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Safety Climate Perception Gaps Across Job Roles in Multinational Construction Workforces: Evidence from Saudi Arabia

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Abstract

Safety performance in construction is strongly influenced by how workers understand and respond to safety practices, particularly in complex and multicultural work environments. Although safety climate has been widely studied, limited attention has been given to how these perceptions differ across job roles in multinational construction settings. This study examines variations in safety climate perceptions across job roles within a multinational construction workforce. A survey was conducted with 256 construction workers representing different occupational groups. The study focused on key safety climate dimensions, including management commitment, supervisory practices, safety training, and individual responsibility for safety and health. Data were analyzed using reliability and validity tests, descriptive statistics, and one-way ANOVA. Overall, workers across the different occupational groups reported comparable views on several aspects of safety climate. However, differences became more noticeable when workers evaluated supervisory safety practices. Frontline and skilled workers, in particular, tended to describe less positive day-to-day supervisory safety experiences than other job groups. These findings suggest that supervisory interactions may not be experienced consistently across all levels of the workforce.

Keywords: Safety Climate; Construction Safety; Job Role Differences; Supervisor Safety Role; Multinational Workforce.

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List of Abbreviations

Abbreviation	Full Term
ANOVA	Analysis of Variance
EFA	Exploratory Factor Analysis
KMO	Kaiser–Meyer–Olkin
CM	Management Commitment to Safety
CS	Supervisor Safety Role
CT	Safety Training
CW	Individual Responsibility for Safety and Health

1. Introduction

Construction work continues to involve a high level of occupational risk compared with many other industries. Workers are regularly exposed to changing site conditions, physically demanding activities, heavy equipment, and time pressure, all of which increase the possibility of accidents and injuries [1]. These challenges become more difficult to manage in multinational projects where employees may differ in language, cultural background, and communication style [2], [3]. As a result, improving safety performance continues to be a major concern for both researchers and practitioners. Researchers frequently use the concept of safety climate to better understand why safety performance differs across workplaces. In construction settings, workers often judge the importance of safety based on what they experience during daily operations rather than on written procedures alone [4] [5], [6]. Rather than focusing only on written policies and procedures, safety climate reflects how workers actually experience safety in their day-to-day activities [7], [8]. It is shaped by routine interactions at the worksite, including communication with supervisors, management priorities, and how safety rules are applied during daily operations [9]. This perspective suggests that safety outcomes are shaped not only by established rules and procedures, but also by how these are implemented and reinforced in practice [10]. From a theoretical perspective, safety climate is often viewed as operating at two levels: 1. organization level; and 2. group level. At the organizational level, factors such as management commitment and formal safety systems tend to create relatively consistent perceptions across the workforce [11], [12]. In contrast, supervisors influence safety at a more immediate level, where daily interactions with workers can lead to differences in how safety is experienced [13]. This issue becomes especially relevant in construction projects because supervisors directly influence how safety expectations are applied during routine site activities [14]. Although safety climate has been examined extensively in construction research, less attention has been given to how workers in different occupational positions experience safety within the same project environment [9]. Construction sites

are organized around different levels of responsibility and authority, meaning workers may not interpret safety practices in the same way [14]. These differences may become even more important in multinational projects where communication styles and cultural expectations vary across the workforce [2]. However, previous research has identified key dimensions of safety climate in the construction industry such as management commitment, supervisor safety role, safety training, and individual responsibility as important predictors of safety performance [15]. While these dimensions have been widely validated, relatively little attention has been given to whether they are perceived differently across different job role and among multinational workforce. Understanding these differences is important for developing safety interventions that better reflect the needs and experiences of different workers [5]. Despite this gap, most existing studies continue to examine safety climate at an aggregated level, without clearly accounting for how perceptions may differ across job roles in complex work environments. This study addresses this limitation by taking a role-based perspective to explore how key safety climate dimensions are perceived by different groups within a multinational construction setting. The objective is to determine whether meaningful differences exist between job roles and to better understand how safety is experienced across the workforce. In doing so, the study provides a more detailed view of safety climate and supports the development of more targeted safety management practices Accordingly, this study aims to examine differences in safety climate perceptions across job roles within a multinational construction workforce. By considering multiple dimensions of safety climate and comparing perceptions across occupational categories, the study seeks to provide a more detailed understanding of how safety is experienced at different levels of the organization. The findings are expected to contribute to both theory and practice by highlighting the influence of job role on safety perceptions and by supporting the development of more effective, role-sensitive safety management strategies. While this study adopts a multi-level perspective to interpret safety climate, the empirical analysis focuses on group-level comparisons rather than formal multilevel modeling. Indeed, this study aims to addresses the following research questions:

RQ1: Do safety climate perceptions differ significantly across job roles in multinational construction environments?

