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Occupational Safety in Action: Assessing the Implementation and Impact of Safety and Health Management Systems

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ABSTRACT

Purpose of the study: The aim of this research is to determine the counseling, implementation, supervision, and supporting facilities for the Occupational Safety and Health management system.

Methodology: The study population was all 2,341 students of State Vocational High School 3 Yogyakarta. The sample size was 342 students, determined using the Slovin formula. Random sampling was used. Data collection was conducted using a questionnaire. Validity was determined using expert judgment, while reliability was determined using the Cronbach's alpha formula.

Main Findings: The results of the study showed that: Extension with a score of 67 (quite good), implementation 74 (good), supervision 69 (quite good), facilities 76 (good), culture 78 (very good).

Novelty/Originality of this study: It can be used as self-evaluation material in following the teaching and learning process and as input that it is important to prioritize the correct implementation of Occupational Safety and Health in students.

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1. INTRODUCTION

In the era of globalization and free trade, every country is required to prepare human resources with competencies and work standards that meet international needs [1]-[3]. These competencies encompass not only technical skills but also aspects of safe and productive work behavior. One major challenge is how to create human resources who are not only intellectually superior but also aware of the importance of occupational safety and health [4], [5]. Efforts to develop quality human resources must begin early, including through an education system that is relevant and adaptive to the demands of the global workplace [6]-[8].

Education plays a crucial role in preparing superior and competitive human resources [9], [10]. Vocational education, in particular, is aimed at equipping students with ready-to-use skills relevant to specific industrial fields [11], [12]. During the learning process, students are not only required to master technical skills (hard skills), but also need to develop soft skills such as discipline, responsibility, and especially an awareness of occupational safety and health [13], [14]. The implementation of occupational safety and health values from an early age in the educational environment is an essential foundation for developing a safe and productive workforce.

Occupational safety and health is a shared responsibility that must be instilled from the time students participate in work experience at school [15], [16]. During practical activities, students come into direct contact with potentially hazardous equipment and materials. Therefore, knowledge and understanding of occupational safety and health are crucial to avoid the risk of accidents and occupational diseases [17], [18]. Introducing and

implementing occupational safety and health principles in educational settings, particularly in laboratories and practical rooms, is a preventative measure in creating a safe and efficient work culture [19], [20].

However, the implementation of an Occupational Safety and Health Management System in educational settings does not always run smoothly. Various challenges are encountered, such as limited budgets for occupational safety and health support facilities, a lack of competent human resources in the field of occupational safety, and a lack of effective communication from management to all educational stakeholders [21], [22]. Implementing an Occupational Safety and Health Management System requires the commitment and involvement of all parties, from leaders to students, to create an effective and sustainable management system [23], [24].

On the other hand, there is still a gap between the understanding of occupational safety and health theory taught in the classroom and its practical application in the field [25], [26]. Students often fail to integrate occupational safety and health knowledge into their daily practical activities. This is reflected in low awareness of the use of personal protective equipment, a lack of awareness of danger signs, and weak supervision in the practical work area [27]-[29]. The lack of an educational approach and the limited instillation of safe behaviors are factors that hinder the implementation of the Occupational Safety and Health Management System in education [30], [31].

Proper implementation of an occupational safety and health management system is not merely an administrative procedure; it requires a comprehensive approach, from planning, training, evaluation, and instilling safety values [32], [33]. In the educational context, strengthening occupational safety and health implementation is key to producing graduates who are professional, risk-aware, and capable of maintaining personal and work environment safety. Therefore, robust and systematic management is required to regulate and oversee occupational safety and health implementation in the learning environment [34], [35].

Given these conditions, it is crucial to conduct an in-depth analysis of how the occupational safety and health management system is implemented in the educational environment, particularly in the practical learning process [36], [37]. Through this analysis, it is hoped that various obstacles and potential improvements in the implementation of the occupational safety and health Management System can be identified to make it more effective. This will ensure that students are better prepared to face the industrial world of work, which demands both skills and a high level of awareness of occupational safety and health.

