Exploring the Effect of Safety Leadership and Safety Performance in Solid Waste Management Industry: Supporting SDGs

Syazwan Syah ZULKIFLY[1]*, Hairul Nazmin NASRUDDIN[2], Mazlina YUSOF[3], Alice Nurizza AB AZIZ[4]

[1]Universiti Utara Malaysia

[2]Universiti Teknologi Mara Malaysia

[3]Department of Occupational Safety and Health Kedah, Malaysia

[4]University College of MAIWP International, Malaysia

*Corresponding Author

ABSTRACT

This study is motivated by the essential role that solid waste management (SWM) plays in advancing the Sustainable Development Goals (SDGs), specifically in fostering sustainable cities and communities (SDG 11) and promoting health and well-being (SDG 3). The contributions of SWM workers are fundamental to achieving these sustainability goals, as they actively support waste management and environmental initiatives. Therefore, ensuring the safety and well-being of SWM workers is critical to sustaining SWM efforts and advancing the SDGs. However, workplace accidents—often resulting from unsafe practices—pose ongoing challenges in the sector, highlighting the need to understand factors that influence worker safety behavior. Safety leadership, particularly through supervisory coaching, concern, and proactive monitoring, has been recognized as an effective driver of safety performance. This study investigates how these aspects of safety leadership impact safety behaviors and accident reduction among SWM workers engaged in public sanitation—an area with limited prior research. Data were analyzed through structural equation modeling using partial least squares (PLS-SEM). Results indicate that safety leadership, as demonstrated through coaching, concern, and monitoring, significantly influences safety behaviors among SWM workers. Furthermore, both coaching and monitoring show particularly strong effects in reducing accident rates within the company. This study examines the impact of safety leadership dimensions—coaching, concern, and monitoring—on safety behaviors and accident reduction among solid waste management (SWM) workers in Kedah, Malaysia. Leveraging Social Exchange Theory and Accident Causation Theory, the research reveals that while coaching and monitoring significantly reduce accidents, the influence of safety concern was unexpectedly limited. These findings provide theoretical insights and practical recommendations for enhancing safety performance in high-risk industries, supporting Sustainable Development Goals (SDGs) such as health (SDG 3) and sustainable cities (SDG 11)

Keywords: Accident; Safety Performance; Safety Behaviour; Safety Leadership; Solid Waste

INTRODUCTION

As global efforts toward sustainability intensify, solid waste management (SWM) has emerged as a critical sector in achieving the United Nations Sustainable Development Goals (SDGs). SWM plays a vital role in advancing SDG targets, such as fostering sustainable cities and communities (SDG 11), enhancing public health and well-being (SDG 3), supporting clean water and sanitation (SDG 6), promoting responsible

consumption and production (SDG 12), and contributing to climate action (SDG 13). Effective SWM initiatives are heavily reliant on the health, safety, and performance of workers engaged in waste collection, recycling, and disposal activities. These workers operate in high-risk environments, frequently exposed to physical hazards, health risks, and challenging work conditions, including heavy machinery, hazardous chemicals, and ergonomic stressors. Previous studies have highlighted hazards in SWM, such as inadequate protective equipment and psychological strain among waste handlers in South Africa (Tshivhase et al., 2022) and health disorders from chemical exposures among informal workers (Jerie, 2016). Yet, despite safety protocols, workplace accidents persist, often linked to unsafe conditions and actions (Bowonder, 1987; Gyekye, 2010; Zakaria et al., 2012), underscoring the need to investigate factors influencing safety behavior.

A primary motivator for this study is the persistent increase in workplace accidents and fatalities within Malaysia's SWM sector, with significant rises reported from 2018 onward (Jabatan Keselamatan dan Kesihatan Pekerjaan, 2021, 2022). Understanding and improving safety behavior is essential for both worker well-being and the continuity of SWM efforts. Safety leadership, particularly through supervisory coaching, concern, and consistent monitoring, has shown considerable promise in shaping positive safety outcomes and reducing accident rates. Although safety training has influenced cognitive and behavioral aspects, such as in Australian construction workers (Loosemore & Malouf, 2019), emotional engagement and overall safety performance depend heavily on effective leadership and a positive safety climate (Kundu, 2015; Oah et al., 2018). Supervisors play a crucial role, as safety leadership has been shown to enhance performance, reduce injuries, and increase motivation and knowledge in hazardous industries (Beus et al., 2016; Lu & Tsai, 2010; Shang et al., 2015).

