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Assessing Safety Climate Dimensions in the Textile Industry: A Correlational Study Using the NOSACQ-50 Framework

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ABSTRACT

The manufacturing sector, particularly the textile industry, faces high occupational accident risks due to inadequate Occupational Health and Safety (OHS) culture. This study evaluates the safety climate in the textile industry and examines the relationship between the seven dimensions of the NOSACQ-50 framework and the overall safety climate. Utilizing a descriptive quantitative, cross-sectional approach, data was collected from 100 purposively sampled workers through the NOSACQ-50 questionnaire, direct workplace observations, and interviews. Data was analyzed using univariate and bivariate (Spearman's rank) methods. Univariate results indicated a "good" overall safety climate with an average score of 3.06 across all dimensions. However, the dimension concerning OHS communication and coworker competence scored the lowest (2.95), identifying a specific area for improvement. Bivariate analysis revealed highly significant correlations between specific dimensions and the overall safety climate. Notably, employee commitment to OHS components demonstrated a very strong relationship (r = 0.783). Furthermore, employee safety priorities and workplace hazard control also exhibited a very strong and significant correlation with the safety climate (r = 0.787). In conclusion, while the general safety climate is good, prioritizing improvements in OHS communication is necessary. Fostering employee commitment and safety priorities plays a crucial role in maintaining a positive safety climate.

Key Messages:

- While the overall workplace safety climate is generally good, the company should focus on improving OHS communication among workers, as employee commitment and safety priorities demonstrate a very strong correlation in shaping the safety climate.

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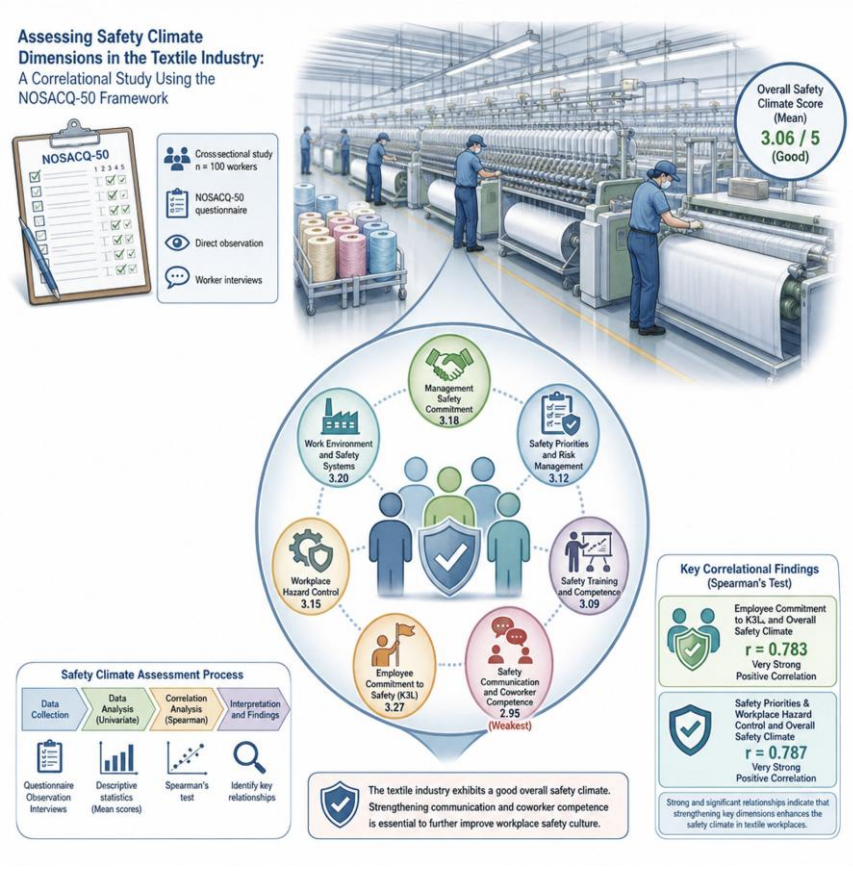
GRAPHICAL ABSTRACT