Research conducted by Jokar Morderaz et al., [38] focuses on designing an occupational safety and health model using a human capital management approach, specifically in the context of the national oil industry, emphasizing the integration of human resource factors in creating an effective occupational safety system. Meanwhile, Murikipudi [39] explores public health crisis management through the application of Java-based technology and artificial intelligence, focusing on digital responses to health emergencies. Both studies provide important contributions to the development of occupational safety and health systems in terms of strategic design and technology utilization. However, there is a research gap that has not been widely discussed, namely the level of direct implementation of occupational safety and health management systems in the field and their impact on actual working conditions. The current research fills this gap by analyzing the extent to which the implementation of the Occupational Safety and Health Management System at State Vocational High School 3 Yogyakarta is implemented and how effective it is in creating a safe and healthy work environment. This focus provides an important practical contribution in connecting the theory of system design and digital innovation with the reality of implementing occupational safety policies at the operational level.

This research is novel in its focus, not only examining the design or supporting technology of the occupational safety system, but also directly evaluating the actual implementation and impact of the Occupational Safety and Health Management System (State Vocational High School 3 Yogyakarta) in the workplace. This approach is important because many previous studies have emphasized the design aspects of models or technology integration, while the effectiveness of implementation at the operational level has rarely been studied in depth. The urgency of this research is also very high considering the still high number of work accidents and health risks due to the less than optimal implementation of the State Vocational High School 3 Yogyakarta in various industrial sectors. By examining the actual implementation and its impact on occupational safety, this research provides an empirical picture that can be used as a basis for policy making to improve the Occupational Safety and Health system, increase managerial awareness, and strengthen the safety culture in the workplace on an ongoing basis. The aim of this research is to determine the counseling, implementation, supervision, and supporting facilities for the Occupational Safety and Health management system.

2. RESEARCH METHOD

2.1. Research Design

This research uses a descriptive method. Descriptive research is a method for examining the status of a group of people, an object, a set of conditions, a system of thought, or a class of events in the present [40], [41]. This descriptive research uses a quantitative approach because the research data are in the form of numbers and the analysis uses statistics [42], [43]. The analysis used is descriptive statistical analysis. Descriptive statistics are statistics used to analyze data by describing or depicting the collected data as it is without the intention of making

conclusions that apply to the public or generalizations [44], [45]. Descriptive research is research aimed at systematically and accurately presenting facts or events regarding the nature of the population. In descriptive research, there tends to be no need to seek or explain relationships between variables and test hypotheses.

2.2. Population and Research Sample

The subjects of this study were all students of State Vocational High School 3 Yogyakarta. The object of this study is the Analysis of the Implementation of the Occupational Safety and Health Management System at State Vocational High School 3 Yogyakarta. The population in this study were all students of State Vocational High School 3 Yogyakarta. The sample is part of the population taken as data that is considered to represent the entire population. The use of instruments in this study is a questionnaire or survey sheet to find out respondents' opinions about the Implementation of the Occupational Safety and Health Management System at State Vocational High School 3 Yogyakarta. Research instrument is a tool used to measure natural or social phenomena that are observed [46], [47]. Specifically, all of these phenomena are called research variables. So the research instrument is a tool or facility used by researchers in collecting data so that their work is easier and the results are better, in the sense that it is more accurate, complete, and systematic so that it is easier to process.

2.3. Data Collection Techniques and Research Instruments

The data collection technique used in this study is a non-test method in the form of a questionnaire. The data collection technique used in this study is using a questionnaire. This type of questionnaire is a closed questionnaire that provides certain answer choices that have been provided by providing certain signs on the answer alternatives that have been selected. Questionnaires are forms that contain statements to obtain information related to the research object. The questionnaire in this study uses a Likert scale. Likert scale is used to measure knowledge, attitudes, and actions taken by respondents [48], [49].