RQ2: Which dimensions of safety climate exhibit the greatest variation across job roles?

2. Literature review

2.1. Safety climate in construction

The construction industry continues to be associated with a high level of workplace hazards due to the dynamic nature of construction activities and the constantly changing site environment [1], [14]. In

construction environments, safety climate is commonly used to describe how workers interpret the organization's approach toward safety and risk management. Zohar in (1980), introduced the concept of safety climate, which refers to how workers perceive and make sense of safety priorities, expectations, and practices within their organization [7]. Over the years, this concept has been widely studied across different industries, and a large body of research confirms its strong link to safety outcomes [8], [9]. Additionally, the construct of safety climate is also associated with two key forms of safety behavior: safety compliance and safety participation [10]. Safety compliance relates to following required safety procedures, whereas safety participation reflects voluntary actions that contribute to improving safety at the workplace [8].

Previous review studies and meta-analyses consistently show that safety climate is closely connected to worker safety behavior and overall safety performance [16]. Likewise, [9] reported consistent relationships between safety climate and safety outcomes across various settings. In construction-industry, various safety climate dimensions have been shown a positive association safety performance [17] [18] [15]. Despite these findings, the concept of safety climate in construction industry remains challenging due to the nature of the work environment. Construction sites are dynamic, involve temporary teams, and operate within hierarchical structures. These challenges are even more evident in multinational settings, where differences in culture and communication may influence how safety is perceived by workers.

2.2. Management commitment to safety

Management commitment is widely recognized as an important factor influencing workplace safety [19], [20]. It reflects how strongly organizational leaders prioritize safety through all aspects [12]. Workers tend to take safety more seriously when they see clear support from management. Visible involvement from organizational leaders, such as addressing hazards, discussing safety concerns, and supporting training efforts, can strengthen workers' confidence in the organization's safety priorities. Several studies indicated that management commitment is positively associated with safety performance in construction [15], [21], [22], [23]. Workers who perceive management as genuinely committed to safety are more likely to follow safety procedures and actively engage in safe work practices [10] . In contrast, when management commitment to safety is weak or inconsistent, safety initiatives tend to lose effectiveness and may even encourage unsafe behaviors. In construction projects, management commitment becomes particularly important because of the risky tasks and the need for coordination among multiple parties [24]. Strong leadership at this level helps ensure that safety is consistently prioritized across all operations in the jobsite.

2.3. Supervisor safety role

The supervisor safety role represents how safety is implemented on a daily basis at the operational level. Supervisors play a direct role in shaping how safety procedures are implemented during daily site operations [13]. Daily communication with supervisors often shapes how workers judge safety conditions at the site. The way supervisors provide instructions, respond to unsafe behavior, and interact with workers can strongly influence workers' perceptions of workplace safety [25] [26]. The literature presents mixed evidence regarding the effectiveness of supervisory practices. Supportive supervisors who communicate openly and encourage worker involvement are often associated with higher levels of safety participation [27], [28]. However, in construction environments, supervisors are often required to balance productivity demands with safety requirements [29]. As a result, some studies indicated that supervisor safety role and behavior int the jobsite significantly affect safety performance [15]. These findings highlight the importance of examining how supervisory roles are experienced by workers in different job categories.

2.4. Safety training

Safety training is commonly used in construction projects to improve workers' awareness of hazards and safe work practices [30]. Effective training programs help workers understand site risks, recognize unsafe conditions, and perform tasks more safely [31]. Training programs are not equally effective in every situation. Workers are more likely to benefit from training when the information is practical, clearly explained, and directly connected to their daily tasks at the worksite [30]. In many construction organizations, training programs are standardized, which may result in relatively similar perceptions of training across different job roles. At the same time, research indicates that safety training can strengthen individual responsibility for safety, suggesting that it influences not only knowledge but also attitudes toward safety [32], [33]. This highlights its role in promoting a more proactive safety culture in jobsite.

