

Occupational Health and Safety Management System in The Automotive and Shoe Industry

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ABSTRACT

This study aims to evaluate the application of an Indonesian abbreviation referring to the Occupational Health and Safety Management System at PT. Adyawinsa Stamping Industry (ASI) and PT Primarindo Asia Infrastructure Bandung (PAI), located in West Java, find a safe, comfortable, and conducive workplace for employees. This research focuses on the evaluation stages of OHSM implementation. The evaluation is done by measuring the work situation and improving the work system. The work system measurement uses the Failure Mode and Effect Analysis (FMEA) method, and the work improvement system uses the Participatory Ergonomics (PE) method. The measurement results using FMEA in the automotive industry resulted in 16 risks of work accidents (2 risks in the medium-risk category, 11 risks in the low-risk category, and three risks in the very low-risk category). The results of improvements using PE are training activities held once every three months, redesigning and installing warning signs, and designing a punishment system. Meanwhile, in the shoe industry, ten risks of work accidents were obtained. The results of the improvements are the application of policies concerning the use of masks and long sleeves, the addition of sanitation points and exhaust fans, the addition of instructions, and the appointment of a person in charge of the health protocol.

Ketwords: OHSM, implementation, FMEA, PE, regulation

1. INTRODUCTION

The policy of limiting activities in public places affects all service and manufacturing industries. When they carry out their operations, they must be well prepared, like the automotive and shoe industries. The production department in both industries requires workers to work directly in the field. This risks these workers' occupational safety and health (hereinafter as OSH). The company must be able to protect its workers by the rights of workers stated in Law Number 1 of 1970 concerning Work Safety. In implementing OSH in the work environment, companies must also implement an OSH Management System (hereinafter referred to as MSOSH). In PP No.50 of 2012 concerning MSOSH, if the company employs more than 100 employees, then the application of MSOSH is mandatory, as stated in Article 5 paragraph 1 of Government Regulation No. 50 of 2012. MSOSH is an activity that ensures and protects the safety and health of workers through efforts to prevent work accidents and occupational diseases. Applying OSH, the application of MSOSH becomes an integral part of the process. MSOSH is a powerful tool to realize a safe, comfortable, conducive, and productive work system for companies to improve performance continuation (ILO, 2020). The

implementation of MSOSH has a positive impact on the company, including increasing worker productivity (Ayu *et al.*, 2019) and avoiding cost losses caused by accidents and occupational diseases, which amount to an estimated 3.94% of the world's gross domestic product or equivalent to \$2.99 trillion (WHO, 2021).

Given the risks faced by workers in the automotive and shoe industries, this study will examine the implementation of MSOSH following PP No.50 of 2012 in two companies that have collaborated with researchers, namely PT. Adyawinsa Stamping Industry is engaged in the automotive industry and PT. Primarindo Asia Infrastructure Tbk is involved in the shoe industry.

This paper focuses on the first stage, namely assessing potential hazards and efforts to control existing risks, with the following stages:

1. Identify potential hazards using FMEA. FMEA is a comprehensive method of mapping the types of hazards, analysis, and proposed improvements in detail so that the results of the upgrades can realize safe, comfortable, and conducive working conditions (Goetsch, 2017). In this stage, assess the risk of accidents and occupational diseases in selected departments and workstations. The risk assessment is carried out with the company and workers to obtain comprehensive assessment results. The assessment results are then sorted from the highest value to the lowest. For the next stage, choosing a workstation with a high-risk level will be improved using the Participatory Ergonomics (PE) Method.
2. Make improvements using the Participatory Ergonomics Method. Currently, the PE method is a method that can provide the best work system improvement because the improvement involves operators, management, and ergonomics using adequate facilities and infrastructure. The improvement results will undoubtedly be as expected for each work activity (Sukapto *et al.*, 2019).
3. Implementation of improvement results. The implementation process of the design results is carried out with profound observation by management and ergonomic experts. 3-month monitoring of design implementation and results The monitoring is then evaluated jointly by the operator, management, and ergonomics experts. If the results are as expected, the tool is used continuously. Meanwhile, if it is not following expectations, further improvements are made using the PE Method.

