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Empowering Workers' Safety Knowledge for Effective Accident Prevention in Sanitary Industry, Malang

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ABSTRACT

People work in various types of jobs, such as foremen, *labourers*, *farmers*, etc.; they can encounter accidents at their workplace, and sometimes it may become a liability if someone gets hurt. One of these injuries is blunt trauma, which results from a mechanical force generated by a blunt object that interacts over some area. Most factory workers in these industries have experienced a history of occupational accidents, especially blunt trauma (up to 60% of overall workers in this workplace) in the Karangbesuki Sanitary Industry Center, Malang. Therefore, being able to quickly understand what workplace safety entails is important to promote safety; however, this knowledge may be quite limited when dealing with accident prevention. This article is intended to analyze the influence of occupational safety knowledge on efforts to prevent blunt trauma workplace accidents in the Sanitary Industry Center of Karangbesuki in Malang City. This was a descriptive cross-sectional study involving 42 workers at the Karangbesuki Sanitary Industry in Malang City. Data collection was carried out through the distribution of questionnaires. The analysis of the data was conducted using IBM SPSS (*Statistical Package for the Social Sciences*) software. Occupational safety knowledge has a significant effect on the incidence of blunt trauma workplace events, with the result that the probability is 0.00 < 0.05. It can be concluded that knowledge of occupational safety is very necessary so that incidents of blunt trauma in the workplace at the Sanitary Industry Center, Karangbesuki, Malang City, do not occur.

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INTRODUCTION

Many industrial sectors in countries around the world still face significant challenges due to workplace accidents and injuries that threaten the safety of thousands of workers every year (Li et al., 2019; Aswar, Sabilu and Pratiwi, 2023; Giovanni, Fathimahhayati and Pawitra, 2023). Globally, 2.9 million deaths were attributed to work, with 2.58 million deaths due to work-related diseases and 0.32 million related to occupational injuries (Takala et al., 2023). A well awareness of Occupational Health and Safety (OHS) is indispensable for prevention of blunt objects such as the present work-related accidents (Barati Jozan et al., 2023; Puteri et al., 2023). Moreover, as a subsector in a national sanitary industry, the Sanitary Industry Center in Karangbesuki, Malang is vulnerable to the occurrence of workplace accidents caused by the application of some tools and machinery (Annisya et al., 2019; Wulandari et al., 2021; Waisapi, 2022).

One of the key aspects of occupational health and safety is ensuring that broad safety training programs are developed and distributed. These programs teach workers the safe operation of equipment, processes, and procedures to identify hazards, use protective equipment correctly, and respond appropriately in emergency situations; in some industries where working conditions and potential hazards have unique characteristics, eg: sanitary (wash basins, sinks, tombstones, flower

pots, garden borders, ornaments, reliefs, garden accessories, fountains), the training needs to cover a variety of topics: the risk of handling materials safely, plant- and machine specific training, and preventing potential emergencies in mechanical plant and emergency response plans. Including an in-depth track on these pieces of knowledge with workers training can be a very effective way to prevent accidents or work-related injuries. Protecting the health of workers and ensuring the future and sustainability of a manufacturing, construction or other industrial enterprise necessarily requires that the organization be able to take the necessary proactive measures to eliminate or minimize its risks, and implement a well-functioning OHS management system (Othman, Shafiq and Nuruddin, 2017; Wary, Sukwika and Prinajati, 2023). An effective Occupational Safety and Health Management System (OSHMS) provides organizations with an organized way to deal with safety and health issues systematically, outlining strategies, policies, and roles to ensure that the safety and health of the workers is cared for from all levels of the organization (Wary, Sukwika and Prinajati, 2023).

Every organization should also have safety policies to keep the workplace safe, such policy must be developed through a proper risk assessment noting the potential hazards and the measures to prevent the hazards. For example, these policies could range from maintenance schedules of machinery, material storage safely and handling procedures to accident reporting and investigating protocols. By having well-documented safety policies and by enforcing them consistently, organizations will move closer towards establishing a safety-first culture where workers are the priority. As such, the participation and commitment from management is indispensable to ensure successful implementation of occupational safety and health initiatives. Organisational leaders need to exemplify a deep dedication to safety, invest the resources required, and enable all levels of employees to be actively involved in keeping each other safe, thus creating an all-pervasive safety conscious culture in the organization (Rusyda and Abdul Aziz, 2021).

