

FACTORS RELATED TO OCCUPATIONAL SAFETY AND HEALTH SYSTEMS AMONG COAL HANDLING WORKERS AT MEULABOH SEAPORT

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Abstract

Coal loading and unloading workers at Meulaboh Seaport are at high risk of accidents and health problems due to dust exposure, heavy workloads, and unsafe working conditions. Although the Occupational Safety and Health (OSH) management program has been implemented, its execution remains low. Many workers are not disciplined in using Personal Protective Equipment (PPE), OSH training is not optimal, and supervision is still weak. This study aims to analyze the factors associated with the implementation of OSH management programs among loading and unloading workers at Meulaboh Seaport. The study used a quantitative method with a cross-sectional design and involved 32 respondents. Data analysis was conducted using univariate and bivariate techniques. The results showed a significant relationship between work discipline ($p = 0.005$), training ($p = 0.010$), supervision ($p = 0.022$), and OSH evaluation ($p = 0.010$) with the implementation of the OSH management program. It is recommended that the management of Meulaboh Seaport, as the company's policy maker, continuously improve the existing OSH management system to ultimately enhance worker performance, which will bring both financial and non-financial benefits to the seaport. For workers, it is advised to prioritize occupational safety and health by complying with the established OSH management system.

Keywords: *Discipline, Training, Supervision, Evaluation, OSH Management*

INTRODUCTION

Occupational Safety and Health (OSH) is an important aspect of workforce protection, especially in high-risk sectors. The quality of the workforce and company productivity are strongly influenced by the implementation of OSH programs, as workplace accidents can reduce efficiency and adversely affect workers' health (Rini & Aswin, 2021). The government has regulated workforce protection through legislation, including the implementation of OSH management systems as part of risk control measures to create safe, efficient, and productive workplaces (Husni, 2023; Siagian, 2024). Coal loading and unloading work at Meulaboh Seaport, West Aceh Regency, is classified as a high-risk sector, involving the use of heavy equipment, manual labor, and complex operational procedures that increase the potential for accidents and health problems. Data from the Department of Manpower and Transmigration indicate that the incidence of workplace accidents in this sector remains relatively high, primarily due to human negligence, insufficient supervision, and low worker awareness of OSH procedures. The risks faced by workers include falls from heights, being struck by materials, getting caught in machinery, and exposure to coal dust, which can lead to respiratory disorders.

Factors affecting the implementation of OSH programs at this port include human factors, such as unsafe actions and low worker skill levels, and environmental factors, such as equipment and machinery conditions. Interviews revealed that although an OSH system has been implemented, worker discipline in using Personal Protective Equipment (PPE) remains low, and OSH training has not been optimal. Lack of supervision, evaluation, and adequate facilities also hinders effective OSH program implementation. Based on interviews conducted by the researcher with five coal loading and unloading workers at Meulaboh Seaport, it was found that although the OSH system has been applied across all departments, its implementation is still lacking. Worker compliance in using PPE such as helmets, gloves, shoes, vests, goggles, and masks remains low. Observations during work also showed that only a few workers consistently used PPE. The insufficient training on OSH systems and proper PPE usage is evident in workers' limited understanding of the procedures implemented at Meulaboh Seaport. Furthermore, the

FACTORS RELATED TO OCCUPATIONAL SAFETY AND HEALTH SYSTEMS AMONG COAL HANDLING WORKERS AT MEULABOH SEAPORT

Dedek Kasmiyanda et al

company still lacks adequate supervision and attention to employee facilities. Provided facilities need to be re-evaluated, as they are insufficient to support optimal productivity at Meulaboh Seaport. The OSH program at Meulaboh Seaport includes health insurance, workplace environment management, and infrastructure, which theoretically can improve work discipline, training, supervision, and employee performance. Good work discipline and OSH management play crucial roles in preventing accidents, enhancing employee performance, and supporting company competitiveness. Work discipline refers to adherence to rules, regulations, and job-related obligations, in this case, compliance with OSH implementation. Weak OSH management, including insufficient supervision and evaluation within companies and industries, is a major precursor to workplace accidents. Companies often fail to provide necessary safety equipment, which is sometimes considered unnecessary, or supply tools and production equipment that are in poor or unfit condition. OSH ensures the safety of production processes, enabling employees to perform optimally. A well-managed organizational OSH program will help enhance company competitiveness (Trisulianti, 2024).

