

## **Analysis of Occupational Safety Risks in the PB Production Division. Sa Sri Anugerah Karawang Uses Hazard Identification, Risk Assessment, And Determining Control (Hiradc) Method**

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**Abstract.** Occupational Safety and Health (K3) is very important for industrial operations, including the food processing sector. However, the high rate of work accidents in the Production Division of the SA Sri Anugerah Rice Factory, with a percentage of 54% in the period 2020 to 2024, shows that there are serious problems in the implementation of K3 procedures. This research aims to identify hazards, assess risks, and determine appropriate control measures. The method used was Hazard Identification, Risk Assessment, and Determining Control (HIRADC), with data collected through interviews. The results of the study show fluctuations in accidents, starting from 15 cases in 2020 to 22 cases in 2024. The Production Division accounted for the most accidents. Occupational risks range from Low Risk to High Risk, with a high risk in the process of peeling the skin and storage of the sack that has the potential to cause serious injury. Recommended control measures include technical engineering (such as engine guards and exhaust fans), improvements to the work environment (anti-slip flooring and safe storage systems), as well as training, work rotations, and the provision of PPE (masks, eye protection, gloves, support belts). This research provides an overview of occupational safety risks and solutions to create a safe work environment.

**Keywords:** Occupational Safety and Health, Occupational Accident Risk Analysis, HIRADC Method, Rice Milling Plant.

## **INTRODUCTION**

Occupational safety and health (K3) is one of the maintenance programs in the company. This is in accordance with the Law No. 13 concerning Manpower, article 86 paragraph 1 "Every worker/laborer has the right to get protection for Occupational Safety and Health". Occupational safety and health is an effort to avoid or reduce occupational disasters by stopping risks or risk factors in order to achieve work or creation goals. (Rosento et al, 2021).

According to Oktaviani & Lydia (2023), the agricultural sector, it is one of the sectors that is the backbone and contributes quite important to the Indonesian economy, but this sector is also a sector with a higher number of poor families when compared to other sectors. Occupational safety is one of the most important aspects of the industry, especially in the manufacturing sector such as rice mills. The rice production process involves various stages that have the potential to pose risks, from the processing of raw materials to the packaging of the final product

Based on the Annual Report of BPJS Ketenagakerjaan for the last 3 years, data on the number of work accidents (including work-related diseases/PAK) continues to increase. In 2021, the number of work accidents amounted to 234,371 cases, and increased a year later to 298,137 cases, and jumped in 2023 by 370,747 cases (Public Relations Bureau Kemnaker, 2024)

According to the Ministry of Manpower, work accidents are accidents that occur in an employment relationship, including accidents that occur on the way from home to work or vice versa and diseases caused by the work environment (Ministry of Manpower, 2021).

Law of the Republic of Indonesia Number 1 of 1970 concerning Occupational Safety states that every workplace whether in a room or field, closed or open, moving or fixed where workers work, or often entered by workers for the purpose of a business has sources of danger for its workers. The law stipulates that every worker has the right to work for the sake of welfare to ensure safety and increase national production and productivity.

According to the Constitution of the Republic of Indonesia of 1945 Article 27 Paragraph (2) concerning the Rights of Every Citizen which reads "Every citizen has the right to work and a decent livelihood for humanity". The article means that the state has an obligation to protect its citizens who want to exercise their right to work. This protection includes ease and speed in job placement services, while still ensuring the physical, moral, and dignity of the workforce.

Companies are required to implement Occupational Safety and Health (K3) in accordance with the Law of the Republic of Indonesia Number 1 of 1970 concerning Occupational Safety. This obligation aims to protect the safety and health of the workforce as stipulated in Article 3 Paragraph (1) letter a, and requires the company's management to provide information about work hazards and safe working practices in accordance with Article 9 Paragraph (1). In addition, K3 also ensures the safety of others in the workplace, as stipulated in Article 12 letter d and Article 13 which requires everyone to comply with work safety rules. In an effort to increase efficiency and productivity, Article 3 Paragraph (1) letters f and m require the provision of personal protective equipment and the creation of a safe work environment. Prevention of losses due to work accidents is also the focus, as stated in Article 3 Paragraph (1) letters b and c regarding the prevention of fire and explosion. To ensure compliance, Article 14 requires the installation of occupational safety rules and the provision of personal protective equipment for free, while Article 15 Paragraph (2) stipulates sanctions in the form of imprisonment for a maximum of 3 months or a maximum fine of IDR 100,000 for parties who violate the provisions of K3.