2. METHODS

Better implementation of OSH with other companies and sectors; 3. review of causal causes of harmful events; 4. compensation and impairment and the results of previous assessments relating to safety; and 5. evaluation of the efficiency and effectiveness of the resources provided

Where in the research stage will be carried out based on Article 6, paragraph 1 PP No. 50 of 2012. The article also contains guidelines for implementing MSOSH, including a. determination of OSH policies; b. OSH planning; c. implementation of OSH plan; d. monitoring and evaluation of OSH performance; and e. review and improvement of MSOSH performance.

Based on Article 6, paragraph 1 of PP No. 50 of 2012, the application of MOSH includes: 1. identification of potential hazards, risk assessment, and control; 2. A better comparison of OSH implementation with other companies and sectors; 3. review of causal causes of harmful events; 4. compensation and impairment and the results of previous assessments relating to safety; and 5. evaluation of the efficiency and effectiveness of the resources provided

3. RESULTS AND DISCUSSION

3.1. Application of PP No. 50 of 2012 concerning MSOSH in the Automotive Industry

PT. Adyawinsa Stamping Industries or PT. ASI is one of the manufacturers of four-wheeled vehicle components and spare parts. The company experienced a decrease in revenue of up to 90%. However, it is known that there is an increase in demand that requires companies to carry out production activities.

The department that has a high risk is the Stamping Department of the Production Division. It takes two to five people at once to operate one machine. In addition, unsafe behaviour is carried out by machine operators, including the use of incomplete PPE and putting items out of place. It is known that there is a relationship between unsafe actions in general the use of incomplete PPE and the occurrence of work accidents.

Based on preliminary research, it is known that the company made adjustments to OSH policies to deal with the pandemic period, including the implementation of health protocols, work-from-home (WFH) policies for office workers, elimination of overtime hours, tracing and monitoring of worker conditions. The policy is evaluated regularly and will be adjusted to the latest conditions of the company. The adjustment steps taken by the company are a form of application of Article 6 paragraph 1E PP No.50 of 2012, namely the review and improvement of MSOSH performance.

When viewed from the OSH side, it is known that the OSH policy applied to the Stamping Department and other departments in the Production Division is well-socialized by the company. This action is a form of application of Article 8 PP No.50 of 2012. Some of these policies include the provision of special routes for worker mobilization, personal protective equipment (PPE) and Standard Operational Process (SOP), checking machine conditions, measuring environmental conditions, supervision by safety officers and production line leaders when production activities are carried out.

The implementation of MSOSH by the company, in general, can be said to be good and by several articles in PP No. 50 of 2012. However, there are still positive cases of COVID-19 in the company environment. In addition, it is known that the company has not resumed the risk assessment program, which will hinder the review and improvement of OSH performance and indirectly hinder the progress of MSOSH performance. Then the research will focus on the risk assessment of accidents and occupational diseases.

3.2. Risk Analysis of Accidents and Occupational Diseases in the Stamping Department of the Automotive Industry

Risk analysis of accidents and occupational diseases begins with identifying potential hazards or risks in PT. Breast milk uses the FMEA method. There are several stages carried out. The following are the stages.

1. Identify Risk, Impact, Frequency, and Control System. Determination of risk, impact, frequency, and control system the determination is made based on direct observations of the operators' performance and the results of discussions with safety officers, heads of sections of the Human Resources and General Affairs (HRGA) Division, hereinafter referred to as the company, to get a comprehensive picture of conditions in the field.
2. Analyse the Severity, Probability of occurrence, and Control System or Detection of the Impact caused by the risk of accidents and occupational diseases by providing values of 1 to 10. Values are assigned to all three components for each of the identified risks.
3. Calculate the Risk Priority Number (RPN). The RPN value indicates the rank or level of the risk studied, where the risk with the highest RPN will be used as a priority for improvement. The calculation is done by multiplying the severity (Severity), probability of occurrence of events (Probability), and detection (Detection). Generally, the RPN value obtained will be grouped into risk categories to determine the risk's urgency level. The risk

categories used in this study are divided into several categories. The division of categories is carried out based on the results of the calculation of the RPN value. Among them are RPN values between 50 to 100, categorized as low; between 100 to 200, categorized as medium; and greater than 200, categorized as high. The results of RPN calculations in the automotive industry for 16 work activities are classified as medium. Table 1 shows the risks that fall into the medium category.

