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## EVALUATION OF IMPLEMENTATION OF HEALTH AND SAFETY IN INDUSTRY AND VOCATIONAL SCHOOL IN YOGYAKARTA SPECIAL REGION

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### ABSTRACT

*The objectives of this study were: (1) to describe the application of occupational safety and health (OSH) in the machinery industry in the Yogyakarta area, (2) describe the application of OSH in vocational schools in Yogyakarta and (3) evaluate how the application of OSH in the machinery industry if applied in the implementation of OSH in vocational schools. The research method used is descriptive qualitative research. Research subjects are 3 production machinery industries and 3 Vocational High Schools (VHSs) in the Yogyakarta region namely: PT. Mega Andalan Kalasan, PT. Yogya Presisi Tehnikatama Industri, CV. Karya Hidup Sentosa (Quick), VHSs 2 Depok Sleman, VHSs 2 Yogyakarta, and VHSs Muhammadiyah 3 Yogyakarta. Data collection uses observation and interviews. The results of the study: (1) The machinery and manufacturing industry in the Yogyakarta area has carried out OSH aspects including occupational safety, occupational health, and OSH management in accordance with the OSH application rules for industry; (2) VHSs in the Yogyakarta area have not implemented all aspects of OSH implementation in accordance with industry standards. The application of occupational safety aspects is still lacking, the application of occupational health is still lacking, and management aspects have not been implemented, and (3) VHSs should implement OSH management in accordance with industry standards, especially OSH management, namely: (a) OSH education and training, (b) socialization of OSH in schools, and (c) provision of personal protective equipment, and (d) health services in schools.*

**Key words:** vocational, health and safety, management.

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### 1. INTRODUCTION

Vocational education in mechanical engineering as part of the national education system in Indonesia, played a very strategic role for the realization of a highly skilled workforce and ready to work. To form graduates who are skilled and ready for the work, the students must have competency in the academic field (hard skills), and have a noble character or character values (soft-skills). In vocational education, the course of practice, is a subject which has a very important and strategic position to form graduates

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who are ready to work. Therefore, the course of practice, is a characteristic on vocational education. Thus, for vocational education can actually produce graduates who are ready to work, required to always improve the quality of practice learning process, either in the workshop or in the laboratory. In order to practice learning to be effective, both in providing academic competence and in instilling the values of character, it is necessary to the development and implementation of practice learning model to integrate aspects of hard-skills and soft-skills in the learning process.

The development of vocational school quality in Indonesia is one of the important priorities in national policy. Various steps have been taken by the government and many related parties, both through the development of facilitation and competition-based programs, establishment of academic quality standards and school academic services through accreditation, development of academic quality assurance institutions, improvement of school curricula, improvement of teacher qualifications and competencies, as well as various kinds of things including increased funding from the central and regional governments. However, improving the quality of schools as a prescribed policy is still not satisfying [1].

Vocational education is secondary education that prepares students to work in certain fields [2]. This has become the mission of Vocational High Schools (VHSs) to educate prospective skilled workers according to the area of expertise that exist in the business world or industry. Expertise competencies held in VHSs are aimed at meeting the operator-level workforce or at level II at the Indonesian Qualification Framework (IQF). Based on the Indonesian Qualification framework, vocational students in machining engineering expertise programs are required to have competence in: 1) apply the principles of occupational safety and health in the work environment, 2) implement quality procedures, 3) measure and use measuring instruments, 4) read technical drawings, 5) using hand tools, and 6) working with lathes, milling machines, and grinding machines [3].

Vocational high school as an educational institution to produce workers organizes theoretical learning and practices in accordance with work competency standards by using a competency-based curriculum. The competencies taught include three domains, namely: attitudes, knowledge, and skills. Attitudes in relation to practical learning are work attitudes in accordance with the performance carried out by students in carrying out practical activities in the laboratory/workshop [4]. Work safety is one aspect of attitude in the implementation of learning in the workshop [5]. Knowledge is intended as a theoretical basis for learning practical skills in the workshop. Occupational health and safety have standards regulated by the ministry of labor which should also be implemented in vocational schools. Based on observations at several vocational schools, it appears that the implementation and management of OSH have not been carried out in accordance with the standards.

Learning practices in workshops in vocational high schools can be categorized as having a high level of risk for safety and health for instructors, students, technicians, and the environment. Some potential sources of danger that can threaten practical education in vocational schools include: exposure to radiation, chemical light, biology, infection, allergies, electricity, and physical such as dislocated (musculoskeletal trauma disorder, low back-pain, slipping, falling, scratching, punctured, and hit, depending on the type of practice held. Besides that, it includes various things (situations and conditions) that can cause errors or omissions (near miss, human error) [6].