This study addresses these gaps by exploring how safety leadership, through coaching, concern, and monitoring, impacts the safety performance of SWM workers in Malaysia. Utilizing Social Exchange Theory and Accident Causation Theory, this research investigates safety knowledge, attitudes, behaviors, and accident reduction among 221 predominantly Muslim SWM workers in Kedah, Malaysia. Data were analyzed through structural equation modeling using partial least squares (PLS-SEM), revealing that safety leadership significantly influences safety behaviors and that coaching and monitoring have particularly strong effects on accident reduction. The findings offer empirical insights that inform policies and practices for safety enhancement within SWM and provide a foundation for future studies linking workplace safety initiatives to sustainability objectives, advancing both worker safety and the global SDG agenda.

LITERATURE REVIEW

Safety Leadership

Safety leadership has emerged as a crucial factor in promoting positive safety outcomes in high-risk industries. Effective safety leadership is often characterized by behaviors such as coaching, showing concern for worker safety, and consistent monitoring, all of which significantly influence safety behaviors and reduce accident rates (Loosemore & Malouf, 2019; Beus et al., 2016). Leaders in high-risk sectors who prioritize safety are better able to create a culture of accountability and safety, encouraging employees to adopt safer work practices (Lu & Tsai, 2010; Shang et al., 2015). Studies have found that supervisors' roles are pivotal, as they engage in behaviors that not only influence immediate safety actions but also foster a broader safety culture within their teams (Lu & Tsai, 2010). For instance, in the SWM sector, safety leadership manifested through coaching and supervisory concern has been associated with reductions in workplace incidents, as supervisors set an example and establish clear safety expectations (Zulkifly, 2020; Zulkifly & Mohamad Zahir, 2022).

Safety Behavior

Safety behavior, influenced by factors such as knowledge, attitudes, and supervisory practices, is a predictive factor for workplace accidents (Bowonder, 1987; Gyekye, 2010; Zakaria et al., 2012). Unsafe behaviors often arise from a lack of training, ineffective leadership, or poor safety attitudes. Studies show that

employees' safety-related behaviors are positively impacted by effective leadership, with safety knowledge and attitudes directly correlating to accident reduction (Kundu, 2015; Oah et al., 2018). Additionally, safety training programs targeting cognitive and behavioral aspects have shown improvements in workers' safety knowledge, although emotional engagement remains an area of challenge (Loosemore & Malouf, 2019). These findings underscore the need for safety-focused leadership that promotes safety through direct engagement, thereby reducing unsafe behaviors and enhancing safety performance across various sectors (Basahel, 2021).

This research draws upon these insights by examining the relationship between safety leadership behaviors and safety outcomes in the SWM industry, aiming to deepen the understanding of how leadership practices shape safety attitudes and behaviors and contribute to sustainable workplace practices.

Safety Performance

Safety performance, often assessed through metrics like accident rates, safety compliance, and adherence to safety protocols, is a critical outcome influenced by various organizational and behavioral factors. In high-risk sectors, where workplace incidents are prevalent, enhancing safety performance remains a primary goal. Studies have demonstrated that effective safety leadership positively impacts safety performance by fostering a proactive safety culture and encouraging safe behaviors among employees (Beus et al., 2016; Lu & Tsai, 2010). Supervisors who actively engage in safety practices—such as regular monitoring, coaching, and demonstrating genuine concern for worker well-being—play a vital role in shaping the safety performance of their teams (Shang et al., 2015).

Research highlights that leadership behaviors emphasizing accountability and open communication contribute to better safety performance outcomes, as employees feel motivated and supported in following safety protocols (Loosemore & Malouf, 2019; Kundu, 2015). Additionally, the consistent influence of safety leadership helps to reduce the frequency and severity of accidents, as demonstrated in studies where supervisor-led safety initiatives were shown to mitigate risks effectively (Zulkifly, 2020; Zulkifly & Hasan, 2023). In settings like solid waste management, where workers face substantial hazards, leadership's role in enhancing safety performance is particularly significant, as supervisors directly impact workers' commitment to safe practices through structured feedback and training (Gyekye, 2010; Bowonder, 1987).

Overall, the literature indicates that safety performance improves when leadership actively supports safety behaviors and promotes an environment where safety is prioritized. This study builds on these insights, focusing on how supervisory coaching, concern, and monitoring can elevate safety performance among SWM workers, thereby contributing to a safer and more resilient workforce.