2.5. Individual responsibility for safety

Individual responsibility for safety refers to the extent to which workers feel personally accountable for maintaining safe working conditions [15]. Individual responsibility for safety concept linked to the concept of safety motivation and is considered a key driver of safety behavior [10], [16]. Workers who view safety as part of their personal responsibility are more likely to comply with safety rules and also engage in voluntary safety related activities [8]. In construction industry, this becomes especially important because many tasks require individual judgment and decision making in changing

conditions. Empirical research indicates that individual responsibility plays a meaningful role in shaping safety conditions within construction environments [15].

2.6. Job role differences in safety climate

Although safety climate has been widely explored, relatively few studies have focused on how perceptions differ across job roles and more specifically among diverse construction workers. Construction projects are structured around multiple hierarchical levels, including frontline workers, supervisors, and management, each with distinct responsibilities and experiences [14]. Research suggests that safety perceptions may vary across these levels due to differences in authority, communication access, and exposure to risks [13]. For instance, managers often evaluate safety based on policies and formal systems, whereas workers tend to base their perceptions on daily interactions and actual site practices [11]. In multinational construction environments, these differences may be further shaped by cultural diversity [3]. Workers from different backgrounds may interpret safety practices differently, which can lead to variation in safety perceptions [29]. While previous studies have examined leadership and cultural influences separately, fewer have directly addressed differences across job roles in such contexts.

2.7. Theoretical framing and identified research gap

Traditionally, safety climate has been treated as a shared organizational construct, often measured at the group or company level [7]. While this approach has provided valuable insights, it tends to overlook differences that may exist within organizations, particularly across hierarchical levels. Previous research has emphasized the role of leadership in shaping safety climate, distinguishing between management level commitment and supervisor level practices [12], [20]. These perspectives suggest that both strategic and operational leadership are important in influencing safety behavior. However, less attention has been given to how these influences may be perceived differently by workers in different roles. In multinational construction environments, these differences may be further influenced by cultural diversity [3], [34].Workers from different national backgrounds may interpret leadership behavior and safety expectations in different ways, which can contribute to variation in safety perceptions. However, most existing studies have examined either cultural factors or leadership effects separately, rather than considering how job role and safety climate interact. Accordingly, this study addresses this gap by adopting a role based perspective to examine whether safety climate perceptions vary significantly across job roles in a multinational construction workforce.

3. Methods

This section outlines the overall methodological approach adopted in this study. To provide a clear overview of the research process, Figure 1 presents the main steps followed, including participant recruitment, survey administration, data preparation, and statistical analysis. The figure summarizes how the study progressed from data collection to the final interpretation of results.

