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The Effect Of Occupational Safety Knowledge, Training Programs, And Management Support On The Level Of Safety Awareness Of Fertilizer Warehouse Workers

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Abstract

Occupational safety awareness is an important factor in preventing accidents in fertilizer warehousing environments that have physical and operational risks. This study aims to examine the influence of Work Safety Knowledge (X1), Occupational Safety Training Program (X2), and Occupational Safety Management Support (X3) on Occupational Safety Awareness Level (Y) among fertilizer warehouse workers. The study used a descriptive, quantitative approach with the survey method. The research population comprised 70 employees, and 60 respondents were selected using Slovin's formula (e=0.05) via simple random sampling. Data were collected using a Likert-scale questionnaire and analyzed using multiple linear regression. The results of the analysis show that occupational safety knowledge has a positive and significant influence on work safety awareness (B=0.478; p<0.001), as well as occupational safety management support (B=0.521; p<0.001). Meanwhile, occupational safety training programs have a positive but not significant effect (B = 0.168; p = 0.127). Simultaneously, the three variables have a significant effect on Y (F=19.98; p<0.001) and explain 51,7% of the variation in occupational safety awareness (R^2=0.517). In conclusion, increased safety awareness among warehouse workers is more influenced by strengthening OHS knowledge and consistent management support, while training requires improvements in methods, evaluation, and field implementation.

Keywords: occupational safety, OHS knowledge, OHS training, management support, safety awareness, fertilizer warehousing

A. INTRODUCTION

The development of industrialization and logistics in Indonesia has led to increasingly dense warehousing activities, including in the fertilizer industry, which plays a crucial role in maintaining national food security. However, this operational intensity also increases the potential for occupational hazards, particularly in fertilizer warehousing, where chemicals such as ammonium nitrate and urea are handled. If safety management is not implemented effectively, risks arise not only in the form of work injuries but also in the form of fires, explosions, and poisoning, which can have fatal consequences for workers and the sustainability of the fertilizer supply chain. This situation emphasizes that occupational safety in fertilizer warehousing must be viewed as an operational necessity inherent to the industry's productivity and sustainability (Izhaq & Dewi, 2025).

Occupational safety issues in fertilizer warehousing are not isolated; they are common among industrial workers who face daily exposure to hazards (fires, explosions, poisoning, and physical accidents resulting from the storage and transportation of heavy loads). In the context of warehouse operations, long working hours, insufficient rest, and diverse educational backgrounds among workers can increase the likelihood of unsafe acts. When the understanding of chemical risks and basic OHS

procedures is low, accidents can escalate into chain incidents, including environmental contamination and mass injuries (Arafat, 2025).

Nationally, the urgency of this issue is reflected in the increasing trend of workplace accidents. The Social Security Agency (BPJS Ketenagakerjaan) reported an increase in workplace accident cases from 221,740 in 2020 to 462,241 in 2024, and the trend for 2025 shows a further increase (Sandi, 2025). Meanwhile, the Ministry of Manpower also highlighted that while OSH policies are in place, implementation in the field is suboptimal, including the high incidence of occupational diseases (e.g., respiratory problems due to exposure to fertilizer dust) (Haspramudilla, 2025). This situation reinforces the need to evaluate and strengthen occupational safety systems, particularly in risk-intensive sectors such as fertilizer warehousing.

Risks in the fertilizer industry are also reflected in field incidents, such as fires at fertilizer production facilities and workplace accidents related to negligence in inspections, emergency preparedness, and human factors. This series of cases demonstrates that preventive measures have been implemented (e.g., emergency simulations), but gaps remain in procedural compliance and in the consistent implementation of OHS (Gamaliel et al., 2025;Siahaan et al., 2024;Nina, 2025). Therefore, the focus on safety is not limited to technical aspects; it must also prioritize human factors (knowledge, training, and organizational support) as determinants of safe behavior.

In this study, the main variables were occupational safety awareness (dependent variable) and occupational safety knowledge**,** occupational safety training programs, and occupational safety management support (independent variables). Occupational safety awareness is defined as workers' vigilance and commitment to safety procedures, including the ability to proactively identify hazards and participate in accident prevention in the fertilizer warehouse environment (Selvia et al., 2025;Indrawan & Piter, 2024). This awareness is important because it acts as a "behavioral gateway": the higher the awareness, the less likely workers are to ignore PPE, reduce routine checks, or violate safe work procedures.

