

Analysis of Occupational Safety and Health Management System Implementation in Laboratory Practices at Politeknik Negeri Madiun

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Abstract

Practical learning activities in vocational higher education, particularly at Politeknik Negeri Madiun, are designed to develop technical competencies and often involve the use of laboratory equipment and production machinery. These activities inherently pose potential risks of occupational accidents if not supported by an adequate Occupational Safety and Health Management System (OSHMS). This study aims to analyze the extent of OSHMS implementation in laboratory practice sessions, focusing on institutional commitment, safety planning, implementation, monitoring and evaluation, and management review. The research employed a questionnaire distributed to students, laboratory technicians, and supervising lecturers, complemented by field observations. Data were analyzed using a scoring method based on the Likert scale. The findings reveal that OSHMS implementation in laboratory practices at Politeknik Negeri Madiun falls within the “fairly good” category. However, several weaknesses remain, particularly in the provision of personal protective equipment (PPE), dissemination of safety procedures, and consistency of supervision.

Keywords: *occupational safety, laboratory practice, vocational higher education.*

1. Introduction

Occupational Safety and Health (OSH) is a fundamental aspect of any activity involving the use of equipment, machinery, or hazardous materials. In the industrial sector, the implementation of OSH has become an obligation to ensure productivity while protecting workers from occupational accident risks (Mondy, 2008). The same principle applies in vocational education environments such as Politeknik Negeri Madiun, where laboratory and workshop practices serve as learning activities that simulate real working conditions (Azimah, 2008).

In the context of vocational education, students are not only expected to master theoretical concepts but also to acquire technical skills through hands-on practice in laboratories or workshops. These activities often involve heavy equipment, automotive machinery, electrical circuits, pneumatic systems, and chemical substances. Consequently, the potential for workplace accidents is significant if a proper Occupational Safety and Health Management System (OSHMS) is not implemented (Ishak, 2004).

According to data from the Badan Penyelenggara Jaminan Sosial (BPJS) Ketenagakerjaan—Indonesia’s Social Security Agency for Employment—workplace accidents have shown a significant upward trend, particularly in the industrial sector. In 2011, the number of occupational accidents nearly doubled compared to the previous year, rising from

47,919 to 86,000 cases (Kemenaker, 2012). Although specific data regarding student accidents during practical sessions are limited, various internal reports from universities indicate the occurrence of minor injuries, small-scale fires, and equipment damage caused by non-compliance with safety procedures (Luckyta, 2012).

The Occupational Safety and Health Management System (OSHMS), as stipulated in the Minister of Manpower Regulation No. 05/MEN/1996, provides a systematic approach to achieving occupational safety and health objectives. The OSHMS framework consists of continuous processes of policy formulation, planning, implementation, evaluation, and management review (Kemenaker, 1996).

At Politeknik Negeri Madiun, laboratory and workshop activities are conducted across various departments such as Automotive Engineering, Mechanical Engineering, Electrical Engineering, and others. Each laboratory presents distinct types of hazards — for example, the automotive laboratory poses mechanical injury risks, the electrical laboratory presents electrocution hazards, and the chemical laboratory carries exposure risks to hazardous substances (Nujhani, 2013). Without a structured OSH management system, these learning activities may result in accidents that harm both students and the institution.

The implementation of OSHMS in educational environments not only protects students but also instills discipline and awareness of workplace safety from an early stage. Consequently, graduates of vocational institutions are expected to exhibit industrial-standard work behavior. This aligns with the link and match program of vocational education, which emphasizes students' readiness to enter the professional workforce (Mathis & Jackson, 2002).

However, challenges remain in implementing OSHMS within higher education institutions. Common issues include students' low compliance with the use of personal protective equipment (PPE), limited laboratory facilities, insufficient dissemination of safety procedures, and inadequate supervision by lecturers or laboratory technicians (Azimah, 2008; Sitalaksana, 2006). These conditions reveal a gap between established standard operating procedures (SOPs) and their actual implementation in the field.

