Enhancing Workplace Safety: Implementation of a Construction Safety Management System in the New Port Toll Road Project

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ABSTRACT

According to the Annual Report of BPJS Ketenagakerjaan presented by the Minister of Manpower, the number of occupational accidents has been steadily increasing. In 2022, up until November, the recorded number of workplace accidents reached 265,334 cases, with the complete data for the year available in early January 2023 (Tira, 2023). The objectives of this study are: (1) to analyze the implementation of the construction safety management system at the project site; (2) to examine the influence of occupational safety and the work environment on workers' performance levels at the project site; and (3) to identify the application of the construction safety management system model at the project site. This study employs a mixed-methods approach, which integrates both quantitative and qualitative research methods to answer the research questions comprehensively. By combining these approaches, the study aims to provide a more thorough understanding of the construction safety management system's effectiveness. The findings of the study reveal the following: (1) the Construction Safety Management System (CSMS) has been implemented in the Makassar New Port toll road project; (2) statistical analysis using SPSS indicates that the occupational safety variable (X1) has a value of 4.335, and the work environment variable (X2) has a value of 3.276, showing a significant influence (t-test) on workers' performance levels at the Makassar New Port toll road project; and (3) prior to the implementation of the CSMS prediction model, no improvement in performance was observed. However, after implementing the CSMS program over three months within the model framework, a significant improvement of 80% was recorded after three weeks of training.

Keywords: Occupational safety, Management system, Construction safety

1. Introduction

Occupational safety and health (OSH) issues remain a significant concern for workers in Indonesia, often being neglected despite their critical importance in preventing workplace accidents. The construction industry, in particular, heavily relies on its workforce as a key factor in operational success. Given the potential hazards inherent in construction activities, the Indonesian government has established comprehensive OSH policies and regulations to mitigate the risks of workplace accidents, occupational diseases, explosions, fires, and environmental pollution. These regulations, tailored to different types and conditions of work environments, aim to ensure a safe and healthy workplace (Rahmawati et al., 2019). According to the Indonesian Ministry of Manpower (Elvania, 2022), occupational accidents are defined as sudden and unexpected incidents that occur due to specific causes and do not happen spontaneously. Such accidents can result in damage to the environment or pose risks of harm to workers, infrastructure, and public safety. Incidents recorded in construction projects often include slips, falls, and other unforeseen events that stem from inadequate safety measures, lack of concentration, and failure to use personal protective equipment (PPE). Consequently, ensuring workplace safety through regulatory compliance and structured management practices is essential to safeguard workers' well-being and productivity.

Several studies have highlighted the significant influence of OSH implementation on worker performance in construction projects. Research conducted by Roharto & Kasmir (2017) on PT Pelabuhan Indonesia II (Persero) at the Kalibaru Terminal dredging project demonstrated that the application of OSH measures had a significant positive impact on company performance. The study concluded that both occupational safety programs and work environment factors played a crucial role in improving overall workforce productivity. These findings underscore the necessity of effective OSH systems to ensure operational efficiency and worker well-being. The Construction Safety Management System (Sistem Manajemen Keselamatan Konstruksi or SMKK) is a vital component of construction project execution, aimed at achieving compliance with safety standards and reducing the occurrence of workplace accidents. SMKK incorporates engineering measures to support construction activities while ensuring compliance with security, safety, health, and sustainability standards. The implementation of SMKK aligns with ISO 45001:2018, with specific adaptations for Indonesia's construction sector following the enactment of Law No. 2 of 2017 on Construction Services. Proper implementation of SMKK is expected to minimize hazards and enhance overall safety culture within construction projects.