The implementation of Occupational Safety and Health (K3) not only aims to comply with the provisions of the law, but also serves to protect the workforce, ensure safety in the workplace, increase work effectiveness, and prevent accidents and losses. With an optimal K3 system, companies can create a safer, more comfortable, and more productive work environment.

Karawang is known as one of the rice production centers in Indonesia, many rice factories still face challenges in implementing an effective occupational safety management system. Some of the factors that contribute to the high risk of work accidents in rice factories include lack of safety training, the use of unmaintained machinery, and the lack of awareness of workers about the dangers that exist in the work environment.

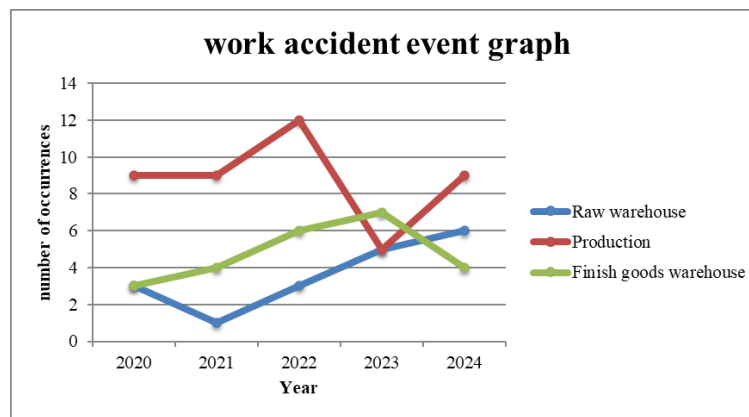
This research was conducted on a rice factory located in Karangpawitan, West Karawang District, Karawang, West Java. This factory can produce 15 tons of rice per day. This factory is an industry engaged in processing rice into rice that accommodates all the rice harvested by farmers.

In the operation of rice mills, there are various risks of work accidents that have the potential to interfere with the safety and health of workers. The following is **Table 1.1** and **Graph 1.1** of work accident data in PB. SA Sri Anugerah:

**Table 1.1** Work Accident Data PB. SA Sri Anugerah

| No. | Division                 | Incident |      |      |      |      | Total | Percentage |       |
|-----|--------------------------|----------|------|------|------|------|-------|------------|-------|
|     |                          | 2020     | 2021 | 2022 | 2023 | 2024 |       |            |       |
| 1   | Raw warehouse            | 2        | -    | -    | 2    | 1    | 5     | 5%         | 19,4% |
| 2   |                          | 1        | 1    | 2    | -    | 2    | 6     | 7,0%       |       |
| 3   |                          | -        | -    | 1    | 2    | 1    | 4     | 4,0%       |       |
| 4   |                          | -        | -    | -    | 1    | 2    | 3     | 3,0%       |       |
| 5   | Production               | 2        | 1    | 2    | 2    | 1    | 8     | 9,0%       | 54,0% |
| 6   |                          | 1        | 2    | 3    | 1    | 1    | 8     | 9,0%       |       |
| 7   |                          | 2        | 2    | 5    | -    | -    | 9     | 10,0%      |       |
| 8   |                          | -        | 1    | -    | 1    | 1    | 3     | 3,0%       |       |
| 9   |                          | 2        | 1    | -    | -    | 1    | 4     | 4,0%       |       |
| 10  |                          | -        | -    | 2    | 1    | 3    | 6     | 7,0%       |       |
| 11  |                          | -        | 1    | 1    | -    | 1    | 3     | 3,0%       |       |
| 12  |                          | 2        | -    | -    | 1    | 2    | 5     | 5,0%       |       |
| 13  | Finished goods warehouse | -        | 1    | 1    | -    | 2    | 4     | 4,0%       | 27,0% |
| 14  |                          | 1        | 1    | 2    | 1    | -    | 5     | 5,0%       |       |
| 15  |                          | -        | -    | 1    | 3    | 2    | 6     | 7,0%       |       |
| 16  |                          | 1        | 2    | 1    | 3    | -    | 7     | 8,0%       |       |
| 17  | Total                    | 1        | 1    | 2    | -    | 2    | 6     | 7,0%       |       |
|     | Total                    | 15       | 14   | 23   | 18   | 22   | 92    | 100%       |       |

