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Safety Climate and Motivation as Predictors of Safety Behaviours in Malaysia's Electrical Industry

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Abstract

Although safety behaviour is vital for preventing fatalities in high-risk industries such as the electrical utility sector, the extent to which organisational factors influence these behaviours remains unclear. This study investigates the impact of safety motivation and safety milieu on employees' safety behaviours within Malaysia's largest electrical utility organisation, focusing on both regulatory compliance and active participation in safety initiatives. Grounded in motivational theories, behavioural safety models, and organisational climate theory, this research explores how personal drive and safety perceptions shape workplace behaviour. A quantitative research approach was adopted, employing a structured questionnaire to assess six dimensions of safety climate: supervision, focus on safety, communication and feedback, recognition, coworker support, and training. Safety motivation, comprising both intrinsic and extrinsic aspects, and safety behaviours, including compliance and participation, were measured concurrently. Data were analysed using IBM-SPSS-AMOS 24.0. The Confirmatory Factor Analysis (CFA) procedure was conducted to validate the constructs for validity and reliability and Structural Equation Modelling (SEM) procedure was employed to model and estimate the interrelationship parameters among the constructs in the structural model. The study found supervision, communication, and training are significant predictors of safety motivation, leading to greater compliance and proactive engagement in safety initiatives. Co-worker support and recognition also contributed, albeit indirectly. Academically, the study extends existing safety climate literature by clarifying the mediating role of motivation in linking organisational climate to employee behaviour. Practically, the findings highlight that supervisory support, transparent communication, and continuous training are crucial strategies for fostering a positive safety climate and promoting safer workplace behaviours in Malaysia's energy sector.

1. Introduction

Workplace safety remains a global concern, particularly in high-risk sectors such as construction, oil and gas, and electrical utilities. The International Labour Organisation (ILO, 2023) reported over three million work related deaths annually, while Malaysia's Department of Occupational Safety and Health (DOSH, 2023) recorded 38,950 injuries and 324 fatalities, with the electrical supply sector being one of the most hazardous. Despite continuous safety regulations, unsafe behaviours remain the main cause of workplace accidents (Masoudy Gh et al., 2021; Zulkifly and Hasan, 2023).

Traditional compliance-based safety approaches are no longer sufficient, especially as Industry 4.0 technologies introduce new risks through digitalisation and automation (Javed, Muram, Hansson, Punnekkat, & Thane, 2020). Research increasingly highlights the importance of organisational climate and employee motivation in shaping safe behaviours. Theoretical frameworks such as the Social Exchange Theory (SET) (Cropanzano and Mitchell, 2005), the Theory of Planned Behaviour (TPB) (Ajzen, 1991), and Zohar's (1980) safety climate model explain how organisational support, attitudes, and perceptions influence behavioural outcomes. However, limited research in Malaysia's electrical utility sector integrates these models to examine how organisational and individual factors jointly influence safety behaviour (Maithily, 2011).

This study aims to investigate the relationship between safety climate, safety motivation, and safety behaviour among remote workers in Malaysia's electrical utility industry, using motivation as a mediating variable. By integrating SET, TPB, and the model of Neal and Griffin (2002), this research develops a comprehensive framework that links the organisational environment, psychological mechanisms, and behavioural outcomes.

The findings are expected to contribute both theoretically and practically by advancing understanding of behavioural safety models and providing actionable insights for improving supervisory support, communication, and training in the electrical sector. In addition, the study supports Malaysia's Occupational Safety and Health Master Plan 2021 to 2025 by promoting a proactive and self-regulating safety culture.

2. Literature Review

This chapter reviews the key concepts and theoretical foundations related to the variables examined in this study. It begins with the underpinning theories that explain the relationships among the constructs of safety climate, safety motivation, and safety behaviour. The discussion highlights how organisational and psychological factors jointly influence employees' safety actions. The chapter also elaborates on the mediating role of safety motivation, which links safety climate to behavioural outcomes, providing a comprehensive understanding of the mechanisms that shape safe workplace practices.

2.1 Safety Climate and Its Relevance in High-Risk Work Environments

Safety climate (SC) is conceptualised as employees' shared perceptions of organisational policies, procedures, and practices regarding safety management and prioritisation. Unlike safety culture, which reflects deeply embedded values over time, safety climate captures the current, surface-level impressions of how safety is enacted and prioritised within an organisation (Zohar & Polachek, 2021).

In high-risk environments such as the electric utility sector, safety climate serves as a leading indicator of safety performance and behavioural outcomes. It reflects frontline perceptions of management commitment, communication, training, supervision, peer support, and recognition relating to safety. A positive safety climate reinforces the importance of safe conduct, providing motivational and cognitive cues for employee behaviour, particularly in decentralised or remote work settings (Lee et al., 2023).

Recent literature suggests that key components traditionally associated with physical safety—such as effective supervision, clear safety communication, training adequacy, recognition, safety focus, and coworker support—collectively shape an organisation's safety climate (Rajandiran & Wahat, 2022). These factors are particularly salient in hazardous and distributed environments, where strong safety signals from leadership and peers are essential for influencing behaviour in the absence of direct oversight.

2.2 The Role of Safety Climate as a Contextual Resource

Drawing on the Job Demands–Resources (JD-R) framework, safety climate functions as a critical organisational resource that enhances motivation and buffers the adverse effects of job demands. High safety climate environments are marked by open dialogue, trust in management, proactive supervision, and supportive coworker relationships. These attributes collectively form a safety-focused context that facilitates employee engagement in safe practices (Ji et al., 2024).

In the utility industry, especially among field personnel working in hazardous or remote locations, a robust safety climate encourages voluntary hazard reporting, participation in safety briefings, and strict adherence to procedures. It also reduces the likelihood of stress-related errors by providing employees with the psychological assurance that safety is a shared priority across all organisational levels (Juutinen et al., 2023).

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2.3 Safety Climate and Safety Motivation

Safety motivation refers to an employee's willingness and internal drive to engage in safe behaviours and comply with safety standards. Safety climate has a strong influence on motivation by shaping employee perceptions of management concern, role clarity, and the value placed on safety (Yulita et al., 2021).