This study focuses on assessing the extent of OSHMS implementation in laboratory and workshop activities at Politeknik Negeri Madiun, emphasizing aspects such as institutional commitment, safety planning, implementation, monitoring and evaluation, and management review (Kemenaker, 1996).

The research employs a mixed-method approach, combining quantitative and qualitative data collection through questionnaires, interviews, and observations. Respondents consist of students, supervising lecturers, and laboratory technicians involved in practical sessions. The collected data were analyzed using a scoring method based on the Likert scale (Likert, 1932). The results of this study are expected to provide an objective overview of OSHMS implementation in laboratory practices and serve as a foundation for recommendations to enhance the safety, health, and productivity of the learning environment at Politeknik Negeri Madiun.

2. Literature Review

Occupational Safety and Health

Occupational Safety and Health (OSH) is a fundamental aspect of every activity that involves the use of equipment, machinery, or hazardous materials. In the industrial sector, the implementation of OSH is mandatory to ensure productivity while protecting workers from potential occupational risks and accidents (Mondy, 2008). The same principle applies to vocational education environments such as Politeknik Negeri Madiun, where laboratory and workshop practices function as learning activities that simulate real working conditions (Azimah, 2008).

In vocational education, students are required not only to understand theoretical concepts but also to master technical skills through practical sessions conducted in laboratories or workshops. These activities often involve the use of heavy equipment, automotive machinery, electrical circuits, pneumatic systems, and chemical substances, all of which pose potential hazards if not managed properly (Ishak, 2004).

Based on the above definition, Occupational Safety and Health can be defined as a systematic effort to prevent occupational hazards and accidents by managing working conditions, providing protective equipment, and establishing safety procedures to create a safe and healthy work or learning environment..

Occupational Safety and Health Management System

The Occupational Safety and Health Management System (OSHMS) is a structured and systematic framework designed to ensure the achievement of occupational safety and health objectives within an organization. As regulated in the Minister of Manpower Regulation No. 05/MEN/1996, OSHMS consists of several key components: policy formulation, planning, implementation, evaluation, and management review — all of which must be carried out continuously (Kemenaker, 1996).

At Politeknik Negeri Madiun, OSHMS plays an essential role in ensuring that practical learning activities are conducted safely across various departments such as Automotive Engineering, Mechanical Engineering, and Electrical Engineering. Each laboratory has different potential hazards — for example, mechanical injuries in automotive labs, electrical shocks in electrical labs, and chemical exposure in chemistry labs (Nujhani, 2013).

Based on these definitions, OSHMS can be understood as a comprehensive system that integrates policies, procedures, and responsibilities to manage workplace safety and health risks, ensuring continuous improvement and compliance with safety standards.

Practical Activities

Practical learning, or laboratory practice, refers to a learning process that emphasizes the development of technical skills through direct experience with tools, machinery, and materials under real or simulated industrial conditions. In vocational higher education, practical activities aim to strengthen students' understanding of theory through its application in real work settings (Azimah, 2008).

Such activities often expose students to various risks, including physical injuries, chemical exposure, and electrical hazards. Therefore, safety awareness and the application of OSH principles are critical components of every practical session. A well-managed practical learning environment promotes discipline, responsibility, and safety culture among students, preparing them to meet industrial work standards (Mathis & Jackson, 2002).

Based on the above definition, practical learning can be defined as a skill-oriented educational activity conducted in laboratory or workshop environments that aims to enhance students' technical competencies while fostering awareness of occupational safety and health.

3. Research Methods

This study employed a descriptive quantitative and qualitative approach to analyze the implementation of the Occupational Safety and Health Management System (OSHMS) in laboratory practices at Politeknik Negeri Madiun. The quantitative method used a Likert-scale questionnaire to measure OSHMS implementation levels, while the qualitative method involved direct observation and semi-structured interviews (Sugiyono, 2017). The research involved 90 respondents, consisting of 70 students, 10 supervising lecturers, and 10 laboratory

technicians, selected purposively from high-risk laboratories such as automotive, electrical, and pneumatic-hydraulic workshops.