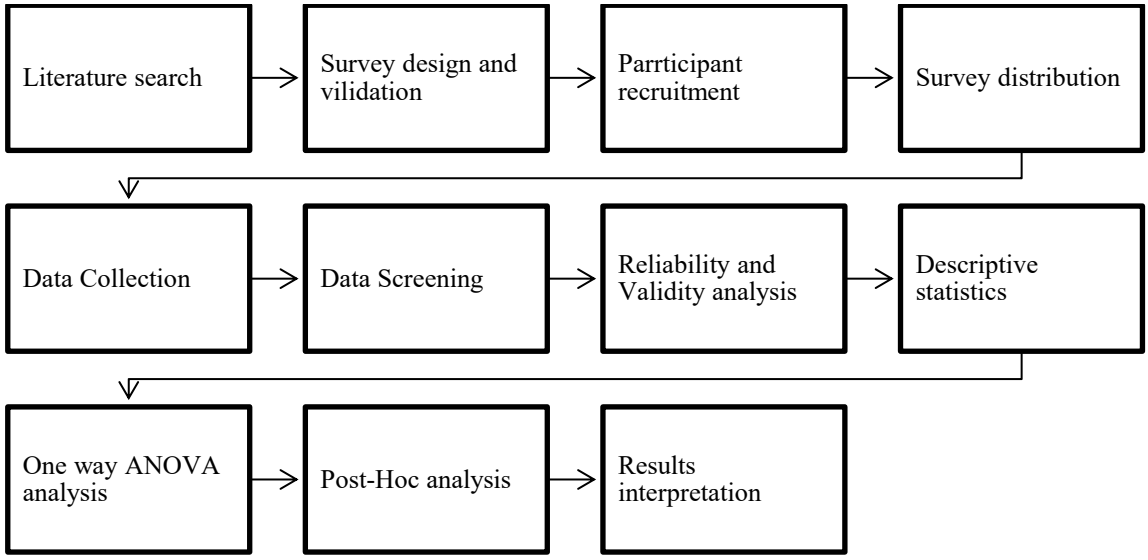


Fig. 1 . Overview of the research methodology and data analysis process

3.1. Research design and data collection

This study used a quantitative approach to address the research question. A survey tool used to examine how safety climate perceptions vary across job roles in a multinational construction site in the Kingdome of Saudi Arabia. Survey methods are widely used in safety-related research because they allow workers to describe their own experiences and perceptions in a structured way [8], [9]. This method allowed the study to assess these perceptions at a single point in time and compare responses across different occupational groups. The research protocol was reviewed and approved by Jouf University. Participation was voluntary, and informed consent was obtained from all respondents prior to data collection. Data were collected from a different construction site employing a multinational workforce. Workers were invited to participate through general site announcements, and those who were willing completed the survey voluntarily. This approach is commonly used in construction research due to practical access constraints while still enabling participation from a wide range of job roles. The final sample included 256 respondents representing frontline workers, skilled trades, supervisory staff, and support personnel, providing a broad representation of a multinational construction workforce. To account for linguistic diversity, the survey was administered in multiple languages. The original instrument was developed in English and translated into Arabic, Hindi, Urdu, and Filipino. A back-translation procedure was

used to verify translation accuracy, where each version was independently translated back into English and compared with the original. Any discrepancies were reviewed and resolved to ensure consistency in meaning across all language versions [35].

3.2. Measurement of variables

The survey instrument consisted of two main sections. The first section collected demographic information, including age, nationality, and job role. These variables were later used to categorize respondents for comparative analysis. The second section measured safety climate perceptions across several key dimensions. The selection of these dimensions based on the prior meta analytic research identifying the most influential predictors of safety climate dimensions in construction [15]. These dimensions are: management commitment to safety, safety rules and procedures, supervisor safety role, safety training, and individual responsibility for safety and health. All constructs were measured using a five-point Likert scale ranging from strong disagreement to strong agreement. A three items adopted from [20] study used to measure the construct of management commitment to safety. Management commitment to safety captured the extent to which organizational top leaders promotes safety in the organization. Additionally, a three items adopted from the same study to measure safety rules. Safety rules and procedures reflected workers' perceptions of the availability, clarity, and enforcement of formal safety requirements within the organization [20]. The supervisor safety role represented the influence of frontline supervisors on safety practices, and four items were adopted from Zohar study (Zohar, 2000). Furthermore, Safety training was assessed using three items adopted from [8] to examine how workers perceive the priority, relevance, and comprehensiveness of training programs related to workplace health and safety [8]. Individual responsibility for safety and health captured the extent to which workers take personal responsibility for following safety procedures and maintaining safe work practices, and it assessed by adopting three items from Griffin & Nea (2000) study.

3.3. Data analysis procedures

Before conducting the analysis, the dataset was checked for missing and inaccurate values. Cronbach's alpha was applied to evaluate the reliability and internal consistency of the survey items [36]. Alpha values above 0.60 were considered acceptable because each construct contained a small number of items. Construct validity was evaluated using exploratory factor analysis (EFA) with principal component analysis and Varimax rotation. The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity were also used to confirm that the data were appropriate for factor analysis [37] . Items with weak factor loadings or low communalities were removed where

necessary to improve the overall measurement structure. In addition, the factor structure was examined to assess how survey items grouped across constructs. This step helped to evaluate whether items associated with each safety climate dimension formed distinct components. While most constructs showed clear grouping patterns, some overlap was observed between safety training and individual responsibility, indicating limited separation between these dimensions in this context. Descriptive statistics were also calculated to summarize the variables. One way ANOVA conducted to assess the diffrences among job roles groups. The ANOVA model can be expressed as:

$$F = \frac{\text{Between} - \text{group variance}}{within - \text{group variance}}$$

This method is appropriate for comparing mean values across multiple independent groups [38]. The assumption of homogeneity of variances was tested using Levene's test. When this assumption was violated, the Welch ANOVA was used as a more robust alternative [39]. Post hoc comparisons were conducted using the Games Howell procedure, which is suitable for unequal group sizes and heterogeneous variances [40].