Despite the existing regulatory framework and studies highlighting the importance of OSH in construction, challenges remain in ensuring consistent implementation across various projects. This study focuses on the application of SMKK at the Makassar New Port toll road project, a critical infrastructure development in Eastern Indonesia with significant regional and international importance. The toll road, spanning 3.2 kilometers, is expected to support the operational activities of Makassar New Port (Sanovra, 2023). Initial findings at the project site from April to June 2023 reported one minor accident and six near-miss incidents, primarily caused by inadequate concentration and improper use of PPE during critical tasks such as pier head inspections. Unlike previous studies that primarily explored the impact of OSH on corporate performance, this research aims to provide an in-depth analysis of SMKK implementation specific to the Makassar New Port project. The study will evaluate the challenges faced in ensuring compliance with safety regulations, identify gaps in the current safety management system, and propose strategic improvements tailored to the unique conditions of the project. Furthermore, the research will assess the effectiveness of SMKK in reducing workplace incidents and fostering a proactive safety culture among workers.

The primary objective of this study is to analyze the implementation of the Construction Safety Management System (SMKK) at the Makassar New Port toll road project to determine its effectiveness in ensuring worker safety and regulatory compliance. This study aims to evaluate the extent to which SMKK has been applied at the project site and assess its role in minimizing workplace hazards and meeting established safety standards. Additionally, the research seeks to examine the influence of workplace safety and environmental conditions on worker performance, with a focus on identifying key factors that contribute to enhanced productivity and overall well-being. Understanding these relationships is crucial for developing targeted interventions that can improve working conditions and foster a proactive safety culture. Furthermore, this study aims to propose a practical implementation model for SMKK by offering strategic recommendations to optimize safety practices and enhance the overall management of occupational health and safety within the construction workforce. The findings of this research are expected to contribute to the continuous improvement of safety performance at the Makassar New Port project and provide valuable insights for future construction projects aiming to achieve higher safety standards.

2. Material And Methods

2.1 Time and Location

This study employed a mixed-methods approach, which combines both quantitative and qualitative research methodologies to comprehensively address the research questions. The integration of these methods allows for a more in-depth analysis by linking numerical data with contextual insights. The research was conducted over a period of five months, from January 31, 2023, to June 30, 2023, at the Makassar New Port toll road construction project, located on Jl. Galangan Kapal, Makassar, Indonesia. The

Makassar New Port toll road construction project comprises Phase I and Phase II, which are being carried out by PT. Wijaya Karya Beton Tbk (WIKA Beton) as the contractor, designed by PT. Cipta Graha Abadi, and supervised by a consortium consisting of PT. Indokoei International, Nippon Koei Co. Ltd., and PT. Cipta Strada JO. The specific location of the research is illustrated in Figure 1, which provides an overview of the project site layout.

