

# Planning Occupational Safety and Health Management System (OSHMS) Based on The Covid-19 Pandemic Guidance at So Good Food Dairy Company

Ali Al Farisi<sup>\*1</sup>, Mirwan Ushada<sup>1</sup>, Moh. Wahyudin<sup>1</sup>

<sup>1</sup>Department of Agroindustrial Technology, Faculty of Agricultural Technology  
Universitas Gadjah Mada, Jl. Flora No.1 Bulaksumur 55281, Indonesia.

Email: ali.al.farisi@mail.ugm.ac.id\*

## Abstract

*Companies need an Occupational Safety and Health (OSH) culture based on a new life guidance during the Covid-19 pandemic. The application of OSH at So Good Food Dairy Company is moderate, though there are no control measures to minimize this risk. This study further aimed to analyze the application of OSH in the workplace and determine the implementation of the OSH Management System (OSHMS). Furthermore, it focused on identifying the probability of accidents at each workstation and proposed risk mitigation plans and anticipatory steps. Questionnaires were then administered to collect primary data from 62 respondents at the So Good Food Dairy Company's processing, filling, packing, and storage workstations. Similarly, secondary data were obtained from documented information about the company's OSH. All the respondents provided valid answers with a Cronbach alpha value of 0.9671, considered very reliable. Moreover, the questionnaire responses showed that So Good Food Dairy Company was rated highly by workers. Failure Mode and Effects Analysis (FMEA) was used to identify the factors causing work accidents and Risk Priority Number (RPN), while recommendations for improvement were made based on the Hazard Identification Risk Assessment & Risk Control (HIRARC) principles. A total of 12 probability accidents were observed in processing, four in filling and packing, and six in storage. Therefore, this study proposes an OSH design that includes an OSHMS planning based on clauses ISO 45001:2018 and ISO/PAS 45005:2020. Additionally, seven OSH programs and a risk mitigation road map using the Pareto Chart principle to set priorities were recommended.*

**Keywords:** ISO 45001:2018, ISO/PAS 45005:2020, OSH Management System

## 1. INTRODUCTION

The Employment Health Social Security Agency data show an increase in work accident cases between 2019 and 2020. In 2019, 114,000 cases of work accidents were reported but increased to 177,000 in 2020 based on the number of insurance claims (Santia, 2021). Meanwhile, Corona Virus Disease 2019, referred to as Covid-19, is an infectious disease caused by Severe Acute Respiratory Syndrome-Corona Virus-2 (Nakat and Bou-Mitri, 2021). The Covid-19 pandemic has increased the health and safety risks to industrial workers.

So Good Food Dairy Company is an industry engaged in milk processing, with an essential role during the pandemic because milk maintains immunity. The importance of So Good Food Dairy Company for consumers

and business partners implies the need to maintain all aspects that support smooth production, such as occupational safety and health (OSH). In this case, OSH comprises all activities to guarantee and protect the workers' safety and health by preventing work accidents and occupational diseases. It is designed structurally through the OSHMS. OSHMS is part of the company's overall management system to control risks related to working activities and create a safe, efficient, and productive workplace (Government Regulation No. 50 of 2012 on Implementation of Occupational Health and Safety Management System, 2012).

The government invites companies to collaborate in creating a safe work environment for workers. The government confirmed this by issuing a policy for industries with more than 100 employees to have ISO 45001:2018

certification as a security guarantee for workers until 2021 (Regulation of the Minister of Manpower of the Republic of Indonesia No. 12 of 2020 on the Strategic Plan of the Ministry of Manpower for the Year 2020-2024, 2020). So Good Food Dairy Company has more than 200 workers.

So Good Food Dairy Company should prepare health management based on a new life guidance using the mitigation concept to reduce the impact of a disaster on the community (Decree of the Minister of Health of the Republic of Indonesia, 2020). The mitigation is related to OSHMS planning that adapts to the Covid-19 life guidance. Subsequently, the company's commitment to implementing OSHMS starts with planning based on the ISO 45001:2018 clause and is complemented by ISO/PAS 45005:2020 for pandemic situations. ISO 45001:2018 is an ISO standard for occupational safety and health management systems, published in March 2018. It aims to reduce the injuries and impacts of occupational diseases, including promoting and protecting physical and mental health (International Organization for Standardization, 2018).