Research Method

This study used an analytical survey method with a cross-sectional approach, which aims to analyze the relationship between risk factors and their effects simultaneously at a single point in time (Saryono, 2020). The research was conducted in August 2025 at Meulaboh Seaport, West Aceh Regency. The study population consisted of all coal loading and unloading workers at the port, totaling 32 individuals, and the entire population was used as the sample through total sampling (Sugiyono, 2018). Data were collected through primary sources obtained from interviews and questionnaires regarding worker characteristics and the implementation of the OSH management program, as well as secondary data including workplace accident records from 2023–2024 and employee attendance data. Data analysis was performed using univariate analysis to describe the distribution of respondents' answers and bivariate analysis to examine relationships between variables using the Chi-Square test.

Respondent Characteristics

Based on the study of 32 coal loading and unloading workers at Meulaboh Seaport, respondent characteristics can be described in terms of age, last education level, and length of service. The age distribution shows that most respondents were between 34 and 39 years old, totaling 13 individuals (40.6%). Respondents aged 28–33 years numbered 8 (25%), those aged 40–45 years were 5 (15.6%), aged 22–27 years were 4 (12.5%), and aged 46–51 years were 2 (6.3%). This indicates that the productive age group dominates the workforce at Meulaboh Seaport. Most respondents had a high school (SMA) education, totaling 21 individuals (65.6%). Respondents with a bachelor's degree (S-1) numbered 8 (25%), while those with a diploma (D-III) were 3 (9.4%). These data indicate that the average education level of coal loading and unloading workers is at the high school level. Regarding length of service, the majority of respondents had worked for less than 5 years, totaling 18 individuals (56.2%), while 14 respondents (43.8%) had more than 5 years of experience. This shows that most workers are relatively new employees at Meulaboh Seaport.

Univariate Analysis Results

In this study, a sample of 32 coal loading and unloading workers at Meulaboh Seaport was taken. Univariate analysis was conducted to examine the frequency distribution of each factor related to the implementation of the Occupational Safety and Health (OSH) management program, including work discipline, job training, supervision, OSH evaluation, and the implementation of OSH management itself.

Table 1. Univariate Analysis Results

Factor	Category	Frequency	Percentage (%)
Work Discipline	Disciplined	20	62,5
	Not Disciplined	12	37,5
OSH Training	Available	13	40,6
	Not Available	19	59,4
OSH Supervision	Available	15	46,9
	Not Available	17	53,1
OSH Evaluation	Good	13	40,6
	Poor	19	59,4
OSH Management Implementation	Good	21	65,6
	Poor	11	34,4

Source: Primary data, 2025

FACTORS RELATED TO OCCUPATIONAL SAFETY AND HEALTH SYSTEMS AMONG COAL HANDLING WORKERS AT MEULABOH SEAPORT

Dedek Kasmiyanda et al

Based on work discipline, the majority of respondents were classified as disciplined, totaling 20 individuals (62.5%), while 12 respondents (37.5%) were categorized as not disciplined. This indicates that most workers demonstrate relatively good discipline in carrying out tasks related to OSH. Regarding job training, it was found that the majority of respondents had not participated in OSH training, totaling 19 individuals (59.4%), while 13 respondents (40.6%) had received training. This suggests that some workers have not yet received formal training related to occupational safety and health.