INTRODUCTION

The manufacturing industry is a vital component in supporting national economic growth. However, this sector tends to have high risk of workplace accidents due to the intensity of operational activities. The large number of workers, heavy equipment usage, machine tools and production materials in operational activities can cause potential danger if there is unsafe interaction between workers and work machine tools. In various sectors of industry, workers are often exposed to long, repetitive work conditions, which are intertwined with the physical workload and risk of illness, including physical tiredness. Some studies suggest that the proportion of workers who experience moderate fatigue levels to weight after hours is significant, giving serious attention to safety and occupational health management (1). Every individual who works in a company will deal with dynamic and complex working environment. Rapid change demands rapid adaptation from workers. Therefore, in the adjustment process, it is important for individuals to understand the potential dangers that may arise in their work environment (2).

Occupational safety is now a mandatory and an important need for every company or institution. The goal is to create a safe, comfortable and pollution-free working environment so that the workers are protected from potential work accidents. In the last three decades, safety climate is known as an important indicator in creating a safety work practice. This concept became relevant in the context of act number 1 in 1970, because the effectiveness of the application of safety regulations was determined not only by the existence of written rules but also by how the rules are defined and enforced in the field. In other words, the success of the regulation implementation is strongly influenced by management commitments and worker participation in building a safety culture (3).

According to article 87 paragraph (1) Indonesian employment laws (Undang-Undang No. Tahun 2003) in which each company is required to adopt a safety and health management system of work. It reinforces the 1970 statute number 1 mandate (Undang-Undang No. 1 in 1970), that work safety should be managed systematically and integrated into the corporate management system. Security in work is enhanced if companies consistently apply safety regulations. Additionally, article 9 in safety laws

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employment (Undang-undang No. 1 in 1970) asserts that stewards are obliged to provide training and an explanation of the conditions and dangers of work to the workforce. These requirements indicate that safety communication is an important element in shaping the worker's positive perception of the safety systems that are applied. Such perceptions, in turn, shape the safety climate in the workplace (4).

According to zohar (dalam penelitian Yusvita, 2021) explains that the safety climate is defined as a collective perception of the workers' policies, procedures, and safety practices that are implemented in organizations. Such perceptions reflect how workers assess safety priorities in day-to-day operations (5). Unlike the safety culture (culture) that refers to the organization's deeper, relative permanence, values, and fundamental assumptions, the safety climate is more dynamic, temporary, and subjective because it depends on the worker's interpretation of the ongoing safety practice (6,7). Thus, safety climate can be understood as a measurable representation of the prevailing condition of safety culture at a particular point in time. If safety culture reflects "what the organization believes" regarding safety, then safety climate indicates "how safety is currently perceived by employees." This conceptual distinction is crucial within a research context, as measuring employees' perceptions enables a more operational and diagnostic evaluation of the effectiveness of safety management implementation.

Accordingly, this study employs the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50), which was developed and validated by occupational safety experts from the Nordic countries, as the primary measurement instrument. This tool was selected because it is specifically designed to assess key dimensions of employees' perceptions, including management commitment to safety, safety communication, and worker involvement in safety practices. The selection of this instrument aligns with the objective of the study, which focuses on measuring safety climate conditions that can be identified and improved through managerial interventions. Furthermore, the instrument is flexible and allows for contextual adaptation to suit specific industrial settings, respondent characteristics, and research needs, provided that the core constructs and measured dimensions are maintained. Several previous studies have also adapted certain items without compromising the fundamental conceptual framework of safety climate measurement (8).

The NOSACQ-50 has been widely applied across various industrial sectors, including mining, construction, and healthcare, and has demonstrated its capacity to identify organizational factors that contribute to safe work behaviour. for example, research by Herza (2023), where the result points out that safety climate also has a significant relationship with safety behavior in mining area workers (9). Moreover, research conducted by Purba (2021) provides an overview that the implementation of the overall safety climate has shown good results, with an average score obtained of 3.17 (7). Another study conducted by Yuliarti (2018) on nurses and supporting medical staffs in hospitals shows that among nurses, all dimensions are in the good category. Meanwhile, among supporting medical staffs, the dimensions such as prioritizing safety, intolerance of risk, and aspects of learning, communication, and innovation are still considered adequate and needed improvement (10).