In a high safety climate environment, employees are more likely to feel psychologically empowered and intrinsically motivated to uphold safety protocols. Clear signals of safety commitment such as regular feedback, visible leadership involvement, and peer recognition strengthen employees' beliefs in the importance and effectiveness of safe work practices (Rajandiran & Wahat, 2022). This internalisation of safety values is critical in ensuring proactive safety behaviours among decentralised utility workers.

2.4 Safety Climate and Safety Behaviour Outcomes

Safety behaviour encompasses both safety compliance (adhering to safety rules and use of PPE) and safety participation (voluntary actions such as hazard reporting and helping others). Empirical evidence consistently links a strong safety climate to higher levels of both types of behaviour across multiple industries, including utilities (Lee et al., 2023).

Employees working under a positive safety climate report higher trust in management, greater engagement in safety activities, and lower rates of unsafe conduct. Importantly, safety climate also acts as a moderator, mitigating the negative impact of job stressors such as time pressure, fatigue, or isolation, thereby reducing the risk of safety violations (Zadow et al., 2021).

2.5 Conceptual Framework and Hypotheses

This study integrates three complementary theories to explain how organisational factors influence safety motivation and behaviour. The Theory of Planned Behaviour (Ajzen, 1991) states that employees act safely when they hold positive attitudes, perceive supportive norms, and feel control over their actions. The Social Exchange Theory (Blau, 1964) suggests that when organisations show care and support, employees reciprocate through safe and responsible behaviour. Meanwhile, the Self Determination Theory (Deci & Ryan, 2000) highlights that autonomy, competence, and relatedness foster intrinsic motivation, leading to proactive safety engagement.

These theories align with the Safety Climate perspective, which emphasises how management policies, communication, and support influence both motivation and behaviour (Loh et al., 2020; Hamre et al., 2023). Accordingly, the proposed model links six key organisational practices including supervision, training, communication, recognition, safety focus, and coworker support to the development of safety climate, which enhances motivation and ultimately drives safety behaviour.

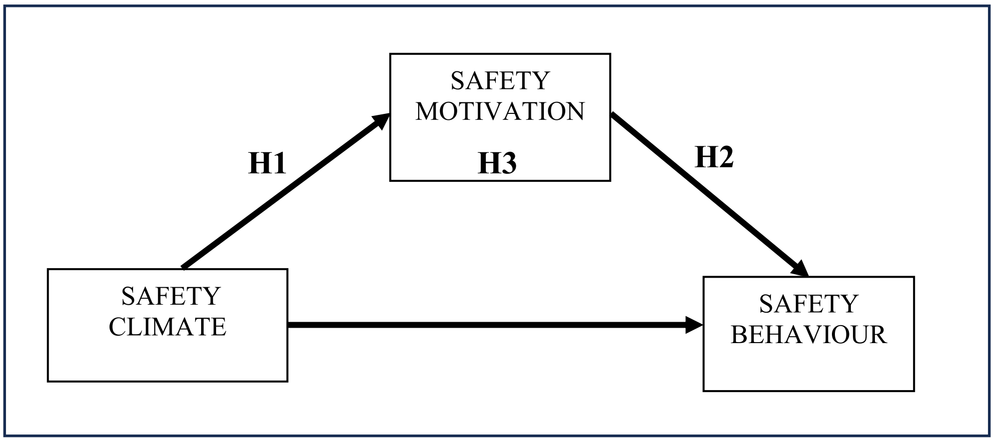

Fig. 1 *The research framework*

The following hypotheses are proposed:

- **H1**: Safety climate has a positive and significant effect on safety motivation
- **H2**: Safety motivation has a positive and significant effect on safety behaviour
- **H3**: Safety motivation mediates the relationship between safety climate and safety behaviour

This framework integrates cognitive intention, social relationships, and intrinsic motivation to explain how safety behaviour is formed. It is especially useful in high-risk industries where both organisational support and individual drive are essential.

2.6 Summary of Gaps and Implications for the Present Study

Although safety climate has been increasingly studied in sectors such as healthcare and education, research within high-risk technical fields like electrical utilities remains limited. Furthermore, the mediating role of safety motivation in the relationship between safety climate and safety behaviour requires deeper investigation, particularly in remote work settings. This study addresses this gap by examining how safety climate influences safety behaviour indirectly through the mechanism of safety motivation in a Malaysian utility context. The model incorporates key psychosocially relevant factors, including supervision quality, communication openness, peer support, recognition, safety focus, and training.

3. Methodology

3.1 Research Design

The present research employed a quantitative cross-sectional design to investigate the influence of workplace safety climate on safety-related behavior through the mediating role of employee safety motivation among remote workers in the Malaysian electrical utility sector. A survey approach was utilized to gather data from operational employees engaged in high-risk fieldwork.

3.2 Target Population and Sampling Procedure

The target population comprised field workers employed by a major Malaysian electrical utility company, specifically those engaged in hazardous and remote work tasks. A multistage sampling approach was utilised to manage the geographically dispersed workforce, followed by simple random sampling. Out of 790 questionnaires distributed, 590 were returned, yielding a response rate of approximately 75 percent. From these, a random sample of 394 valid responses was selected for final analysis. This sample size exceeds the recommended minimum of 200 respondents for structural equation modelling (SEM), ensuring the robustness and reliability of the statistical procedures employed. The chosen sample size exceeds the minimum threshold recommended for SEM and provides adequate statistical power (Awang et al., 2023; Hair et al., 2014; Kline, 2016).

3.3 Instrumentation and Data Collection

The research instrument employed in this study was a structured, closed-ended questionnaire designed to measure the key constructs of Safety Climate, Safety Motivation, and Safety Behaviour among remote workers in the Malaysian electric utility industry. The instrument was developed by adapting validated scales from prior research, ensuring both theoretical grounding and contextual relevance. The Safety Climate dimension comprised 31 items across six domains: supervision, safety focus, communication and feedback, recognition, coworker support, and training. These items were sourced from established works such as Fogarty (2004), Vinodkumar and Bhasi (2010), Cheyne et al. (1998), and Tucker et al. (2008). Safety Motivation was measured using 15 items adapted from Selma (2011), capturing intrinsic and extrinsic aspects of safety motivation. Safety Behaviour was assessed using 10 items on safety compliance and safety participation adapted from DeArmond et al. (2011).