(Source: Initial Observation at SA Sri Anugerah Rice Factory)



**Graphs 1.1** Graph of the Number of Work Accident Incidents

(Source: Initial Observation at SA Sri Anugerah Rice Factory)

Based on initial observations, it was recorded that in 2020, there were 15 people who had work accidents. In 2021, the number decreased to 14 people, but increased again in 2022 with 23 people having accidents. In 2023, the number is 18 people, and in 2024, as many as 22 people have had work accidents. After a percentage calculation between the three divisions, it was found that in the Raw Warehouse Division around 19.4% of work accidents occurred, workers often suffered back injuries due to heavy lifting, fell due to tripping, and exposure to dust that caused respiratory distress and eye irritation. In the Production Division by 54%, accidents often occur while working, the dominant work accidents include serious injuries due to cut and pinched fingers by machines, and health problems due to inhalation of excessive amounts of husk dust.

Meanwhile, in the Finish Goods Warehouse Division, around 27% of work accidents occurred, workers were vulnerable to injuries due to packaging tools, falling from sack piles, and injuries due to being hit by sharp objects during checking goods. The high number of accidents in the production division shows that there are problems in the implementation of occupational safety procedures, which can have an impact on productivity and worker welfare. Therefore, this study was conducted to identify the main risk factors and evaluate the preventive measures that have been implemented to reduce work accidents in rice mills.

Seeing the high number of work accidents in the Production Division, steps are needed to understand the main causes of these accidents. It is important to identify potential hazards early on, assess the risks that may arise, and determine effective prevention efforts. One of the methods used to do this is Hazard Identification, Risk Assessment, and Determining Control (HIRADC), which helps in managing risks in the workplace.

According to Ameiliawati (2021), Hazard Identification, Risk Assessment, and Determining Control (HIRADC) is one of the methods in the Occupational Safety and Health (K3) program that aims to identify potential hazards, assess the level of risk posed, and determine appropriate control measures to reduce or eliminate these risks.

Work accident risk analysis, according to Ihsan et al. (2020), is an activity to investigate the probability of occurrence and its consequences. Although the HIRADC method is widely used, its application in rice mills is still rare. Research in this sector more often uses other methods, such as HIRA, HIRARC, JSA, and the like. Research by Ramadhania et al. (2020) found a high risk at UD Ridho Abadi, with a value of 9 in the wood scraping section, which is recommended to be overcome with training and the use of PPE. Research by Ihsan et al. (2020) shows that all work areas at PT. IGASAR has a moderate risk. Research by Yunandro Markus & Djunaidi (2024) identified 116 risk controls in the maintenance sector, with 42 engineering controls and 33 work practice controls. Islah et al. (2021) found a significant association between hazard identification and occupational accident control, but no association with risk assessment. Saidah & Adistana (2023) revealed that human factors are the main cause of work accidents (66%), and suggested control measures such as safety induction, briefing, and supervision of PPE use.

The purpose of this study is to identify hazards that have the potential to cause work accidents in the Production Division of rice mill plants using the HIRADC method. This study also aims to conduct a risk assessment of the hazards that have been identified to determine the level of risk of work accidents. In addition, this study will determine effective risk control measures to improve occupational safety in the Production Division.