Table 1. Research questionnaire grid

No.	Variables	Sub Variables	Question Items	Amount
1.	Counseling	a) Management commitment statement	1-2	2
		b) Extension strategies	3-6	4
		c) Training	7-10	4
		Number of Questions		10
2.	Implementation	a) Establishing occupational safety and health policies	11-12	2
		b) Hazard identification, risk assessment, and control	12-15	3
		c) Creating occupational safety and health guidelines	16-17	2
		d) Member engagement	18-20	3
		Number of Questions		10
3.	Supervision	a) Workplace environment	21-24	4
		b) Work process	25-27	3
		c) Feasibility of the tools used	28-30	3
		Number of Questions		10
4.	Supporting facilities	a) Organization/unit responsible for occupational safety and health	31-33	3
		b) Resources owned	34-36	3
		c) Operational/work procedures, information, and reporting	36-40	4
		Number of Questions		10
5.	Occupational Safety and Health Culture	a) Seiri (ringkas)	41-42	2
		b) Seiton (rapi)	43-44	2
		c) Seiso (resik)	45-46	2
		d) Seiketsu (rawat)	47-48	2
		e) Shitsuke (rajin)	49-50	2
		Number of Questions		10

2.4. Data Analysis Techniques

The data obtained through the assessment instrument during the trial were analyzed using quantitative descriptive statistics. This analysis is intended to describe the characteristics of the data in each variable. Descriptive statistics are statistics used to analyze data by describing or depicting the collected data as it is without intending to draw conclusions that apply to the public or generalization [44], [50]. Included in descriptive statistics are data presentations through tables, graphs, diagrams, calculations of mode, median, mean, calculations of deciles, percentiles, calculations of data distribution through calculations of averages, calculations of standard deviations and calculations of percentages. In conducting this analysis, the steps taken are describing the data by calculating the mean (Me), median (Md), mode (Mo).

3. RESULTS AND DISCUSSION

3.1. Research Data Description

The research data was obtained using a questionnaire. The data were collected from 342 respondents with 50 questions, comprising 28 teachers, 7 staff, and 307 students from State Vocational High School 3 Yogyakarta. The questionnaire consisted of five variables (X), which are the variables in this study: counseling (X1), implementation (X2), supervision (X3), supporting facilities (X4), occupational safety and health culture (X5), and occupational safety and health management system (Y). All respondents provided their perceptions based on their knowledge and experience. This resulted in data that describe the variables and their relationships.

The data description presented in this study aims to present the data collected by the researcher. The data presented include the mean ($\bar{x}$), median (Me), mode (Mo), standard deviation (SD), and frequency distribution of the research variables. From the data processing that has been carried out, there are several categorizations, namely the less good category with a score range of 0 - 64, the fairly good category with a score range of 64 -70.25, the good category with a score range of 70.25 - 76.5, and the very good category with a score range of 76.5 - 100. Details of the overall data can be seen from the frequency distribution table as follows:

