JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

Analysis Of Factors Hindering Contractors In The Implementation Of The Occupational Safety And Health Management System (OSHMS) In Building Construction Projects (Case Study: Public School In North Sumatra Province)

Fahmi Reza[1], Rezky Ariessa Dewi [1], Gina Cynthia Raphita Hasibuan [1], Gea Geby Aurora Syafridon [1], Syahrizal [1], Indra Jaya [1], Andy Putra Rambe[1]

[1] *Department of Civil Engineering, Faculty of Engineering, Universitas Sumatera Utara, Medan, 20155, Indonesia*

*Corresponding Author: fahmireza8023@gmail.com, rezky.ariessa@usu.ac.id

ARTICLE INFO

Received 15 July 2026
Revised 6 August 2026
Accepted 13 August 2026
Available online 31 August 2026

How to cite:
F. Reza, R.A. Dewi, G.C.R. Hasibuan, G.G.A. Syafridon, Syahrizal, I. Jaya, A.P. Rambe. Analysis Of Factors Hindering Contractors In The Implementation Of The Occupational Safety And Health Management System (OSHMS) In Building Construction Projects (Case Study: Public School In North Sumatra Province). Journal of Civil Engineering and Public Infrastructure Management. 2026. 1(3):14-23.

ABSTRACT

The Occupational Safety and Health Management System (OSHMS) in building construction projects is a crucial aspect of creating a safe work environment, reducing the risk of workplace accidents, and ensuring the smooth implementation of projects. However, in practice, there are still various obstacles that hinder contractors from optimally implementing OSHMS. This study aims to identify and analyze the factors hindering contractors in implementing OSHMS in the North Sumatra Provincial Public School Construction Project. The research method used was a descriptive quantitative method, with data collected through a questionnaire distributed to 12 respondents directly involved in the project's implementation, consisting of project management, supervisors, and OSH experts. The research data were analyzed using validity and reliability tests with the aid of SPSS V27 software, then analyzed using the Relative Importance Index (RII) method and standard deviation to determine the level of importance of each hindering factor. The results showed that there were 4 variables with a High-Medium level of importance, 14 variables with a Medium level of importance, and 7 variables with a Medium-Low level of importance.

Keywords: *OSHMS, contractor constraints, construction projects, Relative Importance Index (RII).*

1. Introduction

The construction sector in Indonesia continues to show significant growth, in line with increasing investment in infrastructure and building development. This trend is a positive indicator for the national economy. However, behind this growth, the construction industry still faces serious challenges related to Occupational Safety and Health (OSH). The latest data from the Social Security Administration Agency (BPJS) for Employment [1] shows that the construction sector accounts for 24.35% of all workplace accidents in Indonesia, ranking highest compared to other sectors. This high rate of workplace accidents not only results in substantial material losses but also leads to fatalities, making it a primary concern for all stakeholders. This fact indicates that the implementation of a comprehensive OSH management system has not yet been optimized in many construction projects.

The government has, in fact, mandated the implementation of the Occupational Safety and Health Management System (OSHMS) through Government Regulation No. 50 of 2012 on the Implementation of the Occupational Safety and Health Management System. This regulation requires every company, including construction contractors, to implement the OSHMS to create a safe, efficient, and productive workplace. Globally, the effective implementation of the OSHMS has been proven to reduce workplace accident rates, lower accident-related costs, and increase project productivity [2]. However, despite having a strong legal foundation and clear benefits, the implementation of OSHMS in the field still faces various complex and multidimensional obstacles, resulting in less-than-optimal outcomes.