ISO/PAS 45001:2020 is a complementary guide to ISO 45001:2018 in preparing OSH management based on general guidelines for working safely during the Covid-19 pandemic. It is expected that the company would effectively protect other related parties from risks related to Covid-19 with a systematic and adaptive approach to dynamic situations (International Organization for Standardization, 2020). These two foundations are expected to protect worker safety, reduce risks and hazards, maintain workers' physical and mental health, and conduct safe production activities during the Covid-19 pandemic.

## 2. MATERIAL AND METHODS

### 2.1 Data Collection and Analysis

Questionnaires were distributed to workers in four work stations, and the data obtained were analyzed by semantic analysis. The questionnaires were prepared using Kansei words based on Kansei Engineering, which translates the respondents' feelings and images for a prototype into planning design elements (Nagamachi, 1955; in Razza and Paschoarelli,

2015).

The word Kansei makes workers focus on answering questions because humans are sensitive or responsive (Ushada et al., 2019). For example question: 1) Are you getting enough rest?; 2) Is the room temperature comfortable enough for you to work?.

The questionnaires were compiled based on Kansei words explained the assessors of OSH application by workers (Zabotto et al., 2019). They were used because they are safer and more effective in obtaining an initial score for implementing OSH in the company based on employee observations.

Workplace observations, such as work behavior, work equipment, facilities and infrastructure, and K3 policies, can be used to create Kansei words. The Kansei vocabulary makes it simpler for employees to complete job satisfaction surveys. The results of the questionnaire will be directly proportional to the level of job satisfaction because each question is positive.

So Good Food Dairy Company employs approximately 207 people. In this study, 30 percent of the total number of workers at each work station will be used as respondents. As a result, the author collected a total of 62 questionnaires.

Direct observations were carried out at each workstation. Evaluative analysis was then performed using Failure Mode and Effects Analysis (FMEA), whose improvement recommendations use the Hazard Identification Risk Assessment & Risk Control (HIRARC) principle (Urrohmah, 2019). The first observation was accompanied directly by the Leader of each workstation. The second observation was conducted independently while supervised by the Leader at the workstation. Furthermore, documentation was used to obtain visual information to reinforce observations in places with potential hazards.

Secondary data were obtained using a literature study by collecting documented information from books, articles, reports, and company OSH documents. The data were analyzed by development analysis using Pareto Charts and program proposals to develop an OSHMS planning framework comprising an OSH program, anticipatory steps, and risk mitigation. The details are in Figure 1.

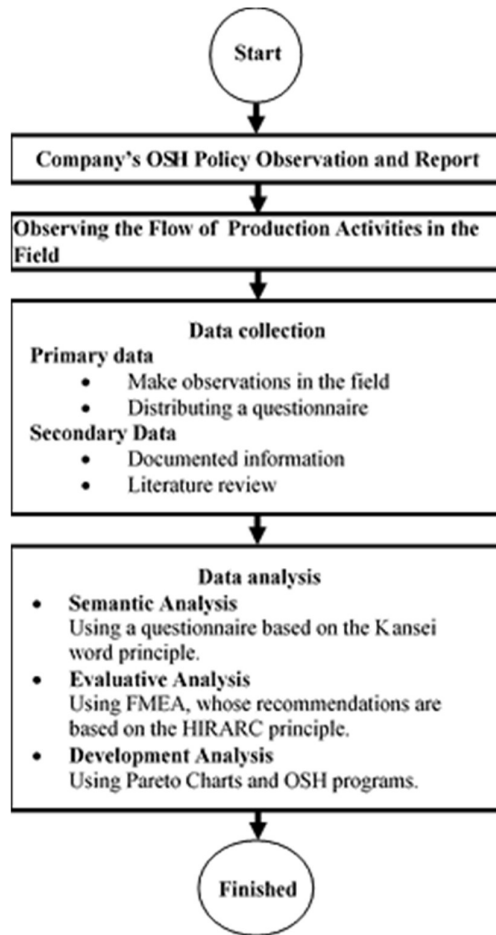


Figure 1. Research Methods

Table 1. List of Kansei Words in the Questionnaire

Workers and Equipment	17	Mobility	15	Affordable
No	Kansei words	18	Sign	16
1	Comfortable	Worker Environment	OSH Policies and Procedures	
2	Understand	No	Kansei words	No
3	Enough	1	Comfortable	1
4	Satisfied	2	Right	2
5	Complaint	3	Comfortable	3
6	In accordance	4	Good	4
7	Appropriate	5	Light	5
8	Obey	6	Light	6
9	negligent	7	Calm	7
10	Report	8	Convey	8
11	The place	9	Worthy	9
12	Competent	10	Large	10
13	Clean	11	Easy	11
14	System	12	Emergency	12
15	In accordance	13	Easy	
16	Danger	14	Affordable	