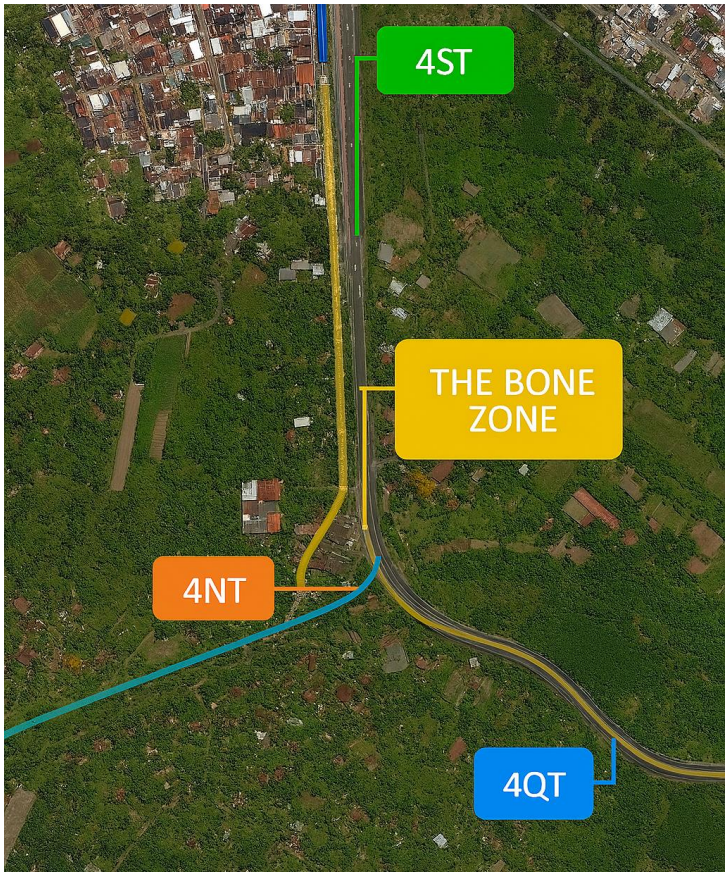

Figure 1. Location of the Makassar New Port Toll Road Construction Project

2.1. *Measurement Aspects*

In this study, the independent and dependent variables were measured using a Likert scale ranging from 1 to 5, with response options as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Agree, and 5 = Strongly Agree. The Likert scale was applied to evaluate respondents' attitudes, opinions, and perceptions regarding various aspects of construction safety management, based on the guidelines provided by Sugiyono (2013). This approach allowed for a structured assessment of subjective variables related to the implementation of safety management systems at the project site. The collected data were processed systematically using Microsoft Excel, involving several key steps, including editing, coding, data entry, data cleaning, and scoring, to ensure data accuracy and consistency. Once processed, the data were presented in both tabular and narrative formats to facilitate comprehensive analysis and interpretation. The structured processing and presentation of data aimed to provide a clear understanding of the safety management system's effectiveness and to support subsequent statistical and qualitative analyses.

2.2. *Data Analysis*

The data analysis in this study was conducted using two software applications: SPSS Statistics version 22 and Stella version 9.0.2. Initially, the data were analyzed using SPSS to derive statistical insights related to the research objectives. Following the statistical analysis, an environmental model simulation was performed using Stella 9.0.2, which is widely recognized as a reliable tool for designing and operating complex systems and processes. Simulation modeling is a technique that captures the cause-and-effect relationships within a system through a computerized model, allowing for the generation of behaviors that closely mimic real-world processes. A simulation model is considered valid when the deviation or error between the simulated results and real-world observations is minimal. In this study, simulations were conducted over a period of three months to estimate key variables in the Makassar New Port toll road project using a dynamic systems approach through various scenario-based simulations in

Stella 9.0.2. The use of simulation modeling is crucial in the planning, design, and monitoring of complex systems, particularly in a highly competitive and evolving construction environment. The results from the simulations were analyzed to understand system behaviors, predict future trends, and provide recommendations for optimizing safety management practices at the project site. The integration of statistical and simulation-based analyses ensures a comprehensive evaluation of the construction safety management system implementation.

3. Results

3.1 HSE Plan Implementation

The construction of the Makassar New Port Toll Road, Phases I and II, as part of the Ujung Pandang Toll Road, is expected to serve as a key land transportation solution, supporting national economic growth by facilitating logistics and alleviating traffic congestion. The Hazard Identification and Environmental Aspect Mechanism begins with the identification of hazards and environmental aspects associated with specific activities or objects, which are subsequently assessed for potential risks. When hazard identification is conducted for a project, the sequence and type of work activities follow the Quality Plan (Q-PLAN), project work methods, and environmental impact assessments (AMDAL or UKL-UPL). Hazard identification in the Hazard Identification, Risk Assessment, and Risk Control (HIRARC) framework involves recognizing potential risks that could endanger personnel, lead to workplace accidents, or negatively impact the environment. The hazard identification process follows the 4M + 1E approach, which considers aspects such as manpower, materials, methods, machinery, and environmental factors. Additionally, hazard identification and environmental aspect analysis are carried out through on-site observations and interviews with personnel involved in relevant activities. Risk and environmental impact assessments consider two primary factors: likelihood and consequence. These factors are evaluated using standardized criteria tables to determine risk levels. If the assessed risk level is deemed unacceptable, appropriate control measures are implemented. Environmental Aspect Impact Identification (EAII) is conducted to evaluate the negative impacts of identified aspects using a set of criteria. Once the average impact evaluation scores are obtained, the aspects are classified as significant or non-significant.