Occupational safety knowledge in this study refers to workers' understanding of occupational risks, prevention protocols, and OHS regulations relevant to fertilizer warehousing—including the identification of chemical hazards such as ammonium nitrate and urea. The literature shows that OHS knowledge is the foundation for building safety awareness. (Ul Huda, 2022) emphasized that a poor understanding of OHS protocols contributes significantly to unsafe acts, while (Fajar & Yusnaidi, 2023) found that low knowledge is associated with low PPE compliance and suboptimal levels of awareness in the workplace. This means that when OHS knowledge is not strong, workers tend to take shortcuts, normalize risks, and view safety procedures as a burden.

Safety training program: Workplace safety is a structured intervention organized by companies to improve workers' risk management capabilities, encompassing the frequency, content, and evaluation of training. Training is considered important because it translates "knowledge" into "safe work skills." (Caroline, 2021) shows that regular training can increase safety awareness and reduce incidents, while (Indrawan & Piter, 2024) confirms the effectiveness of training through increased awareness after emergency simulation-based training. In other words, training is not merely a formality but a mechanism for developing safe habits (e.g., drills, PPE use, spill/leak response, and evacuation routes).

Occupational safety management support. Safety is understood as management's commitment to providing resources, policies, and oversight to support OHS implementation, including the provision of safe facilities and regular communication. Management support is often a determining factor in whether a safety program is truly implemented or merely remains an administrative document. (Selvia et al., 2025) emphasized that management support (e.g., the provision of PPE and regular supervision) is positively correlated with safety awareness, while Izhaq & Dewi (2025) also positioned management support as a mitigating factor to reduce the risk of unsafe actions. In the context of a fertilizer warehouse, management support also involves strict supervision, consistent enforcement of regulations, and an OHS communication culture that encourages workers to report unsafe conditions.

Although these three variables logically influence safety awareness, previous research has yielded inconsistent findings. Regarding the knowledge-awareness relationship, there are differences in direction (Fajar & Yusnaidi, 2023) and (Ul Huda, 2022). Regarding the relationship between training and awareness, Caroline (2021) reports a positive association, but other studies, more oriented towards technical risk analysis, have not identified training as a significant determinant of awareness (Izhaq & Dewi, 2025). Similarly, regarding management support-awareness, some studies confirm the role of management support, but there are contextual gaps (e.g., sectoral differences or a lack of focus on fertilizer warehousing in Indonesia), requiring more targeted empirical evidence.

Departing from the phenomenon of safety risks in fertilizer warehousing, national work accident trends, and empirical gaps related to human factors in K3, this article was written with the title"The

Influence of Occupational Safety Knowledge, Training Programs, and Management Support on the Level of Safety Awareness of Fertilizer Warehouse Workers."The title is derived from the need to quantitatively test the influence of human factors (knowledge, training, and management support) on safety awareness, which has been relatively under-explored in the context of fertilizer warehouses, while also addressing the inconsistencies in the findings of previous studies (Ul Huda, 2022;Fajar & Yusnaidi, 2023;Caroline, 2021;Selvia et al., 2025;Izhaq & Dewi, 2025). The purpose of this research/article is to analyze how these three independent variables relate to the level of safety awareness of fertilizer warehouse workers at PT XYZ, so that it can provide a basis for more appropriate recommendations for strengthening behavior-based OHS programs and organizational support.

Table 1. Mapping Research GAP

Relationship between variables	Previous Research		Research GAP
	Influential	No effect	
Occupational Safety Knowledge towards Safety Awareness Level	Dawn (2023)	The Huda (2022)	Inconsistency
Training Program on Safety Awareness Level	Caroline (2021)	Izhaq & Dewi (2025)	Inconsistency
Management Support for Safety Awareness Levels	Aprilia & Ramadhan (2021)	Selvia et al. (2025)	Inconsistency

Source: Processed data, 2026.

B. LITERATURE REVIEW

Operational Management

Operations management essentially discusses how organizations design, implement, control, and improve work processes so that inputs (labor, materials, tools, time) can be converted into outputs (products/services) efficiently, consistently, and with value. In the context of fertilizer warehousing, the scope of operational management typically includes: receiving goods, storing, handling materials, packaging/bagging, shipping, quality control, and controlling the work risks inherent in these activities (Gunawan, 2025).

Because warehouse processes are routine but risky (e.g., dust/chemical exposure, lifting and carrying loads, forklift use, material spills), effective operational management not only pursues productivity but also ensures that processes are safe and meet work standards.

Work Safety Knowledge

Occupational safety knowledge in this study is defined as workers' understanding of work risks, prevention protocols, and K3 regulations applicable to fertilizer warehousing**,** including the ability to identify chemical hazards such as ammonium nitrate and urea. Operationally, this variable is measured using indicators that reflect workers' understanding of OHS aspects (e.g., evacuation protocols and PPE use) to illustrate the overall level of workers' knowledge. Within the causal framework of this study, OHS knowledge is viewed as a cognitive foundation that enables workers to recognize hazards and understand safety procedures, thereby increasing occupational safety awareness.