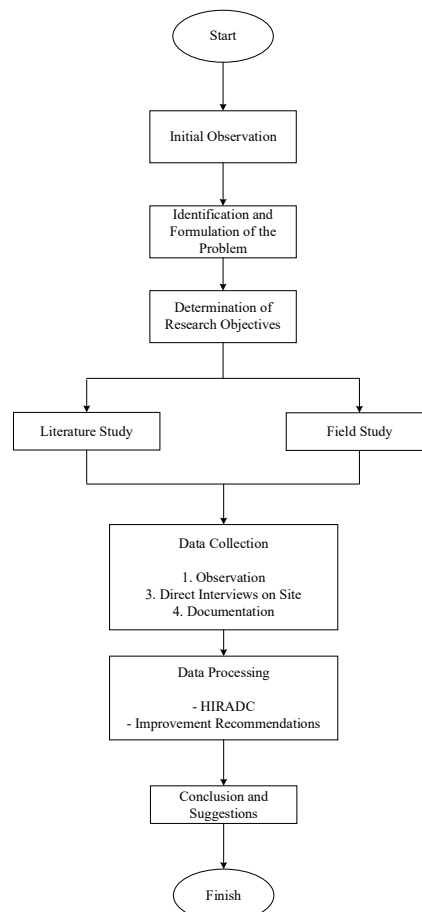
This research has several limitations to keep the focus directed. The research was only conducted in the Production Division of the rice mill because this division has the highest accident rate, which is 54% compared to other divisions. The method used is HIRADC, which includes hazard identification, risk assessment, and determination of appropriate controls. This study focuses on three main variables, namely hazard identification, risk assessment, and risk control, with data obtained through field observations, interviews with workers, and analysis of work accident reports. This study does not discuss the financial aspects of companies related to work accidents, but focuses more on the implementation of Occupational Safety and Health (K3) procedures.

The benefits of this research include providing practical solutions to improve the standards of occupational safety procedures, improve the conditions of the work environment, and reduce the accident rate so that productivity and labor welfare can be maintained. This research also provides empirical data that can be a reference or basis for the development of K3 studies in the future and strengthen the understanding of workers and management regarding the urgency of implementing K3, so that workers' rights to obtain a safe work environment can be guaranteed.

## RESEARCH METHODS

### 3.1 Research Flowchart

**Figure 3.1** below presents a research flow detailing each stage in the research process. This flow is designed to ensure that research takes place in a systematic, organized, and focused manner, so that every step taken supports the optimal achievement of research objectives.



**Figure 3. 1** Flowchart Research

### 1.2 Research Flowchart Description

This research was carried out through systematic stages that began with the determination of the main problem until conclusions were drawn based on the results obtained. The first stage is initiation to understand the context and objectives of the research. Furthermore, preliminary observations are made to identify the main problems to be studied, which are then clearly formulated as the basis for determining the focus of the research. After that, the research objectives are set, which will direct the research process. The research involves two main approaches: literature studies to gather information from various theoretical sources and field studies through direct observation as well as interviews with relevant parties to obtain primary data. The collected data is then processed using the HIRADC method, which includes hazard identification, risk assessment, and control determination to minimize risk. Based on this analysis, suggestions or corrective actions are prepared that aim to reduce risks, improve safety,

and improve work processes. Finally, conclusions are drawn and recommendations are made for further improvement before the research is declared complete.

## RESULTS AND DISCUSSION

### 4.1 Data Collection

#### 4.1.1 Work Accident Data Collection

Data collection was carried out with the aim of identifying the number and distribution of work accident incidents by division and year of occurrence in the period 2020 to 2024. The data is classified into three main divisions, namely Raw Material Warehouse, Production, and Finish Goods Warehouse. Each event is recorded based on the year it occurred and is accumulated to get the total events per division as well as its percentage of the overall total.

From the results of data collection, it is known that the Production division accounts for the highest number of incidents, which is 54% of the total number of work accidents recorded. This shows that more than half of the accidents that occur are in the production area, which is likely due to high operational activity, heavy machine use, and higher potential for other hazards than other divisions.

Therefore, to respond to these problems, the data and findings that have been obtained will be further analyzed using the Hazard Identification, Risk Assessment, and Determining Control (HIRADC) method. This analysis aims to identify potential hazards, evaluate the level of risk posed, and determine effective control measures to improve occupational safety and health in the Production Division environment. Below is **Table 4.1** Work Accident Data of the Production Division that has been successfully collected.

