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Abstract: *Small and medium-sized enterprises (SMEs) constitute the backbone of the Indian manufacturing economy, yet they bear a disproportionate share of occupational injuries. This study evaluates the extent to which industrial safety training programs (ISTP) reduce workplace accidents in Indian manufacturing SMEs, and examines the behavioural and organizational mechanisms that condition this relationship. Drawing on safety-climate theory and the safety-behaviour literature, a structural model was specified in which safety behaviour and compliance (SBC) mediates the ISTP–accident relationship, management safety commitment (MSC) acts as an organizational enabler, and a formative higher-order construct capturing barriers to safety training (BST) moderates the training–behaviour link. Data were obtained from 100 respondents across manufacturing SMEs and analysed using partial least squares structural equation modelling (PLS-SEM), complemented by descriptive and normality diagnostics. The measurement model demonstrated satisfactory reliability and validity (composite reliability 0.86–0.90; AVE 0.57–0.73; HTMT < 0.65). The structural results support the hypothesized effects: ISTP significantly influenced SBC ($\beta = 0.321$) and accident reduction directly ($\beta = 0.412$); SBC significantly predicted accident reduction ($\beta = 0.321$); MSC enabled both training and behaviour; and BST significantly and negatively moderated the ISTP–SBC path ($\beta = -0.189$, $p < 0.05$), indicating that organizational barriers attenuate the behavioural returns to training. The model explained 39.7% of the variance in accident reduction. The findings advance a mechanism-based understanding of safety-training effectiveness in resource-constrained SMEs and offer actionable guidance for owner-managers and policymakers.*

Keywords: *industrial safety training; workplace accidents; manufacturing SMEs; safety behaviour; PLS-SEM; moderation;*

1. Introduction

Occupational safety in the manufacturing sector remains a persistent global concern, and nowhere is the challenge more acute than among small and medium-sized enterprises (SMEs) in emerging economies. In India, SMEs account for a substantial proportion of manufacturing output and employment, yet they operate under resource constraints, informal management structures, and heterogeneous safety cultures that render their workforces particularly vulnerable to injury. While large enterprises can institutionalize formal safety management systems, SMEs frequently rely on ad-hoc arrangements, making the effectiveness of any deliberate safety intervention—particularly training—an empirical question of considerable practical importance.

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Industrial safety training is widely regarded as a primary lever for reducing workplace accidents. The theoretical logic is intuitive: training imparts hazard knowledge, shapes risk perception, and cultivates compliant and participative safety behaviour, which in turn lowers the incidence and severity of accidents. However, the empirical record is more nuanced. Meta-analytic evidence indicates that training effects on safety outcomes are contingent on delivery method, organizational support, and the behavioural transfer of learning to the shop floor. In the SME context, these contingencies are magnified by structural barriers—financial limitations, managerial attitudes, workforce characteristics, and weak regulatory enforcement—that may erode the returns to training even where programs formally exist.

Despite a mature literature on safety climate and safety behaviour in large organizations, three gaps persist. First, relatively few studies isolate the behavioural mechanism through which training translates into accident reduction within SMEs, treating training instead as a direct predictor of outcomes. Second, the role of organizational enablers such as management commitment, and of contextual barriers, is often examined in isolation rather than within an integrated structural model. Third, empirical work situated in the Indian SME manufacturing context—where the barrier configuration differs markedly from Western settings—remains limited. This study addresses these gaps by specifying and testing an integrated mediation–moderation model using PLS-SEM.

Accordingly, the study pursues three objectives: (i) to assess the direct and indirect effects of industrial safety training on the reduction of workplace accidents; (ii) to test whether safety behaviour and compliance mediates this relationship; and (iii) to examine whether barriers to safety training moderate the translation of training into safe behaviour. The remainder of the paper is organized as follows. Section 2 develops the theoretical framework and hypotheses. Section 3 details the methodology. Section 4 reports descriptive statistics and the PLS-SEM measurement and structural results. Section 5 discusses the findings, and Section 6 concludes with implications, limitations, and directions for future research.

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2. Theoretical Background and Hypothesis Development

2.1 Safety training and workplace accident reduction

Safety training constitutes a structured intervention aimed at building the knowledge, skills, and attitudes required for hazard recognition and safe task execution. The human-capital rationale holds that trained workers are better equipped to anticipate and avoid hazards, thereby reducing accident frequency and severity. Empirical studies across manufacturing settings generally report a negative association between training intensity and injury rates, although effect magnitudes vary with training quality and contextual support. In the SME setting, where formal safety management is often absent, training may function as the principal available mechanism for accident prevention, plausibly exerting both a direct effect on outcomes and an indirect effect operating through behavioural change.