Theoretically and empirically, safety knowledge is a determinant of safety behavior. (Basahel, 2021) A study shows that safety knowledge is related to work safety through its relationship with safety behaviors, such as safety compliance and participation. The findings confirm that when workers have strong knowledge, they are better able to understand the consequences of risks and choose safe work actions; therefore, OHS knowledge is expected to increase safety awareness (Y) in risky work contexts such as fertilizer warehousing.

Occupational Safety Training Program

An occupational safety training program is defined asstructured interventions organized by companies to improve workers' ability to manage risks. These include training frequency, content, and evaluation. These variables are measured through indicators reflecting training quality (e.g., the effectiveness of emergency simulations and the suitability of the material to work conditions) to assess whether the training truly supports safe work competencies in the field. In the research model, training is positioned as a crucial tool for translating knowledge into safe work skills, thus improving workers' preparedness for operational risks and more consistent implementation of safety procedures.

Empirical evidence shows that safety training interventions affect various safety outcomes. Meta-analyses show that safety training affects safety outcomes, such as safety compliance and participation, and can influence antecedent factors, such as knowledge/motivation. Furthermore, training effectiveness is also greatly influenced by the method design and delivery strategy. (Bęś & Strzałkowski, 2024) emphasize that selecting the right training method and good training planning contribute to improving occupational safety and are an important part of company sustainability. Similarly, evidence from the Indonesian context also shows that safety education can improve safety awareness. Regarding the use of PPE, a study by Husna et al. (2025) found that the "SAFE" education program was effective in increasing safety awareness among manufacturing workers. Thus, safety training (X2) is expected to positively affect occupational safety awareness (Y) among fertilizer warehouse workers.

Occupational Safety Management Support

Occupational safety management support is the role of management in creating a safe work environment by providing facilities, PPE, and routine supervision to ensure safety policies are implemented consistently. This support essentially represents management commitment, as evidenced by the K3 policy, the provision of resources, the enforcement of regulations, and management's direct involvement in safety control.

Theoretically, management commitment and support are key elements in shaping a safety climate and culture. Studies on the role of management commitment confirm that leadership support influences how an organization prioritizes safety (e.g., through policies, procedures, and enforcement), which in turn drives safe behavior and the quality of OHS implementation (Pinto et al., 2025). In high-risk sectors such as mining, employee assessments of management commitment to OHS regulations are also used to gauge how strongly an organization "lives" safety compliance (Basahel, 2021).

In warehouse operational practices, strong management support is typically evident in: (1) the availability of PPE and facilities, (2) supervision and inspection, (3) communication and enforcement of regulations, and (4) resource allocation for training and improvement. This pattern aligns with the safety climate literature, which positions management commitment as a key dimension in encouraging stable, safe behavior (Hertanto et al., 2023).

Occupational Safety Awareness Level

Occupational safety awareness is defined as a worker's understanding of risks and commitment to following safety procedures; the higher the awareness, the lower the risk of accidents, as workers are more alert and disciplined. In other words, occupational safety awareness reflects a worker's cognitive and attitudinal readiness to recognize hazards, comply with procedures, and prioritize safety while working.

The occupational health and safety literature indicates that safety awareness is associated with safety behavior. For example, in healthcare workers, research has found a link between safety awareness and safety behavior (Husna et al., 2025). In the Indonesian context, a study in the Occupational Health and Safety (K3) journal also links "awareness" to safe behavior/safety implementation, thus understanding awareness as a crucial prerequisite before safe behavior becomes a habit (Agustin & Dwiyanti, 2023). Furthermore, K3 education interventions have also been reported to increase awareness of PPE use among manufacturing workers.

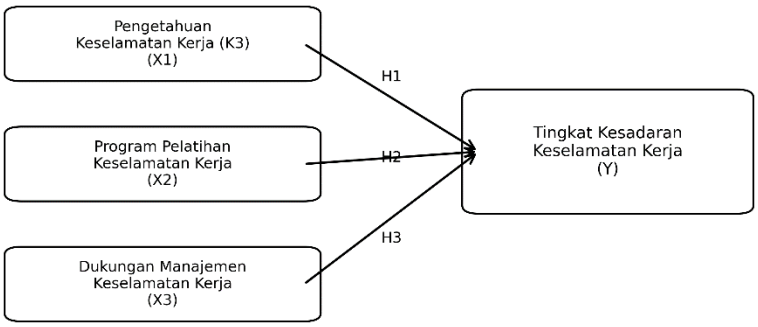

Figure 1 : Conceptual Framework
Source: Processed by Researchers (Based on the Framework of Thought), 2026.

