24	22.4
32-36 years old	14	13.1
More than 37 years old	16	15
Highest level of education		
PMR/PT3	6	5.6
SPM	58	54.2
STPM	15	14
Diploma	15	14
Degree	9	8.4
Others	4	3.7
Position		
Logistics operators	107	100
Working tenure		
Less than 1 year	27	25.2
1-3 years	48	44.9
More than 3 years	32	29.9

In examining the demographic data presented in Table 3, it is evident that the surveyed population displayed a predominant male presence at 73.8%, with females accounting for 26.2%. The age distribution skewed towards individuals aged 22 to 26, making up 41.1% of the sample while the educational background primarily consisted of SPM graduates at 54.2%. Interestingly, this study has concluded the various positions in logistics companies

such as managers, executives, operators, and truck drivers as the logistics operators. Work experience was evenly distributed across the categories, with the 1 to 3 years group being the most prevalent at 44.9%. These demographic insights could serve as foundational data for further research, allowing for correlations between demographic factors and the variables under study while also necessitating a discussion on potential sample biases and limitations within the research context.

Table 4: Mean level according to variable

Variables	Mean	Minimum	Maximum
Safety performance (SP)	4.2646	3.00	5.00
Safety management practices (SMP)	4.4088	3.00	5.00
Safety climate (SC)	4.3353	3.00	5.00

Table 4 presents the mean levels observed across various variables. Analysis reveals that the variable safety management practices garners a notably high mean score of 4.4088. This suggests a strong emphasis on safety management practices within Malaysian logistics companies, indicative of a concerted effort towards promoting workplace safety and environmental sustainability.

Following attentively, the safety climate variable indicates the second-highest mean score of 4.3353, reflecting positive perceptions

regarding safety within the organisational climate. Conversely, the safety performance variable records the lowest mean score of 4.2646, suggesting a slightly lower level of emphasis on safety performance compared to safety management practices and safety climate. These findings underscore the significance of robust safety management practices in fostering a positive safety climate within logistics companies, ultimately contributing to enhanced safety outcomes and organisational effectiveness.

Table 5: Model summary

Model Summary				
Model	R	R-square	Adjusted R-square	Std. Error of the Estimate
1	.872	.781	.756	.25779

Examining the results showcased in Table 5, the R-value of 0.872 indicates a strong relationship between the independent and dependent variables. Moreover, the R-square value of 0.781 suggests that the predictor’s safety management practices and safety climate collectively contribute to 78% of the variance in safety performance. This signifies a robust model, as it effectively explains a significant

portion of the variability in the dependent variable.

Notably, this model exclusively elucidates 78% of the variances in the dependent variable, underscoring the substantial impact of safety management practices and safety climate on safety performance within the context of logistics companies in Malaysia.

Table 6: Result of reliability test

Variable	No. of Items	Cronbach’s Alpha
Safety performance	39	.970
Safety management practices	19	.957
Safety climate	36	.976

Upon analysing the results in Table 6, it becomes evident that each variable demonstrates

a high level of consistency, with coefficients ranging from 0.957 to 0.976. A minimum

Alpha Coefficient of 0.6 is typically considered indicative of reliability. Notably, the safety climate component attains the highest coefficient of 0.976, indicating exceptional reliability and robustness of the data about safety climate.

The safety management practices section achieves a slightly lower coefficient of 0.957. While not as high as the safety climate variable, it

still exhibits strong reliability, further bolstering the credibility of the study’s findings. Overall, the analysis confirms the highly reliable nature of the study’s findings. With solid coefficients across all variables, there is a high level of confidence in the accuracy and trustworthiness of the results, underscoring the validity of the research outcomes.

Table 7: ANOVA table

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	22.006	2	11.003	165.571	< .001b
Residual	6.911	104	.066		
Total	28.917	106			

The ANOVA results in Table 7 unveil a p-value of 0.001, falling below the conventional significance threshold of 0.05. This signifies the statistical significance of the regression model, indicating that at least one predictor within the model significantly accounts for variance in the factors influencing safety performance.