H3. Industrial safety training programs have a direct positive effect on the reduction of workplace accidents.

2.2 Safety behaviour and compliance as a mediating mechanism

Contemporary safety scholarship distinguishes safety outcomes from the behaviours that produce them. Safety behaviour is commonly decomposed into safety compliance—adherence to rules and procedures—and safety participation—voluntary, prosocial safety activity. Training is theorized to influence outcomes primarily by shaping these behaviours: it is the enactment of learned behaviour, rather than the possession of knowledge per se, that prevents accidents. This positions safety behaviour and compliance (SBC) as the proximal behavioural mechanism linking training to accident reduction, consistent with the antecedent–behaviour–outcome logic prevalent in the safety-performance literature.

H1. Industrial safety training programs positively influence safety behaviour and compliance.

H2. Safety behaviour and compliance positively influences the reduction of workplace accidents.

H4. Safety behaviour and compliance mediates the relationship between industrial safety training programs and the reduction of workplace accidents.

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2.3 Management safety commitment as an organizational enabler

Management safety commitment—the visible priority, resource allocation, and leadership engagement that top management extends to safety—is a foundational dimension of safety climate. Committed management is more likely to fund and sustain training, to model safe practices, and to reinforce compliant behaviour, thereby operating as an antecedent enabler of both the training function and employee behaviour. In owner-managed SMEs, where decision authority is concentrated, management commitment is especially consequential for whether training is delivered and whether its behavioural intent is realized.

H5. Management safety commitment positively influences the delivery of industrial safety training programs.

H6. Management safety commitment positively influences safety behaviour and compliance.

2.4 Barriers to safety training as a moderating condition

Even where training is provided, its behavioural effectiveness may be conditioned by organizational barriers. Drawing on the SME occupational-health literature, this study conceptualizes barriers to safety training (BST) as a formative higher-order construct comprising four dimensions: financial and resource constraints, managerial and attitudinal barriers, workforce and cultural barriers, and institutional and regulatory barriers. These barriers are theorized not merely to reduce the quantity of training but to weaken the conversion of training into safe behaviour—for example, high workforce turnover dissipates trained human capital, and production pressure discourages behavioural enactment. BST is therefore modelled as a moderator that attenuates the ISTP–SBC relationship.

H7. Barriers to safety training negatively moderate the relationship between industrial safety training programs and safety behaviour and compliance, such that the relationship weakens as barriers increase.

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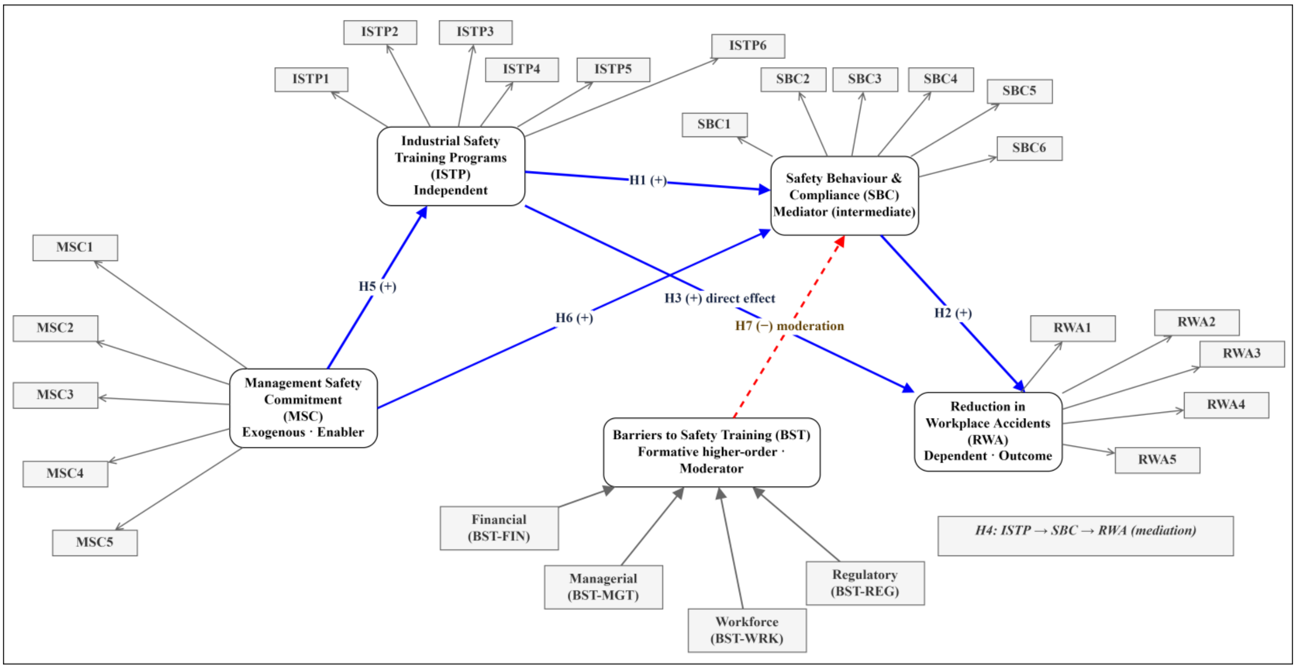