Information:
→ : Partial (direct effect)
X1, X2, X3 = variabel independen
Y = dependent variable
From the image above, the hypothesis can be explained as follows:
H1 = It is hypothesized that Safety Knowledge (K3) influences Safety Awareness.
H2 = It is hypothesized that the Safety Training Program influences Safety Awareness.
H3 = It is hypothesized that Management Support for Safety influences Safety Awareness.

C. METHODOLOGY OF RESEARCH

This research uses quantitative methods with a survey approach, which was conducted among fertilizer warehouse workers at PT XYZ. The research location was chosen because PT XYZ's operations were considered representative of the fertilizer industry sector, and the researcher had access to obtain primary data through direct surveys, so that the measurement of variables (K3 knowledge, training programs, management support, and level of occupational safety awareness) could be carried out accurately.

The population in this study is all fertilizer warehouse workers at PT XYZ, totaling 70 people (permanent and contract workers) who are directly involved in warehouse operational activities and are exposed to occupational safety risks. The sampling technique uses simple random sampling to maintain representativeness and reduce bias, while the sample size is determined using Slovin's formula with a 5% margin of error (e = 0.05)**.** A 5% significance level was also used as the standard for determining the sample, referring to Creswell (2018). The Slovin calculation is:

$$n = \frac{N}{1 + N(and^2)}$$
$$n = \frac{70}{1 + 70(005^2)}$$
$$n = \frac{70}{1 + 70(00025)}$$
$$n = \frac{70}{1 + 0175} = \frac{70}{1175} = 5957 = 60$$

So the number of research samples is 60 respondents. The sampling process involves compiling a population list by employee identity and then selecting respondents at random using a lottery or randomizer device.

The types of research data consist ofdata primer and data seconds. Primary data was obtained directly from warehouse worker respondents through a Likert scale questionnaireto measure the research variables (X1, X2, X3, and Y), while secondary data comes from company documents (e.g., incident reports, safety policies, training records) and scientific literature related to K3 as context reinforcement and validation of the findings.

Data processing and analysis are carried out using SPSS version 23 through the following stages: descriptive analysis, instrument quality testing (Pearson Product-Moment validity and

Cronbach's Alpha reliability), classical assumption testing, and hypothesis testing using multiple linear regression. The regression model used is stated as (Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e), with testing for partial effects and simultaneous influence (significance criteria: $p < 0.05$), as well as calculations of R^2 to see the contribution of independent variables in explaining the variation of the dependent variable.

D. RESULT AND DISCUSSION

Before conducting the hypothesis testing, this study first conducted instrument quality testing and regression prerequisite testing to ensure the data were suitable for analysis. The instruments were tested for validity and reliability, then further tested for classical assumptions (normality, heteroscedasticity, and multicollinearity).

Results

1. Descriptive Analysis Results

Descriptive results show that the occupational safety awareness level (Y) is in the very high category, with an average value of 5.72 and a standard deviation of 0.63. In the independent variable, occupational safety management support (X3) has the highest mean, 3.78, followed by work safety knowledge (X1), with a mean of 3.32, whereas occupational safety training program (X2) has a mean of 3.21.

2. Validity and Reliability Test Results

Validity test using Pearson Product-Moment shows all statement itemsvalidbecause of the value-count> r-table (0.254; df=58; α=0.05). Reliability testing using Cronbach's Alpha indicates that all constructs are reliable (α > 0.70).

Table 2. Validity and Reliability Test Results

Component	Results	Information
Validity	r-count of all items > r-table 0.254	Valid
Reliability X1	α = 0.85	Reliable
Reliability X2	α = 0.82	Reliable
X3 Reliability	α = 0.88	Reliable
Reliability Y	α = 0.87	Reliable

Source: Processed data, 2026.

3. Classical Assumption Test Results

The classical assumption test shows that the model meets the regression prerequisites: the data is normally distributed (Shapiro–Wilk p>0.05), there is no heteroscedasticity (Glejser p>0.05), and there is no multicollinearity (VIF <10; Tolerance >0.10).

Table 3. Results of the Classical Assumption Test

Test	Results	Information
Normality (Shapiro–Wilk)	p>0.05 for all variables	Normal
Heteroscedasticity (Glejser)	p>0,05	There is no heteroscedasticity
Multicollinearity	VIF X1=1,023; X2=1,064; X3=1,068	There is no multicollinearity

Source: Processed data, 2024.