Table 1. Risk Priority

No	Activity	Failure Mode	Impact	Cause	Control System
1	Inserting sheet metal or material handling into the machine	Injured when materials	Scratched material or part	Low level of operator awareness or awareness regarding environmental safety	Socialization of SOPs regularly before carrying out the stamping machine operation process
2	Inserting sheet metal or material handling into the machine	Injured when materials	Scratched material or part	The PPE used is incomplete or does not follow the provisions	Inspections are carried out by each stamping workstation line leader

A fishbone diagram is used to determine each failure mode's root cause. This diagram is used to help identify all the causes and effects of a system or process running out of control.

Figure 1 is a fishbone diagram for selected risks.

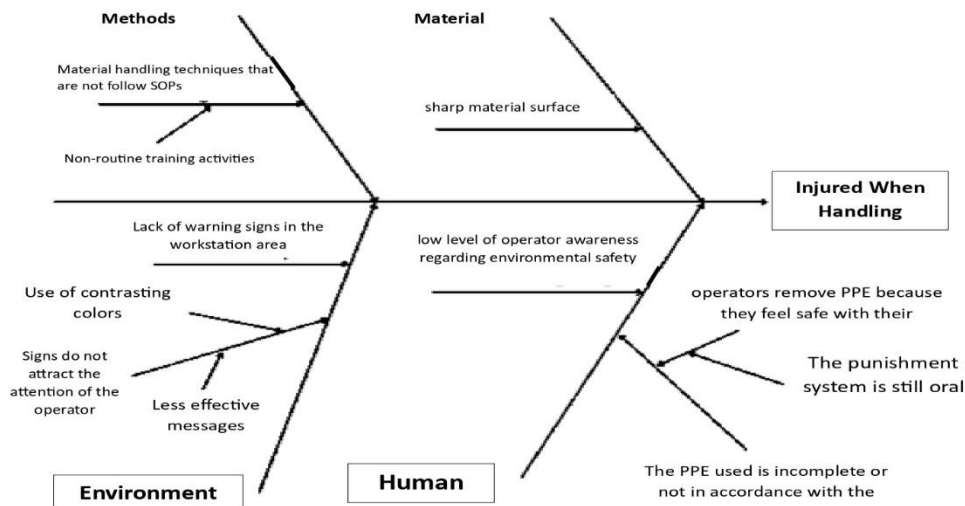


Figure 1. Fishbone Diagram of Causes of Risk of Accidents and Occupational Diseases.

Fishbone diagrams analyze the causes of the risk of work accidents and injuries when handling materials. Based on the results of discussions with the company, it is known that four factors cause work accidents and injuries when handling materials, including methods, materials, environment, and humans and their root causes.

3.3. Design of Proposed Improvements Using Participatory Ergonomics (PE)

Improvements to the root of the problem are carried out using the PE method, where the repair design process involves operators, ergonomicians, and company management. The three parties have continuous discussions to get a concept of improvement that is fit for the company. With this method, improvement is produced through agreements with all three parties. It can be a joint commitment and implemented consistently so that it eventually becomes a corporate culture. Further work system improvements can use the PE method to create a safe, comfortable, and conducive workplace for the company (Sukapto & Sumanta, 2019; Syam, 2017).

Several improvement proposals were obtained based on the PE method, which was formed according to the problem's root and the Stamping Department's current condition. Table 2 is a summary of the proposed improvements.