**Table 4. 1** Production Division Work Accident Data

| No. | Division | Activities                         | Hazard                                                                                   | Impact                                                                     |
|-----|----------|------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 1   | Produksi | Receiving grain from the warehouse | Grain dust inhaled, hit by heavy grain sack                                              | Mild to moderate respiratory distress, Physical injury (back, leg)         |
| 2   |          | Drying                             | Exposure to the heat of the sun for too long, Tripping on tarpaulins/tools, insect bites | Dehydration, heatstroke, minor tripping injuries, allergic/itchy reactions |
| 3   |          | Grain Cleaning                     | Grain dust inhaled, hit by heavy grain sack                                              | Breathing problems, minor wounds                                           |
| 4   |          | Hulling                            | Hand into machine, machine without guard                                                 | Fingers cut, pinched                                                       |
| 5   |          | Husk Separation                    | Dust, engine sound                                                                       | Airway irritation, hearing loss                                            |
| 6   |          | Polishing                          | Machine friction, flying particles                                                       | Skin irritation, abrasion wounds                                           |
| 7   |          | Sorting                            | Unergonomic working position                                                             | Back injury, fatigue                                                       |
| 8   |          | Packaging                          | Heavy load, sack seam                                                                    | Muscle injuries, minor injuries                                            |
| 9   |          | Sotrage & Distribution             | Sack drops, slippery floor                                                               | Head injury, slip                                                          |

After collecting and analyzing work accident data in the Production Division, the next step is to group risks with factory managers by compiling Likelihood and Severity tables. The preparation of this table aims to provide a more structured understanding of the frequency and impact of each incident that occurs, so that it can be used as a basis for the risk assessment process.

The Likelihood table is compiled based on the frequency of events per year, while the Severity table refers to the impact of accidents on workers as well as financial losses and operational disruptions. The results of this grouping are the foundation in determining the risk level for each type of incident that occurs in the work environment of the Production Division. Here is **Table 4.2 Likelihood factory standard** and **Table 4.3 Severity factory standard**.

**Table 4. 2 Likelihood Factory Standard**

| Level | Category              | Frequency of Occurrence | Additional Description                                           |
|-------|-----------------------|-------------------------|------------------------------------------------------------------|
| 5     | <i>Almost Certain</i> | > 4 incident per year   | It occurs regularly every year; Rising trend (2023: 5 incidents) |
| 4     | <i>Likely</i>         | 3–4 incident per year   | It is common; appears almost every year                          |
| 3     | <i>Possible</i>       | 2 incident per year     | It happens occasionally, but is still significant                |
| 2     | <i>Unlikely</i>       | 1 incident per year     | Rare, can be prevented with strict SOPs                          |
| 1     | <i>Rare</i>           | < 1 incident per year   | Almost never, only in exceptional conditions                     |

**Table 4. 3 Severity Factory Standard**

| Level | Category             | Injury Impact                                                    | Number of Casualties / Production               | Estimated Financial Loss |
|-------|----------------------|------------------------------------------------------------------|-------------------------------------------------|--------------------------|
| 5     | <i>Catastrophic</i>  | Fatal (>1 person died), major operational disruption             | >1 person killed, activities completely stopped | > IDR200 million         |
| 4     | <i>Major</i>         | Serious injuries (>1 person), significant operational disruption | Serious injury, lost working time >7 days       | IDR 50–100 million       |
| 3     | <i>Moderate</i>      | Moderate injury, medical treatment                               | 1 person injured, medical treatment, outpatient | IDR25–50 million         |
| 2     | <i>Minor</i>         | Minor injuries (abrasions, minor cuts)                           | Minor injuries, no need for intensive care      | IDR 5–10 million         |
| 1     | <i>Insignificant</i> | No injuries occurred                                             | Only minor damage to the appliance or property  | < IDR 5 million          |

#### 4.1.1 Production Process Sequence

##### 1. Grain Receipt

Grain from farmers or suppliers is received at the milling site. At this stage, an initial inspection is carried out to check the quality and moisture content of the grain. Grain is usually stored in large sacks and unloaded manually from vehicles. with activities such as loading and unloading sacks of grain, weighing and recording receipt data.

##### 2. Grain drying (if needed)

If the grain has a high moisture content, then it needs to be dried to prevent mold or damage when grinded. In traditional factories, drying is often done naturally in the sun using a tarpaulin or drying floor. With activities such as drying grain in the sun and manually turning grain so that it dries evenly.

##### 3. Grain Cleaning

Before entering the machine, the grain is cleaned of impurities such as stones, straw, soil, and leaves. This process uses a blower, manual sieve, or a simple cleaner so that the machine does not break down quickly. This activity includes the filtration and separation of dirt and the use of blowers/sieves.