In addition, carrying out OHS attributes, largely dependant upon management. Every OHS practice effectively scaled and implemented daily should be part of the OHS culture -that means leadership must be competent in OHS. Managers need to set good examples and have a true dedication to safety, as well as to reinforce to workers the need for following safety rules. And the management should also keep encouraging OHS initiatives and apply the proper resources to training, equipment and safety improvements on an ongoing basis. Proactive OHS promotion by management to establish a culture of safety as a shared responsibility and central value.

Evidence from the literature highlights the importance of effective management behaviours in fostering a positive safety culture and organisational-level implementation of OHS (Samson and Nwaoha, 2012; Utami, 2020; Rusyda and Abdul Aziz, 2021). Well-informed supervisors understand the benefits of building and supporting a strong safety culture where they work which enables them to prevent accidents before they happen -and helps illustrate why it is important to work safely (Samson and Nwaoha, 2012). In addition, studies have identified consistent management practices that predict successful implementation of change initiatives and attainment of safety goals such as creating environments where safety is facilitated in the workplace and establishing policies and practices that shape the culture of the organization.

This study was intended to examine the influence of knowledge of OHS for the prevention of occupational accidents of blunt trauma in the workplace at the Sanitary Industry Center in Karangbesuki, Malang (Prasetya and Ramdani, 2022). The results of this research are expected to help us better understand the importance of OHS knowledge in protecting the health of sanitary workers (Ahmad, Anwar and Kamba, 2022; Romdhona et al., 2022). It is hoped that OHS practice can be enhanced to reduce blunt trauma and other occupational accidents (Dogrul et al., 2020; Petrus, 2021; Quek et al., 2021)

METHOD

This study has the objective of analyzing the influence of OHS knowledge against the prevention of work accident of blunt trauma at the Sanitary Industry Center in Karangbesuki, Malang (Prasetya and Ramdani, 2022). This research was conducted in order to investigate the correlation between the perception of occupational health and safety protocols for blunt trauma and the effectiveness of occupationally injury prevention among the workers. The study lends awareness to

the importance of OHS education and training as it scrutinizes this relationship. By examining this relationship, the study seeks to highlight the critical role that OHS education and training play in enhancing workplace safety.

The outcomes of this research can illustrate the role of OHS expertise in ensuring the health of workers in the sanitary industry sector. (Ahmad, Anwar and Kamba, 2022; Romdhona et al., 2022). The sanitary industry is full of activities that pose a high risk, ranging from handling heavy machinery to various tools, which will result in severe injury if not cared for well. Consequently, it is necessary to consider the level of worker knowledge about OHS and its influence on preventing accidents to plan rationale prevention strategies.

Previous studies have shown that greater OHS knowledge is associated with improved safety practices, and a decrease in workplace accidents (Dogrul et al., 2020; Petrus, 2021; Quek et al., 2021). Yet, focused research within industries is needed to inform targeted safety interventions. Focus is given to the sanitary industry in the study, the sector presenting peculiar hazards and difficulties that must be considered for developing OHS training programs.

The research method used a questionnaire to measure worker knowledge of OHS principles and worker experience of occupational accidents as the object of study, which were distributed to workers at the Karangbesuki Sanitary Industry Centre. The survey included items on safety training, knowledge of safety procedures, and history of blunt trauma. Safety officers and management further shed light on the level of training for the existing staff in adhering to safety measure, and areas to be improved.

Above all, it is expected that OHS practices could be enhanced, reducing the risk of workplace blunt trauma (Dogrul et al., 2020; Petrus, 2021; Quek et al., 2021). In doing so, companies can identify gaps in knowledge and areas where workers are not adequately equipped to handle safety risks while implementing training programs that address these, specifically. Good OSH education will enable workers to make pro-active achievable steps to improve on identifying hazards, preventing accidents and reducing the risk.

The insights that could be gleaned from this study, thus, could take into account strategies that range from adding more realistic examples and scenarios that are more tied-in to the sanitary sector within the training material. To ensure that workers keep safety protocols fresh in their minds and know about the most recent safety standards, recurring refresher courses and workshops could be put in place at a regular rate. Creating a safety culture where employees take ownership of their health and safety, and that of their co-workers, can also improve adherence to safety protocols.