Table 2. Summary of Proposed Improvements to the Automotive Industry

No	The Root of the Problem	Proposed Improvements
1	Non-routine training activities	Schedule training activities regularly every three months
2	Lack of warning signs in the workstation area	
3	The use of signs that lack contrast and messages is less effective.	Redesign and install warning signs
4	Low level of operator awareness or awareness regarding environmental safety	Redesign and install warning signs.
5	The punishment system is still in oral form	Design a punishment system in writing

3.4. Application of PP No.50 of 2012 concerning MSOSH in the Shoe Industry

During the pandemic, PT. Primarindo Asia Infrastructure or PT. PAI experienced a decrease in profits, reaching 54.89% compared to the previous year. In addition, PT PAI does not have MSOSH guidelines on floor production and does not have a special division in charge of occupational safety and health management, so the Human Resources and General Affairs Division bears all accidents or occupational diseases. Based on an interview with the head of HRD PT. PAI, it is known that there is a desire from PT. PAI to implement SMK3 in the company as P2K3 (Occupational Safety and Health Development Committee). If reviewed based on PP No.50 of 2012, then PT. PAI still needs to comply with Article 5, Paragraphs 1 and 2. Article 5 Paragraph 2 requires companies to apply MSOSH to companies that meet one or two criteria, namely (1) companies that employ more than 100 workers and (2) have a high level of potential danger Most of the production processes still use manual methods. Then it can be said that the production department of PT. PAI has a high level of potential hazard. This can be the basis for research to develop an MSOSH concept design that can apply to the production floor of PT. PAI. The design of the MSOSH concept in the production division is expected to minimize the OSH risks faced by employees and company management.

The design of the MSOSH concept will use the method contained in PP No.50 of 2012. The results of the MSOSH design are proposed to the workplace, especially the production division.

3.5. Risk Analysis of Occupational Accidents and Diseases in the Production Department of the Shoe Industry

Risk analysis in the shoe industry uses the same method as case studies in the automotive industry, namely the FMEA method. Thus, this subchapter will present a summary of the collection and processing of data carried out in six departments at PT. PAI.

1. Laminating Department

The modes of failure or risk of accidents and occupational diseases specified in the Laminating Department are cutting the operator's finger, respiratory distress, skin irritation of the operator. The potential causes of work accidents are each operator's negligence in using scissors / cutters when cleaning laminating machines from hardened textile glue, smelling the pungent smell produced by textile glue, spilled textile glue. To detect work accidents, the company generally receives a report from the operator when a work accident occurs and then takes the operator to the nearest Community Health Center for further examination. This causes the detection method in the department to be a health check on operators by health workers.

2. Cutting Department

The risk of work accidents identified in the Cutting Department is the pinching of workers' hands by cutting machines and operators at work. The potential causes of this mode of failure are operator negligence when using the cutting machine and there are people infected in the cutting department. The detection method carried out in the cutting department is to report work accidents to the company and then be transferred to the nearest health centre, so that in FMEA the detection method is a health examination by health workers.

3. Printing Department

The risks of work accidents that can be identified in the Printing Department are scratches, cuts on the operator, respiratory problems and skin irritation on the operator. This is because in the printing department, the operator works in the bending trajectory traversed by the heating machine that runs automatically. Operator negligence when applying the color of the shoe upper on the bounce track can cause scratches/cuts or other physical injuries to the operator due to heating machines moving on the track. Then respiratory distress and skin irritation can be induced by textile dyes and adhesives that have a pungent Odor and cause the operator to inhale the Odor for a long time. Meanwhile. The detection method contained in the department is to report work accidents to the company and then refer to the relevant health workers.

4. Sewing Department

In the Sewing Department, the risks of work accidents determined are scratches, cuts, punctures, respiratory problems and skin irritation. This is because in the sewing department, the operator carries out the sewing process using a sewing machine, and there are other processes that use saving machines. The use of this machine results in many work accidents in operators, especially cuts and needle punctures due to not focusing when using related machines. A potential cause of respiratory distress and skin irritation is the operator inhaling the pungent smell of textile glue for a long time. The detection method carried out in this department is to report work accidents to the company to be referred to the nearest health center.