4. Result

The survey was conducted across multiple construction sites, resulting in 256 valid responses from workers representing different job roles. The sample reflects a diverse workforce, allowing for comparison of safety climate perceptions across occupational groups.

4.1. Reliability analysis result

Table 1: Internal Consistency of Safety Climate Constructs

Construct	Number of Items	Cronbach's Alpha (α)	Interpretation
Management commitment to safety	3	0.800	Good
Supervisor safety role	4	0.613	Acceptable
Safety rules and procedures	3	0.043	Unacceptable
Safety training	3	0.676	Acceptable
Individual responsibility for safety and health	3	0.775	Acceptable

Cronbach's alpha was used to check the reliability of the study variables before conducting the main analysis. As shown in Table 1, most variables showed acceptable reliability levels. Management commitment to safety had good reliability (α = 0.800), while individual responsibility for safety and health also showed good consistency (α = 0.775). Safety training had an acceptable reliability

value (α = 0.676). The supervisor safety role variable showed a slightly lower value (α = 0.613), but it was still acceptable for this type of study and the small number of survey items. However, safety rules and procedures showed a very low reliability value (α = 0.043), meaning the items were not consistent with each other. The low reliability result indicates that the survey items may not have reflected a single consistent concept within this study sample. A closer examination indicates that this may be related to differences in interpretation among respondents, particularly given the multilingual and multicultural nature of the sample. One possible explanation is that workers from different linguistic and cultural backgrounds may have interpreted the items differently. As a result, the construct was excluded from the later stages of analysis to avoid affecting the reliability of the findings. Since the construct showed extremely weak internal consistency, it was removed from the later analysis to avoid weakening the overall quality of the statistical results [36].

4.2. Construct validity result

Exploratory factor analysis (EFA) was used to examine the validity of the study variables. Before running the analysis, the suitability of the data was checked using the Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity, as presented in Tables 2, 3, and 4. The KMO value was 0.802, showing that the sample size was adequate for factor analysis. Bartlett's test was also significant ($p < 0.001$), indicating that the data were suitable for this analysis. The results identified three main factors that explained 61.14% of the total variance. After rotation, the factor structure was clear and easy to interpret. Items related to management commitment grouped together under the first factor, while safety training and individual responsibility items loaded mainly on the second factor. It is also important to note that items related to safety training and individual responsibility loaded on the same factor. This suggests a degree of conceptual overlap between these constructs in this study context. One possible explanation is that safety training in construction environments may directly influence workers' sense of personal responsibility, leading respondents to perceive these concepts as closely connected. While this does not invalidate the constructs, it indicates limited discriminant separation between them. This issue is acknowledged as a limitation and should be considered when interpreting the results. The third factor was mainly associated with supervisor safety role items. However, one item from the supervisor role scale and one item from the safety training scale showed weak loadings and low communalities. These items were removed from the final analysis to improve the quality of the measurement model. Overall, the findings showed that most survey items measured their intended constructs well and supported the validity of the study variables.

Table2: KMO and Bartlett's Test

Test	Value
Kaiser–Meyer–Olkin (KMO)	0.802
Bartlett's Test (χ^2)	1152.539
df	66
Sig.	< 0.001

Table 3: Total variance explained

Component	Eigenvalue	% Variance	Cumulative %
1	4.389	36.58	36.58
2	1.814	15.11	51.69
3	1.134	9.45	61.14

Table 4: Rotated component matrix (Loadings ≥ 0.50)

Item	Component 1	Component 2	Component 3
CM1	0.726	—	—
CM2	0.823	—	—
CM3	0.758	—	—
CS1	0.776	—	—
CS3	—	—	0.924
CS4	—	—	0.882
CT2	—	0.677	—
CT3	—	0.729	—
CW2	—	0.791	—
CW3	—	0.743	—

Table 5: Overall descriptive statistics of study variables

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Management Commitment to Safety	256	4.30	0.63	1.00	5.00
Supervisor Safety Role	256	3.61	0.82	1.75	5.00
Safety Training	256	4.40	0.63	1.50	5.00
Individual Responsibility for Safety and Health	256	4.59	0.51	2.00	5.00