The work environment contributes to the physical, social and psychological characteristics of a work setting [7]. Additionally, the work environment deals with all features of the strategy and management of the work system and how the system interacts with employees and their places of work [8]. A better work environment or perceptions of a good work environment are related to several organizational performance indicators. For example, work environment is noted as having a very strong influence on organizational outcomes [9]. However, the examination of work environment as a mediator in explaining the relationship between safety training, management commitment to safety and safety performance is, to the best of the researcher's knowledge, unavailable [10].

The rate of workplace accidents in the industrial world in Indonesia shows quite high numbers. One of the main causes of work accidents is the low level of knowledge and awareness of industry players to implement OSH. Based on data from Central Bureau of Statistics of Republic of Indonesia in 2015 the employment status of the population was working with business status (46.79%), wage earners

(38.58%), and family workers (9.83%). They are spread in the formal and informal sectors. According to the International Labor Organization, current global statistics indicate estimate 2.78 million annual fatalities in workplaces due to poor safety systems, management practices, human- error factors and structural inefficiencies. Of the 7,500 people who die daily, 1,000 die from occupational injuries, and 6,500 die from work-related illnesses. For non-fatal occupational injuries, figures suggest that 374 million people are involved annually [11].

The Employment Social Security Agency (SSA) in 2016 recorded that the year the rate of workplace accidents decreased because the companies that implemented the Occupational Health and Safety Management System program had increased from 1,040 companies to 1,762 companies or experienced a 0.47% increase in the year 2016. Based on data from SSA, the number of work accident cases continues to decline. In 2015 there were 110,285 work accidents, while in 2016 there were 105,182 cases, which decreased by 4.6%. While until August 2017 there were 80,392 cases [12]. Until now there is no accurate data on the occurrence of work accidents in vocational schools throughout Indonesia. Thus the application of OSH in Vocational Schools can be presumed to have not used proper OSH management in accordance with the applicable laws and regulations.

Vocational School organizes learning in the form of theory and practicum. Theoretical learning is carried out in class, and practical learning is carried out in the laboratory or workshop. Learning in the workshop involves the operation of tools and machines that demand the application of OSH. Based on observations in workshops learning machining practices in vocational schools in Yogyakarta Special Region most of them have not applied OSH in accordance with the principles of OSH implementation in the industry. At the workshop in school, there is no visible OSH management, complete PPE and prevention of work accidents, as well as OSH signs. The implementation of OSH in schools will be successful if it starts from improving the management of OSH and the application of standards that are used as guidelines in implementing OSH management systems. Wachter and Yorio [13] examined "A system of safety management practices and workers' involvement: empirical and theoretical investigation", how to prevent work accidents through the involvement of workers. The results showed a significant negative relationship between the presence of workers and individual safety management practices, and there was a significant negative relationship between workers and emotional safety and cognitive involvement with the accident rate. Thus, when organizations invest in a safety management system approach to reduce or prevent accidents and improve safety performance by using a human-based safety management system designed to promote and increase employee involvement. Nielsen (2013) examines "Improving safety culture for the health and safety organization: A case study" in this study discusses the involvement of Health Safety Organizations (HSO) and Health Safety Committees (HSC) in improving the company's safety culture by creating more better interactions related to safety. The results show that this study provides evidence that HSO can improve the company's safety culture by focusing on safety-related interactions [9].

Nordlof, et.al. [14] discusses the relationship between Occupational Health and Safety Management (OHSM) in protecting human health and safety while working properly or not, this is based on factors related to the practice of OHSM in the company such as company size, safety culture, and the company's financial performance. The purpose of this research is to find out whether these factors are related to the performance of OHSM practices in the company. The results of this study indicate that firm size, safety culture, and creditworthiness found that these factors are related to the practice of OHSM in the company, the good or bad practice of OHSM in the company is determined by the management of the OHSM system in each company.

Based on result research "Behavior-based intervention for occupational safety-case study" explained that the concept of safety behavior is used as an alternative to the implementation of OHS management in the industry. Behavior-based approach to industrial safety management is very effective to improve safety performance in different industries and different continents, in this paper BBS is implemented in business in Poland and BBS practices are going well [15].