4. Regression Analysis Results and R-Square

The multiple linear regression model obtained is:Y = 1,626 + 0.478X1 + 0.168X2 + 0.521X3 + e. Mark R-squared = 0,517 and Adjusted R-squared = 0,491, meaning the model explains 51,7% of the variations in levels of occupational safety awareness.

Table 4. Model Summary (R-Square)

Indicator	Mark
R-squared	0,517

Indicator	Mark
Adjusted R-squared	0,491
F-statistic	19,98
Prob (F-statistic)	<0,001
N	60

Source: Processed data, 2024.

The results of the simultaneous test (ANOVA) indicate that the model is significant (F=19.9807; p<0.001), indicating that X1, X2, and X3 jointly influence Y.

5. Hypothesis Test Results (t-Test)

Hypothesis testing is done based on the value and p-value(α=0.05). The results are summarized as follows.

Table 5. Hypothesis Test (Partial)

Direction of the Route	B	t	Say.	Information
X1→ AND	0,478	5,487	<0,001	Influential (H1 accepted)
X2→ AND	0,168	1,552	0,127	No effect (H2 rejected)
X3→ AND	0,521	4,776	<0,001	Influential (H3 accepted)

Source: Processed data, 2024.

Discussion

1. The Influence of Work Safety Knowledge (X1) on the Level of Work Safety Awareness (Y)

The results of the partial test show that occupational safety knowledge (X1) has a positive and significant effect on occupational safety awareness (Y), with B = 0.478, t = 5.487, and p < 0.001, **supporting H1**.

These findings confirm that greater OHS knowledge is associated with greater safety awareness among fertilizer warehouse workers. Substantively, this finding makes sense because OHS knowledge serves as a cognitive foundation that shapes how workers understand work situations: what hazards are, how risks arise, and the consequences of unsafe acts. When workers have a better understanding of OHS, they are better able to "read the situation" (situational awareness) while working—for example, they are more sensitive to slippery floor conditions, stacking positions, moving procedures, and areas with potential exposure to hazardous materials.

In fertilizer warehousing environments, OHS knowledge becomes increasingly crucial because the hazards faced are not only physical hazards (being crushed, slipped, or struck), but also chemical/particulate hazards (dust, exposure to certain materials), and operational hazards from loading and unloading activities and transportation equipment. In such conditions, workers who understand OHS principles and hazard identification will more easily decide on safe work actions, such as consistently using PPE, maintaining a safe distance, following safe routes, and avoiding risky actions. Thus, knowledge is not only "knowing the rules," but also becomes capital for assessing risks in real situations.

This significant finding also strengthens the interpretation of your research findings that risk knowledge is the foundation for building safety awareness. This means that safety awareness in this study did not emerge by chance, but rather was built from a sufficient understanding of what to do and what to avoid. Furthermore, the positive coefficient (B = 0.478) indicates that greater workers' OSH knowledge tends to increase safety awareness. Therefore, company interventions aimed at increasing OSH knowledge have the potential to significantly affect behavior and vigilance.

From a practical perspective, these results lead to recommendations for strengthening knowledge-based safety strategies, for example: (1) conducting regular knowledge reinforcement through safety briefings, (2) ensuring that OHS materials are not only general but specific to fertilizer warehouse risks, (3) providing concise, easy-to-remember materials (posters, signs, visual SOPs), and (4) conducting periodic knowledge assessments (simple pre-tests/post-tests) so that companies know whether workers' understanding is truly improving. This strategy is important because warehouse work tends to be routine and repetitive; in repetitive work, the risk of negligence increases as workers begin to "normalize" hazards. Strong OHS knowledge helps prevent this normalization of risk.

2. The Effect of Occupational Safety Training Program (X2) on Occupational Safety Awareness Level (Y)

The results of the partial test show that the work safety training program (X2) has a positive coefficient, but it is not significant (B = 0.168; t = 1.552; p = 0.127), so H2 **is rejected**.

This finding indicates that, in the context of PT XYZ and during the data collection period, the ongoing safety training program was insufficient to statistically explain differences in safety awareness levels among workers. In other words, while the training did lead to increased awareness (as evidenced by the positive coefficient), the increase was not "consistent and strong" across all respondents, so the effect was not deemed significant.

There are several logical reasons why training may be insignificant, even if it's positive. First, training can be formal or emphasize material delivery rather than behavioral development. In warehouse work, safety awareness is generally developed through a combination of "practical training + familiarization + field reinforcement," rather than just exposure to the material. If training isn't followed by adequate practice (simulations, drills, coaching), the increase in awareness tends to be temporary and quickly declines when workers return to their routines and the pressures of work targets.