Nevertheless, the application of the NOSACQ-50 within the textile industry remains relatively limited. This is noteworthy given that the textile sector possesses distinct occupational risk characteristics, including exposure to fiber dust, high noise levels, the operation of high-speed spinning and weaving machinery, and a workforce profile with specific demographic attributes. These contextual differences may influence the dynamics of safety climate in ways that cannot be readily generalized from other sectors such as mining or construction. To date, the majority of prior studies have predominantly focused on high-risk industries of an extractive or construction nature, whereas the textile sector, as part of labour-intensive manufacturing, has received comparatively limited empirical attention. This gap highlights the need for research that specifically identifies and examines the safety climate profile within textile manufacturing settings in order to obtain a more accurate and context-sensitive understanding. Accordingly, this study aims to analyze the safety climate in a textile industry setting using the NOSACQ-50 instrument. The findings are expected to contribute to the scientific literature by extending the application of this instrument to the textile manufacturing sector and to provide an evidence-based foundation for designing more contextually appropriate interventions to strengthen occupational safety culture (11).

https://doi.org/10.56303/jhnresearch.v5i2.1206

METHODS

Research Design

This study employed a quantitative cross-sectional design supported by qualitative data to provide contextual interpretation of the findings. Quantitative data were collected using a structured questionnaire, while qualitative support was obtained through direct observations and semi-structured interviews.

Study Population and Sampling

The study population consisted of workers in industry workers in the production of textile areas at copany X. A purposive sampling technique was applied to select respondents who met predefined inclusion criteria. These criteria included permanent production workers assigned to the morning shift, having a minimum tenure of six months, and willingness to participate in the study. A total of 100 respondents who voluntarily completed the questionnaire were included in the final analysis. The sampling strategy was intended to ensure that participants possessed sufficient work experience to provide reliable assessments of the organizational safety climate.

Research Instrument and Data Collection

Direct observations were conducted in production and supporting areas during working hours to identify workplace environmental conditions, the availability and use of personal protective equipment (PPE), the presence of safety communication media (e.g., safety posters and signage), and compliance with safe work procedures. In addition, semi-structured interviews were conducted with 10 purposively selected workers representing several production departments. The interviews aimed to explore employees' perceptions regarding management commitment to safety, risk communication practices, and their experiences related to the implementation of occupational health and safety (OHS) policies in daily operations. The findings from observations and interviews were not subjected to in-depth thematic analysis. Instead, they were utilized as supporting data to validate and provide contextual interpretation of the quantitative survey results, particularly in the discussion section.

The primary instrument used to measure safety climate was the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50), which originally consists of 50 items across seven dimensions. In this study, the number of items was adjusted to 35 statements while retaining the original seven-dimensional structure. This modification was conducted through a contextual adaptation process to ensure that each item was relevant to the characteristics of the industry under investigation. Several items were removed due to limited operational relevance or conceptual redundancy. The reduction in the number of items was also intended to improve response quality by minimizing respondent fatigue, thereby maintaining measurement reliability. Despite the reduction in indicators, the original NOSACQ-50 dimensions were preserved to ensure the conceptual integrity of the instrument and to maintain comprehensive representation of safety climate. The seven dimensions of NOSACQ-50 include: 1) Management safety commitment and competence; 2) Management safety empowerment and participation; 3) Management safety justice; 4) Workers' safety commitment; 5) Workers' safety priority and risk non-acceptance; 6) Safety communication, learning, and trust in co-workers' safety competence; 7) Trust in the effectiveness of the safety management system (8).

Data Analysis

Data analysis consisted of univariate and bivariate statistical procedures. Univariate analysis was conducted to identify the frequency distributions and percentages of each independent and dependent variable. Descriptive analysis was further performed to illustrate the distribution of scores across each safety climate dimension. Spearman's rank correlation test was applied in the bivariate analysis to examine the relationship between each safety climate dimension and the overall safety climate score. This non-parametric test was selected because the data were ordinal in nature and did not meet the assumption of normal distribution. Statistical significance was established at $p < 0.05$ to determine the presence of statistically meaningful associations.