The questionnaire contained 30 items covering five OSHMS elements: commitment and policy, planning, implementation, evaluation, and management review. Data from the questionnaires and field observations were complemented by interviews exploring constraints such as limited facilities, budget issues, and low PPE compliance (Creswell, 2014). The scoring method was applied to determine implementation levels, categorized according to the Ministry of Manpower standards (Kemenaker, 1996).

Instrument validity was confirmed through expert judgment, and reliability was tested using Cronbach's Alpha, with values above 0.70 considered acceptable (Hair et al., 2010). Conducted between March and April 2025, the research combined quantitative and qualitative data to ensure objective and comprehensive findings. The results are expected to provide constructive recommendations for strengthening the safety culture at Politeknik Negeri Madiun.

4. Results and Discussion

The questionnaire was distributed to 90 respondents, consisting of 70 students, 10 supervising lecturers, and 10 laboratory technicians. Of these, 85 questionnaires were returned with complete data, resulting in a response rate of 94.4%. This number is considered representative as it includes the majority of parties involved in the practical sessions.

The questionnaire comprised 30 items grouped into six categories: (1) Standard Operating Procedures (7 items), (2) Commitment and Policy (5 items), (3) OSH Planning (5 items), (4) OSH Implementation (5 items), (5) OSH Measurement and Evaluation (5 items), and (6) Management Review (3 items).

Based on the results of the distribution of questionnaires that have been carried out by researchers, presented in table 1 which shows the profile description of 85 respondents.

Table 1. Questionnaire Item Distribution

No	Topik	Jumlah Pertanyaan
I	Standar Operasional Prosedures (SOP)	7
II	Commitment and OSH Policy	5
III	OSH Planning	5
IV	OSH Implementation	5
V	OSH Measurement and Evaluation	5
VI	Management Review	3

Based on the data analysis, the overall average score for OSHMS implementation in the practical sessions was 72.14, which falls into the "poor" category, approaching "fair" according to the Ministry of Manpower classification (Kemenaker, 1996). This indicates that although OSHMS has been implemented, there are still aspects that require improvement.

Comparison of SOP and OSHMS Implementation

The questionnaire results regarding Standard Operating Procedures (SOP) indicate that most students are aware of written regulations related to laboratory practices, such as prohibitions against entering laboratories without personal protective equipment (PPE), the obligation to attend safety inductions, and proper equipment usage procedures. However, 28% of respondents reported that SOPs were not fully enforced, particularly concerning the use of safety helmets and gloves in the automotive workshop. Field observations further revealed that despite the availability of SOPs, student compliance remains low. For instance, during pneumatic-hydraulic system practicals, some students did not wear safety goggles while

performing leakage tests. This finding aligns with Luckyta (2012), who noted that the presence of SOPs does not necessarily translate into worker discipline.

Commitment and Policy

Institutional commitment to OSHMS is reflected in the provision of basic PPE (helmets, masks, gloves), installation of safety signage, and the organization of safety briefings at the beginning of each semester. However, these policies are not yet accompanied by a strict sanction system. Questionnaire data show that 64.7% of respondents agree that OSH policies are clearly defined, but only 42.3% perceive their implementation as consistent.

OSH Planning, Implementation, Evaluation, and Review

OSH planning at Politeknik Negeri Madiun includes the development of laboratory SOPs, arrangement of equipment and machinery layout, and maintenance programs. The average planning score of 71.2 suggests that planning exists but remains suboptimal, for example, evacuation routes are not clearly marked in some laboratories. In terms of implementation, the average score was 70.5, indicating that while students are provided with PPE, compliance in its use is low; only 55% consistently wear complete PPE, and lecturer and technician supervision is inconsistent. Evaluation received an average score of 73.6. Routine evaluations, such as departmental meetings and incident reports, are conducted but lack formal audit structures; minor accidents are often recorded without cause analysis or follow-up, resulting in reactive rather than preventive improvements. The review aspect scored an average of 69.8, classified as poor. Only a few departments conduct formal OSHMS evaluations each semester, and 61.2% of respondents reported that recommendations from previous evaluations are rarely implemented.