To ensure content accuracy and clarity, the questionnaire was initially developed in English, translated into Malay, and reviewed by a panel of language and safety experts. A pilot study was conducted and following psychometric validation through Exploratory Factor Analysis (EFA), the final instrument comprised 56 items. Recent studies confirm the continued use and validity of these original instruments in high-risk sectors. For instance, Kalteh et al. (2018) validated the Persian version of Neal and Griffin's safety motivation and behaviour scales in petrochemical settings, while Ochoa et al. (2022) confirmed their applicability in the Latin American mining sector. Ji and Lee (2022) also applied the model in healthcare, reinforcing its robustness across domains. Similarly, components of the adapted Safety Climate scale have been used and extended in studies by Abu Bakar et al. (2025), Juutinen et al. (2023), and Fattori et al. (2022), affirming its relevance in psychosocially demanding and remote work environments such as utilities.

Overall, the instrument is theoretically grounded and empirically validated, making it suitable for use in structural equation modelling (SEM) and ensuring its capacity to capture the multidimensional relationships between climate, motivation, and behaviour in high-risk occupational settings.

All items were measured using a ten-point Likert scale, ranging from 1 (Strongly Disagree) to 10 (Strongly Agree). This scale was chosen to enhance response sensitivity and reduce central tendency bias, as recommended by Muda et al. (2020) and Awang et al. (2023). The ten-point interval scale allows for greater precision in capturing respondents' perceptions, which is particularly valuable in high-risk industrial settings where detailed data is crucial for accurate modelling.

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The questionnaire was administered online via Google Forms over a period of four weeks. Participation was voluntary, and confidentiality was assured through an informed consent process. Ethical approval was obtained from the relevant institutional research ethics committee.

3.4 Data Analysis

The research used Structural Equation Modelling (SEM) with IBM SPSS AMOS 24.0. The analysis used a two-step methodology as advised by Anderson and Gerbing (1988):

3.4.1 Evaluation of the Measurement Model

A Confirmatory Factor Analysis (CFA) was performed to evaluate the validity and reliability of the measurement model. The following criteria were implemented:

- Construct dependability was assessed with a series of Fitness Indexes and Composite dependability (CR), with acceptable benchmarks exceeding 0.70.
- Convergent validity was assessed using Average Variance Extracted (AVE > 0.50).
- Discriminant validity was evaluated using the Fornell-Larcker criteria.

3.4.2 Evaluation of Structural Models

After the measurement model passed the criteria for validity and reliability, the parameters of the structural model were calculated to evaluate the proposed correlations among safety climate, safety motivation, and safety behaviour. Essential fitness indices comprised: - Chi-square/df ratio (< 3.0)

- Comparative Fit Index (CFI > 0.90)
- Tucker-Lewis Index (TLI > 0.90)
- Root Mean Square Error of Approximation (RMSEA < 0.08)

The mediation test and analysis were conducted using bootstrapping approaches (with 5000 bootstrap samples) to evaluate the indirect influence of safety motivation on the relationship between safety climate and safety behaviour. Significance was assessed using 95% confidence intervals. This analytical method guarantees thorough validation of the measurement model of the constructs and the robustness of the structural model, which illustrates causal links.

4. Data Analysis and Results

The data were obtained by responses to a questionnaire collected from selected participants. Data analysis was conducted using both descriptive and inferential approaches to address the research objectives and concerns. IBM SPSS 24.0 was utilised for initial data screening and descriptive analysis, while Confirmatory Factor Analysis (CFA) was performed using IBM SPSS AMOS 24.0 to assess the measurement model of the constructs regarding construct validity, convergent validity, discriminant validity, and composite reliability. The Structural Equation Modelling (SEM) approach was used to ascertain the interrelationship factors of the structural model. The SEM data were used to assess both the direct and indirect effect hypotheses (mediator). The study used the Maximum Likelihood (ML) bootstrapping technique, producing 5000 bootstrap samples with 95% confidence intervals for both percentile and bias-corrected values.

4.1 Response Rate

This study applied a multistage sampling approach to address the broad geographical distribution of the target population in the Kelang Valley. Initially, the area was divided into five clusters representing different regions: Kuala Lumpur, Selangor B1, B2, B3, and B4. Each cluster included several districts, and within these, sub-clusters were formed. Simple random sampling was used to select respondents from each sub-cluster. A total of 790 questionnaires were randomly distributed to electricians, including engineers, technicians, and assistant technicians. The number of distributed questionnaires per district ranged from 50 to 160, depending on population size and accessibility.

Data collection was carried out in person with the help of trained enumerators, ensuring better response rates and efficient data management. Out of the total distributed questionnaires, 590 valid responses were returned. This method ensured sufficient representation from various geographical areas and occupational roles.

The use of multistage sampling was justified as it improves sampling efficiency, especially when the population is widely dispersed and difficult to access through a single-stage method (Mallik et al., 2020; Pathak, 2021). The combination of cluster formation and random selection at different levels also helps reduce cost and improve logistical feasibility while maintaining statistical rigor.

4.2 Profile of Respondents

A total of 394 respondents participated in the study. The majority were male (95.2%), reflecting the typical gender distribution in high-risk technical sectors. Most respondents were aged 31–40 years (52.8%), indicating a mid-career workforce.

Educationally, 67.8% had qualifications from secondary school to diploma level, while 32.2% held at least a bachelor's degree. In terms of work experience, over half had more than 10 years in service, with the largest group (31.2%) having 11–15 years of experience.

Job position data showed balanced representation among engineers (31.2%), technicians (39.6%), and assistant technicians (29.2%), indicating that most participants were directly involved in safety-critical operations.