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

Many contractors, especially small- and medium-sized ones, still view the implementation of OSHMS as an additional cost burden and a mere administrative formality, rather than a long-term investment. This perception often leads to low management commitment and inadequate resource allocation for OSH programs. Previous research revealed that financial factors, such as limited OSH budgets, are the main barriers to implementing standard OSH procedures [3]. These budget constraints result in insufficient personal protective equipment (PPE), worker training, and the procurement of safety equipment that meets the required standards. In addition to financial factors, human resources also pose a major challenge, given that the construction workforce in Indonesia is dominated by workers with limited formal education and OSH training. Low competency and awareness of the importance of OSH often result in safety procedures not being followed [4]. Technical and managerial factors also complicate the situation; tight project schedules often lead management to disregard occupational safety and health (OSH) procedures in order to meet deadlines. Similarly, complex and dynamic construction designs create high-risk work environments that require highly detailed OSH planning [5]. Weak coordination among management, service providers, and field workers also contributes to ineffective communication regarding potential hazards and preventive measures.

The North Sumatra Provincial Public School Construction Project is one of the government's strategic projects carried out by PT. NINDYA-FYP KSO, located on Flamboyan II street, Simpang Selayang, Medan Tuntungan District, Medan City, North Sumatra. This project is designed as a two-story building serving both public and academic functions, which demands high occupational safety standards throughout the construction process. However, based on initial field observations, this project faces several challenges in implementing OSHMS, such as limited OSH facilities, a lack of worker awareness regarding the use of PPE, and weak managerial oversight of safety program implementation. In addition, there are limitations in on-site supervision, a lack of worker compliance with safety procedures, and suboptimal communication between project management and workers. These conditions serve as a crucial basis for conducting research on the factors hindering contractors in the implementation of OSHMS in this project. Therefore, this study aims to identify and analyze the dominant factors that act as barriers to the implementation of OSHMS in the North Sumatra Provincial Public School Construction Project, thereby providing strategic recommendations for improving OSH performance in similar construction projects in the future.

2. Method

This study employed a descriptive quantitative research approach to identify and analyze the factors hindering contractors in implementing the Occupational Safety and Health Management System (OSHMS) in the Public School in North Sumatra Province Project. The quantitative approach was selected because it enables the measurement of respondents' perceptions objectively and facilitates statistical analysis of the collected data.

The research was conducted at the Public School Development Project located in Medan, North Sumatra. Primary data were collected through questionnaire surveys distributed directly to project personnel involved in construction activities, while secondary data were obtained from project documents, organizational structures, government regulations, scientific literature, and previous studies related to occupational safety management.

The study involved only 12 respondents because the research was conducted as a case study on a single construction project. The respondents were selected using a purposive sampling technique, consisting of project managers, site engineers, supervisors, and safety officers who were directly involved in OSHMS implementation [6]. Therefore, they were considered key informants with sufficient experience to provide reliable assessments. This study is limited to one project and 12 respondents. Therefore, the findings cannot be generalized to all construction projects. Future studiess should involve larger samples from multiple projects.

Five groups of variables representing the barriers to OSHMS implementation were investigated in this study:

Table 1 Factor Variables

No.	Variable		Source
Management and Policy Factors (X_1)			
X1.1	Lack of management commitment to the implementation of OSHMS	X1.1	Ervianto (2005)