In summary, the study will add to the currently scarce OHS literature by providing important insights about safety knowledge in the prevention of blunt trauma accidents within the sanitary industry. Results are intended to inform policy and practice, to improve safety training programs, and to create a safer work environment. The findings carry on elsewhere besides the Karangbesuki Sanitary Industry Center, furnishing insights relevant to similar types of industrial settings in other parts of the world as well.

The study has been subjected to ethical review by an appropriate ethics review committee and has been granted approval. Furthermore, the research has obtained ethical approval, ensuring that all individuals who have participated in the research have done so on the basis of informed and voluntary consent, therefore being able to protect the rights and privacy of all participants throughout the research. The study received ethical clearance from authorized by the ethical commission, Ref No E.5a/236/KEPK-UMM/XI/2022.

RESULTS AND DISCUSSION

This study was conducted with 42 subjects divided into 2 groups of criteria in terms of knowledge of work safety knowledge ("Good" and "Not Good"). This classification domain was designed to evaluate the relationships among understanding and health consequences on the avoidance of blunt trauma injuries in the base of employment. Due to this, the study aimed to reveal how different safety knowledge levels affects injury prevention by separating its two categorical groups. This way of looking at it provides an alternative look and a more granular dive into the

connection between knowledge and safety outcomes, and perhaps students will lead training and safety programs into the future.

They were a group of 11 Good work safety knowledge group. Similarly, 7 (16.7%) were protected from blunt trauma injuries at work - reflecting occupational safety yet again. Therefore, it can be assumed that these respondents would have proactively followed best practice in respect to the protection of their own health and safety and as a result, were more predisposed to identifying and managing their own risk. Nevertheless, 4 (9.5%) who swore they did failed to prevent injuries. This means that, although solid safety knowledge has a lot to do with the prevention of injuries, there are other dynamics as at play. Other factors include the level of exposure and type of work, familiarity with the safety equipment and the behaviour of the individual, respectively.

Conversely, in the group with not good work safety knowledge, there were 31 respondents. This group displayed a contrast, as only 6 respondents (14.3%) successfully prevented blunt trauma injuries. This low success rate highlights the challenges faced by individuals with insufficient safety knowledge. A substantial 25 respondents (59.5%) did not succeed in preventing such injuries, underscoring the critical role that appropriate work safety knowledge plays in preventing workplace injuries. This significant disparity suggests that improving safety knowledge could lead to better safety outcomes and reduced injury rates.

Overall, 13 of 42 respondents (31%) decreased blunt trauma injuries in the workplace, and 29 of 42 respondents (69%) did not. This trend is reinforced in the collective data above in that, safe knowledge can be increased the more success will be likely in injury prevention. This suggests training programs that provide comprehensive safety training may be needed to help workers prevent injuries in the workplace. Similarly, this data indicates work, employers should conduct regular reviews of security protocols to make sure it works and that each employee knows how it work.

By performing statistical we came up with the value of p as 0.006 which re-proved the first Hypothesis which states that there is a significant relationship between wok safety knowledge and a and b blunt trauma injuries at workplace and p value is very important as it is helps in reinforcing the base hypothesis that accidents can be prevented by imparting knowledge and work safety practices. Since the p-value is significantly lower, it shows the difference is statistically significant meaning it is more than just random chance and so we can rally in support for safety education at workplace. Rather, it highlights how desperately facilities need to avoid common mistakes made during safety training programs that ultimately eradicate any remaining hazards on site and together form a safer workspace.

In conclusion, an improved work safety-related knowledge may be beneficial in reducing blunt trauma work-related injuries. Those who received continuous safety training and education were safer on the job and suffered fewer work-related accidents, which brought out the glaring need of it. In addition, organizations should concentrate on construction and execution of safety training courses helping in recognizing risks, reducing the risks, and ensuring that they have the sufficient information and abilities for managing them effectively. Companies that create a culture of safety and continuous learning have prevented those same movements from severely injuring or even killing them.

