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Integration of Occupational Safety and Health Awareness and Compliance in the Implementation of Land Surveying Practices in Vocational High Schools

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Abstract

Occupational Safety and Health (OSH) is a crucial aspect of land surveying practices conducted by vocational high school students. The risk of accidents, such as falls, being buried by soil, and exposure to extreme weather conditions, necessitates the optimal implementation of OSH awareness and compliance. This study aims to analyze the integration of student awareness and compliance with OSH in land surveying practices. The research employs a quantitative approach using multiple linear regression analysis. Prior to analysis, the data were tested for (1) normality, (2) homogeneity, and (3) linearity. The study population consists of 105 students from the Construction and Housing Engineering program at SMK Negeri 3 Semarang, selected through a total sampling technique. Data were collected through questionnaires, observations, and interviews, then analyzed using SPSS. The results indicate that student awareness and compliance significantly and simultaneously influence OSH implementation, contributing 78%. The correlation analysis reveals a strong relationship of 88% between the variables. Students with high awareness and compliance demonstrate greater discipline in adhering to OSH procedures in the field. These findings suggest that enhancing education, providing adequate safety facilities, and enforcing strict supervision can further improve OSH implementation in land surveying practices within vocational school environments.

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INTRODUCTION

Occupational Safety and Health (OSH) is a crucial aspect across various work sectors (Sastrini et al., 2023). In vocational education, particularly in the Construction and Housing Engineering program, land surveying practice plays a vital role. Land surveying practice requires students to work in field conditions with various occupational hazards, including falls due to uneven ground surfaces, being buried by soil, and exposure to extreme weather, which may lead to health issues (Sinaga et al., 2022). Therefore, student awareness and compliance with safety procedures are essential factors in creating a safe, effective, and efficient work environment (Suwandi et al., 2023).

This aligns with Law Number 1 of 1970 on Occupational Safety, which mandates industries to ensure a safe working environment, including the provision of training, personal protective equipment, and adherence to safety procedures by workers (Republik Indonesia, 1970). In 2023, Indonesia recorded 370,747 occupational accident cases, highlighting significant challenges in implementing workplace safety across various sectors (Kementerian Ketenagakerjaan, 2024). This includes construction projects, which emphasize the need for more effective safety practices at work sites. In 2019, the construction sector accounted for 40% of work-related accidents, making it one of the highest-risk industries (Indonesia Safety Center (ISC), 2024). Factors such as the use of heavy equipment, working at heights, and environmental conditions are the primary causes of accidents in construction projects. Many accidents occur due to a lack of understanding and noncompliance with safety procedures (Prameswari & Cahyadi, 2024).

In vocational high school environments, field practice often encounters various challenges, one of which is lack of student awareness and compliance with OSH procedures (Rizky et al., 2023). This increases the risk of occupational accidents, injuries, or even measurement errors due to a lack of attention to safety aspects. Law Number 20 of 2003 on the National Education System, Article 15, states that the objective of vocational education is to prepare students to become skilled and competent professionals in their respective fields (Republik Indonesia, 2003).

With a curriculum emphasizing competencies and skills, vocational education is expected to enable students to quickly adapt to workplace environments and meet industry demands effectively (Sutjipto, 2019). SMK Negeri 3 Semarang has implemented the Merdeka Curriculum, which emphasizes practice-based learning aligned with industry requirements. Students are introduced to how tasks are completed, whether producing goods or services, while ensuring adherence to OSH principles (Endroyo et al., 2020). In the Merdeka Curriculum, researchers have observed that OSH learning is integrated into practical course elements to support the execution of tasks according to recommended procedures. Land surveying practice is no exception, as the application of OSH also requires serious attention.

In land surveying practice, students face various risks, including improper use of measuring instruments, working in unstable or hazardous environments, lack of personal protective equipment (PPE) usage, and negligence in communication and coordination within teams (Prameswari & Cahyadi, 2024). Many students perceive OSH as merely an administrative requirement or a formality rather than understanding its significance (Al Hassany & Nurdin, 2024). This lack of awareness leads to unsafe work habits, such as using equipment without prior inspection, failing to consider environmental conditions, or ignoring potential hazards in the work area.

Integrating awareness and compliance with OSH procedures into land surveying practice is essential for fostering a culture of safety from an early stage. OSH awareness is not only related to knowledge of safety regulations but also involves the application of discipline, responsibility, and concern for personal and team safety (Wibowo et al., 2022). Compliance with OSH procedures also contributes to improved work quality, as a safe and controlled environment enables students to focus on taking measurements with greater accuracy and precision (Simbolon et al., 2024).