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Code of Health Ethics

The research protocol was reviewed and approved by Dr. Moewardi Hospital Surakarta's Health rese a directly related to patients, and uses test animals in research. Please attach with no. approval 1.347/VI/HREC/2025.

RESULTS

Observations in the Field

Based on direct observations conducted in production and supporting areas, it was found that safety communication media such as OHS policy posters, hazard warning signs, and safe work procedure information were not consistently displayed across all work areas. Several production units did not visibly present company safety policy posters or information regarding the proper use of personal protective equipment (PPE). Furthermore, PPE usage among workers was observed to be inconsistent, particularly in tasks involving exposure to dust and high noise levels. In several workstations, no clearly visible signage indicating emergency procedures or evacuation routes was identified.

Observations also revealed that safety briefings were not consistently conducted prior to the commencement of work shifts, and there was limited visual documentation demonstrating active safety campaigns within the workplace environment. In mature safety cultures, communication is proactive, participatory, and continuously reinforced through leadership engagement and peer accountability. The absence of regular safety briefings and limited evidence of active safety campaigns may weaken collective learning processes and reduce opportunities for shared reflection on risks and preventive strategies.

Worker Interviews

Based on semi-structured interviews with 10 production workers, several key findings emerged regarding the workplace safety climate. Some participants reported that company safety policies were introduced during initial orientation; however, these policies were not consistently reinforced or revisited on a regular basis. This suggests that safety communication may be more episodic than continuous in nature. Several respondents indicated that safety-related information was primarily conveyed through direct verbal instructions from supervisors rather than through structured written or visual communication media. While direct supervision plays an important role in operational safety, over-reliance on informal verbal communication may limit standardization and reduce the consistency of safety message dissemination across departments.

In addition, some workers acknowledged that management appeared responsive when incidents occurred. However, communication regarding incident evaluations, corrective actions, or lessons learned was not always openly shared with all employees. Limited transparency in post-incident communication may restrict organizational learning processes and reduce opportunities for collective reflection and improvement. Furthermore, several respondents noted that safety training had not been conducted regularly in recent periods. The absence of routine and structured training programs may weaken continuous learning mechanisms and diminish reinforcement of safe work behaviors.

Distribution of Respondent Characteristics

Based on Table 1, it can be seen that the age of respondents under 35 years are 57 respondents (57%), followed by the age above 35 years as many as 43 respondents (43%). As for the distribution of gender among workers is the same, 50 respondents are male (50%), and 50 respondents are female (50%). Futhermore, respondent distribution based on length of service shows that 55 respondents (55%) have working period of less than 5 years, then 45 respondents (45%) have working period of more than 5 years. This proportion indicates that more than half of the respondents had relatively long tenure within the company, suggesting sufficient exposure to organizational safety policies and practices. Employees with extended years of service may contribute to greater stability in safety climate perceptions, as their assessments are shaped by prolonged experience within the organizational system. Conversely, workers with shorter tenure may offer more critical perspectives regarding safety orientation processes, communication effectiveness, and early-stage safety learning experiences during their initial period of

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employment.

Table 1. Distribution of Respondent Characteristics in Textile Industry Workers

Respondent Characteristics	n	%
Age		
≥ 35 Years Old	57	57%
< 35 Years Old	43	43%
Gender		
Male	50	50%
Female	50	50%
Length of Service		
≥ 5 Years	55	55%
< 5 Years	45	45%
Education		
Elementary School	3	3%
Junior High School	18	18%
Senior High School	72	72%
Higher Education (Diploma/Bachelor)	7	7%
Total	**100**	**100%**

Meanwhile, from the aspect of education level, it can be seen that the most respondents are senior high school graduates, as many as 72 respondents (72%), followed by junior high school graduates as many as 18 respondents (18%), higher education graduates as many as 7 respondents (7%) and finally elementary school graduates as many as 3 respondents (3%). This composition indicates that the majority of the workforce possesses a secondary-level educational background, which may potentially influence how safety information is understood, received, and interpreted within the organization. Educational attainment can affect cognitive processing, risk perception, and the ability to comprehend technical safety instructions. This condition may pose challenges to the effectiveness of safety communication, particularly if communication methods and materials are not adequately tailored to align with the educational characteristics of the predominant workforce. Therefore, adapting safety training strategies and communication approaches to match workers' educational profiles becomes essential to enhance comprehension and promote safe work practices.