METHODOLOGY

This study employs a quantitative approach, using a cross-sectional design to test its hypotheses. A self-administered questionnaire, developed based on previous research (Lyu et al., 2018; Zulkifly et al., 2021), was used to represent the independent and dependent variables. Data analyses were conducted to assess the influence of various safety leadership components on safety behavior and accident rates. Safety performance was considered as the dependent variable, while safety leadership was analyzed among SWM workers in Kedah. This framework allows for an examination of how the independent variables impact the dependent variable, with inferential analysis offering insights into these relationships.

Earlier studies have documented associations between safety leadership and safety behavior (Lu & Yang, 2010; Zulkifly & Hasan, 2023), as well as safety performance in terms of accident rates (Chua & Wahab, 2017). Similarly, research has identified links between safety concern, safety behavior, and accidents (Chua & Wahab, 2017; Shang et al., 2011; Zulkifly et al., 2023; Zulkifly & Mohamad Zahir, 2022). Additionally, safety monitoring has been shown to correlate with safety behavior (Zulkifly et al., 2023). This study's hypotheses are formulated as follows:

- **H$_1$**: Safety coaching significantly influences safety performance (safety behavior) among SWM workers.
- **H$_2$**: Safety coaching significantly influences safety performance (accidents) among SWM workers.
- **H$_3$**: Safety concern significantly influences safety performance (safety behavior) among SWM workers.
- **H$_4$**: Safety concern significantly influences safety performance (accidents) among SWM workers.
- **H$_5$**: Safety monitoring significantly influences safety performance (safety behavior) among SWM workers.
- **H$_6$**: Safety monitoring significantly influences safety performance (accidents) among SWM workers.

These hypotheses are underpinned by Social Exchange Theory, which suggests that workers are more likely to engage in positive safety behaviors and reduce accidents when they perceive supportive leadership practices such as coaching, concern, and monitoring. Additionally, Theories of Accident Causation support these hypotheses by emphasizing how safety leadership influences worker behavior and accident rates through practices like supervision, safety coaching, and monitoring. Social Exchange Theory underscores the reciprocal relationship between workers and leaders, where supportive leadership fosters positive safety behaviors. Accident Causation Theory further highlights how systemic factors, including leadership actions, influence accident occurrence. These frameworks provide a robust basis for exploring how coaching, concern, and monitoring shape safety performance. Previous applications of these theories in high-risk sectors, such as construction and healthcare, affirm their relevance and support this study's focus on SWM.

A self-administered questionnaire, designed on a Likert scale from 1 (strongly disagree) to 5 (strongly agree) and adapted from previous research (Lyu et al., 2018; Zulkifly et al., 2021), served as the primary research instrument. The survey was conducted among general workers employed by a public cleaning company in northern Malaysia. Using G*Power, the sample size was determined to be 250, with a minimum of 89 respondents required to achieve a 5% margin of error and a 95% confidence level (Hair et al., 2006). From a list of 1,406 general workers provided by the company's Safety and Health Officer, 250 participants were randomly selected using a random number table (MacNealy, 1999). Surveys were distributed and collected within a two-week timeframe.

RESULTS AND DISCUSSION

The demographic results show that the sample consisted predominantly of male respondents (91%), with a smaller proportion of female respondents (9%). In terms of marital status, the majority were married (77%), followed by single individuals (21%) and a very small percentage who were widowed or divorced (1%). Regarding ethnicity, the sample was predominantly Malay (77%), with a smaller representation of Indian respondents (23%). In terms of educational background, the largest group had completed LCE/SRP/PMR (38%), followed closely by those with MCE/SPM/SPMV qualifications (32%). The age distribution was varied, with the majority falling within the 30-39 years old category (36%), followed by those aged 40-49 years (25%) and 20-29 years (23%). Lastly, in terms of job tenure, nearly half of the respondents had less than 5 years of tenure (45%), followed by those with a tenure of 5-10 years (24%), and 11-15 years (20%).