Land surveying activities involve specialized tools and techniques that may pose

safety risks if not executed correctly (Muzayanah & Budianto, 2020). For instance, optical instruments such as total stations, automatic levels, and theodolites require sturdy tripods and precise positioning. Conducting measurements on unstable ground or carelessly placing equipment may result in tripod or optical instrument falls, leading to equipment damage and potential injuries to surveyors.

This study aims to provide a clearer understanding of the extent to which vocational high school student awareness and compliance with OSH influence the implementation of OSH in land surveying practice. By identifying factors contributing to student awareness and compliance, schools and teachers can develop more effective strategies to enhance discipline and awareness in implementing OSH (Pangestika et al., 2023). Several approaches that can be taken include increasing education on the importance of OSH, providing adequate safety facilities, and enforcing stricter supervision during practical sessions (Hasibuan et al., 2020).

This study seeks to analyze the integration of vocational high school student OSH awareness and compliance with the implementation of OSH in land surveying practice. By understanding the relationship between these variables, this research aims to provide concrete recommendations for schools, teachers, and students to improve OSH implementation, creating a safer, more effective, and efficient practical learning environment

METHODOLOGY

This study employs a quantitative approach using multiple linear regression analysis. Data collection was conducted through questionnaires to measure the level of student awareness and compliance with OSH implementation, observations to directly examine the application of OSH procedures in land surveying practice, and interviews as a supplementary method to explore deeper insights into student awareness and compliance with OSH. The research instruments serve as reference indicators for data collection, with respondents completing a questionnaire categorized based on the variables of awareness and compliance. Meanwhile, the implementation instrument is used as a reference for observation by the researcher. The instruments were previously validated by experts and declared valid. The instrument grid is presented in Table 1.

Table 1. Instrument Grid for Awareness, Compliance, and OSH Implementation

Student Awareness of OSH	Student Awareness of OSH	Student Awareness of OSH
Understanding of OSH procedures in land surveying practice	Compliance in maintaining equipment, workers, and processes to ensure safety	Level of student readiness in applying OSH in land surveying practice
Attitude in following OSH procedures	Consistency in using personal protective equipment (PPE) during land surveying practice	Student implementation of OSH procedures in the field
Student perception of applying OSH in land surveying	Work discipline in OSH procedures before, during, and after land measurement	Student ability to handle emergencies and address hazards
Sources of information students use to understand OSH	Discipline in following OSH instructions from teachers and other sources	Role of teachers and other sources in OSH socialization as a learning medium

The collected data were processed using SPSS after undergoing a series of prerequisite tests, including (1) normality test, (2) homogeneity test, and (3) linearity test (Sugiyono, 2019). Once the requirements were met, the data were analyzed using multiple linear regression to determine the effect of integrating student awareness and compliance on the implementation of OSH procedures in land surveying practice. The research population consisted of three class groups from Phase E of the Construction and Housing Engineering program at SMK Negeri 3 Semarang, with a total of 105 students. The sampling technique used was total sampling, ensuring that the sample size was equal to the total population, which was 105 students. The integration model applied in this study is presented in Figure 1.