Table 2. The Result of the Questionnaire Based on The Scope of OSH

No	Scope	Satisfaction Value	Number of questions
1	Conditions of workers and equipment	Good	1
		Very good	17
2	Worker environment	Good	5
		Very good	11
3	Work policies and procedures	Good	8
		Very good	4

**2.2 Data Validity**

The validity of the data collected through literature study, observation, and documentation was checked using triangulation techniques. This involved comparing the data in-depth and assessing relationship between data (Cresswell, 2016). Moreover, validity and reliability tests were performed on the data from the questionnaires filled out by the workers (Raharja, 2021).

46 questions in the questionnaire were declared valid, with a Pearson correlation value of more than r-table (0.254) based on equation (1). The questionnaire reliability test produced a coefficient value of 0.9671 based on equation (2), meaning that the questionnaire is very reliable (Raharja, 2021).

$$r_{xy} = \frac{n(\sum X_i Y_i) - (\sum X_i)(\sum Y_i)}{\sqrt{(n(\sum X_i^2) - (\sum X_i)^2)(n(\sum Y_i^2) - (\sum Y_i)^2)}} \quad (1)$$

where:

- $n$  = Number of data pairs X and Y
- $\sum X_i$  = Total Sum of Variable X
- $\sum Y_i$  = Total Sum of Variable Y
- $\sum X_i^2$  = Square of Total Number of Variables X
- $\sum Y_i^2$  = Square of Total Number of Variables Y
- $\sum X_i Y_i$  = Multiply Result of  $\sum X_i^2$  and  $\sum Y_i^2$

$$r_{11} = \frac{k}{k-1} \left( 1 - \frac{\sum \sigma_b^2}{\sigma_t^2} \right) \quad (2)$$

where:

- $r_{11}$  = instrument reliability
- $k$  = number of questions
- $\sum \sigma_b^2$  = number of item variances
- $\sigma_t^2$  = total variance

**3. RESULT AND DISCUSSION**

**3.1 OSHMS Application Based on Questionnaire**

The OSH implementation at So Good Food Dairy Company was observed using a questionnaire prepared with the Kansei word in Table 1. The questionnaire results showed that 62 respondents answers were valid after checking using Pearson correlation.

Based on the OSH scope in Table 2, the questions on workers, equipment, and the environment on average received a very good rating. On average, on the scope of OSH procedures and policies obtained good marks.

**3.2 Workstation Observation Based on Risk Identification and Assessment**

Observations were based on the flow of workers' production activities at each workstation. The workers were observed from each workstation's goods reception until they were forwarded to the next station. Furthermore, observations on probability hazards or accidents in the activities involved asking questions to workers and leaders. Factors causing work accidents at each station could be identified using FMEA as a risk identification tool that helps know the impact, RPN, and improvement recommendations.

In Table 3, the probability of accident found at the processing work station is 12; filling work station is 4; packing workstation is 4 and workstations is 6. The recommendations also in Table 3 were made based on the HIRARC principle.