Based on the above gaps it can be suspected that there is a discrepancy in the application of OHS in the industry to OHS regulations which can be seen that there are still high occupational accidents. Thus it is necessary to describe the implementation of OSH in the industry and look for aspects that excel in its application. Learning in Vocational Schools, especially practical learning must apply OSH principles

in accordance with the regulations that have been applied in the industry. At present, it is suspected that the application of OSH in Vocational Schools is still not going well, so a description of the implementation of OSH aspects in the vocational learning process is needed. Based on the application of occupational safety and health in industry, best practice data from industry is needed that can be applied in vocational schools in order to improve practical learning in vocational schools.

## 2. METHOD

This research method is a qualitative descriptive study. Descriptions include the application of occupational safety and health in industry, application of occupational safety and health at vocational schools, and comparison of the application of occupational safety and health in the industry and vocational schools. A further description is carried out by analyzing the application of OSH from several aspects of OSH that have been running in the industry to be applied in VHSs.

This research was conducted on 3 production machinery industries and VHSs in the Yogyakarta region namely: PT. Mega Andalan Kalasan, PT. Yogya Presisi Teknik Katama Industri, CV. Karya Hidup Sentosa (Quick), VHSs 2 Depok Sleman, VHSs 2 Yogyakarta, and VHSS Muhammadiyah 3 Yogyakarta.

Data collection is done through observation, interviews, and questionnaires. Data analysis used qualitative descriptive analysis.

## 3. RESULT AND DISCUSSION

The research data obtained includes three parts, namely: safety, health, and OSH management system. The sample taken in this study consisted of 20 employees of companies engaged in machining and manufacturing in the Yogyakarta area, and 35 teachers in 3 Vocational High Schools (VHSs) in the Yogyakarta area. Data on OSH implementation research is divided into two, namely: data on the application of OHS in the industry and data on the application of OHS in Vocational Schools. The description of each variable based on the results of questionnaires on 20 employees in the industry and 35 teachers in 3 VHSs, can be seen in the following description.

### 3.1. OHS Implementation in the Industry

In general, the existing OHS program in the company covers several main aspects, namely health and safety rules, awareness of rules, protective clothing, clean floors, light in the production area, work environment, firefighting equipment, first aid and medical services, sufficient number of toilets, bathroom cleanliness, programs, directions, clean drinking water, health and safety committees, emergency procedures and health and safety promotion. But in this study, the focus of the application of OSH in the manufacturing industry in the Yogyakarta region is divided into 3 aspects, namely, aspects of safety, health, and OSH management system.

Based on the results of observations and interviews on the application of occupational safety and health in the manufacturing industry in the Yogyakarta area in terms of aspects of occupational safety include: (1) suitability of buildings, structuring of equipment and machinery according to applicable standards; (2) the use of work equipment and operation of machinery has been carried out in accordance with the Operational Standard Applicable Procedures in the company; (3) the availability of personal protective equipment in accordance with needs such as, safety helmets, safety shoes, ear plugs, work glove, chemical respirator, dust mask, PVC glove, welding glove, welding mask, safety glasses and work clothes; (4) the availability of equipment and the contents of first aid boxes in accordance with the Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia in 2008 concerning first aid in the workplace; (5) hydrant is available according to the needs in each workroom, and (6) sanitation in the work environment is well proven by maintaining the cleanliness of the surrounding environment and water quality as well as the existence of a reservoir waste of production [16]. The implementation of OSH in the industry has been going well, but there are some deficiencies in the implementation of OSH in the industry, especially in terms of safety including management and utilization of waste production, and have not installed alarms and emergency shower fire detection in each room.

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The implementation of occupational health and safety from occupational health aspects based on observations and interviews includes: (1) cleanliness of the work environment in good condition, (2) noise at a stable level, (3) availability of air conditioning/ fans in each workroom, (4) completeness the lights in each workroom, as well as the hallway in accordance with the applicable regulations, (5) a clean culture in the workplace has been carried out such as cleanliness of the floor and hallways, storage/warehouse, hand washing, and toilet, availability of waste disposal, (6) employee health insurance in collaboration with BPJS Employment, and (7) there is leadership support and good communication with workers. Based on observations in the industry, the implementation of occupational health and safety began with health maintenance running well but there were several opinions and stated that the implementation of occupational health had not run optimally because in practice there were still many obstacles to be faced, for example, the management of hazardous and toxic waste materials had not gone well and labeling is also not well coordinated.