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

X1.2	Lack of adequate OSH training and awareness programs	X1.2	Oktavio et al (2020)
X1.3	Weak supervision of OSH implementation	X1.3	Oktavio et al (2020)
X1.4	Budget constraints for implementing OSH programs	X1.4	Ervianto (2005)
X1.5	Lack of written OSH policies or SOPs	X1.5	Oktavio et al (2020)
Workforce and Behavioral Factors (X_2)			
X2.1	Low worker awareness of occupational hazards	X2.1	Soeharto (2001)
X2.2	Non-compliance with the use of Personal Protective Equipment	X2.2	Ervianto (2005)
X2.3	Low work discipline	X2.3	Oktavio et al (2020)
X2.4	Lack of worker experience in occupational safety and health	X2.4	Ervianto (2005)
X2.5	Fatigue due to long working hours	X2.5	Oktavio et al (2020)
Work Environment and Facility Factors (X_3)			
X3.1	High-risk work area conditions	X3.1	Soeharto (2001)
X3.2	Lack of workplace safety facilities (signs, first aid kits, fire extinguishers)	X3.2	Oktavio et al (2020)
X3.3	Inadequate lighting, temperature, or cleanliness in the work area	X3.3	Ervianto (2005)
X3.4	Unclear evacuation access and escape routes	X3.4	Oktavio et al (2020)
X3.5	Lack of routine inspections of environmental conditions	X3.5	Soeharto (2001)
Communication and Coordination Factors (X_4)			
X4.1	Communication between workers and management is ineffective	X4.1	Ervianto (2005)
X4.2	Inter-departmental coordination within the project is poor	X4.2	Oktavio et al (2020)
X4.3	Lack of forums or meetings to evaluate occupational safety and health (OSH)	X4.3	Soeharto (2001)
X4.4	Lack of reports or documentation of workplace incidents	X4.4	Oktavio et al (2020)
X4.5	Delays in information regarding hazards in the field	X4.5	Ervianto (2005)
Technical and Administrative Factors (X_5)			
X5.1	Incomplete OSH management system documentation	X5.1	Oktavio et al (2020)
X5.2	Lack of OSH experts on the project	X5.2	Ervianto (2005)
X5.3	Discrepancies between implementation and the OSH management system plan	X5.3	Oktavio et al (2020)
X5.4	Delays in reporting workplace accidents	X5.4	Soeharto (2001)
X5.5	Limited OSH inspection and monitoring equipment	X5.5	Ervianto (2005)

Each variable was measured using several statement indicators on the questionnaire, which were assessed using a Likert scale with four or more questions combined with a choice of options provided to form a score/value from respondents to determine the level of agreement with the statements in the questionnaire, such as knowledge, attitude, and behavior (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) [7]. The questionnaire was developed based on previous literature regarding occupational safety management in construction projects and was adjusted to the characteristics of the case study project.

Prior to further analysis, the questionnaire was tested for validity and reliability using Statistical Package for Social Sciences (SPSS) Version 27. The validity test was performed using the Pearson Product Moment correlation, whereas the reliability test employed Cronbach's Alpha coefficient. Questionnaire items with correlation coefficients greater than the critical value and Cronbach's Alpha values exceeding 0.60 were considered valid and reliable for further analysis.

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

To determine the significance level of each barrier, this study applied the Relative Importance Index (RII) method and Standard Deviation (SD). The RII method is widely used in construction management research because it effectively ranks factors according to respondents' perceptions. The Relative Importance Index was calculated using the following equation:

$$RII = \frac{\sum W}{A \times N}$$

Where:

- W = Weight assigned by respondents
- A = Highest Likert score (5)
- N = Total number of respondents

The calculated RII values range from 0 to 1, with higher values indicating greater importance of the factor.

To strengthen the interpretation of the ranking results, Standard Deviation (SD) analysis was also performed. Standard deviation measures the variation of respondents' opinions, where lower SD values indicate greater consistency among respondents. Combining RII and SD provides a more comprehensive assessment by considering both the importance and the level of agreement for each identified barrier. The Standard Deviation was calculated using the following equation:

$$s = \frac{\sqrt{\sum_{(x_i - x)} 2}}{n - 1}$$

Where:

- $\sum$ = Sum of deviations
- x_i = The i-th data point
- X = Mean
- N = Number of data points

By calculating the standard deviation, we can determine the spread of the data and the degree of variability of the data relative to its mean.

The research procedure is summarized as follows:

1. Literature review and identification of OSHMS barrier variables.
2. Preparation of the research questionnaire.
3. Distribution of questionnaires to project personnel.
4. Validity and reliability testing using SPSS Version 27.
5. Analysis using Relative Importance Index (RII).
6. Standard Deviation analysis.
7. Ranking of the dominant contractor barriers.
8. Interpretation of findings and formulation of conclusions.