Risk control measures are applied to all identified risks using a hierarchical control approach, which includes elimination, substitution, engineering controls, administrative controls, and the provision of personal protective equipment (PPE). When establishing risk controls, relevant legal and regulatory requirements must be considered to ensure compliance. Once appropriate risk control measures are implemented, a reassessment is conducted to confirm that risk levels have been reduced to an acceptable or "Low" (L) level. Control of environmental aspects and impacts is applied to all activities, regardless of whether they have been classified as significant or non-significant. Additionally, a work permit system is implemented to ensure safety in high-risk activities. The work permit document contains details of the authority granted to a work team leader or a group of individuals approved by the permit issuer to carry out identified high-risk activities within specific project areas and timeframes. Prior to obtaining a work permit, the work team leader is required to conduct an on-site assessment to identify potential hazards and develop a Job Safety Analysis (JSA). The general work permit submission process must be supported by relevant documentation, including work instructions, work methods, JSA, and, if necessary, special work permits. Job Safety Analysis (JSA) is an essential method for evaluating work processes to identify potential hazards and incidents associated with each step, with the objective of developing preventive and control measures to eliminate or mitigate risks.

3.2. Implementation of SMKK at the Project Site

The implementation of the Construction Safety Management System (SMKK) at the Makassar New Port toll road project focuses on ensuring worker safety through the proper use of Personal Protective Equipment (PPE). The use of PPE is essential in protecting workers from potential hazards and injuries, and it must align with the specific risks identified at the project site. For example, workers operating at heights are required to wear full-body harnesses to reduce the risk of fatal falls, as shown in Figure 2. It is crucial that all PPE provided by the company complies with applicable safety standards to ensure maximum protection for workers. In addition to PPE provision, the project site is equipped with an organized waste management system, ensuring proper handling of solid, liquid, and hazardous waste (B3). Waste disposal points are strategically located across the project site, with designated bins categorized by color to facilitate proper waste segregation: green bins for organic waste, red bins for hazardous waste (B3), and blue bins for inorganic waste. Another critical safety measure is the installation of fire extinguishers (APAR) at designated locations throughout the project site to address potential fire hazards. These fire extinguishers serve as an initial fire suppression tool to prevent the spread of fire and minimize property damage. The project also includes the installation of K3 safety signage to enhance awareness and compliance among workers. The signage reminds workers to adhere to safety protocols, such as wearing full-body harnesses when working at heights and refraining from littering in unauthorized areas. Proper signage serves as a visual cue to reinforce compliance with project safety standards and mitigate environmental risks associated with improper material disposal.

To further enhance worker safety, safety nets have been installed to prevent falls from heights, providing an additional layer of protection. The correct installation and regular inspection of safety nets are essential to ensure their reliability and effectiveness

in protecting workers from fatal injuries. The provision of sanitation facilities, such as toilets at the project site, is another important aspect of maintaining worker health and comfort. Adequate sanitation facilities contribute to hygiene and well-being, thereby enhancing productivity and morale. Additionally, first aid kits (P3K) have been made available at various locations on-site to provide immediate medical assistance in case of an accident. These kits contain essential medical supplies to administer first aid before professional medical help arrives. The project also implements Safety Morning briefings, conducted by the HSE (Health, Safety, and Environment) team to reinforce safety awareness among workers. These briefings serve as a platform to discuss potential hazards, review safety protocols, and emphasize the importance of proper PPE usage. Regular safety briefings contribute to building a strong safety culture and help prevent accidents by keeping workers informed and vigilant. Overall, the implementation of the Construction Safety Management System (SMKK) at the Makassar New Port toll road project aims to minimize risks, ensure compliance with safety regulations, and foster a culture of safety awareness among all workers involved.