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The implementation of the occupational safety and health management system (OSHMS) in the manufacturing industry in the Yogyakarta area based on observations and interviews obtained several findings which indicate that management has gone well. In general, the implementation of SMOSH in the industry is in accordance with the regulation of the minister of Manpower of the Republic of Indonesia in 1996 concerning the basic principles of OHS management system which consists of 5 parts carried out continuously, namely: (1) commitment/ policy, (2) OSH planning, (3) implementation, (4) measurement / evaluation, and (5) review and improvement. Apart from these 5 aspects, there are some new findings that affect the implementation of the OSH management system in the industry, which refers to Law No. 1 of 1970, Section VIII Article 12 concerning the determination of reward and punishment has not been implemented optimally because there is still a lack of supervision from the institutions/institutions in charge handle OSH fields and lack OSH experts [17].

### 3.2. OSH Implementation in Vocational High Schools

The implementation of OSH in Vocational Schools has not been implemented and coordinated between school management, teachers, technicians, and students. Based on observations and interviews with the head of the workshop and the teacher, data was obtained that the implementation of OSH in schools was planned and implemented by each subject matter taught in accordance with the rules in each workshop. The quality of teacher performance in planning and implementing OSH in schools is a benchmark in the application of OSH.

Based on the findings and direct observation of the machining workshop, the application of OSH in Vocational Schools in terms of safety: (1) the condition of the workshop/laboratory building in the Vocational High School is largely not in accordance with the Regulation of Minister of National Education No. 40 of 2008 concerning the standard of facilities and infrastructure of vocational school, and (2) maintenance of the machine is carried out periodically by cleaning the machine every month and lubrication is carried out every 6 months, and overhauling is carried out every 1 year [18]. The implementation of OSH in machining workshops is not yet in accordance with the standards applied by the industry, there are many shortcomings in the implementation of OSH in Vocational Schools, namely: the condition of the machine used for 50% practicum under unfit conditions such as damage to the coolant, automatic mechanism, and lighting on the machine. Damage to the machine is due to the age of the engine that is old and the maintenance is not optimal.

The implementation of OSH in vocational machining workshops from health aspects includes: (1) availability of School Health Units (SHU), and (2) lighting, ventilation, and air circulation system functioning properly. There are still many shortcomings in occupational health in vocational schools, namely: (1) cleanliness of workshops, hand washing, and toilets, (2) staining on the walls of workshops, (3) providing disposal sites for production waste, and (4) completeness of fans or blowers in the workshop. Some of the short comings that caused the condition of the workshop did not support the implementation of OSH and were less comfortable for the implementation of practical learning.

The application of occupational safety and health management systems in vocational schools, based on direct observations made it appears that the application has not been implemented in the vocational workshop. The work program for the dissemination of OSH programs to teachers, employees, and students by the school management has not been implemented and coordinated properly. Based on

aspects of OSH management, there are some employees and teachers who already know the program, but the application does not yet exist because of limited communication between teachers, employees, students and school management in formulating OSH programs. Based on the data above, it can be concluded that the application of OSH in schools has not been carried out in accordance with the standards of OSH implementation in the industry.

### 3.3. Comparison of OSH Implementation in Industry with Vocational Schools

The implementation of OHS in the industry and in vocational high schools is different, especially in terms of facilities and infrastructure. Referring to Minister of National Education Regulation No. 40 of 2008, the workshop is said to be feasible if there is a complete Personal Protective Equipment (PPE) and meets the ratio of the number of students, but in the school workshop, there is not enough PPE available. The industry applies OSH consequently so that PPE that is owned is in accordance with the number of workers, even a number of reserve APDs are still provided by a number of employees who work in their respective divisions.

Minister of Manpower and Transmigration Regulation of the Republic of Indonesia No. PER.15/Men/VIII/2008 Article 1, states that first aid in workplace accidents is an attempt to provide first aid to workers/employees / other people who are at work, who experience pain or injury at work. The first aid box condition in the industry is very complete because the danger posed has a high risk. Conditions that occur in vocational equipment and the contents of first aid boxes are incomplete and only a few items of drugs and medicinal plaster are provided. Therefore, the application of OSH from health aspects in Vocational Schools needs to be improved in the provision of OSH supporting facilities and infrastructure in the workshop.