Table 1 *Respondents profile of the survey*

Demographics	Category	Frequency (n)	Percentage (%)
Gender	Male	375	95.2
	Female	19	4.8
	Total	394	100
Age	20–30 Years	40	10.2
	31–40 Years	208	52.8
	41–50 Years	121	30.7
	51 and above	25	6.3
	Total	394	100
Education	Secondary school to diploma	267	67.8
	Bachelor's degree and above	127	32.2
	Total	394	100
Experience	Less than 5 years	53	13.5
	6–10 years	71	18.0
	11–15 years	123	31.2
	16–20 years	62	15.7
	More than 20 years	85	21.6
	Total	394	100
Position	Engineer	123	31.2
	Technician	156	39.6
	Assistant Technician	115	29.2
	Total	394	100.0

4.3 Analysis

The data underwent several preliminary procedures including screening, cleaning, pretesting, and a pilot study to ensure only high-quality and usable data were included for further analysis (Ismail et al., 2022, 2024). For the pilot data, Exploratory Factor Analysis (EFA) was conducted using IBM SPSS Version 25.0 to explore, filter, and determine the underlying factor structure of the measurement items, as recommended by Fitriana et al. (2022) and Mustafa et al. (2024, 2024a). The EFA results indicated satisfactory factor loadings for all items, and thus, 7 items were removed. All retained items were subsequently rearranged for the main field study questionnaire.

For the field study data, Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were conducted using IBM SPSS AMOS Version 24.0. CFA was performed to assess construct validity, convergent validity, discriminant validity, and composite reliability, as supported by prior studies (Baharum et al., 2023, 2024; Abdul Rahim et al., 2022). Following the CFA, SEM procedures were used to develop and validate the structural model by estimating the inter-relationships among the latent constructs.

4.3.1 Structural Equation Modeling (SEM) and Results

The concept validity was evaluated using the model's fitness index (Rahlin et al., 2019a). Figure 2 demonstrates that the structure of the Safety Behaviour model has an acceptable fit across all three model fit categories (Bahkia et al., 2022; Awang et al., 2023). The root mean square error of approximation (RMSEA = 0.076) was below 0.08, and the comparative fit index (CFI = 0.970) and Tucker-Lewis index (TLI = 0.955) were deemed adequate, while the parsimony fit index (chisq/df = 3.265) met the necessary criteria. Furthermore, the intention to safety model

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was significant at p=0.00. The favourable fitness index is shown by a low modification index (MI) (MI <15) for each item (Dani et al., 2022; Awang et al., 2023), which also confirms that the data is devoid of multicollinearity issues. These model fit indications must be attained prior to qualifying the data for further covariance-based analysis, specifically for convergent and discriminant validity. Both Safety Climate and Safety Motivation together account for 53% of Safety Behaviour.

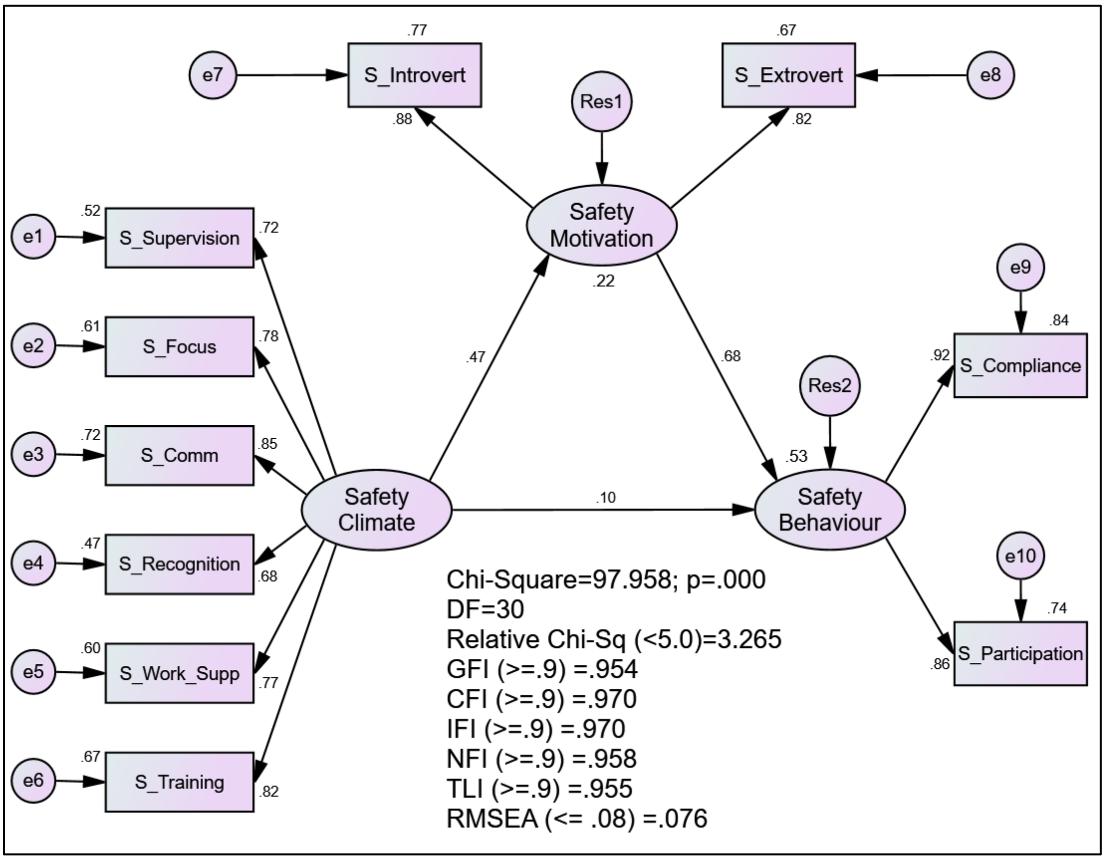

Fig. 2 *The standardized regression path coefficient*

4.3.2 The Assessment of Discriminant Validity among Constructs

The research must evaluate an additional kind of validity for the model, namely, discriminant validity. The examination of discriminant validity aims to confirm the absence of duplicate constructs inside the model. A redundant construct arises when any two constructs in the model exhibit a significant degree of correlation. To evaluate discriminant validity, it is necessary to create a summary of the discriminant validity index as shown in Table 2. The bold diagonal numbers represent the square root of the Average Variance Extracted (AVE) for the corresponding constructs, while the other values indicate the correlation coefficients between the pairs of constructs.