5. Stock Fitting Department

In the Stock Fitting Department, the identified risks of occupational accidents and diseases are scratches, cuts, minor burns, respiratory problems skin irritations. This is identified

because in the stock fitting department, there is an outsole roughing process, sticker installation on the outsole using a heating machine, the application of textile glue and primary solution on the surface of the outsole, and the large number of operators. Negligence Operators in each process can cause work accidents. The detection method is to report work accidents and then take them to the relevant health workers.

6. Assembly Department

The failure modes determined in the Assembly Department are scratches, cuts, pinches, skin irritation on the operator. This is because in the assembly department, operators use equipment such as pliers, scissors, presses, textile glue, and primary solutions. There is a risk for work accidents in each process, such as negligence when using a press machine, or errors when using pliers or scissors and not using gloves when applying textile glue / primary solution. The detection method is the same as that of other departments, where work accidents are reported to the company and then referred to the nearest Community Health Centre for examination.

3.6. Risk Analysis of Occupational Accidents and Diseases in the Production Department of the Shoe Industry

Based on the results of the assessment and calculation of the risk priority number or RPN that has been calculated, the Department of Printing, Laminating, and Stock Fitting is the priority of the department, which will be given improvements in the form of the MSOSH concept design. **Table 3** is a summary of the proposed improvements.

Table 3: Summary of Proposed Improvements to the Shoe Industry

No	Problems	Proposed improvements
1	Masks that are not used by all machine operators due to hot air	Requiring masks in departments
2	Masks that are not used by all machine operators due to hot air	Provision of Exhaust Fan in the Printing Department
3	The hand sanitization point is only at the entrance/exit of the Printing Department.	Addition of hand sanitization points
4	Efforts to control the risk of OSH	Appoint the person in charge to supervise the implementation of health protocols by operators in the Printing and Laminating Department
5		Wearing clothing that covers the operator's entire hand area
6		Giving instructions, either directly or posters, regarding the position of body posture when lifting goods to the operator of the Laminating Department

Applying Article 6 Paragraph 3 of PP No.50 of 2012 in these two companies is a review of harmful causes and effects to workers. Both companies strive to improve existing work systems so all workers can carry out activities safely, comfortably, and conductively. Necessary steps taken to improve the work system are:

1. Conduct regular training activities every three months.

This proposal is based on irregular and infrequent training activities for old operators, about once every four to six months. According to senior operators, training activities are also needed for old operators aimed at improving the ability of operators to do their jobs to increase the productivity of the Stamping Department. After the discussion, it was proposed that training activities for old operators would be held every three months. The training activities include OSH, material handling techniques, and machine operation. Training activities will be carried out in stages for all operators in the Stamping Department. However, the schedule of training activities cannot be prepared. This is because further considerations are needed from the financial side, the timing of the implementation, and other considerations.

2. Redesign and install warning signs.

The redesign and installation of warning signs in the Stamping Department were carried out to overcome several root problems, including the need for warning signs in the work area, using less contrast sign colours, and ineffective messages. In addition, this sign is also used to help increase operator awareness regarding environmental safety.

3. Compliance with the application of Article 5 Paragraph 1 of PP No. 50 of 2012

Concerning Companies Implementing MOSH for Workers of at least 100 people.

4. In this article, both companies have more significant employees than 100 people, so having a particular unit responsible for managing MSOSH is mandatory. The duties of MSOSH for the two companies are a. ensuring that they have policies on MSOSH; b. make plans for all sections about MSOSH; c. implement the MSOSH plan made; d. monitoring and evaluation of MSOSH performance periodically, namely every 6 months.

5. Application of Article 7 Paragraph 1 of PP No. 50 of 2012 concerning Identification of Potential Hazards, Risk Assessment and Control.