Furthermore in this study, Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the data. Convergent validity was first assessed to ensure that items within each construct consistently measured the same underlying concept. The high Cronbach's alpha values (Accident = 0.826, Safety Behavior = 0.974, Safety Coaching = 0.958, Safety Concern = 0.966, Safety Monitoring = 0.972), as displayed in Table 1, indicate strong internal consistency. Likewise, composite reliability values ranging from 0.885 to 0.968 confirm the reliability of the measurement model. Additionally, average variance extracted (AVE) values exceeding 0.5 (e.g., Safety Behavior = 0.865, Safety Coaching = 0.857, Safety Concern = 0.882, Safety Monitoring = 0.875) confirm that each construct explains a substantial amount of variance in its indicators, supporting convergent validity (Ramayah et al., 2018). The R-squared (R^2) values further reveal that predictor variables explain a significant portion of variance in safety behavior (0.662) and

accidents (0.230), demonstrating the model's predictive strength for these outcomes. The results were depicted in Table 1.

Table 1: Convergent validity Variables

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)	R2
Accident	0.826	0.885	0.660	0.230
Safety Behaviour	0.974	0.978	0.865	0.662
Safety Coaching	0.958	0.968	0.857	
Safety Concern	0.966	0.974	0.882	
Safety Monitoring	0.972	0.977	0.875	

Table 2 presents the Heterotrait-Monotrait (HTMT) ratios, which assess discriminant validity by evaluating the distinctiveness of each construct in the model. Discriminant validity is crucial in ensuring that each construct captures a unique concept, thereby confirming that items intended to measure different constructs are not overly correlated. According to Henseler et al. (2014), HTMT values below 0.85 indicate acceptable discriminant validity, suggesting that the constructs are adequately distinct from each other.

In this study, the HTMT values between the constructs indicate strong discriminant validity. For instance, the ratio between Accident and other constructs remains well below the threshold, with values of 0.373, 0.511, 0.440, and 0.475 when paired with Safety Behavior, Safety Coaching, Safety Concern, and Safety Monitoring, respectively. These low correlations support the idea that the Accident construct is measuring a concept distinct from the other variables in the model.

Similarly, the Safety Behavior construct shows acceptable HTMT values with the other constructs, maintaining a ratio of 0.786 with Safety Coaching, 0.800 with Safety Concern, and 0.749 with Safety Monitoring. Although the values between Safety Behavior and both Safety Coaching and Safety Concern are closer to the 0.85 threshold, they still indicate that the constructs are measuring separate aspects of safety performance. This suggests that while these constructs are related, they maintain sufficient independence to confirm discriminant validity.

Moreover, Safety Coaching and Safety Concern, with an HTMT ratio of 0.850, are right at the threshold but still indicate that the constructs are distinct enough to be considered separate factors. Lastly, Safety Concern and Safety Monitoring also have a high HTMT value of 0.840, yet remain below the threshold, further affirming that each construct measures unique aspects within the study. Collectively, these HTMT values validate the distinctiveness of each construct, ensuring that they capture different dimensions of safety leadership and behavior, thus supporting the robustness of the measurement model (Henseler et al., 2014).

Table 2: Discriminant validity ratio - HTMT (Heterotrait-Monotrait)

	1	2	3	4
1. Accident				
2. Safety Behaviour	0.373			
3. Safety Coaching	0.511	0.786		
4. Safety Concern	0.440	0.800	0.850	
5. Safety Monitoring	0.475	0.749	0.789	0.840

Table 3 presents the path coefficients and T-statistics for the relationships between safety leadership components (Safety Coaching, Safety Concern, and Safety Monitoring) and two key outcomes: Accident and Safety Behavior. The path coefficient (β) indicates the strength and direction of each relationship, while the T-statistics and *p* values demonstrate the significance of these effects.

The results show that **Safety Coaching** has a negative effect on Accident (β = -0.341, T = 2.737, $p < 0.05$), suggesting that as safety coaching increases, the incidence of accidents decreases. This relationship is statistically significant at the 0.05 level, indicating that effective safety coaching can play an important role in reducing workplace accidents. Safety Coaching also has a positive impact on Safety Behavior (β = 0.317, T = 2.401, $p < 0.05$), signifying that enhanced coaching leads to improved safety behavior among workers.

On the other hand, **Safety Concern** shows a non-significant relationship with Accident (β = 0.057, T = 0.331), meaning that expressed concern for safety does not have a statistically significant effect on accident reduction in this study. However, Safety Concern does have a positive and significant relationship with Safety Behavior (β = 0.356, T = 2.565, $p < 0.05$), indicating that when supervisors demonstrate concern for safety, it positively influences workers' adherence to safe behaviors.