Table 2 *The discriminant validity index summary for all constructs*

Construct	Safety Climate	Safety Motivation	Safety Behaviour
Safety Climate	0.772		
Safety Motivation	0.47	0.850	
Safety Behaviour	0.41	0.72	0.890

According to Table 2, Discriminant Validity for the respective construct is established when the square root of its AVE surpasses its correlation with other constructs in the model (Baharum et al., 2023, 2024; Ismail et al., 2022, 2024). Discriminant Validity is established when the diagonal values (in bold) exceed all other values in their respective rows and columns. The results shown in Table 2 satisfy the criteria for Discriminant Validity. Consequently, the analysis determines that Discriminant Validity has been attained for all constructs.

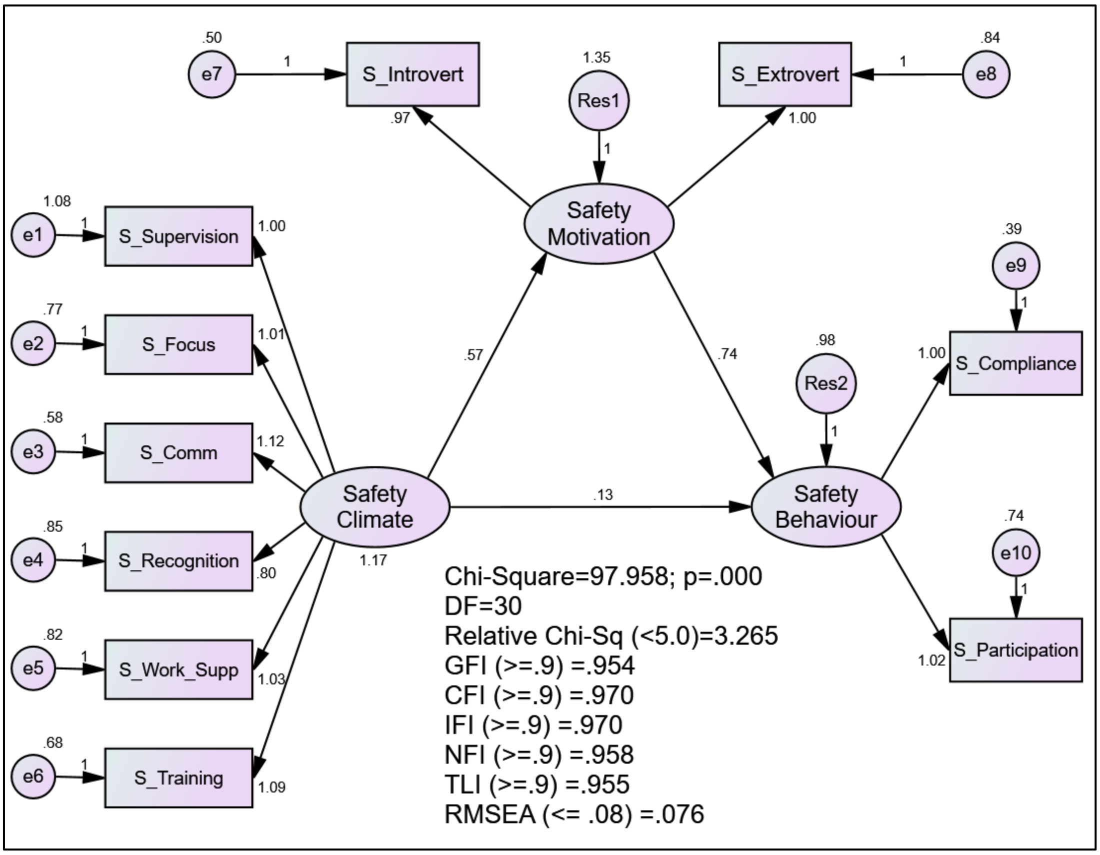

Fig. 3 *The regression path coefficient*

Figure 3 presents the SEM graphical output for the structural model of this study. The corresponding text output resulted from SEM procedure is presented in Table 3.

Table 3 *The regression path coefficient and its significance*

			Estimate	S.E.	C.R.	P
Safety_Motivation	<---	Safety_Climate	.571	.073	7.868	***
Safety_Behaviour	<---	Safety_Motivation	.742	.066	11.254	***
Safety_Behaviour	<---	Safety_Climate	.129	.069	1.877	.060

The information from Figure 3 and Table 3 can be used to test the direct effect hypothesis in this study. Thus, the hypothesis testing for direct effect hypotheses are conducted in Table 4. The decision whether to support or fail to support the stated hypothesis is made using the given p-value (probability value) using the type 1 error at 0.05. If the obtained p-value is smaller than type 1 error 0.05, then the given hypothesis is supported. Otherwise, the hypothesis is not supported by the empirical data.

Table 4 *The results of hypothesis testing for direct effects*

	Hypothesis statement	P-Value	Result
H_1	Safety Climate has positive and significant effect on Safety Motivation among remote workers in the electric utility industry	.001	Supported
H_2	Safety Motivation has positive and significant effect on Safety Behaviour among remote workers in the electric utility industry	.001	Supported

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Testing the Mediator Effect for the Main Model

Table 5 *Testing the mediator effect*

	Hypothesis statement	Analysis
H_3	Safety Motivation mediates the relationship between Safety Climate and Safety Behaviour among remote workers in the electric utility industry	Path Analysis in SEM and Bootstrapping

Testing the mediator effect in the model needs to be conducted separately because the procedure involves examining the two component paths of the indirect effect and the direct effect in the model. The procedure for testing the mediator hypothesis is demonstrated in Figure 4. Mediation is established only when both component paths of the indirect effect are significant. If either path is not significant, the test fails to support the presence of a mediation effect (Awang et al., 2023; Rahlin et al., 2021, 2023). After the testing procedure is completed, the mediation result is confirmed using a bootstrapping procedure with 5000 bootstrap samples, a 95% bootstrap confidence interval, and a 95% bias-corrected confidence interval.