3.3. *SPSS Data Analysis Results*

The validity test was conducted using the Pearson Product Moment method by correlating individual item scores with the total score. The results indicate that the calculated Pearson correlation value (R-count) is greater than the critical R-table value (0.219), confirming that all 30 questionnaire items related to occupational safety (X1), work environment (X2), and employee performance (Y) are valid. Following the validity test, a reliability test was performed using the Cronbach's Alpha method to assess the internal consistency of the variables. A variable is considered reliable if the Cronbach's Alpha value is equal to or greater than 0.6. The test results show that the occupational safety variable (X1) achieved a Cronbach's Alpha value of 0.710, the work environment variable (X2) recorded 0.833, and the employee performance variable (Y) obtained 0.809, indicating that all variables are reliable. The summary of the reliability test results is presented in Table 1.

Table 1. SPSS Reliability Test Results

Variabel	Koefisien *Cronbach Alpha*	Keterangan
Keselamatan Kerja (X1)	0.710	Reliabel
Lingkungan Kerja (X2)	0.833	Reliabel
Tingkat Kinerja (Y)	0.809	Reliabel

The classical assumption tests, starting with the normality test, were conducted using the normal probability plot analysis. According to the results, the residual values are normally distributed if the data points in the graph align closely with the diagonal line, as illustrated in Figure 2. The figure indicates that the data follows a normal distribution pattern, as the points are closely aligned with the diagonal line, confirming that the normality assumption is met.

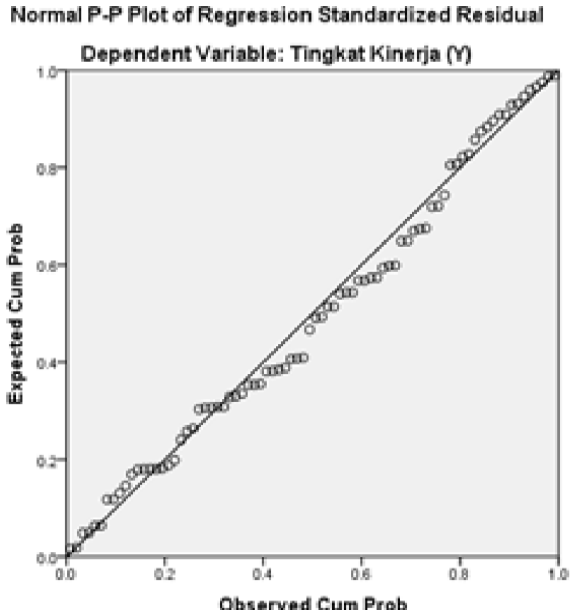

Figure 2. Normal Probability Plot Distribution Curve

The linearity test was conducted to determine whether a significant linear relationship exists between the independent and dependent variables. This was evaluated by comparing the significance value from the deviation from linearity test. The decision criteria for linearity are as follows:

a. If the significance value is greater than 0.05, there is a significant linear relationship between the independent and dependent variables.

b. If the significance value is less than 0.05, there is no significant linear relationship between the independent and dependent variables.

The results of the linearity test, as shown in Table 2, indicate that the significance value for occupational safety (X1) and employee performance (Y) is 0.496, which is greater than 0.05, confirming a significant linear relationship. Similarly, the work environment variable (X2) has a significance value of 0.205, which is also greater than 0.05, confirming a linear relationship between X2 and Y.