Second, training can be uneven or inconsistent, for example, due to irregular frequency, lack of contextual material, or inadequate post-training evaluation. In your thesis, this insignificance is also linked to the possibility of ineffective training implementation, for example, in terms of methods, evaluation, or internalization of post-training behavior.

If the training has not yet addressed behavioral changes, workers who have participated in the training will not necessarily show a significantly different level of awareness than other workers, especially if the daily work culture remains the same and there is no reinforcement from supervisors.
Third, training may be implemented, but its effects are "overshadowed" by other, more dominant factors, especially K3 knowledge and management support, which have proven to be significant.

In this situation, training becomes less prominent as a direct predictor because worker awareness is already high and influenced by other factors, or because training works indirectly (e.g., training increases knowledge, which then increases awareness). Because the model used is a direct regression, such indirect relationships are not explicitly captured.

The important implication of these results is not that training is unnecessary, but that its design and implementation need to be optimized to become a factor that truly shapes awareness. Companies can make improvements by: (1) increasing the portion of practice and simulation for fertilizer warehouse risks (e.g., spill handling exercises, evacuation, fire, use of PPE), (2) making training more frequent but shorter (micro-training) so as not to disrupt operations, (3) strengthening post-training evaluation (post-test, behavioral observation), and (4) integrating training into monitoring mechanisms (e.g., supervisors monitor the implementation of training results). With this approach, training does not stop at the level of "activity", but becomes a process of changing safe work behavior.

3. The Influence of Occupational Safety Management Support (X3) on the Level of Occupational Safety Awareness (Y)

The results of the partial test show that occupational safety management support (X3) has a positive and significant effect on the level of occupational safety awareness (Y), with B = 0.521, t = 4.776, p < 0.001, so that H3 **is accepted**.

These findings indicate that tangible commitment and support from management are powerful drivers of safe work habits and increased safety awareness. In operational settings, management support typically manifests itself through the provision of PPE and safety equipment, regular supervision, consistent rules, and clear safety communication. When these elements are present, workers perceive a strong signal that safety is an organizational priority, leading to greater motivation and commitment to comply with procedures.

The significance of X3 is also important because it shows that safety awareness is not only an individual issue, but also a systemic and organizational culture issue. Even knowledgeable workers can remain negligent if the organizational environment is permissive of violations, PPE is unavailable, or supervision is inadequate. Conversely, when management is actively present, workers tend to increase compliance and vigilance because standards are maintained and there are clear consequences. In this context, management support serves as a "reinforcer" that stabilizes safe behavior in the field.

This finding is also consistent with the descriptive results of your study, which show that management support (X3) has the highest average value among the variables. This indicates that workers perceive management as relatively involved in safety matters, and this support is significantly related to safety awareness. Furthermore, the coefficient for X3 (B = 0.521) is the largest among X1

and X2, indicating that changes in management support tend to have a greater impact on safety awareness than ineffective training.

The practical implication is that companies should maintain and strengthen management support through: (1) structured safety supervision (routine and documented), (2) availability of adequate and easily accessible PPE and safety facilities, (3) two-way safety communication (workers are encouraged to report hazards/near-misses without fear of being blamed), and (4) consistent enforcement of rules (rewards and punishments). In this way, management support is not only "felt" but becomes a system that continues to produce safe behavior in a sustainable manner.

4. General Implications of the Model

Simultaneously, the regression model in this study was significant ($F = 19.9807$; $p < 0.001$) and explained 51.7% of the variation in occupational safety awareness ($R^2 = 0.517$; Adjusted $R^2 = 0.491$). This means that the combination of OHS knowledge, safety training, and management support is indeed relevant to explaining safety awareness, although almost half of the remaining variations are influenced by factors outside the model. These other factors include work experience, intensity of direct supervision from superiors, safety culture, workload, target pressure, physical warehouse conditions, and individual worker characteristics.

Judging from the partial results, this model reveals an important pattern: cognitive factors (knowledge) and organizational factors (management support) are more dominant than training in explaining variations in safety awareness. This means that increasing safety awareness cannot rely solely on periodic training programs; it must emphasize consistent knowledge reinforcement and tangible operational-level management support. These findings also signal that safety efforts are most effective when worker knowledge meets a supportive organizational system: workers understand the risks, and the organization provides the conditions for safe behavior to be easily implemented and maintained.