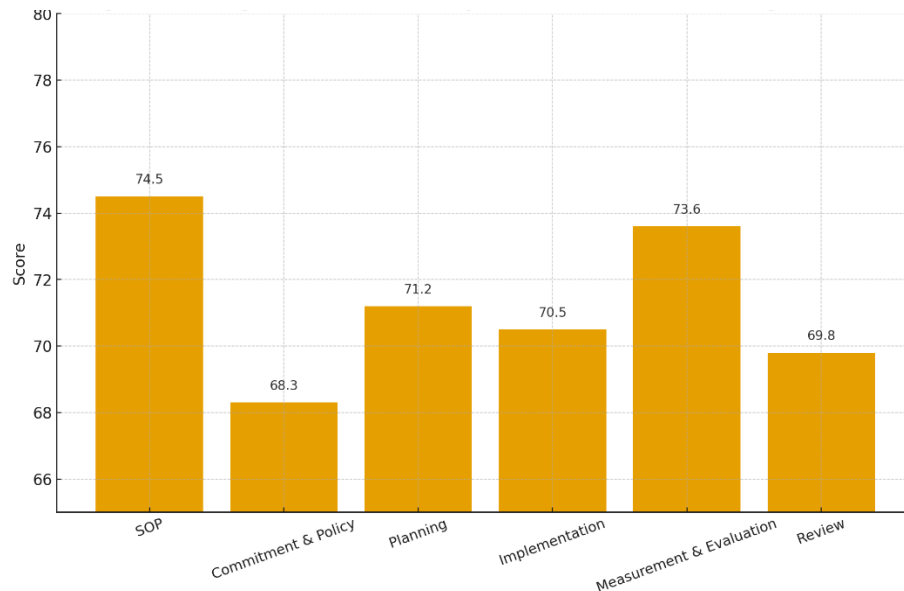


Figure 1. Average Score of OSHMS Implementation at Politeknik Negeri Madiun

The recapitulation results indicate that the SOP aspect is relatively better compared to the other elements, although discipline enforcement still requires strengthening. The weakest aspect is commitment and policy, primarily due to limited socialization and the absence of sanctions for violations.

Overall, these findings are consistent with Nujhani (2013), who reported that OSHMS implementation tends to be weak in the areas of evaluation and management review. The

situation at Politeknik Negeri Madiun exhibits a similar pattern, suggesting that the success of OSHMS largely depends on consistent supervision and the follow-up of evaluation results.

5. Conclusion

Based on the analysis of OSHMS implementation in practical activities at Politeknik Negeri Madiun, it can be concluded that the system has been implemented but is not yet optimal, with an overall average score of 72.14, classified as “poor” by the Ministry of Manpower (Kemenaker, 1996). Among the six OSHMS aspects, Standard Operating Procedures (SOP) scored the highest at 74.5, indicating that safety guidelines are relatively well established, while commitment and policy scored the lowest at 68.3 due to the lack of effective sanctions and reward mechanisms. Planning, implementation, measurement, evaluation, and management review scored between 69 and 73, showing that OSH activities exist but are not consistently or comprehensively applied.

Human factors, particularly student behavior, significantly affect OSHMS effectiveness. Low awareness of PPE usage and frequent neglect of safe work procedures remain major barriers to establishing a safety culture. Overall, OSHMS at Politeknik Negeri Madiun is still in the early stages, requiring strengthened institutional commitment, improved facilities, and stricter supervision.

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