Safety Monitoring is significantly associated with Safety Behaviour (β = 0.198, T = 1.702, $p < 0.05$), indicating that monitoring efforts by supervisors can improve workers' safety practices. Safety Monitoring also exhibits a negative effect on Accident (β = -0.220, T = 1.597, $p < 0.1$), which is significant at the 0.1 level. This suggests that increased monitoring contributes to a reduction in accidents, though this relationship is less statistically robust compared to other findings.

Table 3: Path Coefficient

Path	β (Path Coefficient)	T Statistics	Significance Level
Safety Coaching -> Accident	-0.341	2.737	$p < 0.05$
Safety Coaching -> Safety Behaviour	0.317	2.401	$p < 0.05$
Safety Concern -> Accident	0.057	0.331	Not significant
Safety Concern -> Safety Behaviour	0.356	2.565	$p < 0.05$
Safety Monitoring -> Accident	-0.220	1.597	$p < 0.1$
Safety Monitoring -> Safety Behaviour	0.198	1.702	$p < 0.05$

The study offers valuable insights into the factors influencing safety dynamics and accident rates among solid waste management (SWM) workers, emphasizing the importance of targeted leadership interventions in promoting safety. Specifically, **Safety Coaching** was found to have a significant effect in reducing accidents and positively influencing safety behavior (Zulkifly & Hasan, 2023). This underscores the crucial role of effective coaching as a proactive safety measure, where supervisors guide and educate workers to adopt safe practices, ultimately lowering accident occurrences.

Although **Safety Concern** did not have a direct effect on accident reduction, it demonstrated a significant impact on safety behavior (Lu & Yang, 2010). This finding suggests that when leaders genuinely express concern for safety, it fosters a safety-conscious environment among workers, encouraging them to adhere to safe practices even if it does not immediately translate to fewer accidents. The supportive environment cultivated by safety concern can be seen as an essential foundation for longer-term safety improvements.

Furthermore, **Safety Monitoring** was shown to enhance safety behavior, highlighting its role in reinforcing adherence to safe work practices and minimizing risks through continuous oversight (Zulkifly et al., 2022). Regular monitoring serves as an active reminder for workers to follow established safety protocols, which helps reinforce positive safety behaviors over time.

These findings collectively highlight the need for well-designed safety interventions and leadership strategies tailored to the unique risks within the SWM sector. By integrating safety coaching, concern, and monitoring into daily operations, organizations can foster a culture of safety that not only encourages safer behaviors but also actively works toward reducing accidents, thus improving overall safety performance in this high-stakes industry.

CONCLUSION

In conclusion, this study sheds critical light on the role of safety leadership in enhancing safety performance and reducing accident rates among SWM workers, a workforce essential to environmental sustainability yet exposed to high occupational risks. The findings underscore that safety coaching, with its direct influence on reducing accidents and promoting safe behavior, is indispensable in fostering a proactive safety culture. Safety concern, while not directly lowering accident rates, significantly enhances safety-conscious behaviors, illustrating the importance of a supportive environment where workers feel that their well-being is a priority This unexpected finding may be attributed to potential mismatches between expressed concern and perceived actions by workers. For example, SWM workers may interpret safety concern as superficial if not coupled with tangible actions such as improved safety training or resource allocation. Another possibility is that cultural norms in the workplace prioritize direct, action-oriented leadership behaviors like coaching and monitoring over empathetic approaches. Future qualitative studies, including interviews with SWM workers, could provide deeper insights into this phenomenon. Additionally, the positive impact of safety monitoring on adherence to safe practices reaffirms the value of consistent oversight as a means to reinforce compliance and reduce risk.

These insights reveal that a multifaceted approach to safety leadership—encompassing coaching, concern, and monitoring—can meaningfully enhance safety outcomes in the SWM industry. For practitioners and policymakers, these findings highlight actionable pathways for designing targeted interventions that promote worker safety, align with sustainable development goals, and contribute to a more resilient and effective SWM sector. By embedding robust safety leadership practices into organizational policies, companies can safeguard their workers, reduce incident rates, and strengthen the SWM sector's capacity to meet critical environmental objectives. This study not only advances the understanding of safety dynamics in high-risk environments but also serves as a foundation for future research exploring the intersection of occupational safety and sustainability.

LIMITATION OF STUDY AND FUTURE RECOMMENDATION

The present study, focusing on SWM workers in Kedah, limits the generalizability of its findings. Variations in regional, cultural, and organizational contexts may influence the impact of safety leadership on safety outcomes. To address this limitation, future research should replicate the study in diverse geographic and cultural settings, encompassing both rural and urban areas in Malaysia and other countries, to validate and broaden the applicability of the findings.