The application of the occupational safety and health management system refers to the Regulation of the Minister of Public Works Number. 09/Per/M/2008 explains that SMOSH is part of the overall management system which includes organizational structure, planning, responsibility, implementation of procedures, processes, and resources needed for the development, implementation, achievement, assessment, and maintenance of OSH policies in order risk control related to work in order to create a safe, efficient and productive workplace. The implementation of OSH in the industry has implemented SMOSH in accordance with the applicable regulations, but the implementation in VHS is not planned and there is no implementation. Based on data from the Ministry of Education and Culture the implementation of OSH management was only applied to 60 State VHSs in the Jakarta, Bogor, Depok, Tangerang and Bekasi areas. Therefore, to implement industry-based SMOSH in Vocational Schools, the SMKs should carry out the preparation of an industry-based learning curriculum, thus the VHSs will be able to apply industrial-based OSH culture.

### 3.4. Alternative OSH Programs That Can Be Applied By Vocational High Schools

Based on the questionnaire filled by the industry and the school, important aspects can be identified that are applied in the industry but not yet implemented in schools. The things that have not been implemented in Vocational Schools are as follows.

Aspects of work safety:

- Availability of fewer machines/engine sufficiency
- Novelty machines used
- Availability of spare parts for each engine for maintenance
- Traffic signs in the lab/workshop information board about the use of
- Personal Protective Equipment
- Emergency button in the lab/workshop
- Temperature sensors, air pressure, humidity
- Alarm
- Checking fire extinguishers
- Checking combustible material
- Carrying out simulations to prevent, reduce and extinguish fires

- The SOP of fire hazard
- Control of chimney pipes, pipelines, exits, stairs, and OSH signs
- Building and sanitation protection.

Occupational health aspects:

- The convenience of the lab/workshop
- Ventilation and temperature
- Number of lights
- Setup Layout
- Health examination
- Handling of hazardous materials.

OSH management aspects:

- OHS procedure
- Implementation of OSH Regulation
- OHS Supervision
- Providing OSH Training
- Rewards and sanctions
- Evaluation of OHS programs.

Based on several aspects of occupational safety and health that have not been studied in vocational schools, it can be proposed an alternative application of occupational safety and health in vocational schools based on the application of occupational safety and health in the industry as follows.

#### **3.4.1. Industrial-Standard OSH Education and Training**

OSH education and training for teachers and employees in vocational schools is intended so that teachers and employees understand the role of the OSH program in working and in the learning process. The results of education and training are used as provisions for the implementation of the OSH program in the lab workshops and school laboratories. Thus, it can minimize the risk of accidents related to the machines used in the learning process and can increase the productivity of teachers, employees, and students. Recommendations that can be given are that the vocational school organizes OSH training for teachers and employees or collaborates with companies engage in machining manufacturing to foster vocational schools in applying the OSH culture.

#### **3.4.2. Socialization of OSH in School**

The socialization conducted by the school management to teachers, employees, and students does not yet exist. Many teachers, employees, and students who do not know and understand about OSH, so that in practice learning is often ignored by students. This happens for example not using Personal Protective Equipment when practicing (glasses, practice clothes). Recommendations that can be given are that the school management participates in the formulation and preparation of productive learning activities, with the aim that the school management can contribute to the planning, implementation, supervision, and evaluation of OSH implementation in learning in the workshop.

#### **3.4.3. Provision of Personal Protective Equipment**

The availability and completeness of PPE is a measure of the application of industry- based OSH in schools. The school should provide PPE for a number of students who carry out the practice in the workshop plus the reserve of a number of these students. Poor or damaged PPE is repaired or replaced. Supervision of the use of PPE and monitoring of PPE conditions is very important to be done to minimize work accidents.

#### **3.4.4. Health Services at School**

Health services in schools are still relatively common, such as the availability of School Health Unit (SHU) and first aid boxes. SHU in schools are not in accordance with the needs of OSH implementation in the workshop. First aid in accidents should be supported by services near the workshop so that in the event of a work accident, it can be handled immediately. The recommendations that can be given are that the vocational school must provide health clinics and doctors as well as health insurance to teachers, employees, and students so that all school residents are guaranteed health and school residents do not



need to worry if there are accidents that occur during the practicum because they are directly handled by the authorities.

#### 4. CONCLUSIONS

Based on the results of quantitative and qualitative data analysis it can be concluded that:

- The machinery and manufacturing industry in the Yogyakarta area has carried out OSH aspects including occupational safety, occupational health, and OSH management in accordance with the OSH application rules for the industry.
- Vocational high schools in the Yogyakarta area have not carried out all aspects of the application of OSH in accordance with industry standards.
- The application of occupational safety aspects is still lacking, and aspects of management have not been implemented.
- SMKs should apply OSH management in accordance with industry standards, especially OSH management, namely: (a) OSH education and training, (b) socialization of OSH in schools, and (c) provision of personal protective equipment, and (d) school health services.

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