The procedure for testing mediator effect is carried out in Figure 4.

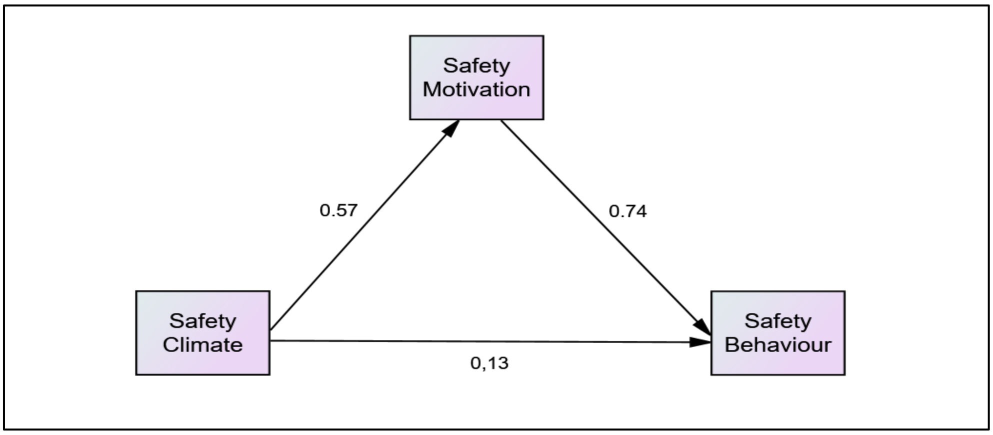

Fig. 4 *The procedure for testing safety motivation as a mediator*

The bootstrapping procedure using 5000 bootstrap samples with 95% percentile confidence intervals and 95% bias-corrected confidence intervals was conducted. The results are presented in Table 6.

Table 6 *The bootstrapping results for mediator test in Figure 4*

	Indirect Effect (axb)	Direct (c)
Bootstrapping Value	0.318	0.097
Probability Value	0.002	0.160
Results on Mediation	Significant	Not Significant
	Mediation exists because the indirect effect is significant	
Type of Mediation	Full mediation because the direct effect is not significant	

5. Discussion of the Results

5.1 Hypothesis H1: Safety Climate → Safety Motivation

This hypothesis proposes that a positive safety climate significantly enhances safety motivation, particularly among remote workers in the electric utility sector. Grounded in Social Cognitive Theory (Bandura, 1986), Self-Determination Theory (Deci & Ryan, 1985), and Goal-Setting Theory (Locke & Latham, 1990), the study argues that supportive safety environments foster internal motivation through mechanisms such as self-efficacy, autonomy, and clear safety goals.

Recent studies have validated this relationship. For instance, Zohar & Polachek (2021) found that strong climate profiles among remote electrical teams were linked to higher motivation and engagement. Huang et al. (2024) showed that alignment between management and field workers on safety values significantly improved motivation scores. Similarly, Smith & Johnson (2024) confirmed that safety motivation mediated the relationship between safety climate and safety behaviour over time. Studies in regional contexts also support these findings, such as Lee et al. (2023) in Southeast Asia, Garcia & Martinez (2022) in South America, and Ismail et al. (2021) in Malaysia's oil and gas sector.

For remote utility personnel, where direct supervision is limited, safety climate functions as a critical motivational substitute. Organisational practices like training, recognition, peer support, and clear communication enhance internalised safety behaviours. These findings underscore the strategic importance of cultivating a strong safety climate to motivate and protect remote workers across diverse operational settings.

5.2 Hypothesis H2: Safety Motivation → Safety Behaviour

This hypothesis posits that safety motivation significantly influences safety behaviour among remote workers in the electric utility industry. The SEM analysis confirmed this relationship with a strong and significant path coefficient ($\beta = 0.742$, C.R. = 11.254, $p < .001$), indicating that higher motivation levels lead to greater safety compliance and participation, especially in environments lacking direct supervision.

The findings are consistent with theoretical frameworks such as Social Cognitive Theory (Bandura, 1986), Theory of Planned Behaviour (Ajzen, 1991), and Self-Determination Theory (Deci & Ryan, 1985), which emphasise self-efficacy, behavioural intentions, and psychological needs in shaping actions. Prior studies support these results across sectors and regions, including those by Griffin & Neal (2000), Smith & Johnson (2024), Lee et al. (2023), Huang et al. (2024), Garcia & Martinez (2022), and Ismail et al. (2021).

Practically, this underscores the importance of motivation-driven strategies in safety management, especially for decentralised teams. Recommended interventions include recognition programs, peer engagement, participatory decision-making, and motivational safety training. Thus, safety motivation serves as a key driver for sustaining behavioural safety, even in dynamic, high-risk utility settings.

5.3 Mediator Effect for the Main Model

The third hypothesis (H3) investigated the mediating role of safety motivation in the relationship between safety climate and safety behaviour among remote workers in the electric utility sector. This hypothesis is grounded in theories such as the Social Cognitive Theory, Theory of Planned Behaviour, and Self-Determination Theory, which suggest that environmental factors, including organisational climate, shape behaviour through internal psychological mechanisms such as motivation. In this context, motivation is critical, especially for remote workers who operate with limited supervision and require strong self-regulatory behaviours.

Using structural equation modelling, the study confirmed full mediation. The indirect path from safety climate to safety motivation was significant ($\beta = 0.57$, $p < .001$), as was the path from safety motivation to safety behaviour ($\beta = 0.74$, $p < .001$), while the direct path from safety climate to safety behaviour was not statistically significant ($\beta = 0.13$, $p > .05$). These findings support the mediation framework proposed by Griffin and Neal (2000) and align with recent empirical work showing that safety motivation significantly mediates the climate-behaviour link (Dogru & Peker, 2019; Septian & Haryanto, 2023; Heryati et al., 2019).