Table 2. SPSS Linearity Test Results

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Tingkat Kinerja (Y) * Keselamatan Kerja (X1)	Between Groups	(Combined)	264.056	11	24.005	4.837	0
		Linearity	216.999	1	216.999	43.722	0
		Deviation from linearity	47.057	10	4.706	0.948	0.496
	Within Groups		337.494	68	4.963		
	Total		601.550	79			
			Sum of Squares	df	Mean Square	F	Sig.
Tingkat Kinerja (Y) * Lingkungan Kerja (X2)	Between Groups	(Combined)	265.193	13	20.399	4.003	0
		Linearity	181.670	1	181.670	35.647	0
		Deviation from linearity	83.523	12	6.960	1.366	0.205
	Within Groups		336.357	66	5.096		
	Total		601.550	79			

The partial test (t-test) was conducted to assess whether individual independent variables significantly influence the dependent variable by comparing the calculated t-value (t-count) with the critical t-table value. The criteria for the t-test decision-making process are as follows:

a. If the calculated t-value (t-count) is greater than the t-table value, the hypothesis is accepted, meaning the independent variable significantly affects the dependent variable.

b. If the calculated t-value (t-count) is less than the t-table value, the hypothesis is rejected, meaning the independent variable does not significantly affect the dependent variable.

Based on the results presented in Table 3, the t-count values for occupational safety (X1) and work environment (X2) are 4.335 and 3.276, respectively, both exceeding the critical t-table value of 1.991. These findings confirm that both occupational safety (X1) and work environment (X2) have a significant influence on employee performance (Y), thereby accepting the research hypothesis.

Table 3. SPSS t-Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Si
1	(Constant)	12.880	3.737		3.447	.0
	Keselamatan Kerja (X1)	.426	.098	.432	4.335	.0
	Lingkungan Kerja (X2)	.282	.086	.327	3.276	.0

a. Dependent Variable: Tingkat Kinerja (Y)

Based on the results of the t-test, it can be concluded that occupational safety (X1) and the work environment (X2) have a significant influence on employee performance (Y). The calculated t-values for X1 (4.335) and X2 (3.276) are greater than the critical t-table value (1.991), leading to the conclusion that the hypothesis is accepted. Furthermore, the simultaneous test (F-test) was conducted to determine whether all independent variables collectively influence the dependent variable by comparing the calculated F-value (F-count) with the critical F-table value. The decision criteria for the F-test are as follows:
a. If the calculated F-value (F-count) is greater than the F-table value, the hypothesis is accepted, meaning that the independent variables collectively influence the dependent variable.
b. If the calculated F-value (F-count) is less than the F-table value, the hypothesis is rejected, meaning that the independent variables do not collectively influence the dependent variable.

Table 4. SPSS F-Test Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	264.046	2	132.023	30.120	.000[b]
	Residual	337.504	77	4.383		
	Total	601.550	79			

a. Dependent Variable: Tingkat Kinerja (Y)

a. Dependent Variable: Employee Performance (Y)
b. Predictors: (Constant), Work Environment (X2), Occupational Safety (X1)
Based on the results of the F-test, the calculated F-value (30.120) is greater than the F-table value (3.115), leading to the conclusion that occupational safety (X1) and the work environment (X2) collectively have a significant impact on employee performance (Y).

4. Discussion

4.1 Results of Stella 9.0.2 Data Analysis

Following the statistical analysis using SPSS, a dynamic system simulation was conducted using Stella 9.0.2 to further analyze the impact of the Construction Safety Management System (SMKK) training program on workers' knowledge and behavior at the Makassar New Port toll road project. The simulation aimed to evaluate the effectiveness of the training in improving occupational health and safety (OHS) awareness and compliance among workers.