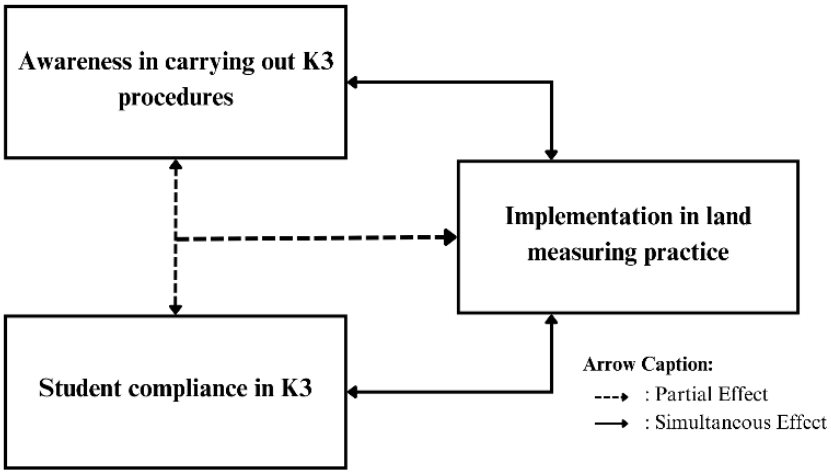

Figure 1. Research Integration Model

RESULT AND DISCUSSION

Result

The collected data were analyzed in accordance with research principles using prerequisite analysis tests. Data were processed using SPSS software with multiple linear regression analysis. The testing stages involved the following prerequisite analyses: (1) Normality test using Kolmogorov-Smirnov analysis, where the significance values for the awareness, compliance, and implementation variables were 0.154, 0.93, and 0.200, respectively, all greater than 0.05, indicating that the data were normally distributed. (2) Homogeneity test using Levene Statistic analysis, which produced a significance value based on the mean of 0.557, greater than 0.05, confirming that the data were homogeneous. (3) Linearity test for awareness and compliance variables concerning implementation, where the significance values for Deviation from Linearity were 0.796 and 0.970, both greater than 0.05, indicating that the data met the linearity assumption. After passing these prerequisite tests, the data were further analyzed using multiple linear regression. Tables 2, 3, and 4 present the output results of the multiple linear regression analysis conducted with SPSS.

Table 2. Output Coefficients of Multiple Regression Analysis Using SPSS

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	146.224	15.203		6.788	.000
Kesadaran	.982	.168	1.338	9.782	.000
Kepatuhan	1.271	.375	.785	5.975	.000
a. Dependent Variable: Implementasi					

Based on the regression analysis results from the output coefficients, the significance value for the awareness and compliance variables was 0.000. Since the significance value of 0.000 is less than 0.05, it can be concluded that both awareness and compliance variables have a significant influence on the implementation of OSH in land surveying practice. Furthermore, based on the t-test, the calculated t-value for each variable was greater than the critical t-table value of 1.983. This indicates that both independent variables, student awareness and compliance with OSH, individually contribute significantly to the implementation of OSH in land surveying practice.

Table 3. Output of ANOVA for Multiple Regression Analysis Using SPSS

ANOVA[a]						
	Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	2065.643	2	1312.822	44.482	.000[b]
	Residual	1948.242	70	29.633		
	Total	3213.886	72			
a. Dependent Variable: Implementation						
b. Predictors: (Constant), Compliance, Awareness						

The ANOVA test results indicate that the significance value for regression is 0.000. When compared to the maximum threshold of 0.05, the significance value of 0.000 < 0.05 suggests that the awareness and compliance variables jointly (simultaneously) influence the implementation of OSH in land surveying practice. Additionally, the calculated F-value was 44.482, while the F-table value was 3.09. Since 44.482 > 3.09, it can be concluded that both independent variables collectively influence the dependent variable.

Table 4. Model Summary Output for Multiple Regression Analysis Using SPSS

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.882[a]	.783	.761	5.444
a. Predictors: (Constant), Compliance, Awareness				

The Model Summary table explains that the correlation coefficient (R) is 0.882, which equals 88%. The output also includes the coefficient of determination (R Square), which indicates the significance of the simultaneous effect of the awareness and compliance variables on the implementation of OSH in land surveying practice. The R Square value is 0.783, meaning that the combined effect of awareness and compliance on OSH implementation accounts for 78%. The remaining 22% is influenced by other factors that were not examined in this study.

Discussion

Based on the research findings, student awareness and compliance with OSH simultaneously influence OSH implementation in land surveying practice by 78%. This indicates that awareness and compliance variables significantly contribute to the successful application of occupational safety and health procedures in the field. Additionally, the correlation value of 88% suggests a strong relationship between student awareness and compliance with OSH implementation. In other words, the higher the level of student awareness and compliance with OSH, the better the implementation of safety procedures in land surveying practice.

From the perspective of student awareness, integration into OSH implementation is evident in their understanding of safety procedures, identification of potential hazards, and risk mitigation measures before, during, and after practice. Students with high awareness better understand the importance of maintaining personal and workplace safety, making them more proactive in applying OSH principles. This awareness also influences their consistency in using personal protective equipment (PPE) and following safety instructions provided by teachers and other learning media.

Student awareness in OSH implementation also contributes to strengthening a safety culture in the school environment, particularly in land surveying practice. Students who recognize the importance of workplace safety actively participate in discussions about safety procedures and show concern for their peers during practice. This awareness is closely related to their ability to identify risk factors in the field, such as survey site conditions, weather, and the safe use of surveying

equipment. Therefore, continuous education and training play a crucial role in maintaining and enhancing student awareness of OSH implementation.