Distribution of Safety Climate

Based on Table 2, it can be known that the implementation of the safety climate in the textile industry in general is already in the good category. These findings indicate that, overall, workers demonstrated a positive perception of the implementation of occupational health and safety (OHS) within the organization. Among the seven safety climate dimensions assessed, six dimensions achieved mean scores of 3.00 or higher, reflecting generally favorable evaluations. However, one dimension recorded a mean score below 3.00, specifically Dimension 6 (Safety communication, learning, and trust in co-workers' safety competence), with a mean value of 2.95.

Although this score remains within the acceptable or "fairly good" category, it is relatively lower compared to the other dimensions. This result suggests that aspects related to safety communication, continuous learning, and peer safety competence may require further organizational attention and improvement efforts. The comparatively lower score may indicate opportunities to strengthen structured safety communication channels, enhance feedback mechanisms, and promote continuous safety learning initiatives to ensure consistent understanding and shared responsibility among workers.

Based on Table 3, it can be seen that the variables from all dimensions in the NOSACQ-50 components are related to safety climate. The dimensions of employee commitment to OHS and employee safety priority with hazard control on site have a very strong correlation (0.787) compared to other dimensions. In the context of Spearman's rank correlation, a coefficient of 0.787 indicates a very strong positive relationship. This finding suggests that higher worker perceptions regarding safety prioritization and rejection of unsafe risks are strongly associated with higher overall safety climate scores. In other

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words, when employees consistently prioritize safety over productivity pressures and demonstrate low tolerance for hazardous conditions, the collective perception of safety climate within the organization becomes significantly stronger.

Table 2. Distribution of Average Score Safety Climate on the NOSACQ-50 Dimension Components

No	Dimension Components	Mean±SD	Maximum Score	Minimum Score
1	Management Commitment to OHS	3.10 ± 0.29	4.0	2.4
2	Management Participation Support for OHS	3.03 ± 0.32	4.0	1.8
3	Management Justice towards Employees Regarding OHS Issues	3.06 ± 0.27	4.0	2.4
4	Employee Commitment to OHS	3.19 ± 0.32	4.0	2.4
5	Employee Safety Priorities and Workplace Hazard Control	3.01 ± 0.33	3.8	2.2
6	OHS Communication Learning and Co-Worker Competence	2.95 ± 0.28	3.8	2.4
7	Worker Trust in the Effectiveness of the OHS System	3.02 ± 0.31	4.0	2.2
	Safety Climate Average Score	3.06 ± 0.21		
	Safety Climate Category	Good		

Table 3. Correlation of the Relationship between NOSACQ-50 Dimensional Components and Safety Climate in Textile Industry Workers

Variable	Safety Climate	
	p-value	r
Management Commitment to OHS	0.000	0.538
Management Participation Support for OHS	0.000	0.723
Management Justice towards Employees Regarding OHS Issues	0.000	0.551
Employee Commitment to OHS	0.000	0.783
Employee Safety Priorities and Workplace Hazard Control	0.000	0.787
OHS Communication Learning and Co-Worker Competence	0.000	0.729
Worker Trust in the Effectiveness of the OHS System	0.000	0.704

So, it can be concluded that there is a strong and significant relationship between the dimensions of employee commitment to OHS and the dimensions of employee safety priorities and hazard control in the workplace with safety climate. Furthermore, all dimensions demonstrated statistical significance with *p* values of 0.000 ($p < 0.05$), indicating that the observed relationships were statistically significant. Thus, it can be stated that all seven NOSACQ-50 dimensions were meaningfully associated with the overall safety climate within the context of the textile industry examined in this study. These findings suggest that the multidimensional structure of the NOSACQ-50 instrument remains relevant and consistent when applied to the textile manufacturing sector. Despite contextual differences between high-risk industries such as mining or construction and labour-intensive manufacturing environments, the core perceptual dimensions captured by NOSACQ-50 appear to maintain conceptual stability.