From a managerial perspective, these results can be used as a basis for prioritizing the OHS improvement program at PT XYZ. First, the focus on strengthening knowledge (X1) must be sustained because it has been proven to be the foundation of safety awareness. Second, management support (X3) needs to be maintained and, if possible, increased, as its influence is large and significant and it is a driver of safety culture. Third, training (X2) should be revitalized: not just an administrative routine, but designed to be more context-specific, applicable, and directly linked to field supervision, so that its impact on safety awareness is stronger and more measurable.

E. CONCLUSION

This study aims to analyze the influence of Work Safety Knowledge (X1), Occupational Safety Training Program (X2), and Occupational Safety Management Support (X3) on Occupational Safety Awareness Level (Y) among fertilizer warehouse workers. The test results showed thatOccupational Safety Knowledge (X1) has a positive and significant effecton the Level of Occupational Safety Awareness ($B = 0.478$; $t = 5.487$; $p < 0.001$), so that the better the workers' understanding of K3 principles and hazard identification, the higher the workers' awareness in complying with occupational safety procedures. Furthermore, the Occupational Safety Training Program (X2) has a positive but not significant effect ($B = 0.168$; $t = 1.552$; $p = 0.127$), indicating that the existing training is not strong enough to provide direct and equitable increases in safety awareness among all workers. Meanwhile,Occupational Safety Management Support (X3) has a positive and significant effect ($B = 0.521$; $t = 4.776$; $p < 0.001$), so that management commitment, such as the provision of PPE/safety facilities, routine supervision, and consistency of K3 policies, is proven to be an important factor in increasing occupational safety awareness.

Simultaneously, variables X1, X2, and X3 together have a significant influence on the Level of Occupational Safety Awareness, with the model explaining 51.7% of the variation in occupational safety awareness ($R^2 = 0.517$; $F = 19.98$; $p < 0.001$). In general, these findings confirm that cognitive factors (K3 knowledge) and organizational factors (management support) are more decisive in increasing occupational safety awareness than training programs whose implementation is suboptimal.

F. REFERENCES

Agustin, C., & Dwiyanti, E. (2023). The Correlation between Awareness, Motivation, and Perception with Safe Behavior at Ngadiredjo Sugar Factory. *Indonesian Journal of Occupational Safety and Health*, *12*(1), 30–41. https://doi.org/10.20473/ijosh.v12i1.2023.30-41

Aprilia, D., & Ramadhan, A. (2021). Efforts to Control Potential Hazards of Working at Height at a Gresik

Fertilizer Company, Indonesia. *Indonesian Journal of Occupational Safety and Health*, *10*(3), 331–342. https://doi.org/10.20473/ijosh.v10i3.2021.331-342

Arafat, Y. M. (2025). Daily Workplace Accidents, Active Indonesian Workers Face Field Risks, Where is BPJS Employment? *Pojoksatu.Id*. https://www.pojoksatu.id/edugov/1086793428/kecelakaan-kerja-tiap-hari-pekerja-aktif-indonesia-hadapi-risiko-lapangan-bpjs-ketenagakerjaan-di-mana

Basahel, A. M. (2021). Safety leadership, safety attitudes, safety knowledge, and motivation toward safety-related behaviors in electrical substation construction projects. *International Journal of Environmental Research and Public Health*, *18*(8). https://doi.org/10.3390/ijerph18084196

Bęś, P., & Strzałkowski, P. (2024). Analysis of the Effectiveness of Safety Training Methods. *Sustainability (Switzerland)* , *16*(7). https://doi.org/10.3390/su16072732

Caroline, P. (2021). The Relationship between the Implementation of Occupational Health and Safety Programs and the Behavior of Using Personal Protective Equipment (PPE) at PT Pusri Palembang (Fertilizer Bagging Division).*OKUPASI: Scientific Journal of Occupational Safety & Health*, *1*(1), 28–35. https://jurnal.um-palembang.ac.id/OKUPASI/article/view/3201/2377

Fajar, A., & Yusnaidi. (2023). Analysis of Employees' Awareness Level of Occupational Health and Safety at PT. Works of Fertilizer Land. *International Journal of Economics and Management*, *1*(01), 1–6. https://doi.org/10.54209/iem.v1i01.4

Gamaliel, A., Padilah, N., Wilbertus Sembiring Milala, W., Anisha Nenshy Ambarita, Y., Panjaitan Business Management, A., Negeri Medan, P., & Medan, K. (2025). Analysis of K3 Standard Compliance in Operations.*IKRAITH-EKONOMIKA Journal*, *8*(3), 843. https://doi.org/10.37817/ikraith-ekonomika.v8i3

Gunawan, S. A. (2025). Digital Transformation in Warehouse and Logistics Operations: Analysis of Development and Implementation in Modern Supply Chain.*Cohesion: Multidisciplinary Journal of Science and Technology*, *Volume 7 N*(4), 1–23. https://ejournal.warunayama.org/kohesi