3. Results and Discussion

3.1 Respondent Characteristic

The respondents involved in this study consisted of 12 professionals directly participating in the implementation of the North Sumatra Provincial Public School Development Project. The respondents represented several project positions, including project management personnel, site engineers, supervisors, field engineers, and occupational safety officers. The diversity of respondent backgrounds provides comprehensive information regarding the implementation of the Occupational Safety and Health Management System (OSHMS) from both managerial and operational perspectives [8].

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

Since all respondents were actively involved in daily project activities, they possessed sufficient knowledge and experience to evaluate the obstacles encountered during OSHMS implementation. Consequently, the

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

collected responses were considered representative for identifying the dominant contractor barriers affecting occupational safety management [9].

3.2 Validity Test

Table 2 Validity Test Results

Variable	Item	R Count	R tabel	Result
Management and Policy (X1)	X1.1	0.795	0.576	Valid
	X1.2	0.925	0.576	Valid
	X1.3	0.642	0.576	Valid
	X1.4	0.863	0.576	Valid
	X1.5	0.776	0.576	Valid
Workforce and Worker Behavior (X2)	X2.1	0.974	0.576	Valid
	X2.2	0.956	0.576	Valid
	X2.3	0.925	0.576	Valid
	X2.4	0.864	0.576	Valid
	X2.5	0.941	0.576	Valid
Working Environment and Safety Facilities (X3)	X3.1	0.883	0.576	Valid
	X3.2	0.592	0.576	Valid
	X3.3	0.809	0.576	Valid
	X3.4	0.708	0.576	Valid
	X3.5	0.862	0.576	Valid
Communication and Coordination (X4)	X4.1	0.892	0.576	Valid
	X4.2	0.778	0.576	Valid
	X4.3	0.610	0.576	Valid
	X4.4	0.772	0.576	Valid
	X4.5	0.776	0.576	Valid
Technical and Administrative Factors (X5)	X5.1	0.955	0.576	Valid
	X5.2	0.795	0.576	Valid
	X5.3	0.581	0.576	Valid
	X5.4	0.667	0.576	Valid
	X5.5	0.908	0.576	Valid

Based on the results of the r table from 12 respondents at a significance level of 5% in the distribution of r table values, a value of 0.576 was obtained. Then, the calculated r value from the results of calculations using SPSS software will be compared with the known r table value. Attribute data is declared valid if the calculated r > r table [10].

In table 1 it can be inferred, the calculation results obtained from the 12 respondents' answers that underwent validity testing, project positions, including project management personnel, site engineers, supervisors, field

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

engineers, and occupational safety officers, attribute instruments were generally valid because all calculated r values were greater than the table r value. Therefore, all questionnaire attributes could proceed to the next stage.

3.3 Reliability Test

Reliability testing aims to ensure that data remains reliable even when tested repeatedly and over a long period of time [11].

Table 3 Reliability Test Results

Reliability Statistic			
Variable	N of Items	Cronbach's Alpha	Description
Management and Policy (X1)	5	0.819	Reliable
Workforce and Worker Behavior (X2)	5	0.952	Reliable
Working Environment and Safety Facilities (X3)	5	0.791	Reliable
Communication and Coordination (X4)	5	0.829	Reliable
Technical and Administrative Factors (X5)	5	0.847	Reliable

In table 2, based on the reliability test results, the Cronbach's Alpha value for each research variable is above 0.6, which is the minimum threshold used as a reliability criterion. The Cronbach's Alpha value for the variables indicates that the research instrument has a good level of internal consistency.This means that each indicator in these variables can be relied upon to measure the construct being studied. Thus, all instruments used in this study are declared reliable and can be used in further analysis.

3.4 Relative Importance Index (RII) Analysis and Standard Deviation Analysis

In this study, the technique used was the Relative Importance Index (RII), a data analysis technique used to rank a group of factors or variables that are subsequently considered to be the most influential or most important to respondents. The ranking of these factors is determined by the RII values obtained; the higher a factor's ranking, the greater its influence.