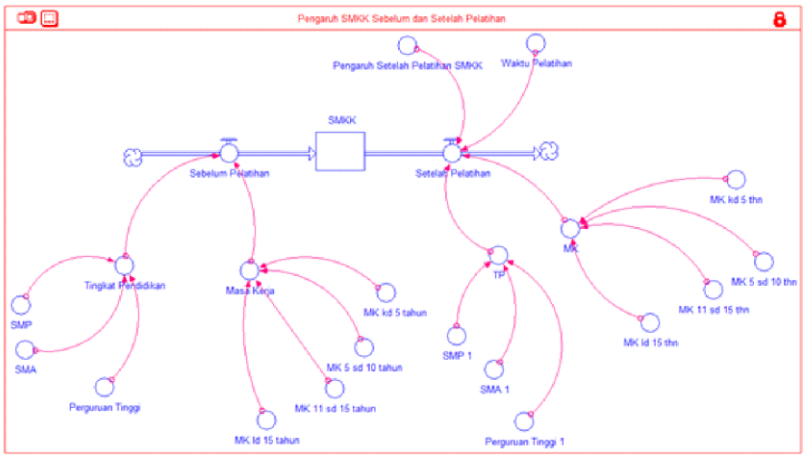

Figure 3. Model Scheme Before and After SMKK Training

The model illustrated in Figure 3 was developed based on key influencing parameters, including education level and work experience, to measure the impact of SMKK training on workers' safety-related knowledge and behavior. These factors were considered crucial in understanding how OHS knowledge dissemination affects behavioral change and compliance. Before implementing the training program, the simulation model was used to predict the level of workers' awareness and the potential improvements after undergoing structured training interventions. The model provides insights into the relationship between

training duration, learning retention, and behavioral adjustments over time, allowing for a comprehensive evaluation of the program's effectiveness.

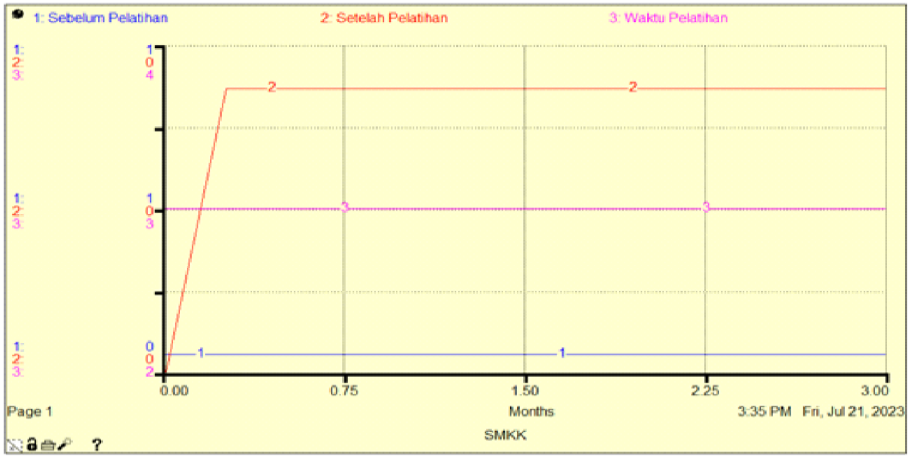

Figure 4. SMKK Prediction Model Graph

The results of the simulation, as shown in Figure 4, highlight a significant improvement in worker knowledge and compliance levels post-training. The blue line in the graph represents the baseline knowledge level before SMKK training, revealing a critical lack of awareness and understanding of construction safety management protocols. The red line represents the improvement in knowledge and compliance observed after the implementation of the SMKK training program, while the pink line denotes the three-month training period incorporated into the model.

The findings indicate that before the training intervention, the workers demonstrated minimal understanding of SMKK principles and practices, which posed potential safety risks on the project site. However, after a three-week intensive training program, there was a remarkable increase of 80% in workers' safety knowledge and compliance levels, as reflected by the upward trajectory of the red line. This improvement underscores the crucial role of structured safety training programs in fostering a culture of safety awareness and adherence to regulations in high-risk construction environments. Further analysis suggests that the significant improvement observed post-training is influenced by several factors, including the structured training approach, hands-on demonstrations, and continuous reinforcement of safety procedures through periodic refresher sessions. The findings emphasize the need for ongoing monitoring and reinforcement to sustain the achieved improvements in safety knowledge and compliance. The results of this study are consistent with previous research that highlights the importance of structured safety training programs in enhancing workers' understanding of OHS practices. A study conducted by Rahmawati et al. (2019) found that construction workers who received formal OHS training demonstrated a 75% improvement in safety compliance and awareness, closely aligning with the 80% increase observed in this study. This finding reinforces the notion that targeted safety interventions can lead to substantial behavioral changes and reduce the likelihood of workplace accidents.