From the perspective of student compliance, integration into OSH implementation is reflected in their disciplined behavior in following established safety procedures. Student compliance is evident in their actions when maintaining surveying instruments, consistently using PPE, and following safety instructions responsibly. Students with high levels of compliance tend to be more meticulous in inspecting equipment before use, more disciplined in carrying out work procedures, and more responsive in avoiding or handling potential hazards in the field.

This compliance also plays a role in developing positive habits in land surveying practice, such as following the correct work procedures, adhering to standard operating procedures (SOP), and collaborating with the team to ensure collective safety. Additionally, a high level of compliance indicates that students have internalized the importance of OSH as part of their professional skills, which will be beneficial when they enter the workforce. In practice, students with high compliance can minimize safety violations, reduce challenges during practical sessions, and contribute positively to maintaining a safe work environment. The following table presents the achievement levels of student awareness and compliance with OSH indicators.

Table 5. Achievement Levels of Student Awareness and Compliance with OSH

Variable	Indicator	Percentage
Student Awareness of OSH	Students have an understanding of OSH procedures, including identifying potential hazards and preventive measures	80%
	Students demonstrate a positive attitude in applying safety procedures	84%
	Students recognize the importance of OSH implementation in land surveying practice to prevent workplace accidents and improve work efficiency	84%
	Students consistently use personal protective equipment (PPE)	82%
Student Compliance with OSH	Students comply with regulations in maintaining surveying instruments, ensuring equipment remains in good condition, and maintaining team safety during measurements	85%
	Compliance in wearing PPE during practice	82%
	Students demonstrate discipline in preparing instruments before practice, adhering to safety procedures during measurements, and properly storing equipment after practice	84%
	Students proactively identify and mitigate potential hazards in the field	80%

Based on the table above, the level of student awareness and compliance with OSH implementation falls into the good category, as indicated by the achievement percentages for each indicator. These results demonstrate that students exhibit a high level of awareness and compliance with OSH implementation in land surveying practice. This finding suggests that efforts in education and the application of safety procedures within the learning environment have been effective in improving student understanding, attitudes, and discipline in maintaining workplace safety.

The findings from this study are supported by Sarbiah (2023), who emphasizes the importance of awareness and compliance in OSH implementation, stating that individual awareness of occupational safety standards significantly contributes to reducing accident risks and increasing work efficiency. This is consistent with the perspective of Manaya et al. (2024), who assert that compliance with safety procedures strongly correlates with a disciplined and professional work culture, ultimately leading to improved safety in the workplace. The integration of OSH in vocational practice enhances student understanding and skills in managing real work risks. Additionally, continuous training related to OSH can further improve student discipline and compliance with safety procedures, which will

influence their readiness to enter the industry (Istiqomah et al., 2024).

As a key novelty in this study, the instruments and analyses used to measure student awareness and compliance were designed based on industry-standard requirements, allowing them to reflect the actual needs and conditions of the professional workplace. Furthermore, the analysis applied in this research not only evaluates the relationship between awareness and compliance with OSH implementation in general but also highlights the achievement of specific indicators referring to safety standards in the construction sector. Moreover, interviews with students revealed that their overall perception of OSH in land surveying practice is generally positive. Most students acknowledged that implementing OSH helped them become more disciplined and better understand the importance of workplace safety. However, some students admitted facing difficulties in adapting to the consistent use of PPE, such as safety helmets, vests, and safety shoes, as they were not accustomed to wearing such equipment. Therefore, the discussion in this study not only provides an overview of student conditions but also serves as a reference for developing industry-based curricula that place greater emphasis on OSH implementation in vocational training.

CONCLUSION

Based on the research findings, it can be concluded that the integration of awareness and compliance among students in the Construction and Housing Engineering program regarding the implementation of OSH in land surveying practice at SMK Negeri 3 Semarang falls into the good category. The simultaneous correlation level between awareness and compliance with OSH implementation is also classified as strong. Students have demonstrated an understanding of the importance of workplace safety and have made efforts to consistently apply OSH procedures. To further enhance OSH implementation in land surveying practice, it is recommended that schools and teachers provide more interactive and continuous education on the importance of workplace safety. Additionally, stricter supervision and the implementation of educational sanctions for students who fail to comply with OSH procedures could be applied to foster a more professional attitude among students.

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