Table 1. Cross tabulation of Work Safety Knowledge to Prevention of Workplace Blunt Trauma Injuries

		Prevention of Workplace Blunt Trauma Injuries					
		Good		**Not Good**		**Total**	
		F	**%**	**F**	**%**	**F**	**%**
Work Safety Knowledge	Good	7	16,7	4	9,5	11	100
	Not good	6	14,3	25	59,5	31	100
Total		13	31	29	69	42	100
P = 0.006							

Job-related knowledge is crucial for preventing workplace accidents, as highlighted by (Prahartiko, Soesetijo and Yani, 2019). Studies have shown that safety training programs increase workers' perceptions of risk, resulting in fewer accidents and personally received injuries. This

training programs actually helps the workers in recognizing and controlling the hazards of all form which helps in maintaining a much safer working environment.

As well as that, by attending safety training programs a culture of safety among the work force is brought into action. When workers both learn about the hazards they expose themselves to when working on a project and proper preventive measures, through training, they will adhere more often to safety instructions from both themselves and their fellow team members. Having such intelligence and emphasis on security can lead to a monumental decrease in work accidents.

Training also gives workers the confidence to report unsafe conditions or propose a stop-work action, if necessary. Regular education of safety knowledge helps employees remain vigilant and better able to respond to issues or incidents which may occur in the corporate workplace, improving overall operational safety.

Impact of Knowledge on Accident Prevention

Knowing some steps to prevent accidents in the area, we must understand Occupational Health and Safety in practice (OHS). Jamaluddin and Fauzan, (2021) revealed that there was a relationship between knowledge and competency levels in the prevention of accidents. From this correlation, we can hypothesise that workers with high OHS knowledge are more likely to engage in behaviours to avoid accidents. For instance, proper use of PPEs or identification of unsafe conditions can reduce injuries by a large margin. Prajapati et al., (2023) also coming to the same conclusion in the literature review of the role for general job knowledge in safety management and prevention all types of accidents, supporting the comprehensive scenario argument theory.

Sharing occupational health and safety knowledge is a key element in creating a safety culture and preventing workplace accidents. Those companies who do provide a documented, consistent safety solution and who remind employees of safety plans annually have numbers in the low single digit %age points of labor accidents. Results Workplaces that incorporated OHS training into their ongoing education program reported far fewer OHS accidents than those where OHS training was conducted in an ad hoc way or as a minor isolated activity. Traditional EHS training has moved to a continuous, multimodal education regime to keep employees current on new and evolving risks, practices and standards of safety. That level of versatility is especially important in a rapidly changing industrial space, where both workplace hazards and regulations change on a dime. If the work force is given full and updated OHS trainings routinely, the organization projects the employees into better performing identification, analysis, and risk reduction for a more safe, productive and resilient work environment A commitment to proactive, holistic safety instruction displays that the organization cares about the safety and health of its employees, evoking a collective responsibility to maintain a culture of continuous safety improvement into perpetuity.

Role of Hazard Identification and Mitigation

The most important element in avoiding work-related accidents is to recognize and lessen any potential hazards. Workers with OHS skills can proactively deal with the hazards before they convert into hazards. This implies that adequate knowledge of accident prevention is a must. Research by Rudyarti et al., 2021; Akbar and Putri, 2022; Prasetya and Ramdani, 2022; Aswin, Lanita and Ningsih, 2023) show that information can also act as a preventive mechanism mainly if the workers are well informed of what should be done as far as their health, and that of their colleagues are concerned, for example in terms of checks on machines and advisable personal protective equipment as well as what to do and from whom to seek help should hazards occur, and that they also provide an explanation for the very low sickness absence rate. It is the result of these behavioural impacts that makes a workplace safe - keeping in mind that when people are more self aware, they also have safety in their best interest. The result and the evidence are unambiguous: the more one makes an active, anticipatory endeavour to lower the incidence of low-back pain, as well as all occupational injuries, the more the workers will profit both personally and the establishment as well.

Furthermore, effective hazard identification necessitates not only recognizing obvious risks but also understanding less apparent dangers. This requires a deep examination of workplace

processes and the identification of any deviations from standard operating procedures that may lead to potential risks. Regular risk assessments and encouragement of a culture of safety will mean that employees feel safer to report near misses and hazardous conditions-without fear of retribution-and in turn, this will encourage transparency and a proactive safety climate.

Furthermore, employers that frame a culture of open communication and employee involvement allow employees to engage in recognizing and addressing workplace hazards. A comprehensive system A system that includes a lot of provisions and training as well as is constantly learning A collaborative system A successful OHS system that has the well-being of employees at the very top of the list.