Table 3. FMEA, Kansei Word, and HIRARC Recommendations in-process Workstation

No	Failure mode	Kansei word	RPN	HIRARC recommendations
Process workstation				
1	Worker while climbing on the tank truck	Large	72	Administrative supervision using pinched tires and making warning signs containing procedures when trucks arrive at the reception.
2	The driver during the fresh milk transfer process	Report	6	The technical control is to change the pipe to a longer length and direct it to the diverted ground. Equipped with a simple cover to avoid exposing the steam directly to wind gusts.
3	Hot water drain	Sign	4	The technical control is to change the pipe to a longer length and direct it to the diverted ground. Equipped with a simple cover to avoid exposing the steam directly to wind gusts.
4	Workers when pouring flavors and other ingredients	In accordance	72	Technical control replaces the flavor container and other materials whose diameter is larger than the tank opening. It is provided with a funnel to make it easier for the ingredients to enter the tank.
5	Worker climbing on top of the milk tank	In Accordance, danger	70	In the substitution control, the manual faucet is replaced with an automatic valve, or the worker is given a tool to turn the faucet.
6	Wet floors and stairs	Large	54	Technical control by repairing leaking pipes.
7	Leaking pipe	Report	200	Technical control in the form of repairing leaky pipes.
8	Do not close the door of the freight elevator	In accordance, Obey	90	Administrative control by making a warning symbol affixed to the door and closing or locking the elevator door when not operating.
9	Leaky acid tank	Report	105	Technical control by repairing a leaking tank.
10	Pipe connection between tanks	Report, Sign	48	Technical control by installing a guardrail near the heat pipe and being given a warning symbol or painted red.
11	UHT pipe adjacent to the work line	Report, Danger, Sign	48	Technical control by installing a guardrail near the heat pipe and being given a warning symbol or painted red.
12	The aseptic tank that makes noise	Calm	72	PPE control with workers always using earmuffs for ears.
Filling workstation				
1	Packaging roll replacement	In accordance	64	Administrative control, the hand stacker is operated by at least two trained people.
2	Replacement of packaged sterilizing fluid	In accordance, Socialization	56	At least two trained persons conduct administrative controls with fluid replacement.
3	Checking filling machine	In accordance, Socialization	56	Administrative control through fluid replacement performed by a minimum of 2 trained people.
4	Do not close the door of the freight elevator	In accordance, Obey	180	Administrative control, familiarize workers to close the elevator door when the freight elevator is not operating to eliminate the hazard. Making posters containing warnings and sticking them on doors to remind workers.
Packing workstation				
1	Error when picking up product from conveyor	Competent, Worthy	48	Administrative controls on how to take the product position with fingers facing up and the nails should not be long.
2	Error when arranging cardboard onto pallets	In accordance	196	Technical control, there needs to be additional parts on the machine. It should form an inclined plane leading directly to the pallet and use a back brace (a kind of corset).
3	Errors when wrapping a pile of packaging cartons	In accordance, Negligent	112	Administrative control, there needs to be supervision of wrapping, carried out at least up to ¾ of the stack height to ensure a neat cardboard arrangement.
4	Transfer of goods to the warehouse	Easy, Understand	112	Administrative control, there needs to be communication with warehouse workers wearing safety helmets or packing workers using helmets when entering the storage warehouse.

No	Failure mode	Kansei word	RPN	HIRARC recommendations
Storage workstation				
1	Errors of workers walking in the rack area without a helmet	Easy, Understand	112	Administrative control regulates activities around the shelves with supervision for workers to always use complete PPE while in the warehouse.
2	Forklift operator error not wearing a helmet	In accordance, Negligent	112	Administrative control regulates activities around the rack when operating forklifts with supervision for workers to always use complete PPE while in the warehouse.
3	Error in the size of the item stored	In accordance, Easy	128	Administrative control for an inspection of the size of the goods stored and supervision for workers to always use complete PPE while in the warehouse.
4	Forklift operator error when getting off the forklift	In accordance, Easy	56	Administrative control, operators need to be present. Perform three-point contact when getting on and off the forklift. Workers hold the handle near the forklift steering wheel while the other holds the forklift seat. They wear proper, non-slip shoes before operating forklifts.
5	The error of worker walking near the operating forklift	Obey	80	In administrative control, workers need to reduce activities near the forklift and not close to the operating forklift path. Workers are constantly reminded to wear safety shoes.
6	Errors of workers doing product sorting	Obey	112	Administrative control: workers perform sorting activities away from the warehouse's storage rack, northeast corner. Workers always wear helmets when in the warehouse.

### 3.3 Kansei Word's Relationship With FMEA

The Kansei words compiled in each question item in the questionnaire include adjectives, verbs, and nouns. The worker's assessment is the respondent's psychological and physiological indicator regarding the OSH condition in the workstation. In this case, the Kansei word results for each question item complete the error finding data in the FMEA table. Therefore, the results of the two analyses in Table 3 could be combined to formulate an OSHMS planning proposal.

In Table 3, each finding of errors written into the FMEA is correlated or related to the kansei words contained in the questionnaire questions. Kansei words that do not have a correlation with FMEA can be used as material for discussion and program preparation.

### 3.4 OSHMS Design Proposal

The proposed Occupational Health and Safety Management System (OSHMS) planning is based on Government Regulation No. 50 of 2012. The ISO 45001:2018 clauses complemented by ISO/PAS 45005:2020 include organizational context, worker leadership, and participation. In this regard, planning management has committed to implementing OSH in the company. This is evidenced by company documents on OSH accessed from the So Good Food Company Policy on Occupational Health and

Environmental Safety in 2018, OSH Work Program Committee in 2019, So Good Food Company Emergency Response Guidelines in 2019, and documentation at work stations.