Similarly, research by Roharto & Kasmir (2017) on safety training in large-scale infrastructure projects indicated that effective safety training could reduce workplace incidents by 60%, further demonstrating the importance of investing in comprehensive training programs. They reported that ongoing safety reinforcement and leadership commitment played a critical role in maintaining long-term compliance with safety standards. Moreover, a study by Elvania (2022) found that periodic reinforcement of safety training significantly contributes to sustained behavioral change and compliance, emphasizing the need for continued education beyond the initial training phase. The study highlighted that without follow-up sessions, safety knowledge retention declined over time, suggesting that periodic refresher training sessions are essential to maintaining a high level of safety awareness among workers. In comparison to global best practices, studies by Zhou et al. (2021) in the Chinese construction sector revealed that integrating digital simulation tools, such as virtual reality (VR) and computer-based safety training, further enhances workers' comprehension and engagement with safety procedures. The application of Stella 9.0.2 in this study provides a step towards adopting advanced simulation techniques, enabling the prediction of behavioral trends and identifying areas for further safety improvements. Future studies could explore the integration of such technologies to further enhance the impact of training interventions.

The findings from the current study provide several critical implications for improving safety training programs within the construction industry. Firstly, the results demonstrate that structured and well-planned training interventions can significantly enhance worker knowledge and compliance with safety protocols. Therefore, construction companies should prioritize regular safety training sessions, with a focus on hands-on practical applications and real-life scenarios to ensure workers can effectively apply their knowledge in the field. Secondly, the study highlights the importance of incorporating dynamic simulation tools such

as Stella 9.0.2 in the planning and evaluation of safety training programs. Simulation models allow for the visualization of training impacts over time and can be used to adjust training strategies to maximize effectiveness. Future research could explore integrating other advanced simulation techniques, such as augmented reality (AR) and machine learning, to further optimize training effectiveness. Thirdly, management commitment and worker engagement play crucial roles in ensuring the success of safety training programs. Companies should encourage active participation from workers and provide incentives for consistent compliance with safety regulations. Engaging workers through feedback mechanisms and continuous improvement initiatives can contribute to the development of a robust safety culture.

5. Conclusion

Based on the findings of this study, several conclusions can be drawn. First, the Construction Safety Management System (SMKK) has been implemented at the Makassar New Port toll road project through various safety measures, including the provision and use of Personal Protective Equipment (PPE), waste disposal facilities, fire extinguishers (APAR), safety signage, safety nets, sanitation facilities, first aid kits (P3K), health check-ups, and regular safety morning briefings. However, the implementation has not been fully effective, as there remain significant challenges, such as approximately 30% of workers failing to use PPE and improper disposal of construction waste at the project site, which require special attention and corrective actions. Second, statistical analysis using SPSS revealed that both occupational safety (X1), with a t-value of 4.335, and the work environment (X2), with a t-value of 3.276, have a significant influence on worker performance at the Makassar New Port toll road project, as confirmed by the t-test results. This finding underscores the importance of ensuring a safe and conducive work environment to enhance productivity and overall project efficiency. Third, prior to the implementation of the SMKK predictive model, no significant improvements in worker performance were observed. However, after the implementation of the SMKK program over a period of three months, a significant improvement of 80% was recorded within the first three weeks of training. This indicates that structured safety interventions can lead to substantial improvements in safety awareness and compliance among construction workers. It is recommended that future research further develop this study by incorporating additional parameters, such as occupational health, OHS training, and work productivity, which could provide a more comprehensive understanding of factors influencing worker performance and contribute to further enhancing construction safety management practices.

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