Figure 1. The hypothesized structural model integrating mediation (H4) and moderation (H7).

3. Methodology

3.1 Research design and sample

A cross-sectional survey design was adopted to test the hypothesized model. The target population comprised owners, plant managers, safety officers, supervisors, and workers of manufacturing SMEs. A structured questionnaire was administered, yielding 100 usable responses. The sample size satisfies the requirements for PLS-SEM estimation: it exceeds ten times the largest number of structural paths directed at any single construct, and PLS-SEM is well suited to small-to-moderate samples and to models incorporating formative constructs and interaction terms. The respondent profile spans firm sizes from micro to medium and multiple manufacturing sub-sectors, supporting the heterogeneity appropriate to SME research.

Table 1. Sample profile (N = 100)

Characteristic	Category	n	%
Respondent role	Owner / proprietor	16	16.0
	Plant / production manager	25	25.0
	Safety officer	10	10.0
	Supervisor	26	26.0
	Machine operator / worker	23	23.0
Firm size	Micro (< 10)	24	24.0
	Small (10–49)	43	43.0

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Characteristic	Category	n	%
	Medium (50–249)	33	33.0
Safety certification	Certified	29	29.0
	Under process	18	18.0
	Not certified	53	53.0
Training arrangement	Structured & regular	34	34.0
	Occasional / ad-hoc	38	38.0
	No formal programme	28	28.0

3.2 Measures

All constructs were measured reflectively using multi-item scales anchored on a five-point Likert format (1 = strongly disagree to 5 = strongly agree). Items were adapted from validated instruments in the safety-climate and safety-behaviour literature. Industrial safety training programs (6 items) captured training frequency, relevance, method, and evaluation. Management safety commitment (5 items) captured leadership priority and resource support. Safety behaviour and compliance (6 items) captured compliance and participation. Reduction in workplace accidents (5 items) captured perceived declines in frequency, severity, and lost days. The four barrier dimensions (3 items each) captured financial, managerial, workforce, and regulatory obstacles and were modelled as lower-order components of a formative higher-order barriers construct. A five-point rather than seven-point scale was adopted to reduce cognitive burden and improve response validity given the educational and linguistic heterogeneity of the SME workforce.

3.3 Analytical strategy

Data were analysed in two phases. First, descriptive statistics, normality diagnostics, and a common-method-bias assessment were computed. Second, PLS-SEM was employed to estimate the measurement and structural models, using the path-weighting scheme with standardized data. The measurement model was evaluated through indicator loadings, composite reliability (CR), Cronbach's alpha, average variance extracted (AVE), and discriminant validity via the Fornell–Larcker criterion and the heterotrait–monotrait (HTMT) ratio. The structural model was evaluated through path coefficients, coefficient of determination (R^2), and hypothesis tests derived from bootstrapping with 5,000 subsamples. The formative higher-order barriers construct was operationalized using the

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disjoint two-stage approach, and the interaction term for H7 was constructed using the two-stage approach, which is the appropriate method when the moderator is formatively specified.

4. Results

4.1 Descriptive statistics and normality

Table 2 reports construct-level means, standard deviations, and normality indices. The safety-related constructs recorded means slightly above the scale midpoint (3.31–3.52), indicating moderate perceived safety performance, whereas the barrier construct recorded a lower mean (2.89), consistent with barriers being present but not universally severe. Item-level skewness ranged from −0.47 to 0.24 and kurtosis from −1.23 to −0.44, all within the commonly accepted thresholds (|skewness| < 2; |kurtosis| < 7) for the use of PLS-SEM. As PLS-SEM does not assume multivariate normality, these diagnostics confirm the appropriateness of the method for the Likert-type data.