A review of company documents showed that seven OSH programs could be compiled according to the questionnaire results and recommendations for improvement in Table 3. Therefore, ISO 45001:2018 and ISO/PAS 45005:2020 could be applied by company management through monitoring the availability and feasibility of personal protective equipment, providing first aid kits for accidents, health protocol checklist, and OSH Checklist by Leader. Additionally, the clauses could be applied by preparing for safe operations from the spread of Covid-19 virus infection, combining Work From Office (WFO) and Work From Home (WFH), and through the workers' roles during a pandemic.

The risk mitigation-based improvement road map is divided into three parts. The first part is the refinement of the workstation based on the Pareto chart principle. A faulty leaky pipe causes the skin to itch, resulting in blisters. The solution is to fix a leaky pipe with 24% on the Pareto chart. Errors at the filling station include failure to close the freight elevator's doors, increasing the risk of bodily injury or death upon falling. This could be fixed by always closing and locking the freight elevator's door when not in use, with a percentage of 51% on the Pareto chart.

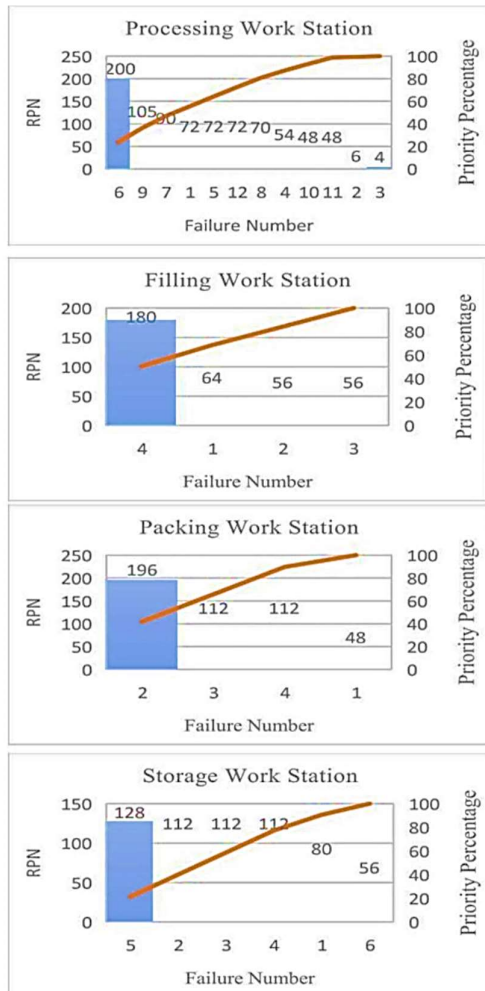


Figure 2. Pareto Chart

Errors in workstation packaging in less ergonomic workers' positions could result in back, hand, and foot pain. This is resolved by adding an inclined plane, with 42% on the Pareto Chart. Furthermore, errors at the storage workstation in placing items stored larger than pallets resulted in their falling off the shelves. Improvements with 42% on the Pareto chart involve checking the size of items stored and larger items placed on the bottom shelf or the floor with free space. Details in Figure 2.

The second part involves developing guidelines to form a Covid-19 task force in the company as a mitigation against the risk of transmission. This is because production activities increase the risk of transmission due to the disease's contagious nature. The third part is to develop guidelines to establish an emergency preparedness and response team. Companies are encouraged to prepare for emergencies and respond to them with

appropriate care and So Good Food Company already has guidelines on this matter. However, there is a need to implement health protocols in a pandemic situation.

#### 4. CONCLUSIONS

1. The OSH was well implemented at So Good Food Dairy Company based on workers' responses in questionnaires with Kansei word at each workstation and review of documents regarding the company's OSH policies and programs in line with ISO 45001:2018 and ISO/PAS 45005:2020.
2. The probable factors or risks which could cause the work accidents at each workstation were identified using FMEA and given improvement recommendations according to HIRARC.
3. The planning was proposed for the OSHMS at So Good Food Dairy Company based on the ISO 45001:2018 and ISO/PAS 45005:2020 clauses.

#### ACKNOWLEDGMENT

We would like to express our sincere gratitude to Mr. Prasetya Yoga P. S.T.P., management and staff of PT. So Good Food Dairy, Boyolali Regency for supporting this article.

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