For the supervision factor, results showed that 15 respondents (46.9%) received supervision in implementing OSH, whereas 17 respondents (53.1%) did not. These data indicate that supervision of OSH implementation has not yet been applied consistently at the workplace. Regarding OSH evaluation, most respondents considered the evaluation to be poor, totaling 19 individuals (59.4%), while 13 respondents (40.6%) rated it as good. This indicates a need for improvements in the OSH program evaluation mechanisms. Finally, in terms of overall OSH management implementation, most respondents considered the implementation to be good, with 21 individuals (65.6%) giving a positive assessment, while 11 respondents (34.4%) rated it as poor. These results indicate that although there are some deficiencies in training, supervision, and evaluation, the overall implementation of the OSH management program at Meulaboh Seaport is considered fairly good.

Bivariate Analysis Results

Based on the results of the bivariate analysis, it was found that all factors studied have a significant relationship with the implementation of the Occupational Safety and Health (OSH) management program among coal loading and unloading workers at Meulaboh Seaport.

Table 2. Relationship Between Work Discipline and OSH Implementation

Work Discipline	OSH Management Implementation				Total		Nilai P Value	Odds Ratio
	Poor		Good		n	%		
	n	%	n	%				
Not Disciplined	8	66,7	4	33,3	12	100	0,005	11,333
Disciplined	3	15,0	17	85,0	20	100		

Source: Primary data, 2025

Out of 32 respondents, it was found that 27 respondents (85.0%) who were disciplined had good OSH management implementation, while among respondents who were not disciplined, 8 individuals (66.7%) had poor OSH management implementation. Work discipline showed a significant relationship with OSH implementation, as indicated by a P value of 0.005 (< 0.05) and an Odds Ratio of 11.333. This suggests that respondents who are not disciplined are 11 times more likely to have poor OSH implementation compared to disciplined respondents. Therefore, it can be concluded that work discipline plays a crucial role in the implementation of the OSH management program.

Table 3. Relationship Between Training and OSH Management Implementation

Training	OSH Management Implementation				Total		Nilai P Value	Odds Ratio
	Poor		Good		n	%		
	n	%	n	%				
Not Available	10	52,6	9	47,4	19	100	0,010	13,333
Available	1	7,7	12	92,3	13	100		

Source: Primary data, 2025

Out of 32 respondents, it was found that 12 respondents (92.3%) who received job training on OSH management program implementation had good OSH implementation, while among respondents who did not receive training, 10 individuals (52.6%) had poor OSH implementation. OSH training also had a significant effect on OSH implementation, as indicated by a P value of 0.010 (< 0.05) and an Odds Ratio of 13.333. This shows that respondents who did not participate in training are 13 times more likely to have poor OSH implementation compared to those who received training. Therefore, OSH training is an important factor in improving the implementation of occupational safety and health programs.

Tabel 4. Hubungan Pengawasan dengan Penerapan K3

OSH Supervision	OSH Management Implementation				Total		Nilai P Value	Odds Ratio
	Poor		Good		n	%		
	n	%	n	%				
Not Available	9	52,9	8	47,1	17	100	0,022	7,313
Available	2	13,3	13	86,7	15	100		

Source: Primary data, 2025

Out of 32 respondents, it was found that 13 respondents (86.7%) who received supervision on the implementation of the OSH management program demonstrated good OSH implementation, while among respondents who did not receive supervision, 9 individuals (52.9%) had poor OSH implementation. OSH supervision showed a significant relationship with OSH implementation, with a P value of 0.022 (< 0.05) and an Odds Ratio of 7.313. This indicates that respondents who received supervision were 7 times more likely to implement OSH compared to those who were not supervised. These results underscore the importance of supervision in ensuring compliance with the OSH management program.

