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Analysis of SMK3 Implementation on Building Construction Project Implementation Performance (Case study of the Construction of the Menara Mandiri Building in Denpasar)

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Abstract

The construction industry is inherently associated with a high risk of occupational accidents. A major contributing factor to such incidents is the inadequate implementation of Occupational Safety and Health (OSH) practices. To mitigate these risks, the professional application of the Occupational Safety and Health Management System (OSHMS) is crucial and should comply with relevant laws and government regulations. This study aims to assess the level of OSHMS implementation in the construction of the Menara Mandiri Building in Denpasar and to identify key factors influencing its application. A qualitative descriptive method was employed, with data collected through the use of checklists and questionnaires. The data were analyzed using percentage analysis to determine the implementation level, descriptive statistics (mean values), and ranking analysis to identify influential factors. The findings indicate that the OSHMS implementation level was satisfactory, with a compliance rate of 96.39% and a minor non-compliance rate of 3.61%. The most significant factor influencing the implementation of OSHMS was the availability of occupational safety and health training for workers.

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1 Introduction

Construction is one of the sectors with a high risk of occupational accidents in Indonesia. The complexity of work processes, the diversity of the workforce, and the dynamic working environment make this sector vulnerable to various incidents that impact occupational safety and health (OHS) (Ismail et al., 2020). Therefore, the Indonesian government, through Government Regulation Number 50 of 2012, mandated the implementation of an Occupational Safety and Health Management System (SMK3) as a preventative measure to create a safe, efficient, and productive work environment.

SMK3 is an integral part of the overall company management system, aimed at controlling risks associated with work activities to create a safe and healthy workplace (Ministry of Manpower of the Republic of Indonesia, 2012). Effective SMK3 implementation is believed to improve project performance, both in terms of time, cost, quality, and worker safety in the field (Huda et al., 2021; Popov et al., 2010).

In the context of building construction projects, the implementation of an OHSMS not only reduces the rate of workplace accidents but also contributes to increased operational efficiency and effectiveness. Previous studies have shown that construction projects that consistently implement OHSMS principles tend to have better project performance than projects that ignore them (Putra & Ramli, 2019). However, various obstacles to OHSMS implementation in the field still exist, ranging from low management commitment, limited resources, to a lack of workforce awareness of the importance of OHS (Nugraha et al., 2022).

This study aims to analyze the extent to which OHSMS implementation impacts the performance of the Menara Mandiri Building construction project in Denpasar. This case study was chosen because it is a large-scale project located in an urban area with high work complexity. This analysis is expected to provide a comprehensive overview of the role of OHSMS in supporting the successful implementation of building construction projects and provide input for relevant parties in improving occupational safety and health management in the future (Liu et al., 2023).

2 Materials and Methods

This study uses a quantitative descriptive method to analyze the impact of the implementation of the Occupational Safety and Health Management System (SMK3) on the performance of building construction projects. This approach was chosen to describe and measure the extent to which SMK3 aspects are implemented and their impact on project performance indicators such as quality, cost, time, and occupational safety (Sugiyono, 2018).

Location and Research Objects

The research was conducted on the Menara Mandiri Building construction project located in Denpasar, Bali. This project was selected as a case study because it has complex construction characteristics and involves various types of occupational risks, making it relevant for analysis in the context of SMK3 implementation.

Data Collection Techniques

Data collection is done through two sources:

1. Primary Data: Obtained through questionnaires and direct interviews with respondents consisting of workers, project management, and OHS officers in the field. The questionnaire was compiled based on OHSMS implementation indicators following Government Regulation No. 50 of 2012.
2. Secondary Data: Obtained from project documents such as monthly project reports, work incident reports, as well as references from literature and previous research related to OHSMS and construction project performance (Creswell, 2014).

Data Analysis Techniques

The data obtained were analyzed using descriptive and inferential statistical methods. Descriptive statistical analysis was used to identify the level of OHSMS implementation and respondents' perceptions of project performance. Furthermore, to test the relationship between OHSMS implementation and project performance, Pearson correlation analysis and simple linear regression were used using SPSS software (Santoso, 2017).

The research instrument was tested for validity and reliability before further analysis. Validity was measured by measuring the correlation between items in the questionnaire and the total score. Reliability was assessed using Cronbach's Alpha, with values above 0.70 considered reliable (Ghozali, 2016).