We scrutinise the coefficient values derived from the regression analysis to pinpoint which independent variables wield significant relationships with the dependent variable. These coefficients elucidate the strength and direction of the relationships between the predictors and safety performance, providing valuable insights into the factors driving safety outcomes within the context of our study.

Table 8: Coefficient table

Model	Unstandardised Coefficients		Standardised Coefficient			Collinearity Statistics	
	b	Std. error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	.270	.221		1.220	.225		
SMP	.380	.099	.375	3.855	< .001	.243	4.119
SC	.535	.099	.526	5.408	< .001	.243	4.119

A multiple regression analysis was conducted to examine the research question represented by Table 8, employing safety management practices and safety climate as predictors and safety performance as the dependent variable. The results indicated the overall significance of the predictive model, with a statistically significant F-value of 165.57 for the model (df = 2, 104), a substantial coefficient

of determination ($R^2 = .872$), and a p-value less than .001.

The findings demonstrated that safety management practices and climate significantly and positively predicted safety performance. Specifically, safety management practices exhibited a significant positive effect ($\beta = .375$, $t = 3.86$, $p < .001$), indicating that as

safety management practices increase, safety performance also increases. Similarly, safety climate emerged as a significant positive predictor ($\beta = .526, t = 5.41, p < .001$), implying that a positive safety climate corresponds to higher safety performance levels. These results underscore the importance of safety management practices and safety climate in shaping safety performance within the study, highlighting their critical roles in promoting workplace safety within logistics companies in Malaysia.

Conclusions and Implication

This research aimed to evaluate the interchange between safety performance, safety management practices, and safety climate within logistics companies in Malaysia. Utilising SPSS for data analysis, the study uncovered a significant correlation between a positive safety climate and enhanced safety performance. The cultivation of a safety-conscious culture within these organisations was associated with proactive measures, leading to a reduction in accidents, and overall improvement in safety outcomes. The findings underscore the potential impact of targeted interventions to support the safety climate on sustained safety success in Malaysian logistics operations. Moreover, the study highlights the pivotal role of safety management practices and safety climate in shaping safety performance.

This research emphasises the imperative of promoting safety awareness among logistics employees in Malaysia, underscoring the importance of regular safety training. Tailored training modules covering hazard identification, emergency response, and safety protocols are recommended, complemented by practical simulations and multimedia tools. Collaboration with safety experts, ongoing training sessions, and periodic evaluations are essential for sustaining safety awareness. Furthermore, innovative technologies such as GPS tracking systems and wearable devices like smart helmets or vests are proposed to mitigate risks, monitor the logistics operators' behaviour, and enhance personal safety awareness in daily routine

operations. Embracing these technological solutions fosters a safer work environment and aligns with contemporary safety standards and safety protocols in the logistics industry nowadays.

For future researchers focusing on safety performance within logistics companies, conducting direct interviews with employees can offer valuable insights into understanding occupational safety and health issues. Exploring the nexus between safety culture, performance, and financial outcomes may yield broader organisational benefits, advocating for investments in safety programs. Investigating the role of occupational safety and health practitioners in improving safety outcomes and enhancing their knowledge represents a critical avenue for future research. Additionally, crafting a comprehensive framework that amalgamates existing organisational safety culture models can provide a more nuanced understanding of the factors influencing safety culture development. By investigating these aspects, researchers can contribute to a deeper comprehension of the intricate relationship between safety management practices, safety climate, and performance, thereby fostering advancements in safety across diverse organisational contexts.

Acknowledgements

This research has been a collaborative endeavour made possible through the invaluable support and contributions of many individuals and institutions. We extend our deepest gratitude to Universiti Utara Malaysia, whose continuous commitment to academic excellence provided the resources and intellectual environment necessary for this study. Our appreciation also goes to the Malaysian logistics companies that participated in this research, offering insights and data crucial for our investigation.

Special thanks are due to the safety management professionals and frontline workers whose engagement and honesty in discussing their experiences have enriched our understanding of the complex interplay between safety management, safety climate, and safety

performance. Their openness has allowed us to explore these critical factors in depth, paving the way for future enhancements in safety practices within the logistics industry.

We are also grateful for the constructive feedback from our peer reviewers and colleagues, whose critical insights have significantly strengthened the rigour and scope of this research. Their contributions have been instrumental in refining our focus and ensuring that our findings can make a meaningful impact on both academic discourse and practical applications.