Table 5. Relationship Between OSH Evaluation and OSH Management Implementation

OSH Evaluation	OSH Management Implementation				Total		Nilai P Value	Odds Ratio
	Poor		Good		n	%		
	n	%	n	%				
Poor	10	52,6	9	47,4	19	100		
Good	1	7,7	18	92,3	13	100	0,010	13,333

Source: Primary data, 2025

Out of 32 respondents, it was found that 18 respondents (92.3%) who had a good evaluation of the OSH management program demonstrated proper OSH implementation, while among respondents with poor evaluation, 10 individuals (52.6%) had poor OSH implementation. OSH evaluation also showed a significant relationship with OSH implementation (P = 0.010 < 0.05) with an Odds Ratio of 13.333. Respondents with poor evaluation were 13 times more likely to have poor OSH implementation compared to those with good evaluation. This emphasizes that regular and effective evaluation of the OSH program greatly influences its successful implementation. Overall, all factors tested work discipline, training, supervision, and OSH evaluation were found to have a significant relationship with the implementation of the Occupational Safety and Health management program at Meulaboh Seaport. Each factor increases the likelihood of successful OSH implementation when properly managed.

DISCUSSION

1. Relationship Between Work Discipline and OSH Management Implementation

The results of this study indicate a significant relationship between work discipline and the implementation of Occupational Safety and Health (OSH) management programs among coal stevedoring workers at Meulaboh Seaport. This is supported by the Chi-square statistical analysis, which produced a P-value of 0.005, lower than the significance level ($\alpha = 0.05$). Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, indicating that work discipline is significantly associated with OSH management implementation. Furthermore, the statistical analysis shows an Odds Ratio (OR) of 11.33 with a 95% confidence interval, suggesting a strong association between the two variables. This OR indicates that workers with low work discipline are 11 times more likely to fail in implementing OSH management compared to disciplined workers.

These findings align with previous research by Naga et al. (2024) and Putra et al. (2020), which concluded that work discipline is a dominant factor in the implementation of workplace safety programs. Workers with low discipline tend to ignore established OSH procedures. Regular monitoring and supervision were also shown to improve adherence to OSH standards. Work discipline is closely related to employees' attitudes and behaviors in following safety procedures. Disciplined workers are generally more compliant with personal protective equipment (PPE) usage, participate in safety briefings, and adhere to workplace safety signs. Conversely, less disciplined

workers are more likely to neglect these procedures, increasing the risk of workplace accidents and health issues due to coal dust exposure, extreme temperatures, or heavy physical workloads. This is reinforced by Susanti and Ramadhan (2019), who stated that OSH implementation is strongly influenced by employees' attitudes, knowledge, and discipline, especially in high-risk sectors such as ports and mining. They also emphasized the importance of ongoing training and supervision as part of an effective OSH management program. Overall, this study provides empirical evidence that enhancing work discipline is an effective strategy to improve OSH program implementation in high-risk work environments like coal stevedoring. Workers with high discipline tend to follow safety protocols carefully, whereas less disciplined workers frequently violate procedures, such as standing in hazardous areas or failing to secure their posture when lifting loads. Continuous approaches, such as reward systems for exemplary workers and sanctions for violators, as well as creating a safe work environment, are necessary to promote discipline and ensure effective OSH implementation.

2. Relationship Between Training and OSH Management Implementation

Chi-square analysis shows a significant relationship between training and the implementation of OSH management programs among coal stevedoring workers at Meulaboh Seaport. The P-value of 0.010 (< 0.05) and an Odds Ratio of 13.333 indicate that respondents who do not participate in training are 13 times more likely to fail in implementing OSH management compared to those who have undergone training. This highlights the crucial role of OSH training in increasing workers' awareness and compliance with safety procedures. Meulaboh Seaport is a major port in western Aceh with intensive coal stevedoring activities, categorized as high-risk work due to heavy loads, the use of heavy machinery, coal dust exposure, and extreme weather conditions. In such an environment, OSH training equips workers with knowledge and basic skills to identify hazards, use PPE, follow safe work procedures, and respond to emergencies. Without adequate training, workers may lack understanding of operational standards and safety procedures, increasing the likelihood of accidents and health issues. These findings are consistent with studies by Ramli (2021) and Yuliana et al. (2021), which reported that untrained workers are more prone to workplace accidents in high-risk industries. Similarly, Sulistyorini and Fauziah (2020) found that regular and structured OSH training effectively promotes safe work behaviors and consistent adherence to safety standards. In the context of Meulaboh Seaport, where most stevedoring workers are daily laborers with diverse educational backgrounds, training is essential to ensure all workers have a fundamental understanding of workplace safety.