Additionally, while the cross-sectional design provides valuable insights into the relationships between variables, it does not establish causality. A longitudinal approach that tracks safety leadership and its effects over time would offer stronger causal inferences. Future studies should adopt this approach to better capture the dynamic nature of safety leadership and its influence on safety performance in high-risk industries.

Practical implications are also critical for translating these findings into actionable strategies. Recommendations include developing supervisory training programs that emphasize effective coaching and proactive monitoring. Policymakers should prioritize providing funding and incentives for organizations that adopt leadership-driven safety initiatives. Moreover, safety concern should be operationalized through concrete measures such as consistent communication, enhanced safety resources, and worker engagement programs. These steps will ensure that safety practices align with worker expectations and promote a safer workplace environment.

This approach not only strengthens the research's practical relevance but also provides a framework for future safety leadership interventions.

ACKNOWLEDGEMENT

REFERENCES

1. Basahel, A. M. (2021). Safety leadership, safety attitudes, safety knowledge, and motivation toward safety-related behaviors in electrical substation construction projects. *International Journal of Environmental Research and Public Health, 18*(8), 1–17. https://doi.org/10.3390/ijerph18084196
2. Beus, J. M., McCord, M. A., & Zohar, D. (2016). Workplace safety: A review and research synthesis. *Organizational Psychology Review, 6*(4), 1–30. https://doi.org/10.1177/2041386615626243
3. Bowonder, B. (1987). Industrial hazard management: An analysis of the Bhopal accident. *Project Appraisal, 2*(3), 157–167. http://dx.doi.org/10.1080/02688867.1987.9726622
4. Chua, J. L., & Wahab, S. R. A. (2017). The effects of safety leadership on safety performance in Malaysia. *Saudi Journal of Business and Management Studies, 2*, 12–18. https://doi.org/10.21276/sjbms.2017.2.1.3
5. Gyekye, S. A. (2010). Occupational safety management: The role of causal attribution. *International Journal of Psychology, 45*(6), 405–416. https://doi.org/10.1080/00207594.2010.501337
6. Hair, J. F., Black, B., Babin, B., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Pearson.
7. Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8
8. Jabatan Keselamatan dan Kesihatan Pekerjaan. (2021). *Statistik kemalangan dan penyakit pekerjaan negara tahun 2021*. Department of Occupational Safety and Health Malaysia.
9. Jabatan Keselamatan dan Kesihatan Pekerjaan. (2022). Statistik kemalangan pekerjaan mengikut sektor Januari - Oktober 2022 (Dilaporkan ke JKKP Sahaja). *Department of Occupational Safety and Health Malaysia*. https://www.dosh.gov.my/index.php/ms/statistik/occupational-accident-statistics/statistik-kemalangan-pekerjaan-2022/4284-statistik-kemalangan-pekerjaan-mengikut-sektor-januari-ogos-2022-dilaporkan-ke-jkkp-sahaja/file
10. Jerie, S. (2016). Occupational risks associated with solid waste management in the informal sector of Gweru, Zimbabwe. *Journal of Environmental and Public Health, 2016*, 1–9. https://doi.org/10.1155/2016/9024160
11. Kundu, S. C. (2015). Effects of safety climate and safety attitude on safety performance: A study of an Indian Organization. *Human Resource Management: Emerging Horizons in Business Management*, January, 1–10.
12. Loosemore, M., & Malouf, N. (2019). Safety training and positive safety attitude formation in the Australian construction industry. *Safety Science, 113*, 233–243. https://doi.org/10.1016/j.ssci.2018.11.029
13. Lu, C.-S., & Tsai, C.-L. (2010). The effect of safety climate on seafarers' safety behaviors in container shipping. *Accident Analysis and Prevention, 42*, 1999–2006. https://doi.org/10.1016/j.aap.2010.06.008
14. Lu, C.-S., & Shang, K.-C. (2005). An empirical investigation of safety climate in container terminal operators. *Journal of Safety Research, 36*(3), 297–308. https://doi.org/10.1016/j.jsr.2005.05.002
15. Lu, C.-S., & Yang, C.-S. (2010). Safety leadership and safety behavior in container terminal operations. *Safety Science, 48*, 123–134. https://doi.org/10.1016/j.ssci.2009.05.003
16. Lyu, S., Hon, C. K. H., Chan, A. P. C., Wong, F. K. W., & Javed, A. A. (2018). Relationships among safety climate, safety behavior, and safety outcomes for ethnic minority construction workers. *International Journal of Environmental Research and Public Health, 15*(3), 1–16. https://doi.org/10.3390/ijerph15030484
17. MacNealy, M. S. (1999). *Strategies for empirical research in writing*. Longman.