Education on Safety Knowledge

Educational background plays a crucial role in shaping an individual's knowledge and awareness of occupational safety. Studies by Waisapi, 2022; and Seprini et al., 2023 indicate that workers with higher levels of education are more likely to have a better understanding of OHS principles. Ahmad, Anwar and Kamba (2022) found that workers with only elementary education often have limited access to information about workplace safety, which can hinder their ability to take preventive actions.

Knowing this can increase the number of workplace injuries, particularly blunt trauma. Thus the need for better job opportunities and occupational safety skills is quite high an important as well as the effective methods is education and training programs. Initiatives like this raise awareness among employees of the risks involving their workplace, and what steps they need to take to work safely and remain healthy. Workers being trained in these areas will become more aware of how the risks arise, allowing them to prevent injuries, overall creating a safer working environment.

Formulation of educational programs to match the diversity and educational level of the workers and their basic literacy and lack of knowledge in the industrial workplace on Occupational Safety and health. Visual images and hands-on demonstrations have also been particularly effective in communicating more complex safety information and protocols to trainees with limited educational background.

Create and distribute a well-structured, user-friendly safety training resource that can be easily understood and accessed by all employees regardless of education level, so that everyone is well informed and ready to follow proper safety protocols at work. This all-encompassing style of security education and training is necessary for protecting the underprivileged workers who are often overlooked, as securing protection will always be out of reach without safety knowledge and training due to barriers in OSH supremacy.

Importance of Safety Training and Education

Training and educating staff on work safety is the backbone of all safety in the workplace. Training aimed at the Sanitary Industry Center in Karangbesuki, Malang can raise effectively the skill of the workers in comprehending the practice of OSH. A lots of research studies have proved that such initiatives can lower the probability of accidents in workplace. Training programs also must address how to properly wear PPE, respond to emergencies, and recognize hazards. These standards mandate that these programs need to be updated on a routine basis to reflect the most current and best safety standards and practices. (Rudyarti et al., 2021; Ahmad, Anwar and Kamba, 2022; Aswin, Lanita and Ningsih, 2023; Prajapati et al., 2023).

Continuous and adaptable training programs are important for maintaining a safe and effective workforce, as workplace environments and job responsibilities can evolve over time. Regular courses and specific training for specific hazards help workers stay informed about safety protocols and procedures, and may upgrade their awareness of potential hazards. Incorporating feedback from workers about the training's effectiveness and areas needing improvement enables organizations to design the programs to the specific needs and challenges of the workforce, make sure the training remains relevant, engaging, and successful in improving occupational safety.

It can only be able to get that feedback from the workforce at large, thus allowing regular updates to training programs for relevance to workplace demand. This best classroom is the workplace in many cases and the workers who are doing the work often have the best sense for where

training can be improved or built on. Using all of this feedback, the final version should ensure that the design is ready when fail & fits in the evolution of the workforce and also the organization understands what all safe practice does mean to them.

Ultimately, maintaining continuous, adaptive training programs that are responsive to employee input is essential for fostering a safe and productive work environment. By prioritizing ongoing training and continuous improvement, organizations can better protect the health and well-being of their workers and ensure the workforce remains equipped to navigate the changing workplace landscape.

Proactive Preventive Measures

In addition to the steps necessary to educate and guide employees in the event of a potential disaster, the next crucial step is to ensure that a framework is established for a sustained healthy and secure work environment. This could be something like wearing PPE, alterations to how they perform their duties, or continual safety performance review. Several studies have shown that these approaches have a positive impact on workplace injuries (Wulandari et al., 2021; Romdhona et al., 2022; Waisapi, 2022; Abdulloh et al., 2023; Lestari, Rizalmi and Setiowati, 2023). For example, if you ensure your employees have and wear PPE, it can reduce injuries by a significant amount. Regular safety audits help you see the unseen, and ensure all necessary safety measures are followed.

Interventions for occupational accidents (blunt trauma) Engineering control isolates the hazard from the worker and is suitable for hazards where design changes can reduce risk to the worker by changing workstations so physical exposure to injury are reduced. For blunt trauma, these could involve putting soft surfaces in high-risk areas, using safety guards on machinery and making sure that tools are stored safely and securely to prevent slips or impact. It is important that these engineering controls address the physical risk factors of blunt trauma as they are largely responsible for adverse health outcomes.