In this study, efforts have been made to reduce the level of risk using the FMEA Method. The results of improvements that need to be made to the automotive industry are as follows: a. Scheduling training activities regularly for every three months; b. Redesign and install warning signs; and c. Design a punishment system in writing. While in the shoe industry is a. Require the use of masks in departments; b. Provision of Exhaust Fan in the Printing Department; c. Addition of hand sanitization points; d. Appoint the person in charge to supervise the implementation of health protocols by operators in the Printing and Laminating Department; e. Wearing clothing that covers the operator's entire hand area; f. Instruction provisions either directly or posters regarding the position of body posture for lifting goods to the operator of the Laminating Department.

6. The application of Article 2 point c PP No. 50 of 2012 concerning the purpose of SMK3 is to create a safe, comfortable, and efficient workplace to encourage productivity.

These two companies consistently make work situations safe, comfortable, and conducive for everyone. The leadership and all employees of the company continuously plan the steps that need to be done to find solutions; conduct trials to measure whether the results are as planned or not; check to find out errors in the second stage that had been done; and if there are deficiencies or errors, then it can make repairs according to the needs of each unit.

4. CONCLUSION

Based on research and observations in the automotive and shoe industry, it has thoughtfully implemented PP No.50 of 2012 in Article 6 (1). The application form is the establishment of OSH policy, OSH planning, implementation of the OSH plan, monitoring and evaluation of OSH performance, and the review and improvement of MSOSH performance has been done well. The efforts made in improving the work system are consistently and continuously making improvements so that they can make various improvements and can realize a safe, comfortable and conducive working environment.

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6. AUTHORS' NOTE

The author does not have a conflict of interest, and the authors confirmed that the paper was free of plagiarism

7. REFERENCES

- Apriyan, J. (2017). Risk Analysis of Work Accidents in Building Projects with the FMEA Method, *Journal of Muara Science, Technology, Medicine and Health Sciences*, 1(1),115-123.
- Ayu, F., Fidita, D.K, Nourma, M.R. (2019). The Effect of K3 Program on Work Productivity in Heavy Equipment Operators at PT BJTI Kota Surabaya, *Business and Finance Journal*, 4 (2), 115 – 121.
- Goetsch, D.L. (2017). *Occupational Safety and Health for Technologists, Engineers, and Manager*, 8th edition, Pearson Prentice Hall.
- Handayani, E.E., Wibowo, T.A., Suryani, D. (2010). The Relationship between the Use of Personal Protective Equipment, Age, and Working Period with Work Accidents in Rustic Section Workers at PT. Borneo Melintang Buana Eksport Yogyakarta, *Journal of Public Health*, 4(3),144 -239.
- ILO. (2020). *In the Face of the Pandemic: Ensuring Safety and Health in the Workplace*.
- Ministry of Industry. (2021). *Impact of the COVID-19 Pandemic on the Automotive Industry edition I*, 1-35.
- Mitra, A. (2016). *Fundamentals of Quality Control and Improvement (4th Edition)*. New Jersey: John Wiley and Sons, Inc.
- Sukpto, P., Putu, J.H., Susanto, S. (2020). Improving Occupational Health And Safety And In The Homebased Footwear Industry Through Implementation Of ILO-PATRIS, NOSACQ-50 And Participatory Ergonomics: A Case Study. *International Journal Of Technology, Faculty Of Engineering, University of Indonesia*, 10 (5).
- Sukpto, P., Samanta, H. (2019). Application of Participatory Ergonomics in Redesigning Buggy Games to Improve Safety for Users: A Case Study in Kampung Gajah Wonderland. *Journal of Public Health* , 13(1), 1 – 10.
- Syam, N.S., (2017). Implementation of Patient Safety Culture by Nurses at Ibnu Sina Hospital Makassar. *Journal of Public Health*, 11(2), 169 – 174.

Site:

<https://covid19.go.id/> accessed on February 3, 2022 at 11.00 WIB

<https://sinfonews.com/dampak-covid-19-terpaksa-pt-adyawinsa-stamping-industries-karawang-pangkas-karyawan/> accessed on February 3, 2022 at 11.30 WIB

Laws and Regulations:

Law No. 1 of 1970 concerning Work Safety

Law No. 50 of 2012 concerning the Implementation of Occupational Safety and Health Management System