Finally, we acknowledge the unwavering support of our families and friends, whose encouragement and understanding have been vital throughout this research journey. Their patience and belief in the value of this work have been a constant source of motivation.

Conflict of Interest Statement

The authors declare that they have no conflict of interest.

References

- Auyong, H.-N., Zailani, S., & Surlenty, L. (2016). Perceived safety management practices in the logistics sector. *Work*, 53(4), 729-735. <https://doi.org/10.3233/wor-162272>
- Han, B., Son, S., & Kim, S. (2021). Measuring safety climate in the construction industry: A systematic literature review. *Sustainability*, 13(19), Article 10603. <https://doi.org/10.3390/su131910603>
- Kim, S., Kim, P. B., & Lee, G. (2021). Predicting hospitality employees' safety performance behaviors in the COVID-19 pandemic. *International Journal of Hospitality Management*, 93, Article 102797. <https://doi.org/10.1016/j.ijhm.2020.102797>
- Naji, G. M. A., Isha, A. S. N., Mohyaldinn, M. E., Leka, S., Saleem, M. S., Rahman, S. M. N. B. S. A., & Alzoraiki, M. (2021). Impact of safety culture on safety performance; mediating role of psychosocial hazard: An integrated modelling approach. *International Journal of Environmental Research and Public Health*, 18(16), Article 8568. <https://doi.org/10.3390/ijerph18168568>
- Noor Arzahan, I. S., Ismail, Z., & Yasin, S. M. (2022). Safety culture, safety climate, and safety performance in healthcare facilities: A systematic review. *Safety Science*, 147, Article 105624. <https://doi.org/10.1016/j.ssci.2021.105624>
- Probst, T. M., Goldenhar, L. M., Byrd, J. L., & Betit, E. (2019). The Safety Climate Assessment Tool (S-CAT): A rubric-based approach to measuring construction safety climate. *Journal of Safety Research*, 69, 43-51. <https://doi.org/10.1016/j.jsr.2019.02.004>
- Shaikh, A. Y., Osei-Kyei, R., & Hardie, M. (2020). A critical analysis of safety performance indicators in construction. *International Journal of Building Pathology and Adaptation*, 39(3), 547-580. <https://doi.org/10.1108/ijbpa-03-2020-0018>
- Shea, T., De Cieri, H., Vu, T., & Pettit, T. (2021). How is safety climate measured? A review and evaluation. *Safety Science*, 143, Article 105413. <https://doi.org/10.1016/j.ssci.2021.105413>
- Sultana, S., Andersen, B. S., & Haugen, S. (2019). Identifying safety indicators for safety performance measurement using a system engineering approach. *Process Safety and Environmental Protection*, 128, 107-120. <https://doi.org/10.1016/j.psep.2019.05.047>
- Vu, T.-V., Vo-Thanh, T., Nguyen, N. P., Nguyen, D. V., & Chi, H. (2022). The COVID-19 pandemic: Workplace safety management practices, job insecurity, and employees' organizational citizenship behaviour. *Safety Science*, 145, Article 105527. <https://doi.org/10.1016/j.ssci.2021.105527>
- Wagner, A., Rieger, M. A., Manser, T., Sturm, H., Hardt, J., Martus, P., Lessing,

- C., & Hammer, A. (2019). Healthcare professionals' perspectives on working conditions, leadership, and safety climate: A cross-sectional study. *BMC Health Services Research*, *19*(1). <https://doi.org/10.1186/s12913-018-3862-7>
- Wong, T. K. M., Man, S. S., & Chan, A. H. S. (2020). Critical factors for the use or non-use of personal protective equipment amongst construction workers. *Safety Science*, *126*, Article 104663. <https://doi.org/10.1016/j.ssci.2020.104663>
- Wong, T. K. M., Man, S. S., & Chan, A. H. S. (2021). Exploring the acceptance of PPE by construction workers: An extension of the technology acceptance model with safety management practices and safety consciousness. *Safety Science*, *139*, Article 105239. <https://doi.org/10.1016/j.ssci.2021.105239>