Haspramudilla, D. (2025). Protecting Labor-Intensive Sectors, the Government Extends Discounts on Work Accident Insurance (JKK) Contributions.*Mediakeuangan.Kemenkeu.Go.Id*. https://mediakeuangan.kemenkeu.go.id/article/show/lindungi-sektor-padat-karya-pemerintah-perpanjang-diskon-iuran-jaminan-kecelakaan-kerja-jkk

Hertanto, A., Erwandi, D., Widanarko, B., & Tejamaya, M. (2023). Relationship between Safety Climate and Safety Behavior in Company X in Indonesia.*Safety*, *9*(4), 1–20. https://doi.org/10.3390/safety9040089

Husna, A. M., Setyawan, H., & Nurriwanti, N. S. S. (2025). Enhancing PPE Awareness through SAFE Education among Manufacturing Workers in Sleman, Indonesia.*The Indonesian Journal of Occupational Safety and Health*, *14*(3), 2540–7872. https://doi.org/10.20473/ijosh.v14i3.2025.305-316.Received

Indrawan, A., & Piter. (2024). Seroja Husada.*Seroja Husada Journal of Public Health*, *1*(5), 372–383. https://doi.org/10.572349/verba.v2i1.363

Izhaq, D. C., & Dewi, S. (2025). Analysis of occupational accident risks in the packing and warehousing process using the House of Risk and Fault Tree Analysis approaches (Case study: Fertilizer Company in Indonesia).*Journal of Integrated Industrial Engineering*, *8*(1), 209–217. https://doi.org/10.31004/jutin.v8i1.39322

Listiana, T., & Suaibatul Aslamiyah. (2024). The Influence of Work Motivation, Work Discipline, and Work Environment on Employee Productivity at PT. Petrokopindo Cipta Selaras.*Journal of Business and Entrepreneurship*, *13*(1), 91–99. https://doi.org/10.37476/jbk.v13i1.4459

Nurul Aulia Pratama, Rycha Kuwara Sari, & Ferawaty Puspitorini. (2024). The Effect of Workload and Work Discipline on Employee Performance at PT XYZ.*Journal of Management and Economics Cluster*, *1*(3), 833–842. https://doi.org/10.61722/jrme.v1i3.2268

OSHA. (2015). *Resource for Development and Delivery of Training to Workers*. https://www.osha.gov/Publications/osha3824.pdf

OSHA. (2016). Recommended Practices for Safety and Health Programs in Construction. *Osha*, *October*, 1–40.

https://www.osha.gov/shpguidelines/
Nina, L. (2025). In-House Training Accident Investigation BNSP Certification, PT Petrokimia Gresik 25-27 August 2025.*Phitagoras.Co.Id*. https://www.phitagoras.co.id/in-house-training-accident-investigation-sertifikasi-bnsp-pt-petrokimia-gresik-25-27-agustus-2025.html
Pinto, V. S., Silva, I. S., & Costa, D. (2025). The Impact of Contextual Constraints on the Role of Management Commitment in Safety Culture: A Moderation Analysis. *Societies*, *15*(6), 1–18. https://doi.org/10.3390/soc15060145
Sandi, F. (2025). The Number of Work Accidents in Indonesia is Increasing; the Root Causes are Revealed.*CNBC Indonesia*. https://www.cnbcindonesia.com/news/20250826131119-4-661455/angka-kecelakaan-kerja-di-ri-meningkat-biang-keroknya-terbongkar
Savitri. (2024). The Influence of Work Discipline, Work Environment, and Employee Work Performance Culture.*Journal of Philosophy*, *30*(1), 290–302. https://doi.org/10.33503/paradigma.v30i1.4722
Selvia, Firda Vinanda, Muhammad Raply, & Abdurrozzaq Hasibuan. (2025). Implementation of ISO 45001 in Improving OHS Performance in Various Industrial Sectors.*Antigen: Journal of Public Health and Nutritional Sciences*, *3*(2), 216–226. https://doi.org/10.57213/antigen.v3i2.665
Siahaan, B. I., Studi, P., Iii, D., Transportasi, M., Daratan, P., Sungai, P. T., Dan, D., & Palembang, P. (2024).*FERTILIZER AT THE Wharf AT PT PUPUK SRIWIDJAJA*.
Ul Huda, N. (2022). Review of Occupational Health and Safety Issues in the Fertilizer Industry. *Journal of Natural and Applied Sciences Pakistan*, *4*(1), 850–859. http://www.kinnaird.edu.pk/