Table 2. Frequency Distribution of Variables

Counseling					
No.	Category	Score Range	Student	Employee	Teacher
1.	Poor	0 – 64	136 (44.3%)	3 (42,9 %)	6 (21,4 %)
2.	Fair	64 – 70.25	61 (19.9%)	3 (42,9 %)	3 (10,7%)
3.	Good	70.25 – 76.5	43 (14%)	0	6 (21,4 %)
4.	Very Good	76.5 - 100	67 (21.8%)	1 (14,3%)	13 (46,4%)
Implementation					
No.	Category	Score Range	Student	Employee	Teacher
1.	Poor	0 – 64	34 (11,1 %)	3(42,9%)	1 (3,6 %)
2.	Fair	64 – 70.25	44 (14,3 %)	1(14,3 %)	4 (14,3%)
3.	Good	70.25 – 76.5	59 (19,2 %)	0	3 (10,7%)
4.	Very Good	76.5 - 100	170(55,4 %)	3(42,9 %)	20(71,4%)
Supervision					
No.	Category	Score Range	Student	Employee	Teacher
1.	Poor	0 – 64	111(36,2 %)	4(57,1 %)	4(14,3 %)
2.	Fair	64 – 70.25	72 (23,5 %)	1(14,3 %)	5(17,9 %)
3.	Good	70.25 – 76.5	54 (17,6 %)	2(28,6 %)	5(17,9 %)
4.	Very Good	76.5 - 100	70 (22,8 %)	0	14(50 %)
Facility					
No.	Category	Score Range	Student	Employee	Teacher
1.	Poor	0 – 64	7(7,2%)	2(28,8 %)	1 (3,6 %)
2.	Fair	64 – 70.25	15(15,4%)	2(28,8 %)	2 (7,1 %)
3.	Good	70.25 – 76.5	39(40,2%)	1(14,3 %)	3 (10,7%)
4.	Very Good	76.5 - 100	27(27,8%)	2(28,6 %)	22(78,6%)
Culture					
No.	Category	Score Range	Student	Employee	Teacher
1.	Poor	0 – 64	3 (1%)	0	0
2.	Fair	64 – 70.25	0	0	0
3.	Good	70.25 – 76.5	103(33,6 %)	4(57,1 %)	8 (28,6 %)
4.	Very Good	76.5 - 100	201(65,5 %)	3(42,9 %)	20(71,4 %)

Judging from the frequency distribution table above, the results of the data calculations include the highest score, lowest score, mean ($\bar{x}$), median (Me), mode (Mo), standard deviation (SD). Data details can be seen from the variable score calculation table as follows:

Table 3. Calculation of Variable Scores

Variables	Subject	Highest Score	Lowest Score	Mean	Median	Mode	Standard Deviation
Extension	Students	100	32.5	66	67.5	60	13
	Teachers	90	40	72.7	75	72.5	13.7
	Employees	85	37.5	62.8	65	65	14.4
Implementation	Students	97.5	42.5	76.7	77.5	82.5	9.8
	Teachers	87.5	60	78	77.5	77.5	7.3
	Employees	90	50	67.5	65	77.5	14.7
Supervision	Students	90	42.5	67.9	67.5	67.5	10.7
	Teachers	90	57.5	74.8	76	80	9.3
	Employees	72.5	57.5	64.6	62.5	60	6
Facilities	Students	90	55.5	74	74	71.5	6.3
	Teachers	95	50	80.7	81	82.5	9.3
	Employees	85	62.5	70.7	67.5	62.5	8.1
Culture	Students	95	52.5	78.5	80	75	6
	Teachers	90	67.5	80	82.5	82.5	6
	Employees	85	70	75.3	72.5	72.5	5.6

Counseling is the process of introducing the occupational safety and health management system within the school environment. It is also a key factor influencing the successful implementation of the program at State Vocational High School 3 Yogyakarta. Based on the data, the score obtained for students was 66, which falls into the fairly good category. Meanwhile, the average score for teachers was 72.7, categorized as good, and the average score for employees was 62.5, which falls into the poor category. Notably, the employee group had the lowest score, with 42.9% of respondents in the poor category, 42.9% in the fairly good category, and only 14.3% in the very good category.

This low performance among employees is attributed to their limited participation in the counseling sessions held at school. The lack of involvement has led to reduced knowledge and interest, causing some employees to underestimate the importance of the counseling process. The effectiveness of counseling is also influenced by how well the information is disseminated. Uneven distribution of information results in certain groups—especially employees—being unaware of the ongoing programs. In contrast, teachers, as professional educators with high awareness of occupational safety and health, tend to appreciate the value of such programs. This is reflected in their scores, with 46.4% of teachers in the very good category, while only 21.4% fall into the less good category.

As for students, their score of 66, with 44.3% in the less good category and only 21.8% in the very good category, indicates a need for continuous guidance on the importance of occupational safety and health. Therefore, improvements are necessary, including conducting counseling sessions more regularly, ensuring full participation across all groups, and enhancing the content delivery to make it more engaging and informative. Inviting external experts in occupational safety and health can also help motivate school residents. Overall, while the counseling process is currently in the fairly good category, the suggested improvements can help it achieve optimal results.