Equally, human engineering controls to maximise rescue from fatigue and tedium on the job, and machine maintenance procedures to obviate risk from machinery malfunctions are key components of accident-proofing a workplace. These work practice controls are then supplemented to engineering controls in way of heavy exertions, making sure to cover the non-traumatic nature of task additionally adds up in the total coverage for safety for the worker. This will as a concept integrate the workings of all of these strategies, for a unified and cohesive purpose to genuinely care for each single employee with a view towards their physical and psychology safety.

Comprehensive Safety Programs

While actual elimination will not happen overnight, comprehensive workplace safety programs that promote training and education can help. These are programs that will be developed specifically for this industry on a risk based approach too both to your agency and the type of work. This provides the opportunity for organizations to birth a culture of safety, across multiple levels of the organization, to secure a holistic, a total safety conception. Yes that, it must offer/give suitable training and equipment, however far more significantly, it must foster a safety culture at work where safety is the priority and everyone is encouraged to safe guard themselves;- These programs should address the root of workplace hazards (which include ergonomic risks, inadequate safety measures, and lack of personal protective equipment) and take safety precautions to prevent occupational health hazards in industries such as manufacturing, construction, and health care. Basic risk assessments, daily safety checks, and comprehensive incident reporting and investigation mechanisms need to be carried out to identify and address any hazards that can lead to injuries, which are other critical components of a successful workplace safety program. These programs must also provide continuing training and education to employees that will allow them to learn to recognize and fix safety problems, and facilitate an open channel of communication between management and staff that is dedicated to promoting a culture of safety in the workplace.

Also, such programs must involve feedback and support from workers for them to adapt and adapt over time and generate new safety concerns as the program expands. Those organizations that take a proactive approach to workplace safety can create a healthier and safer work environment that

prevents injury, protects workers, and can even increase productivity and benefit the organization that shows it cares about the welfare of its workforce members (Utami, 2020).

In addition, a good safety program will also include a great deal of communication to keep workers informed regarding safety materials via newsletters, safety meetings and even an app. In addition, having open conversations about concerns and suggestions around safety provides an early warning system to catch any issues long before they have the opportunity to morph into something worse. This two-way communication allows workers to voice the safety perspective, and managers to work with them to address safety issues through a balanced approach. Secondly, being explicit about safe behaviours and what that looks like in terms of performance reduces the risk of a worker undermining the safety rules or becoming overly compliant with a lowest-bidder safety culture. If the organization is open and everyone can participate in work safety, it is easier to involve the workforce in the effort and establish a common culture and commitment to the joint mission of a well-being and safety at work (Rusyda and Abdul Aziz, 2021).

This discussion overall suggests that occupational safety is a complicated issue, and care should be taken to educate and train employees, create a strategy using innovative/forward-thinking ways to prevent work injuries. As elements of an integrated safety as a whole system, they can go a long way in mitigating injuries and ensuring a safe and productive work environment. Solid safety is about building and nurturing that culture around training and enforcement - where your staff can easily recognize and prevent hazards and are given positive reinforcement when they are safe. A coordinated, all-in-one front like this operates in concert in problem-solving and remediation and more comprehensive umbrella of workplace specifics and complexities are being figured in and dealt with as businesses hammer out a new, continually-evolving, open-to-change safety approach. Ultimately, paying attention to occupational safety, besides protecting the safety of employees, also promotes the feeling of sustainability and contributes to the strategic competitive advantage of the business.

CONCLUSION

Understanding and implementing Occupational Health and Safety (OHS) principles is essential for preventing workplace incidents and safeguarding workers' health, as demonstrated by research at the Sanitary Industry Center in Karangbesuki, Malang, where OHS knowledge significantly reduced blunt trauma accidents. Continuous education, dynamic training, and hands-on demonstrations are crucial for fostering a culture of safety, enabling employees to recognize and respond to hazards effectively, regardless of their educational background. The integration of pre-emptive measures such as personal protective equipment (PPE), procedural workflow changes, and routine safety audits further enhances workplace safety. Organizations should adopt comprehensive, enterprise-wide safety programs that address physical, social, and psychological aspects of OHS, thereby embedding safety into their core operations and empowering workers to take responsibility for their own well-being. For future research, it is suggested to investigate the long-term impact of tailored OHS training programs and the effectiveness of different educational approaches in various industrial sectors, particularly focusing on how these interventions influence safety culture and accident rates over time.

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