In addition to the Relative Importance Index, this study also calculated the standard deviation. Standard deviation is useful for identifying the superior factor when the RII values for several factors are close to one another. Standard deviation itself aims to indicate the degree of data dispersion within a sample. Unlike the RII, the smaller the standard deviation value, the greater the respondents' agreement regarding the answers provided.

Table 4 RII Value Importance Level Range

RII Value Range	Level of Importance
$0.8 \leq RII \leq 1$	*High (H)*
$0.6 \leq RII \leq 0.8$	*High-Medium* (H-M)
$0.4 \leq RII \leq 0.6$	*Medium* (M)
$0.2 \leq RII \leq 0.4$	*Medium-Low* (M-L)

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

$0 \leq RII \leq 0.2$	*Low* (L)

The following is a summary of the scores using the Relative Importance Index and standard deviation, along with the rankings for all indicator

Table 5 Ranking of Factors Hindering OSHMS Implementation Based on RII

Indicator Code	Indicator	RII	Standard Deviation	Importance Level
X2.3	Low work discipline	0.73	1.07	*High-Medium*
X3.1	High-risk working environment	0.73	1.44	*High-Medium*
X2.1	Low worker awareness of occupational hazards	0.68	1.44	*High-Medium*
X2.2	Non-compliance with the use of Personal Protective Equipment (PPE)	0.60	1.28	*High-Medium*
X2.5	Worker fatigue due to long working hours	0.58	1.16	*Medium*
X4.5	Delay in communicating hazard information at the workplace	0.57	0.67	*Medium*
X3.3	Poor lighting, temperature, or cleanliness of the work area	0.57	0.72	*Medium*
X4.3	Lack of OSH evaluation meetings	0.55	0.52	*Medium*
X3.5	Lack of routine workplace inspections	0.55	0.62	*Medium*
X2.4	Lack of worker experience in occupational safety and health	0.53	0.65	*Medium*
X1.1	Lack of management commitment toward OSHMS implementation	0.53	0.98	*Medium*
X4.2	Poor coordination among project divisions	0.50	0.65	*Medium*
X4.4	Insufficient reporting and documentation of workplace incidents	0.50	0.72	*Medium*
X3.2	Inadequate safety facilities (safety signs, first aid kits, fire extinguishers)	0.50	0.90	*Medium*
X4.1	Ineffective communication between workers and project management	0.47	0.75	*Medium*
X1.5	Lack of written OSH policies or Standard Operating Procedures (SOPs)	0.43	0.72	*Medium*
X5.4	Delay in reporting workplace accidents	0.40	0.60	*Medium*
X5.5	Limited inspection and OSH monitoring equipment	0.40	0.74	*Medium*
X5.1	Incomplete OSHMS documentation	0.38	0.79	*Medium-Low*

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

X5.3	Inconsistency between OSHMS planning and implementation	0.38	0.67	*Medium-Low*
X5.2	Insufficient number of OSH professionals on the project	0.35	0.62	*Medium-Low*
X1.2	Inadequate OSH training and awareness programs	0.33	0.65	*Medium-Low*
X1.3	Weak supervision of OSHMS implementation	0.33	0.98	*Medium-Low*
X1.4	Limited budget allocated for OSH programs	0.32	0.51	*Medium-Low*
X3.4	Unclear evacuation routes and emergency exits	0,32	0,67	*Medium-Low*

Note: Indicators with identical RII values were assigned the same rank. Standard deviation (SD) was used to indicate the level of agreement among respondents. Lower SD values indicate greater agreement among respondents.

3.5 Discussion

The results of this study indicate that workforce behavior and workplace conditions are the dominant barriers to the implementation of the Occupational Safety and Health Management System (OSHMS) in the North Sumatra Provincial Public School Construction Project. Among the twenty-five investigated indicators, four factors were classified as having a High-Medium level of importance, namely low work discipline (X2.3), high-risk working environment (X3.1), low worker awareness of occupational hazards (X2.1), and non-compliance with the use of Personal Protective Equipment (PPE) (X2.2). These findings demonstrate that human behavioral factors play a more significant role than managerial or administrative factors in influencing the effectiveness of OSHMS implementation.