Implementation requires hard work to achieve what has been planned. The implementation of the Occupational Safety and Health Management System (State Vocational High School 3 Yogyakarta) at State Vocational High School 3 Yogyakarta has been proven to be carried out well, as evidenced by the results of data collection from 342 respondents. The implementation variable obtained an average score of 76.7, with a breakdown of teacher subjects scoring 78 (very good category), student subjects scoring 76.7 (good category), and employee subjects scoring 67.5 (fairly good category). These results indicate that, overall, the implementation of State Vocational High School 3 Yogyakarta is in the good category with a combined average score of 74 across all subjects.

However, the relatively low score from the employee group highlights a gap that needs to be addressed. This gap may be due to a lack of understanding regarding occupational safety and health among employees, leading to obstacles in practical implementation. In contrast to teachers and students who frequently work in workshops with higher risks, employees tend to work in less hazardous environments, which may reduce their alertness and awareness of potential dangers. Therefore, it is crucial to strengthen the system specifically for employees through enhanced counseling, increased awareness, and stricter supervision by management. Such targeted improvements are expected to elevate the effectiveness of State Vocational High School 3 Yogyakarta implementation across all groups.

In addition to implementation, supervision is also a key factor in ensuring that occupational safety and health practices run effectively. Supervision was assessed based on scores from teachers (74.8), students (67.7), and employees (64.6), resulting in an overall average of 69, placing supervision in the fairly good category. Teachers, with the highest score, are both supervisors and supervisees, thus requiring a high level of alertness and the ability to identify hazards. Meanwhile, students, as the main focus of supervision efforts, received more attention in monitoring processes, which may explain their higher score compared to employees. The employee group scored lowest, likely due to their less frequent engagement in high-risk environments such as workshops. To improve this, schools should involve employees more actively in the supervision process, enhance their knowledge of occupational safety, and raise their hazard awareness. Strengthening supervision holistically is essential to support safer and more effective occupational environments within the school.

The success of the welding workshop's occupational safety and health implementation is inseparable from the completeness and condition of the available personal protective equipment. Based on research involving 97 tenth-grade mechanical engineering students, the average score for the availability and usability of personal protective equipment was 74, which falls into the good category. This indicates that, overall, the welding workshop's personal protective equipment is complete and suitable for use. However, there were variations in student perceptions. According to the frequency distribution data, 7 students stated the personal protective equipment was inadequate, possibly due to discomfort when using the equipment during practice. Another 15 students felt the equipment was sufficient, though some items were damaged, such as broken goggles and welding masks, yet still serviceable for several students.

A larger number of students—39 in total—assessed the personal protective equipment as good, stating that the essential equipment needed during welding practice was available. Meanwhile, 27 students rated the condition and completeness of the personal protective equipment as very good and entirely suitable for use. These findings are consistent with interview results from mechanical engineering teachers, who confirmed that the quantity and quality of personal protective equipment were aligned with the number of students practicing. Given the limited number of welding machines and space in the workshop, students are divided into smaller groups—16 at a time—to ensure safety and efficiency. Although the workshop remains functional, there is a clear need for equipment updates and improved workshop facilities to support optimal learning conditions.

Supporting documentation further confirms the condition of the personal protective equipment inventory. The welding workshop is equipped with 20 helmets (all in good condition), 20 welding masks (16 in good condition, 4 damaged), 20 pairs of goggles (17 in good condition, 3 damaged), 20 respiratory masks (18 in good condition), 20 pairs of gloves, 20 aprons, and 20 pairs of safety shoes—all in good condition. This equipment is adequate for the 16 students practicing at one time. Despite some items needing repair, the personal protective equipment can be considered sufficient and functional. Furthermore, the overall occupational safety and health culture at State Vocational High School 3 Yogyakarta is rated very good, with a score of 78 based on student responses. This reflects a strong awareness of the importance of occupational safety and health, which contributes to producing quality human resources who understand and apply safety principles in daily life.