Descriptive statistics were computed to examine the average and variability of the key study variables among respondents. As shown in Table 5, all constructs recorded relatively high mean values, indicating generally positive perceptions of safety climate among the respondents. Individual responsibility for safety and health exhibited the highest mean score (M = 4.59, SD = 0.51), suggesting that workers strongly recognize their personal role in maintaining safe working

conditions. Safety training also received a high rating (M = 4.40, SD = 0.63), reflecting favorable perceptions regarding the availability and effectiveness of training programs. Management commitment to safety was rated positively as well (M = 4.30, SD = 0.63), indicating that respondents generally perceive strong organizational support for safety practices. In contrast, the supervisor safety role showed a comparatively lower mean (M = 3.61, SD = 0.82), although still within the positive range. This suggests greater variability in how workers perceived the supervisory practices. Overall, the findings indicate a favorable safety climate within the studied construction sites, with particularly strong perceptions of individual responsibility and management commitment, while supervisory practices appear to be more inconsistently experienced. While the overall results provide a general view of safety climate perceptions, they do not capture potential differences across job roles. To examine these differences in more detail, descriptive statistics were calculated for each job role category, as presented in Table 6.

Table 6. Descriptive statistics of safety climate dimensions by job role

Job Role	N	Management Commitment (Mean ± SD)	Supervisor Role (Mean ± SD)	Safety Training (Mean ± SD)	Individual Responsibility (Mean ± SD)
Frontline workers	52	4.34 ± 0.49	3.42 ± 0.70	4.43 ± 0.46	4.53 ± 0.43
Skilled trades	33	4.14 ± 0.70	3.36 ± 0.59	4.29 ± 0.78	4.48 ± 0.45
Supervisory staff	16	4.25 ± 0.61	3.56 ± 0.94	4.31 ± 0.63	4.48 ± 0.78
Support / other	155	4.33 ± 0.65	3.74 ± 0.87	4.43 ± 0.64	4.65 ± 0.51
Total	256	4.30 ± 0.63	3.61 ± 0.82	4.40 ± 0.63	4.59 ± 0.51

As shown in Table 6, the mean values for management commitment to safety, safety training, and individual responsibility are consistently high across all job roles, with only minor differences between groups. This suggests that these dimensions are generally perceived in a similar way across the workforce. In contrast, greater variation can be observed in the supervisor safety role, where frontline workers and skilled trades report lower mean scores compared to supervisory staff and the support/other group. Although these differences appear modest at the descriptive level, they indicate that supervisory practices may not be experienced uniformly across job roles. These observations provide an initial basis for further statistical testing to determine whether the differences are statistically significant. These patterns suggest that safety climate perceptions are influenced not only by job role but also by shared organizational practices. The relatively small differences observed

across groups indicate that safety-related policies and communication may be applied consistently across the workforce.

4.3. Differences in safety climate across job roles

A one-way ANOVA was performed to determine whether perceptions of the safety climate varied among different job roles. The results are shown in Table 7. Prior to analysis, the assumption of homogeneity of variances was assessed using Levene's test. For most variables, the assumption was satisfied; however, for the supervisor safety role, the assumption was violated ($p < 0.001$). Therefore, the Welch robust test was used to confirm the results for this variable. Although statistical differences were examined, the magnitude of these differences should be interpreted carefully, particularly in light of the reported effect sizes. This indicates that while statistical differences may exist, their practical importance may be limited, and other factors may play a more significant role in shaping safety perceptions.

Table 7. One-way ANOVA results for safety climate across job roles

Variable	F	p-value	Welch p-value	Effect Size (η^2)	Interpretation
Management Commitment	0.907	0.438	0.520	0.011	Not significant
Supervisor Safety Role	3.312	0.021*	0.012*	0.038	Significant
Safety Training	0.609	0.610	0.704	0.007	Not significant
Individual Responsibility	1.599	0.190	0.192	0.019	Not significant

Table 8. Post Hoc Comparisons (Games–Howell) for Supervisor Safety Role

Comparison	Mean Difference	p-value	Interpretation
Frontline vs Support/Other	-0.320	0.041	Significant
Skilled Trades vs Support/Other	-0.375	0.018	Significant
Other comparisons	—	>0.05	Not significant

4.3.1 Management commitment to safety

The results indicated that there were no statistically significant differences in perceived management commitment to safety across job roles among participants, $F(3, 252) = 0.907$, $p = 0.438$. The Welch test confirmed this finding ($p = 0.520$). The effect size was very small ($\eta^2 = 0.011$), suggesting minimal variation between groups. This indicates that perceptions of management commitment are relatively consistent across job roles, with only minimal variation between groups.