DISCUSSION

Based on the results of research conducted on textile industry workers, an average safety climate score of 3.06 was obtained from all the NOSACQ-50's dimension components, which means that it can be categorized as "good" in its implementation in the textile industry. Of the seven measured dimensions, six achieved mean score within the categorized as "good" range (≥ 3.00). However, when compared to previous studies conducted in other sectors, the score suggests differences in the level of safety climate maturity across industries. For example, Purba (2021), in a study conducted in the construction sector, reported a higher mean safety climate score of 3.17. This difference may be explained by sectoral characteristics. The construction industry typically operates under stricter safety regulations, more

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intensive field supervision, and visibly high-risk working environments. As a result, safety awareness and control mechanisms tend to be more structured and systematically reinforced (7).

In contrast, the textile industry, as a labour-intensive manufacturing sector, is characterized by chronic and repetitive hazards, such as dust exposure, high noise levels, and high-speed machinery. Over time, these persistent exposures may contribute to a phenomenon known as risk normalization, where workers gradually perceive routine hazards as standard operational conditions. This normalization process may result in safety climate perceptions that are generally positive but not as strong as in sectors with more explicit fatal risks and regulatory pressures.

Furthermore, Herza (2023), in a study within the mining sector, found that safety climate was significantly associated with safety behavior. A similar pattern is observed in the present study, where all seven NOSACQ-50 dimensions demonstrated statistically significant relationships with overall safety climate ($p = 0.000$). This consistency strengthens the construct validity of NOSACQ-50 when applied in the textile industry context and confirms that the multidimensional structure of the instrument remains conceptually robust across different industrial sectors, including manufacturing (9).

Despite the generally favorable results, Dimension 6 (Safety Communication, Learning, and Trust in Co-workers' Safety Competence) recorded the lowest mean score (2.95). This finding indicates that safety communication and continuous learning represent relatively weaker components within the company's safety system. When linked to respondent characteristics, where 72% of workers had a secondary-level educational background (senior high school or vocational school), the effectiveness of safety communication becomes particularly critical. Communication strategies that are visual, interactive, and repetitive may be more effective than purely formal or administrative approaches in ensuring comprehension and internalization of safety messages. Therefore, in order to improve dimension 6, company can make some efforts including encouraging employee involvement in safety-related decision-making, conducting regular sharing and OHS discussions, and providing rewards for active employees who report potential hazards or provide input on work safety programs.

In the dimension of management commitment and support for management participation in OHS, the company strives to ensure that all workers receive information related to work safety through the implementation of briefings before starting work activities. The management guarantees and encourages workers compliance with safety in accordance with company procedures, including placing employee safety as a top priority to prevent work accidents. The company provides adequate safety facilities and equipment in the workplace, and also personal protective equipment (PPE) in the form of work uniforms, safety shoes, masks and others. Based on the results of the processed questionnaire, management is responsive to follow up on any OHS problems (12,19).

On the other hand, based on direct observations conducted in production areas and several supporting facilities, physical implementation of occupational safety measures was evident through the provision of personal protective equipment (PPE), including masks, gloves, and hearing protection. Most workers were observed wearing PPE appropriate to their respective job tasks. This indicates that the company has provided basic protective facilities to mitigate workplace hazards (18). However, previous research by Yuliarti (2020) in the manufacturing sector reported that the dimension of safety communication and learning often received the lowest scores compared to other safety climate dimensions. This condition was associated with an organizational culture that emphasized administrative compliance rather than active worker participation. Similar patterns were identified in the present study, where interview findings revealed that safety training was generally conducted during initial employment orientation but was not consistently sustained over time (10).