From the table above, it can be explained that the teacher's high score of 80 falls into the very high category. This is due to the teacher's high level of knowledge, awareness, and discipline, resulting in a good occupational safety and health culture. In addition, teachers are figures who are good examples for others. It is appropriate for teachers to have a high occupational safety and health culture. Then, for students in terms of occupational safety and health culture, they obtained a fairly high score, falling into the good category. This can be influenced by several factors, including the role of teachers who always guide students to behave well in every action, especially when facing things that have potential dangers. Other things can be due to students' knowledge and awareness of the importance of occupational safety and health so that students can carry out activities according to procedures and over time will become a good culture. In relation to the subject of employees in terms of culture, it also shows a high score where the employee score is in the good category, although in the implementation, employees show quite good results, but supported by adequate supervision and facilities, employees are starting to realize that it is necessary to have a good culture in every activity carried out in order to improve their performance.

From all the existing variables and subjects including teachers, employees and students, the following average results were obtained:

Table 4. Variable Score Categorization

No.	Variables	Average Score	Category
1.	Extension	67	Quite Good
2.	Implementation	74	Good
3.	Supervision	69	Quite Good
4.	Facilities	76	Good
5.	Culture	78	Very Good

The data above indicates the need for improvement and refinement in existing counseling and supervision to maximize results, including by increasing interest, awareness, and discipline in implementing occupational safety and health in schools. This can also be done by adding information about occupational safety and health. In terms of counseling, all school members can also be actively involved so that existing supervision can run optimally.

From all the data that has been discussed, it can be concluded that the implementation of State Vocational High School 3 Yogyakarta with the variables of counseling, implementation, supervision, facilities, and culture related to the subjects of teachers, students, and employees obtained an average of 72.8. This proves that the management system in State Vocational High School 3 Yogyakarta is included in the good category.

This research has had a positive impact on increasing awareness and understanding of the importance of implementing an Occupational Health and Safety Management System (Vocational High School 3 Yogyakarta) in vocational education settings, particularly at Vocational High School 3 Yogyakarta. The findings of this study can serve as a basis for formulating school policies related to strengthening an Occupational Health and Safety culture, improving practice facilities, and enhancing Occupational Health and Safety supervision and training for all school personnel, especially educational staff. Furthermore, the results of this study contribute to the limited literature on Occupational Health and Safety implementation in educational settings.

However, this study has several limitations. First, the scope of the study was limited to one school, so generalizing the results to other schools requires caution. Second, the data were obtained from respondents' perceptions through questionnaires and interviews, making them susceptible to subjectivity. Third, this study did not exhaustively measure the causal relationship between Occupational Health and Safety implementation and increased safety or reduced workplace accident rates in the school environment. Therefore, further research with a broader scope, a longitudinal approach, or more in-depth quantitative methods is needed to obtain more comprehensive and generalizable results.

4. CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the implementation of the Occupational Safety and Health Management System (State Vocational High School 3 Yogyakarta) has generally gone quite well. Occupational safety and health counseling still needs to be improved because the interest and awareness of the subjects, especially students and employees, are still low. The implementation of occupational safety and health is quite good, although employees show less than optimal results. Occupational safety and health supervision is in the fairly good category because it is still dominated by teachers with limited participation from students and employees. occupational safety and health facilities in the form of personal protective equipment in the welding workshop are adequate and are used well by the school community. Meanwhile, the occupational safety and health culture is in the very good category thanks to consistent implementation and effective supervision support, thus forming positive occupational safety and health -aware behavior in the school environment. Further research is recommended to explore the relationship between occupational safety culture and the effectiveness of occupational safety and health management systems implementation across various industrial sectors. Furthermore, follow-up studies could include longitudinal analyses to evaluate the long-term impact of OHS system implementation on employee productivity and well-being.

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