4.3.2 Supervisor safety role

The results showed a significant difference in how workers from different job roles viewed the supervisor's role in safety, $F(3, 252) = 3.312$, $p = 0.021$. Given the violation of homogeneity of variance, the Welch test was used and also indicated a significant effect ($p = 0.012$), confirming the

robustness of the result. The effect size was small ($\eta^2 = 0.038$), suggesting that job role accounts for only a limited proportion of the variance in perceptions. Post hoc comparisons using the Games–Howell test revealed that respondents in the support/other category reported significantly higher perceptions of supervisor safety role compared to frontline workers ($p = 0.041$) and skilled trades ($p = 0.018$). No significant differences were observed between other group pairs. This pattern suggests that differences in supervisory practices may be linked to how workers interact with supervisors in their daily tasks, rather than structural differences between job roles alone.

4.3.3 Safety training

The ANOVA results showed no statistically significant differences in perceived safety training across job roles, $F(3, 252) = 0.609$, $p = 0.610$. The Welch test further confirmed the absence of significant differences ($p = 0.704$). The effect size was negligible ($\eta^2 = 0.007$), indicating that safety training is perceived in a largely consistent manner across job roles.

4.3.4. *Individual responsibility for safety and health*

Similarly, no statistically significant differences were found in individual responsibility for safety and health across job roles, $F(3, 252) = 1.599$, $p = 0.190$. The Welch test yielded consistent results ($p = 0.192$). The effect size was small ($\eta^2 = 0.019$), suggesting that differences across job roles are minimal. Overall, while some statistically significant differences were identified, the consistently small effect sizes indicate that job role explains only a limited portion of variation in safety climate perceptions. This suggests that broader organizational factors, such as management practices and safety systems, may have a stronger influence on how safety is experienced across the workforce.

5. Discussion

5.1. Overview of findings

This study examined whether safety climate perceptions differ across job roles in multinational construction sites in Saudi Arabia. The results showed that workers across different job roles had similar views on most safety climate factors. However, perceptions of the supervisor's safety role were significantly different between job groups. These results suggest that while organizational-level safety practices are broadly shared and similarly interpreted across the workforce, supervisory practices are experienced differently depending on job role, highlighting the importance of frontline leadership in shaping safety perceptions. However, the magnitude of these differences was generally small, suggesting that job role plays a limited role in shaping overall safety climate perceptions.

5.2. Consistency of organizational safety climate dimensions

The lack of significant differences in perceptions of management commitment to safety suggests that workers in different job roles generally viewed the organization's safety priorities in a similar way. This may indicate that safety expectations and management support for safety are clearly communicated across the workforce [11], [12]. From a theoretical perspective, this supports the notion that safety climate operates as a collective construct, where shared perceptions emerge from consistent organizational signals and practices [7], [8]. Workers from different job roles may develop similar views about safety when management actively supports safety through clear policies, regular communication, and adequate resources. This result also agrees with previous studies showing that management commitment plays an important role in improving safety performance among different groups of workers [15], [31]. The small effect size suggests that organizational safety practices are applied in a largely consistent manner, resulting in only minor differences across job roles.

5.3. Uniform perceptions of safety training

Likewise, no significant differences were found in perceptions of safety training between job roles. This suggests that safety training programs are delivered in a similar and consistent manner across the workforce. This result is similar to findings from earlier studies showing that well organized safety training programs often lead to consistent outcomes among workers [30]. In construction environments, training is often mandatory and centrally managed, which may contribute to consistent perceptions regardless of job role. From a practical standpoint, this suggests that organizations have been effective in institutionalizing safety training, ensuring that all employees receive comparable information and guidance. However, it also raises questions about whether standardized training adequately addresses the specific needs of different job roles, particularly in complex and diverse work environments. The small effect size further supports this finding, indicating that differences across job roles are minimal in practical terms.

5.4. Stability of individual responsibility for safety

The results showed that workers across different job roles had similar views regarding individual responsibility for safety and health. This indicates that employees, regardless of their position, understand the importance of their own role in maintaining a safe work environment. Previous studies have also highlighted that personal commitment and safety awareness are important factors in encouraging safe behavior at work [10], [16]. The results suggest that safety is viewed as a shared responsibility across the organization, regardless of job role. This may reflect the role of training,

communication, and workplace practices in promoting a shared understanding of safety responsibilities among workers.