The highest-ranked factor, low work discipline (X2.3), obtained a Relative Importance Index (RII) value of 0.73 with a Standard Deviation (SD) of 1.07. This result indicates that workers' discipline in complying with occupational safety procedures remains one of the greatest challenges faced by contractors. Low work discipline may include ignoring safety procedures, performing unsafe work practices, and failing to follow project regulations. Such behavior directly increases the risk of workplace accidents and reduces the effectiveness of OSHMS implementation. This finding supports the argument that the success of occupational safety management is highly dependent on workers' behavioral compliance rather than solely on the existence of safety regulations or documentation.

Another dominant barrier identified in this study is the high-risk working environment (X3.1), which also obtained an RII value of 0.73. Building construction projects involve various hazardous activities, including work at height, material handling, heavy equipment operation, and continuously changing site conditions. These conditions require continuous hazard identification, risk assessment, and effective supervision throughout project implementation. Without adequate control measures, hazardous working environments significantly reduce the effectiveness of OSHMS implementation. The relatively higher standard deviation (SD = 1.44) compared with X2.3 suggests that respondents had more varied perceptions regarding workplace risks, although they consistently considered this factor highly important.

The third dominant factor, low worker awareness of occupational hazards (X2.1), obtained an RII value of 0.68. This finding suggests that many workers still have limited understanding of workplace hazards and preventive measures. Workers who are unable to recognize potential hazards are more likely to underestimate workplace risks and neglect established safety procedures. Therefore, improving workers' knowledge through continuous occupational safety training, toolbox meetings, and regular safety awareness campaigns should become a priority for contractors.

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

Similarly, non-compliance with the use of Personal Protective Equipment (PPE) (X2.2) was identified as another important barrier with an RII value of 0.60. PPE represents the final layer of protection against workplace hazards; therefore, failure to use appropriate protective equipment substantially increases the probability of occupational injuries. This finding indicates that merely providing PPE is insufficient unless accompanied by consistent supervision, strict enforcement of safety regulations, and continuous efforts to develop a positive safety culture among construction workers.

The overall findings reveal that three of the four highest-ranked indicators originate from the Workforce and Worker Behavior (X2) variable, while the remaining indicator belongs to the Working Environment and Safety Facilities (X3) variable. This pattern demonstrates that behavioral aspects contribute more significantly to the barriers affecting OSHMS implementation than management policy, communication, or administrative factors. Although management commitment, communication, and documentation remain important components of OSHMS, their effectiveness ultimately depends on workers' willingness to comply with established safety procedures during daily construction activities.

These findings are generally consistent with previous studies, which reported that worker behavior, safety awareness, management commitment, and workplace conditions are among the most influential factors affecting occupational safety performance in construction projects [12]. Previous research has emphasized that successful OSHMS implementation requires not only comprehensive regulations but also active participation from both management and workers through continuous supervision, safety training, effective communication, and organizational commitment toward occupational safety [13].

From a practical perspective, this study suggests that contractors should prioritize behavioral safety management in addition to strengthening administrative compliance. Regular occupational safety training, behavior-based safety programs, routine toolbox meetings, stricter supervision, and periodic evaluation of workplace hazards should be integrated into everyday construction activities [14]. Furthermore, project managers should strengthen safety leadership by consistently promoting safe work behavior and ensuring that all workers comply with occupational safety procedures. These strategies are expected to improve workers' safety awareness, reduce unsafe behavior, minimize workplace accidents, and enhance the overall effectiveness of OSHMS implementation in building construction projects [15].