18. Oah, S., Na, R., & Moon, K. (2018). The influence of safety climate, safety leadership, workload, and accident experiences on risk perception: A study of Korean manufacturing workers. *Safety and Health at Work, 9*, 427–433. https://doi.org/10.1016/j.shaw.2018.01.008

19. Ramayah, T., Cheah, J., Chuah, F., Ting, H., & Memon, M. (2018). *Partial least squares structural equation modeling (PLS-SEM) using SmartPLS 3.0: An updated guide and practical guide to statistical analysis*. Practical Assessment, Research and Evaluation.

20. Shang, K. C., Yang, C.-S., & Lu, C.-S. (2011). The effect of safety management on perceived safety performance in container stevedoring operations. *International Journal of Shipping and Transport Logistics, 3*(3), 323–341. https://doi.org/10.1504/IJSTL.2011.040801

21. Subramaniam, C., Mohd Shamsudin, F., Mohd Zin, M. L., Sri Ramalu, S., & Hassan, Z. (2016). Safety management practices and safety compliance in small medium enterprises. *Asia-Pacific Journal of Business Administration, 8*(3), 226–244. https://doi.org/10.1108/APJBA-02-2016-0029

22. Tshivhase, S. E., Mashau, N. S., Ngobeni, T., & Ramathuba, D. U. (2022). Occupational health and safety hazards among solid waste handlers at a selected municipality in South Africa. *Health SA Gesondheid, 27*(0), 1–8. https://doi.org/10.4102/hsag.v27i0.1978

23. Vinodkumar, M. N., & Bhasi, M. (2010). Safety management practices and safety behavior: Assessing the mediating role of safety knowledge and motivation. *Accident Analysis and Prevention, 42*, 2082–2093. https://doi.org/10.1016/j.aap.2010.06.021

24. Zakaria, N. H., Mansor, N., & Abdullah, Z. (2012). Workplace accident in Malaysia: Most common causes and solutions. *Business and Management Review, 2*(5), 75–88.

25. Zulkifly, S. S. (2020). Safety leadership and its effect on safety knowledge-attitude-behavior (KAB) of Malaysian manufacturing workers. *International Journal of Solid State Technology, 63*(3), 218–229.

26. Zulkifly, S. S., Baharudin, M. R., Mahadi, M. R., Ismail, S. N. S., & Hasan, N. H. (2021). Validation of a research instrument for safety leadership and safety knowledge-attitude-behavior (KAB) for Malaysia manufacturing setup. *IRASD Journal of Management, 3*(1), 22–34. https://doi.org/10.52131/jom.2021.0301.0023

27. Zulkifly, S. S., Hasan, N. H. (2023). Examining the effect of safety leadership towards safety behaviour amongst domestic collecting workers in Malaysia. *Journal of Technology and Operations Management, 18*(1), 56–68. https://doi.org/10.32890/jtom2023.18.1.5

28. Zulkifly, S. S., Hasan, N. H., & Baharudin, M. R. (2022). Role of safety leadership in fostering safety behaviour in Malaysia's small and medium manufacturers: Determining the effect of safety knowledge and attitudes. *Res Militaris, 12*(5), 1154–1166.

29. Zulkifly, S. S., Ismail Syed, S. N., Hasan, N. H., Mahadi, M. R., & Baharudin, M. R. (2020). Assessing the level of safety knowledge-attitude-behavior (Safety KAB): A case study in a public cleansing firm. *Journal of Safety, Health and Ergonomics, 2*(1), 1–7.

30. Zulkifly, S. S., Mohamad Zahir, N. S. (2022). Transformational leadership and safety performance of Malaysia's small and medium manufacturing firms. *International Journal of Technical & Scientific Research Engineering, 5*(6), 1–12.

31. Zulkifly, S. S., Mohamad Zahir, N. S., & Ranjan, M. Z. (2023). Factors of leadership and behaviour towards organisational safety performance: A predictive model for small and medium manufacturing industry. *International Journal of Safety and Security Engineering, 13*(2), 277–288. https://doi.org/10.18280/ijsse.130210