5.5. Variability in supervisor safety role

Supervisor safety role construct showed significant differences across job roles, indicating that supervisory practices are not experienced uniformly. Post hoc analysis, as shown in Table 8, revealed that workers in the support/other category reported higher perceptions of supervisor safety role compared to frontline and skilled workers. This finding highlights the critical role of supervisors as the interface between management and workers**.** While management commitment is consistently communicated, supervisory practices may vary in how they are implemented and enforced [13]. The observed differences may be explained by variations in daily interactions, communication patterns, and enforcement styles. This variation may reflect differences in daily interactions with supervisors, communication patterns, and perceptions of enforcement among frontline workers. Frontline and skilled workers, who are more directly exposed to hazards and supervisory oversight, may experience supervision differently compared to other groups. In some cases, supervisory practices may be perceived as overly directive or enforcement-oriented, which can influence how safety is interpreted at the operational level. Previous studies have shown that overly directive supervision may reduce workers' safety participation when it is seen as controlling rather than supportive [26], [41]. The findings also support the view that safety climate is not entirely homogeneous and may vary depending on the level of interaction with supervisory personnel. Although statistically significant differences were identified, the associated effect sizes were small, suggesting that job role accounts for only a limited share of variation in safety climate perceptions. Accordingly, the practical implications of these differences should be interpreted with caution. Additionally, it should also be noted that the "support/other" category includes a diverse set of roles. This heterogeneity may have influenced the observed differences and should be considered when interpreting the results. This suggests that while supervisory practices influence safety perceptions, their overall impact is limited compared to broader organizational factors.

5.6. Implications of the results

The findings indicate that safety climate operates at different levels within the organization. Management commitment and safety training were perceived consistently, while supervisor-related factors varied across job roles. This supports the view that safety climate can be understood as a multi-level concept, where organizational practices shape shared perceptions, and supervisors influence day-to-day experiences. This aligns with prior work on the hierarchical nature of safety climate [13]. From

a practical perspective, consistent perceptions of management commitment and training suggest that organizations have established effective safety systems. These should be maintained. However, variation in supervisory practices highlights the need for improvement at the frontline level. Supervisors should be trained to communicate clearly, support workers, and balance enforcement with engagement. The results also suggest that safety strategies should be tailored to different job roles. Frontline and skilled workers may experience supervision differently, and targeted interventions can help improve safety outcomes. At the same time, the small effect sizes observed in this study suggest that these differences should not be overstated, and that safety climate remains largely consistent across job roles.

6. Conclusion

This study examined differences in safety climate perceptions among workers in different job roles within a multinational construction workforce. The results showed that management commitment to safety, safety training, and individual responsibility for safety and health were viewed similarly across job roles. This indicates that these aspects of safety climate are generally consistent across the workforce. However, perceptions of the supervisor's safety role differed significantly between job groups. Specifically, frontline and skilled workers reported lower evaluations compared to other groups. This indicates that workers may experience supervisory safety practices differently depending on their position at the worksite. Overall, the results show that variation in safety climate is primarily associated with supervisory practices rather than organizational-level factors. These findings indicate that differences in safety perceptions are limited to specific dimensions rather than the overall safety climate. From a practical perspective, the study highlights the need to strengthen supervisory leadership and improve consistency between organizational safety policies and frontline safety practices. Overall, the findings suggest that construction organizations should consider workers' different job roles when developing and implementing safety management practices in multinational work environments.

7. Limitations and future research

Several limitations should be taken into account when reviewing the findings of this study. First, the study used a cross-sectional survey, so it cannot fully explain cause-and-effect relationships between the variables. Second, the data were based on workers' self-reported responses, which may include some response bias. Third, the study focused on workers from a specific multinational construction environment, so the findings may not fully represent other industries or work settings Future studies should examine safety climate over a longer period of time to better understand how workers'

perceptions may change. Researchers could also include objective safety data, such as accident or near-miss records, together with survey responses. In addition, future research may further explore the influence of cultural differences and specific job roles on safety perceptions in multinational construction projects.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request

Conflicts of Interest

The authors declare no conflict of interest / or state any conflict if any.

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