Observational findings also indicated that visual safety communication media remained limited. Posters outlining OHS policies and information related to national occupational safety regulations were not clearly visible in several production areas. In addition, information boards displaying emergency procedures, evacuation routes, and safety slogans were not uniformly installed across all work units. Some areas also lacked safety reminder media such as banners or safety performance boards displaying accident statistics. These conditions suggest that visual safety communication has not yet been fully optimized as a strategic component of strengthening safety culture. Furthermore, safety briefings (toolbox talks) were not

https://doi.org/10.56303/jhnresearch.v5i2.1206

consistently conducted prior to the commencement of work, and documentation of their implementation was not systematically evident. Although no major safety violations were observed, the findings indicate that preventive and proactive safety approaches could still be further enhanced to support a more mature and participatory safety culture (3,13).

For that reason, in order to increase management commitment and participation in work safety, management needs to provide an active leadership culture in implementing OHS in the workplace, such as prioritizing work safety in every decision making and also complying with every OHS rule that has been made in each workplace area. Besides, companies ought to provide opportunity for workers to voice their ideas or views regarding safety without fear of punishment by the company. Management levels also need to improve managerial competency in the OHS aspect. For example, there should be the implementation of the occupational safety and health management system (OHSMS), risk hazards identification using the Hazard Identification, Risk Assessment, and Determining Control (HIRADC) method and other competent OHS technical capabilities in order to integrate the OHS program into part of the company's business planning and strategy. Therefore, in the future, the fulfilment of the provisions that must be met by the company will not just be a complement and a formality (2,14).

In the dimension of worker commitment to OHS, it is categorized as good, where this aspect reflects the level of awareness, responsibility and concern of workers in implementing OHS aspects in carrying out routine work in the workplace. This dimension also shows workers' awareness in complying with OHS regulations, stopping work temporarily if it is felt that activities can cause the risk of unsafe conditions and also reminding coworkers about unsafe behaviour or action at work. In the context of occupational health and safety (OHS), safety attitude can be understood as an individual's tendency or readiness to support safe work practices. However, such attitudes do not automatically translate into observable safety behaviours. Rather, attitudes represent an internal predisposition toward action, not the action itself. Therefore, even when workers demonstrate positive attitudes toward safety, this does not necessarily guarantee consistent compliance with safety procedures or the regular use of personal protective equipment (PPE). The translation of safety attitudes into actual behavior often depends on enabling factors, such as supervisory enforcement, availability of facilities, organizational norms, and reinforcement mechanisms within the work environment (15,16).

Based on the results of implementing the dimension 4, the company can determine the extent to which employees have an active role in creating a safe work environment. Worker commitment to OHS is an important indicator in forming a participatory work safety culture, where responsibility for safety does not only lie in the hands of management, but also belongs to every individual in the workplace. Therefore, in order for implementation in this dimension to always be good and optimal, a collaborative approach is required between management and workers. Management must create an environment that supports workers to take a stand against safety risks and build a work climate that encourages workers to feel responsible for their own safety and that of their fellow coworkers. Thus, by increasing workers' commitment to OHS, the company will be able to prevent the potential for work accidents on an ongoing basis.

Furthermore, dimension 7 in the NOSACQ-50 questionnaire assesses the extent to which workers have confidence in the effectiveness of the OHS system. Based on the results of the data analysis, the assessment for this dimension is at an average score of 3.00, which means it is in the "good" category. This dimension focuses on workers' perceptions of the safety systems, procedures and policies in place at the company to protect workers from potential occupational hazards and risks. The good implementation in this dimension is characterized by high worker trust in the applicable OHS system, inspection activities or OHS activities that can have a safety impact on them, such as audit activities, use of PPE, and incident reporting and accident investigation systems. Hence, the implementation will make workers feel protected and demonstrate work behaviour that is compliant and proactive towards safety (17,18).

Based on the findings of this study and the specific risk characteristics of the textile industry, strengthening the occupational health and safety (OHS) system should be directed toward hazard control measures that are both specific and contextually grounded. The textile industry is characterized by potential risks arising from high-speed machinery, mechanical equipment with exposed moving parts,

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continuous noise exposure, and the accumulation of textile fiber dust in the work environment. Therefore, safety control strategies should not rely solely on administrative measures but must integrate engineering controls, strengthened safety communication, and enhanced worker competence.