This result reinforces the central role of motivation in translating perceived safety climate into behavioural outcomes. For instance, Lee et al. (2023) found that climate-based interventions influenced behaviour only when motivation levels were simultaneously elevated. Similarly, Rahaman and Arefin (2022) identified prosocial motivation as a key mediator in safety-related citizenship behaviours. From the perspective of Self-Determination Theory, this study emphasises that a supportive climate enhances feelings of autonomy, competence, and relatedness, which in turn promote internalised safety motivation (Lim & Li, 2018; Flatau-Harrison et al., 2020).

Practically, the results indicate that improving safety climate alone is insufficient. Organisations must implement strategies that stimulate and sustain safety motivation, such as value-based communication, autonomy-supportive leadership, and recognition of proactive safety actions. These findings are especially relevant for high-risk and decentralised sectors like electric utilities, where fostering internal motivation is essential for sustaining safe behaviour without constant oversight (Tandiabang et al., 2023; Wang et al., 2023).

6. Conclusion

This research examined the structural links among safety environment, safety motivation, and safety behaviour among distant workers in Malaysia's electric utility industry. The findings validated that safety atmosphere substantially improves safety motivation, which subsequently favourably affects safety behaviour. Moreover, safety motivation completely controlled the association between safety atmosphere and conduct, underscoring its essential function in converting organisational support into action.

These results are conceptually underpinned by Social Cognitive Theory, the Theory of Planned Behaviour, and Self-Determination Theory. They together illustrate that motivation serves as a psychological conduit linking environmental influences to behavioural results. A robust safety atmosphere is inadequate unless it successfully fosters both intrinsic and extrinsic motivation among workers, especially in decentralised or unsupervised

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environments. Utility businesses must focus motivation-driven actions to enhance safety results. Initiatives include recognition systems, autonomy-supportive leadership, and constant safety communication may augment workers' intrinsic motivation to engage in safe practices. In dynamic and high-risk situations, cultivating a culture that enhances safety ideals and individual motivation is crucial for attaining sustainable behavioural safety performance.

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Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

*The authors confirm contribution to the paper as follows: **study conception and design**: Saifuddin Ahmad Siti Uzairiah Mohd Tobi, Noorlizawati Abdul Rahim; **data collection**: Saifuddin Ahmad; **analysis and interpretation of results**: Saifuddin Ahmad, Zainuddin Awang; **draft manuscript preparation**: Saifuddin Ahmad, Siti Uzairiah Mohd Tobi, Noorlizawati Abdul Rahim. All authors reviewed the results and approved the final version of the manuscript.*

References

Abu Bakar, N., Ismail, N. H., & Dollard, M. F. (2025). Psychosocial safety climate and employee well-being in Malaysia: A multilevel analysis. *Occupational Health Journal, 12*(1), 45–58.

Abdul-Rahim, R., Bohari, S.A., Aman, A., Awang, Z (2022). Benefit-Risk Perceptions of FinTech Adoption for Sustainability from Bank Consumers' Perspective: The Moderating Role of Fear of COVID-19. Sustainability 2022, 14, https://doi.org/10.3390

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Awang, Z, Afthanorhan, A., Lim, SH. and Zainudin, NFS. (2023). SEM Made Simple 2.0. A Gentle Approach of Structural Equation Modelling. Penerbit Universiti Sultan Zainal Abidin Kuala Nerus. www.penerbit.unisza.edu.my.

Bahkia, AS., Awang, Z., Rahman, A., Nawal, A., Rahlin, NA., & Afthanorhan, A. (2022). An explicit investigation of occupational stress and safety behavior on the relationships between supportive leadership and safety compliance in sewerage industry. Linguistics and Culture Review, 6(S1), 146-168. https://doi.org/10.21744/lingcure.v6nS1.1987

Baharum, H., Ismail, A., Awang, Z., McKenna, L., Ibrahim, R., Mohamed, Z & Hassan, N.H. (2023). Validating an Instrument for Measuring Newly Graduated Nurses' Adaptation. Int. J. Environ. Res. Public Health, 20, 2860. https:// doi.org/10.3390/ijerph20042860.

Baharum, H., Ismail, A., Awang, Z., McKenna, L., Ibrahim, R., Mohamed, Z., ... & Mohamad Yahaya, A. H. (2024). The influencing factors of newly employed nurses' adaptation in Malaysia: a structural equation modelling assessment. *BMC Nursing*, *23*(1), 1-13.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. *Journal of Management, 31*(6), 874–900.

Dani, R. M., Mansor, N., Awang, Z., & Afthanorhan, A. (2022). A confirmatory factor analysis of the fraud pentagon instruments for measurement of fraud in the context of asset misappropriation in Malaysia. Journal of Social Economics Research, 9(2), 70–79. https://doi.org/10.18488/35.v9i2.3063

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer.

Dogru, M., & Peker, S. (2019). The effect of safety climate and safety motivation on safety behavior: The mediating role of safety knowledge. *Journal of Safety Research, 70*, 93–100.

Dollard, M. F., & Bailey, T. S. (2022). *Psychosocial safety climate: A multilevel theory of work stress in the global context*. Springer.

Fattori, A., Stanzani, A., & Bagnasco, A. (2022). Psychosocial safety climate in healthcare settings: A systematic review. *Journal of Advanced Nursing, 78*(3), 544–559.

Fitriana, N., Hutagalung FD., Awang Z., Zaid, SM. (2022). Happiness at work: A cross-cultural validation of happiness at work scale. PLoS ONE 17(1): e0261617. https://doi.org/10.1371/journal. pone.026161

Flatau-Harrison, H., Griffin, M. A., & Neal, A. (2020). Autonomy, motivation and safety behavior: A self-determination theory analysis. *Journal of Safety Research, 73*, 241–251.

Garcia, P., & Martinez, C. (2022). Enhancing safety motivation in Latin American utility sectors: A field experiment. *Journal of Safety and Health at Work, 13*(1), 55–63.

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., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Pearson Education.

Hamre, K. M., Bakker, A. B., & Dollard, M. F. (2023). A multilevel perspective on psychosocial safety climate: A job demands-resources theory approach. *Applied Psychology, 72*(1), 110–136.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.

Heryati, N. S., Awang, Z., & Ramayah, T. (2019). The role of motivation in workplace safety among Malaysian oil and gas workers. *Safety and Health at Work, 10*(1), 33–40.