Finally, it should be acknowledged that this study was conducted as a case study involving only one construction project with twelve purposively selected respondents. Consequently, the findings primarily reflect the conditions of the investigated project and should not be generalized to all construction projects. Future studies are recommended to include larger sample sizes and multiple construction projects to obtain more comprehensive evidence regarding the factors influencing OSHMS implementation.

4. Conclusion

This study investigated the factors hindering contractors in implementing the Occupational Safety and Health Management System (OSHMS) in the North Sumatra Provincial Public School Development Project using the Relative Importance Index (RII) and Standard Deviation methods.

The results indicate that all investigated variables contribute to the implementation of OSHMS with different levels of importance. Four indicators were classified as High-Medium, fourteen as Medium, and seven as Medium-Low, indicating that the identified barriers vary in their influence on occupational safety performance.

Among the investigated factors, low worker discipline, high-risk working environments, limited worker awareness of occupational hazards, and non-compliance with Personal Protective Equipment (PPE) were identified as the most dominant barriers affecting OSHMS implementation. These findings demonstrate that workforce behavior and workplace conditions have greater influence than organizational or administrative factors.

JCE-PIM | JOURNAL OF CIVIL ENGINEERING AND PUBLIC INFRASTRUCTURE MANAGEMENT

The study highlights that improving occupational safety performance requires more than regulatory compliance. Contractors should strengthen safety culture through continuous occupational safety training, behavior-based safety programs, stricter field supervision, routine toolbox meetings, and consistent enforcement of PPE regulations.

5. Acknowledgements

The authors would like to express their sincere gratitude to all respondents, project management personnel, supervisors, and Occupational Safety and Health officers involved in the North Sumatra Provincial Public School Development Project for their valuable cooperation during the data collection process. The authors also thank the Department of Civil Engineering, Faculty of Engineering, Universitas Sumatera Utara, for providing academic support throughout this research.

6. Conflict of Interest

The authors of this work, whose names are stated below, attest to the absence of conflicts of interest.

Fahmi Reza

7. References

[1] BPJS Ketenagakerjaan. 2023. Data on Workplace Accidents in the Construction Sector in Indonesia in 2023. Jakarta: BPJS Ketenagakerjaan.
[2] Lestari, D., et al. (2022). The Application of OSHMS in Improving Construction Project Productivity. Journal of Civil Engineering.
[3] Suryanto & Hidayat. (2021). Analysis of Factors Hindering the Implementation of Occupational Safety and Health in Construction Projects. Journal of Civil Engineering.
[4] Prasetyo, A. (2022). The Impact of Workforce Competence on the Implementation of Occupational Safety and Health. Journal of Labor Studies.
[5] Wibowo, A., & Sari, D. (2023). The Impact of Project Management on Workplace Safety. Journal of Civil Engineering.
[6] Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D.*
[7] Nempung, T., Setiyaningsih, T., & Syamsiah, N. (2015). *Otomatisasi Metode Penelitian Skala Likert Berbasis Web*. *November*, 1–8.
[8] Putri, A., et al. (2023). The Impact of Occupational Safety Measures on Accident Risk. Journal of Engineering.
[9] Pratama, R., & Yuliani, S. (2024). Analisis penerapan SMKK pada proyek konstruksi. Jurnal Infrastruktur.
[10] Ghozali, I. (2016). Applications of Multivariate Analysis Using IBM SPSS. Diponegoro University Press.
[11] Ramli, S. (2021). OHSAS 18001 Occupational Safety and Health Management System. Dian Rakyat
[12] Utami, S., et al. (2024). Barriers to the Implementation of SMK3 in Construction Projects. Journal of Construction Management.
[13] Sari, N., & Nugroho, A. (2023). The effectiveness of implementing SMK3 in construction companies. Journal of Civil Engineering.
[14] Tarwaka, (2021). Occupational Safety and Health: Management and Implementation of OSH in the Workplace. Harapan Press.
[15] Hidayat, R., et al. (2022). Implementation of a construction safety management system in construction projects. Journal of Construction.