With regard to production machinery such as spinning, weaving, and cutting machines, the company should reinforce the implementation of Hazard Identification, Risk Assessment, and Determining Control (HIRADC), particularly at points prone to entanglement or crushing injuries caused by moving machine components. Periodic inspections of machine guards must be conducted systematically to ensure that no operational parts remain unprotected during machine operation. Furthermore, the installation of automatic sensors or easily accessible emergency stop buttons may significantly reduce the risk of severe injuries in unsafe situations. Operational supervision should also be intensified to prevent workers from deviating from standard operating procedures in pursuit of production targets (18).

From the perspective of safety communication, the company should adopt more visual and interactive approaches. Considering that the majority of the workforce has a secondary-level educational background, OHS information delivery should not rely solely on written documents or formal briefings. Instead, illustrative posters depicting machinery hazards, accident simulation videos, and safety performance boards displaying safety achievements may enhance comprehension and risk awareness. The strategic placement of warning signs and safety slogans in high-risk areas can help maintain vigilance against hazards that may have become normalized through routine exposure. In addition, the implementation of short toolbox meetings or safety talks prior to work commencement may serve as an effective platform for discussing daily hazards and preventive measures. These sessions should be conducted in a participatory and dialogic manner, allowing workers to share experiences or report unsafe conditions without fear of sanctions. Encouraging active worker involvement in hazard identification processes may also strengthen their sense of ownership toward the safety management system (19).

More broadly, service quality in any organizational context is highly influenced by the quality of human resources involved in operational processes. Human resources constitute a central organizational component, as they directly contribute to planning, implementation, and evaluation activities. High-quality performance is not determined solely by technical competence but also by communication effectiveness, responsiveness, professionalism, and proactive engagement. In the context of OHS, strengthening worker participation and competence will not only improve safety performance but also reinforce the overall organizational culture of safety (20).

CONCLUSION

Based on the results of the distribution of occupational safety climate measurements using the NOSACQ-50 instrument measuring tool, it was found that all the safety climate in the textile industry was included in the good category, with an average overall score of 3.06. The six components of the majority dimensions already have an average score of 3.00-3.19, which means in the good category level. The qualitative findings derived from observations and interviews provide a critical reality check against the survey results. Although workers' perceptions of safety were generally categorized as good, field observations revealed limitations in visual safety communication. In particular, company OHS policies and information related to national occupational safety regulations were not consistently visible across work areas. These findings suggest the presence of a gap between perceived safety commitment and the practical implementation of formal safety communication mechanisms.

The implementation of toolbox meetings or safety talks prior to the commencement of work can serve as an effective platform for discussing daily hazards and corresponding control measures. These sessions should be conducted in a dialogic and participatory manner, enabling workers to share experiences and report unsafe conditions without fear of sanctions. Active worker involvement in hazard identification processes may strengthen their sense of ownership toward the safety management system. Furthermore, consistent enforcement of OHS regulations and routine risk assessments, conducted with worker participation, may serve as strategic measures to improve safety prioritization and hazard control practices. Embedding workers in risk evaluation processes can reinforce accountability and promote collective responsibility for workplace safety.

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Overall, these recommendations emphasize that strengthening safety culture within the textile industry requires a comprehensive approach addressing technical, behavioural, and communication dimensions simultaneously. By integrating engineering controls for machinery safety, effective management of noise and dust exposure, and more participatory communication strategies, companies can enhance the sustainability of their occupational safety management systems and foster continuous improvement in safety climate performance over time. Therefore, the company needs to establish measurable occupational safety and health performance indicators and evaluate them periodically by involving all levels of management and workers in the company in making appropriate and effective decisions in the future.

DECLARATION OF THE USE OF AI

The authors declare that no artificial intelligence (AI), AI-assisted technologies, or large language models (LLMs) were used in the conception of the study, data analysis, or the drafting, writing, and editing of this manuscript. The only exception is the graphical abstract, which was created using the design platform Illustrae (https://illustrae.co/). The authors take full responsibility for the content and accuracy of the graphical abstract and the entire manuscript.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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