Population and Samples

The population in this study was all workers involved in the Menara Mandiri Building project. The sampling technique used was purposive sampling, selecting respondents deemed to have direct knowledge and experience in the implementation of the Occupational Health and Safety Management System (SMK3) and project performance. The number of respondents involved in this study was 40 people, consisting of foremen, supervisors, project managers, and OHS officers.

Testing Research Instruments

Validity Test

Validity testing using a statistical program (SPSS) has a significance value of 5% and uses a sample of 15 respondents, so the r-table value based on the table is 0.514. Each statement is compared with the r-table value, and the statement is declared valid if the r-table value is greater than the r-table value. Based on calculations using a statistical program (SPSS), the r-table value can be seen in the following table.

Table 1
Questionnaire Validity Test Results

X	N	rhitung	rtabel	information
X01	15	0.853	0.514	Valid
X02	15	0.621	0.514	Valid
X03	15	0.781	0.514	Valid
X04	15	0.781	0.514	Valid
X05	15	0.738	0.514	Valid
X06	15	0.537	0.514	Valid
X07	15	0.698	0.514	Valid
X08	15	0.711	0.514	Valid
X09	15	0.697	0.514	Valid
X10	15	0.625	0.514	Valid

Source: Analysis results, 2025

Based on the table above regarding the results of the validity test on the influencing factors of the implementation of the Occupational Safety and Health Management System (SMK3) in the Menara Mandiri Denpasar Building Construction project, it is clear that all the questions are valid because they have a correlation value above 0.514. Therefore, it can be said that these questions are suitable for use as a research questionnaire.

Reliability Test

The test was conducted using a Cronbach's Alpha value limit of 0.60. A research instrument can be considered reliable if the Cronbach's Alpha value is above 0.60. For more details, a reliability test of the factors influencing the implementation of the Occupational Safety and Health Management System (SMK3) in the construction of the Menara Mandiri Denpasar building is presented, as shown in the following table:

Table 1
Questionnaire Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
.884	10

Source: Hasil Analisa, 2025

Based on the table above regarding the results of reliability testing on factors influencing the implementation of the Occupational Safety and Health Management System (SMK3), it appears that all questionnaire items are reliable, as they have a Cronbach's alpha value above 0.60, namely 0.884. This indicates that all questionnaire items are suitable for use as measuring instruments in this study.

3 Results and Discussions

Analysis of SMK3 Implementation Level

Based on the results of the analysis and assessment of the checklist carried out, it is known that the number of fulfillments in the implementation of the 12 Criteria Elements consisting of 166 Sub-Criteria Elements contains 160 Criteria fulfilled/compliant and 6 Criteria not fulfilled/non-compliant (Minor Category), the results are then used to determine the percentage value of fulfillment of the achievement level based on the provisions stated in PP Number 50 of 2012 concerning the Implementation of the Occupational Safety and Health Management System (SMK3) by using the following calculation formula:

Achievement level: $\frac{160}{166}\ x\ 100\% = 96{,}39\%$

Degree of Nonconformity: $\frac{6}{166}\ x\ 100\% = 3.61\%$

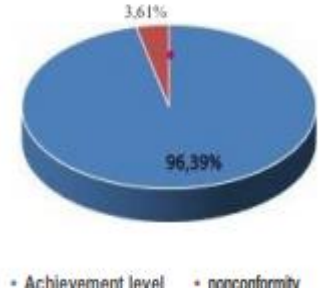

Figure 1. Results of Implementation Achievement Level

The results of the implementation achievement level based on the provisions of Government Regulation No. 50 of 2012, namely the implementation achievement level (85-100%), are considered Satisfactory.
From the six non-conformities above, the core of the problems can be concluded as two main points:

1. Communication with workers, especially those providing information on OHS issues.
2. Installation of safety signs and hazard warnings.

From the above discrepancies, the following alternative solutions were obtained:

1. Based on the first core problem, namely communication with workers, especially regarding K3 issues, an alternative solution was taken with:
   a) Worker representatives are maximally involved according to their role.
   b) Increase routine consultations to boost worker enthusiasm and evaluate implementation.
   c) Conduct outreach and outreach to increase OHS motivation and solicit input.
   d) Optimize the function of the Safety Officer, acting not only as a supervisor but also as a source of input from workers.
2. Based on the second core problem, namely the installation of safety signs and hazard warnings, an alternative solution was taken:
   a) Outreach and outreach to raise awareness of road signs among all parties.
   b) Evaluating and improving the installation of road signs following regulations and guidelines.
   c) Evaluating and improving site conditions and providing road signs that are appropriate to their condition and function.