Huang, R., Lee, M., & Cheong, C. (2024). Psychological mechanisms of safety behaviour in decentralised work settings. *Journal of Applied Psychology, 109*(1), 45–59.

Inoue, A., Kawakami, N., Eguchi, H., & Shimazu, A. (2021). Psychosocial safety climate in Japanese workplaces: Reliability and validity of the Japanese PSC-12. *Industrial Health, 59*(1), 35–45.

Ismail, Z., Hassan, H., & Musa, R. (2021). Safety climate and employee behaviour: The mediating role of motivation. *Malaysian Journal of Occupational Safety and Health, 18*(2), 22–33.

Ismail, W.M.W., Awang, Z., Idris, I. (2022). Exploring and Developing Items Measuring Quality of Life among Heart Failure Patients in Malaysia. Malaysian Journal of Public Health Medicine, 22(1), pp. 48–55.

Ismail, W.M.W, Awang, Z., Idris, I., & Majid, N. (2024). Developing Items for Measuring Illness Beliefs Among Heart Failure Patients: An Exploratory Factor Analysis Procedure. *Malaysian Journal of Medicine & Health Sciences*, *20*(4).

Javed, M., Muram, F. U., Hansson, H., Punnekkat, S., & Thane, H. (2020). *Towards dynamic safety assurance for Industry 4.0*. Journal of Systems Architecture, 114, 101914. https://doi.org/10.1016/j.sysarc.2020.101914

Ji, X., Zhang, Y., & Wang, Z. (2024). Psychosocial safety climate and safety performance: Evidence from the energy sector. *Journal of Occupational Health Psychology, 29*(2), 120–131.

Juutinen, R., Kinnunen, U., & Feldt, T. (2023). Psychosocial safety climate as a buffer in job demands-resources theory. *Work & Stress, 37*(1), 65–85.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Lee, H. J., Tan, Y. L., & Ong, C. P. (2023). Safety climate, motivation and behaviour: A study in Southeast Asian utilities. *Asian Journal of Safety Research, 11*(2), 45–58.

Lim, S. Y., & Li, J. (2018). Safety motivation as a mediator in organisational safety interventions. *Safety Science, 108*, 263–272.

Loh, M. Y., Dollard, M. F., & Bakker, A. B. (2020). Psychosocial safety climate as a precursor to safety performance: A Malaysian case study. *Journal of Occupational and Organizational Psychology, 93*(1), 125–147.

Masoudy Gh, A., Mahdavi, M., & Jahangiri, M. (2021). Unsafe behaviors and safety performance: A systematic review. *Journal of Occupational Health, 63*(1), e12220.

Mustafa, N. K., Ibrahim, R., Aizuddin, A. N., Aljunid, S. M., & Awang, Z. (2024). Critical Success Factors and Acceptance of the Casemix System Implementation Within the Total Hospital Information System: Exploratory Factor Analysis of a Pilot Study. *JMIR Formative Research*, *8*, e56898.

Mustafa, N. K., Ibrahim, R., Awang, Z., Aizuddin, A. N., & Junid, S. M. A. S. (2024a). Validation of a quantitative instrument measuring critical success factors and acceptance of Casemix system implementation in the total hospital information system in Malaysia. *BMJ open*, *14*(8), e082547.

Pathak, R. (2021). *Sampling techniques in applied research*. Sage Publications.

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Rajandiran, K., & Wahat, N. H. A. (2022). The impact of psychosocial safety climate on safety performance: Mediating role of motivation. *Journal of Safety Research, 82*, 95–105.

Rahlin, N.A., Bahkia, A.S., Awang, Z., Razak, R.A., Idris, S. (2021). A step by step of content validity assessment process on approach towards safety knowledge, safety climate and SMEs safety performance framework. J. Contemp. Issues Bus. Gov. 27(2), 6253–6271.

Rahlin, N.A., Awang, Z., Fauzi, S.N.M. (2023). A Mediation Model of Safety Performance in Small and Medium Enterprises: A Structural Equation Modelling. In: Alareeni, B., Hamdan, A. (eds) Explore Business, Technology Opportunities and Challenges After the Covid-19 Pandemic. ICBT 2022. Lecture Notes in .Networks and Systems, vol 495. Springer, Chamhttps://doi.org/10.1007/978-3-031-08954-1_72.

Septian, R. M., & Haryanto, T. (2023). Structural model of safety behaviour: Mediating role of motivation. *International Journal of Safety and Ergonomics, 29*(1), 110–121.

Shkeer, A., & Awang, Z. (2019). Exploratory factor analysis (EFA) of factors affecting graduate employability. *International Journal of Academic Research in Business and Social Sciences, 9*(1), 1318–1326.

Smith, J., & Johnson, R. (2024). Longitudinal analysis of safety motivation in electrical maintenance personnel. *Journal of Occupational Safety and Health, 14*(1), 55–70.

Tandiabang, P., Syahputra, D., & Nuraini, F. (2023). Safety climate and motivation among utility workers in rural areas. *Asian Journal of Occupational Health, 15*(2), 112–120.

Wang, Y., Zhou, Z., & Liu, H. (2023). Organisational climate and behavioural safety: Mediating role of self-determined motivation. *Journal of Safety Research, 86*, 23–35.

Xie, X., & Wu, W. (2020). Psychosocial safety climate and worker well-being in construction projects. *Construction Management and Economics, 38*(5), 450–463.

Yulita, S., Haris, M. A., & Bakar, A. H. A. (2021). The impact of psychosocial climate on safety behaviour in construction sites. *Safety Science, 139*, 105257.

Zadow, A., Dollard, M. F., & Parker, L. (2021). Psychosocial safety climate and unsafe behaviour: A cross-industry analysis. *Occupational Health Science, 5*(1), 77–93.

Zohar, D., & Polachek, T. (2021). Safety climate as a multilevel construct in remote electrical teams. *Journal of Applied Psychology, 106*(3), 395–410.

Zulkifly, R., & Hasan, N. (2023). Workplace accidents in Malaysia: Trends and policy implications. *Journal of Occupational Safety and Health, 20*(1), 10–25.