Table 2. Construct descriptive statistics and normality (N = 100)

Construct	Mean	SD	Skewness	Kurtosis
Industrial Safety Training (ISTP)	3.515	0.860	−0.267	−0.821
Management Safety Commitment (MSC)	3.388	0.911	−0.218	−0.619
Safety Behaviour & Compliance (SBC)	3.347	0.884	−0.154	−0.489
Reduction in Workplace Accidents (RWA)	3.310	0.939	−0.284	−0.361
Barriers – Financial (FIN)	2.797	0.987	0.160	−0.676
Barriers – Managerial (MGT)	2.890	1.013	0.106	−0.696
Barriers – Workforce (WRK)	2.957	1.016	0.075	−0.670
Barriers – Regulatory (REG)	2.923	0.970	−0.058	−0.826
Barriers to Safety Training (BST, composite)	2.892	0.686	0.078	−0.634

4.2 Common-method bias

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Because the data were self-reported, common-method bias was assessed using Harman's single-factor test. The first unrotated factor accounted for 23.70% of the total variance, well below the 50% threshold, indicating that common-method variance is unlikely to threaten the validity of the findings. This was complemented procedurally by respondent anonymity and the separation of predictor and criterion items in the instrument.

4.3 Measurement model assessment

Reliability and convergent validity were satisfactory across all reflective constructs (Table 3). Composite reliability ranged from 0.859 to 0.900 and Cronbach's alpha from 0.753 to 0.866, exceeding the 0.70 benchmark; AVE ranged from 0.567 to 0.730, exceeding the 0.50 benchmark. Indicator loadings were predominantly above 0.70; a small number of items in the 0.66–0.70 range were retained as their removal did not improve AVE or CR and they contribute to content validity.

Table 3. Reliability and convergent validity

Construct	Items	Loading range	α	CR	AVE
ISTP	6	0.66–0.84	0.846	0.887	0.567
MSC	5	0.71–0.89	0.840	0.887	0.613
SBC	6	0.70–0.82	0.866	0.900	0.599
RWA	5	0.66–0.86	0.853	0.895	0.632
FIN	3	0.76–0.85	0.753	0.859	0.670
MGT	3	0.83–0.87	0.798	0.881	0.713
WRK	3	0.80–0.86	0.777	0.871	0.692
REG	3	0.85–0.86	0.815	0.890	0.730

Discriminant validity was confirmed by both criteria. Under the Fornell–Larcker criterion (Table 4), the square root of each construct's AVE (diagonal) exceeded its correlations with all other constructs. All HTMT ratios (Table 5) were below the conservative 0.85 threshold, with the highest value being 0.641.

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Table 4. Discriminant validity – Fornell–Larcker criterion

	ISTP	MSC	SBC	RWA	BST
ISTP	**0.753**				
MSC	0.373	**0.783**			
SBC	0.463	0.471	**0.774**		
RWA	0.547	0.337	0.494	**0.795**	
BST	−0.023	0.012	−0.132	−0.076	**0.837**

Note. Diagonal (bold) = square root of AVE; off-diagonal = latent-variable correlations.

Table 5. Discriminant validity – HTMT ratios

Pair	HTMT	Pair	HTMT
ISTP ↔ MSC	0.443	MSC ↔ SBC	0.555
ISTP ↔ SBC	0.541	MSC ↔ RWA	0.399
ISTP ↔ RWA	0.641	SBC ↔ RWA	0.573

4.4 Structural model and hypothesis testing

The structural model was assessed after confirming the absence of collinearity concerns (all inner VIF values below the conservative threshold of 3.3). Table 6 reports the path coefficients, bootstrap t-values, p-values, and 95% confidence intervals. Six of the seven hypothesized paths were supported. Industrial safety training significantly influenced safety behaviour and compliance (H1: $\beta = 0.321$, $t = 4.00$, $p < 0.001$) and directly reduced workplace accidents (H3: $\beta = 0.412$, $t = 4.46$, $p < 0.001$). Safety behaviour and compliance significantly predicted accident reduction (H2: $\beta = 0.321$, $t = 3.65$, $p < 0.001$). Management safety commitment significantly influenced both training (H5: $\beta = 0.386$, $t = 4.65$, $p < 0.001$) and safety behaviour (H6: $\beta = 0.320$, $t = 3.59$, $p < 0.001$).