Analysis of Factors Influencing the Implementation of SMK3

The distributed questionnaires were then reviewed to determine the results and answers from each respondent. The frequency of each response was then calculated. The calculated data was then analyzed to determine the mean value and ranking of each statement.

Descriptive Analysis

After collecting data from respondents, the data was analyzed using the mean method. The mean value is obtained by dividing the total data for all individuals in the group by the number of individuals. The results of the mean value calculation for each question are as follows:

Table 2
Average Value Analysis Results

Statistics										
		X01	X02	X03	X04	X05	X06	X07	X08	X09	X10
N	Valid	30	30	30	30	30	30	30	30	30	30
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		3.77	3.70	3.63	3.60	3.47	3.47	3.50	3.60	3.53	3.30

Source: Hasil Analisa, 2025

Based on the descriptive analysis table above, the average (mean) value was obtained for all statements "Factors influencing the implementation of the Occupational Safety and Health Management System".

Ranking Analysis

Ranking analysis is a method used to test three or more samples presented simultaneously, to determine the order or level of the samples based on a specific attribute. After obtaining the average value for all statements, a ranking test is performed by ordering the mean values from largest to smallest (Rokooei et al., 2023). The results of the ranking analysis can be seen in the following table:

Table 3
Ranking Analysis Results

No	Factors influencing the implementation of the Occupational Safety and Health Management System	Mean	Ranking
1	Does the training on Occupational Safety and Health from the company where you work have an impact on implementation in the field?	3.77	1
2	Does the existence of a budget regarding K3 in construction projects have an impact on its implementation?	3.70	2
3	In your opinion, does using Personal Protective Equipment properly and correctly have an impact on workers in implementing Occupational Safety and Health?	3.63	3
4	If the company provides personal protective equipment for workers in this project, will this impact its implementation in the field?	3.60	4
5	Does the evaluation of the implemented K3 programs have an impact on the success of K3 implementation?	3.60	4

No	Factors influencing the implementation of the Occupational Safety and Health Management System	Mean	Ranking
6	Can it have an impact on its implementation if the company imposes sanctions on workers who do not use Personal Protective Equipment?	3.53	5
7	Does the existence of a unit that handles K3 in the company where you work have an impact on the implementation of K3 in the field?	3.50	6
8	Does it matter if the project you are working on implements K3 following existing standards?	3.47	7
9	If the implementation of the Occupational Safety and Health Law has been carried out consistently, can it have an impact on the implementation of K3 in the field?	3.47	7
10	Will a safe and clean working environment have an impact on the implementation of K3 in the field?	3.30	8

From the analysis above, we obtain a ranking order for all statements. The ranking of factors influencing the implementation of the Occupational Safety and Health Management System in the Menara Mandiri Denpasar Building construction project shows that the most influential factor is Occupational Safety and Health training.

The importance of OHS training is to equip, enhance, and develop workers OHS skills, typically covering work procedures and knowledge of hazards and their prevention. Even if workers have extensive experience, advanced skills, or work safely according to established procedures, this does not mean that workplace accidents or injuries are impossible (Sutapa et al., 2022).

4 Conclusion

Based on the results of the analysis, several conclusions can be drawn as follows:

1) The implementation level of the Occupational Safety and Health Management System (SMK3) in the Menara Mandiri Building Construction project in Denpasar showed a satisfactory level of implementation, with a percentage of 96.39% compliance and 3.61% non-compliance (Minor Category). The non-compliance that resulted in the project not meeting the criteria of Government Regulation No. 50 of 2012 was communication with workers, specifically information on OHS issues, and the installation of safety signs and hazard warnings.
2) A factor influencing the implementation of the Occupational Safety and Health Management System (SMK3) in the Menara Mandiri Building Construction project in Denpasar was training on OHS. This training provided workers with knowledge of the hazards surrounding them and their prevention.

Conflict of interest statement
The authors declared that they have no competing interests.

Statement of authorship
The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

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