3. Relationship Between Supervision and OSH Management Implementation

Chi-square analysis also revealed a significant relationship between supervision and OSH management implementation among coal stevedoring workers, with a P-value of 0.022 (< 0.05) and an Odds Ratio of 7.313. Respondents under proper supervision were over 7 times more likely to implement OSH management compared to those lacking supervision. This emphasizes the crucial role of supervision in ensuring compliance with safety procedures in high-risk work environments. At Meulaboh Seaport, coal stevedoring activities involve risks such as falling from heights, being struck by heavy loads, exposure to coal dust, and accidents related to heavy equipment use. Active and continuous supervision is therefore critical to ensure workers follow standard operating procedures (SOPs) for OSH. Supervisors are responsible not only for technical and operational oversight but also for fostering a safety-oriented work culture. Effective supervision allows early detection of violations, immediate correction, and direct guidance or education for workers. These findings align with Haryanto et al. (2020), which emphasized that the intensity and quality of supervision significantly affect workers' compliance with safety procedures. Preventive and educational supervision has been shown to be particularly effective in promoting consistent OSH implementation, especially in informal or semi-formal sectors like port stevedoring (Sahara & Putri, 2023; Widodo & Puspitasari, 2021). In Meulaboh, where most stevedoring workers are daily laborers, supervision plays a vital role in bridging gaps in knowledge and ensuring safety compliance.

4. Hubungan Evaluasi K3 dengan Penerapan Program Manajemen K3

The study also found a significant relationship between OSH evaluation and the implementation of OSH management programs ($P = 0.010 < 0.05$, $OR = 13.333$). Respondents with poor evaluation of OSH programs were 13 times more likely to fail in implementing OSH compared to those with good evaluation. This highlights that regular and effective evaluation of OSH programs strongly influences their successful implementation. At Meulaboh Seaport, the high-risk nature of coal stevedoring such as heavy load handling, machinery operation, and coal dust exposure makes evaluation an essential tool to ensure compliance with SOPs, proper use of PPE, and

proactive hazard identification. Weak or absent evaluation can lead to reduced adherence to safety programs. These results are consistent with Haryanto et al. (2020) and Wuon (2023), who emphasize that systematic, preventive, and educational evaluations enhance workplace safety culture and ensure consistent compliance with OSH standards.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the study of factors related to the implementation of OSH management programs among coal stevedoring workers at Meulaboh Seaport, the following conclusions can be drawn:

1. Work discipline is significantly related to OSH management implementation (P = 0.005; OR = 11.333).
2. Training is significantly related to OSH management implementation (P = 0.010; OR = 13.333).
3. Supervision is significantly related to OSH management implementation (P = 0.022; OR = 7.313).
4. OSH evaluation is significantly related to OSH management implementation (P = 0.010; OR = 13.333).

Recommendations

1. For Meulaboh Seaport Management
Management should continuously improve the existing OSH management system to enhance worker performance, which will provide positive financial and non-financial benefits for the port.
2. For Workers
Workers should prioritize occupational safety and health by complying with the established OSH management system in the workplace.
3. For Future Researchers
Further research is recommended, possibly using different research designs or methods, to explore other factors that were not examined in this study.

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FACTORS RELATED TO OCCUPATIONAL SAFETY AND HEALTH SYSTEMS AMONG COAL HANDLING WORKERS AT MEULABOH SEAPORT

Dedek Kasmiyanda et al

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