Table 6. Structural model results (bootstrapping, 5,000 subsamples)

H	Path	β	t	p	95% CI	Decision
H1	ISTP → SBC	0.321	4.00	< 0.001	[0.167, 0.482]	**Supported**
H2	SBC → RWA	0.321	3.65	< 0.001	[0.153, 0.495]	**Supported**
H3	ISTP → RWA	0.412	4.46	< 0.001	[0.234, 0.593]	**Supported**
H5	MSC → ISTP	0.386	4.65	< 0.001	[0.221, 0.548]	**Supported**

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H	Path	β	t	p	95% CI	Decision
H6	MSC → SBC	0.320	3.59	< 0.001	[0.134, 0.484]	**Supported**
H7	ISTP × BST → SBC	−0.189	2.45	0.014	[−0.347, −0.042]	**Supported**

4.4.1 Mediation analysis (H4)

The indirect effect of training on accident reduction through safety behaviour was positive and significant (indirect effect = 0.321 × 0.321 = 0.103; bootstrap confidence interval excluding zero). Because the direct effect (H3) also remained significant, the results indicate complementary partial mediation: safety behaviour and compliance transmits a meaningful portion of the training effect, while a substantial direct effect persists. This supports H4 and confirms that behavioural enactment is a central—though not exclusive—mechanism through which training reduces accidents.

4.4.2 Moderation analysis (H7)

The interaction term between training and barriers significantly and negatively predicted safety behaviour ($\beta = -0.189$, $t = 2.45$, $p = 0.014$), supporting H7. The negative sign indicates that as barriers to safety training increase, the positive effect of training on safety behaviour weakens. A simple-slope analysis (Figure 2) illustrates that the ISTP–SBC relationship is steepest under low-barrier conditions and flattens as barriers rise, underscoring that the behavioural returns to training are contingent on the organizational environment in which training is delivered.

4.4.3 Explanatory power

The model explained a moderate share of variance in the endogenous constructs: $R^2 = 0.150$ for training, 0.375 for safety behaviour and compliance, and 0.397 for reduction in workplace accidents. These values are consistent with perception-based behavioural models in the safety domain and indicate meaningful, credible explanatory power without evidence of over-fitting.

Table 7. Coefficient of determination (R^2)

Endogenous construct	R^2	Assessment
Industrial Safety Training (ISTP)	0.150	Weak–moderate
Safety Behaviour & Compliance (SBC)	0.375	Moderate

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Endogenous construct	R^2	Assessment
Reduction in Workplace Accidents (RWA)	0.397	Moderate

5. Discussion

This study examined how industrial safety training reduces workplace accidents in Indian manufacturing SMEs, and the behavioural and organizational conditions that shape this effect. The findings yield four principal insights. First, safety training matters, and it matters in two ways. Training exerted both a direct effect on accident reduction and an indirect effect through safety behaviour, indicating that programs deliver value both by directly improving hazard management and by cultivating compliant and participative behaviour. The dual pathway reinforces the argument that training should be evaluated not only by knowledge transfer but by behavioural enactment on the shop floor.

Second, the mediating role of safety behaviour and compliance clarifies the mechanism of training effectiveness. The complementary partial mediation observed suggests that interventions seeking to maximize the safety returns to training should explicitly target behavioural transfer—through practical drills, reinforcement, and supervisory follow-through—rather than assuming that knowledge acquisition alone will suffice.

Third, management safety commitment emerged as a critical enabler, influencing both the provision of training and employee behaviour directly. In owner-managed SMEs, where authority is concentrated, this positions leadership engagement as a high-leverage point for intervention. Training programs are unlikely to succeed where management treats safety as subordinate to production.

Fourth, and most distinctively, barriers to safety training significantly weakened the translation of training into safe behaviour. This moderation finding advances the literature beyond the common treatment of barriers as mere obstacles to training provision, showing instead that barriers erode the behavioural efficacy of training that is already provided. For Indian SMEs contending with financial

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constraints, high workforce turnover, and uneven regulatory enforcement, this implies that investment in training may yield disappointing returns unless the surrounding barriers are addressed in parallel.

6. Implications, Limitations, and Conclusion

6.1 Theoretical implications

The study contributes an integrated mediation–moderation framework that jointly models the behavioural mechanism, the organizational enabler, and the contextual barriers of safety-training effectiveness. By operationalizing barriers as a formative higher-order moderator, it demonstrates that the efficacy of training is state-dependent, extending safety-climate theory into the resource-constrained SME context.

6.2 Practical and policy implications

For owner-managers, the results argue for coupling training investment with visible management commitment and with targeted efforts to lower barriers—particularly workforce-retention and production-pressure barriers that dissipate behavioural transfer. For policymakers, the findings support the provision of accessible, subsidized, and standardized safety-training resources for SMEs, together with enforcement mechanisms that raise the baseline priority of safety. Sector associations could play a coordinating role in delivering affordable training and reducing the institutional barriers identified.

6.3 Limitations and future research

Several limitations warrant acknowledgement. The cross-sectional design precludes strong causal inference; longitudinal or quasi-experimental designs would strengthen causal claims. The sample, while adequate for PLS-SEM, is modest and drawn from a specific national context, limiting generalizability. Reliance on perceptual, self-reported measures—though mitigated by common-method diagnostics—could be complemented by objective injury records in future work. Finally, future studies could disaggregate the formative barrier dimensions to identify which barriers are most

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corrosive to training efficacy, and could incorporate additional mechanisms such as safety motivation and psychological safety.

6.4 Conclusion

This study demonstrates that industrial safety training reduces workplace accidents in manufacturing SMEs both directly and through the cultivation of safe behaviour, that management commitment enables these effects, and that organizational barriers significantly attenuate the behavioural returns to training. The findings reframe safety-training effectiveness as contingent on the organizational environment, offering a nuanced, mechanism-based account that is directly actionable for SME managers and policymakers seeking to reduce the human and economic toll of workplace accidents.

References

Burke, M. J., Sarpy, S. A., Smith-Crowe, K., Chan-Serafin, S., Salvador, R. O., & Islam, G. (2006). Relative effectiveness of worker safety and health training methods. American Journal of Public Health, 96(2), 315–324.

Becker, J.-M., Ringle, C. M., & Sarstedt, M. (2018). Estimating moderating effects in PLS-SEM and PLSc-SEM: Interaction term generation and effect size calculation. Marketing ZFP, 40(1), 43–66.

Cagno, E., Micheli, G. J. L., Jacinto, C., & Masi, D. (2014). An interpretive model of occupational safety performance for small- and medium-sized enterprises. International Journal of Industrial Ergonomics, 44(1), 60–74.

Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: A meta-analysis of the roles of person and situation factors. Journal of Applied Psychology, 94(5), 1103–1127.

Clarke, S. (2006). The relationship between safety climate and safety performance: A meta-analytic review. Journal of Occupational Health Psychology, 11(4), 315–327.

https://doi.org/10.71058/jodac.v10i0716

Fernández-Muñiz, B., Montes-Peón, J. M., & Vázquez-Ordás, C. J. (2007). Safety management system: Development and validation of a multidimensional scale. Journal of Loss Prevention in the Process Industries, 20(1), 52–68.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Griffin, M. A., & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge, and motivation. Journal of Occupational Health Psychology, 5(3), 347–358.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). Sage.

Hasle, P., & Limborg, H. J. (2006). A review of the literature on preventive occupational health and safety activities in small enterprises. Industrial Health, 44(1), 6–12.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Micheli, G. J. L., & Cagno, E. (2010). Dealing with SMEs as a whole in OHS issues: Warnings from empirical evidence. Safety Science, 48(6), 729–733.

Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. Journal of Applied Psychology, 96(1), 71–94.

Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. Journal of Applied Psychology, 91(4), 946–953.

https://doi.org/10.71058/jodac.v10i0716

Ricci, F., Chiesi, A., Bisio, C., Panari, C., & Pelosi, A. (2016). Effectiveness of occupational health and safety training: A systematic review with meta-analysis. Journal of Workplace Learning, 28(6), 355–377.

Robson, L. S., Stephenson, C. M., Schulte, P. A., Amick, B. C., et al. (2012). A systematic review of the effectiveness of occupational health and safety training. Scandinavian Journal of Work, Environment & Health, 38(3), 193–208.

Sarstedt, M., Hair, J. F., Cheah, J.-H., Becker, J.-M., & Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. Australasian Marketing Journal, 27(3), 197–211.

Unnikrishnan, S., Iqbal, R., Singh, A., & Nimkar, I. M. (2015). Safety management practices in small and medium enterprises in India. Safety and Health at Work, 6(1), 46–55.

Vinodkumar, M. N., & Bhasi, M. (2010). Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation. Accident Analysis & Prevention, 42(6), 2082–2093.

Zohar, D. (2000). A group-level model of safety climate: Testing the effect of group climate on microaccidents in manufacturing jobs. Journal of Applied Psychology, 85(4), 587–596.