##### 4. Hulling

The grain is then put into a huller machine to separate the husk husk (husk) from the contents (broken rice or brown rice). This machine works on the principle of friction/pressure with a noise level of 90 dB for 4 hours in the operating area of the machine. With activities such as feeding grain into the huller machine, adjusting the pressure of the machine and separating the husk from the cracked rice.

5. Husk Separation

The hulled husk is removed by a blower or wind system with a noise level of 92 dB for 3 hours at the machine operating site. The husk can be used as fuel or animal feed. Meanwhile, the broken rice enters the next process. These activities include regulating the airflow for husk separation and collecting husks to the shelter.

6. Penyosohan (Polishing)

The cracked rice is then polished to remove the aleuron layer and produce clean white rice. This process uses a stirring machine that is based on friction between rice grains. With activities such as putting brown rice into the polishing machine, adjusting the polishing time and pressure and producing white rice and bran.

7. Sorting & Sorting

The white rice produced is sorted by size and quality. This sorting process can be done manually using a sieve or using a simple grading machine. This activity includes separation based on size (whole and broken rice), visual/manual sorting of quality.

8. Packaging

The rice that has been sorted is then packaged into 5kg, 10kg, 25kg, or 50kg sacks according to market needs. Packaging is done manually or semi-manually using sack sewing aids. With activities such as weighing the weight of rice, putting it into sacks, sewing and labeling.

9. Storage & Distribution

Sacks of rice are stored in warehouses before being distributed. It is important to maintain humidity and ventilation so that the rice is not damaged or attacked by warehouse pests. This activity includes stable preparation of sacks, temperature and pest control, preparation for delivery to distributors/markets.

## **4.2 Data Processing**

### **4.2.1 Hazard Identification**

Based on the results of hazard identification carried out in activities in the Production Division, a number of sub-activities were found that have a potential risk of work accidents. Some of these sub-activities include machine operation, material cutting process, packaging, and cleaning of work areas. The conditions identified include Routine (R) and Non-Routine (NR), where most hazards arise in daily routine activities. The most dominant sources of hazards come from work equipment such as cutting machines, automatic production machines, as well as high exposure to husk dust in the work environment. Below is **Table 4.2** Hazard Identification.

**Table 4. 4** Hazard Identification

| Hazard Identification |                        |           |    |   |                              |                              |                                                     |
|-----------------------|------------------------|-----------|----|---|------------------------------|------------------------------|-----------------------------------------------------|
| No.                   | Sub-Activity           | Condition |    |   | Source of Danger             | Risk                         | Impact                                              |
|                       |                        | R         | NR | E |                              |                              |                                                     |
| 1                     | Grain Reception        | ✓         |    |   | Grain dust                   | Inhaled                      | Mild to moderate respiratory distress               |
|                       |                        |           |    |   | Heavy sack of grain          | Smashed                      | Physical injuries (back, legs)                      |
| 2                     | Drying (if necessary)  | ✓         |    |   | Exposure to the sun's heat   | Prolonged exposure           | Dehydration, heatstroke                             |
|                       |                        |           |    |   | Tarpaulins/tools             | Stumble                      | Minor injuries due to tripping                      |
|                       |                        |           |    |   | Insect                       | Bite                         | Allergic/itchy reactions                            |
| 3                     | Grain Cleaning         | ✓         |    |   | Fine dust & particle         | Inhaled/affected by the eyes | Eye irritation, respiratory distress                |
|                       |                        |           |    |   | Blower tool                  | Electrical contact           | Mild electric shock                                 |
| 4                     | Hulling                | ✓         |    |   | Unguarded machine            | Hand exposed to moving parts | Heavy finger/hand injuries                          |
|                       |                        |           |    |   | Feeding port open            | Hand entry into the machine  | Stuck in the machine                                |
| 5                     | Husk Separation        | ✓         |    |   | Husk dust                    | inhaled                      | Respiratory disorders, allergies                    |
|                       |                        |           |    |   | Blower engine sound          | Exposure to noise            | Long-term hearing damage                            |
| 6                     | Polishing              | ✓         |    |   | Machine friction             | Skin contact                 | Minor burns due to friction                         |
|                       |                        |           |    |   | Rice particles and dust      | Exposed                      | Skin and respiratory tract irritation               |
| 7                     | Sorting                | ✓         |    |   | Repetitive manual activities | Imideal posture              | Aches, muscle pain, musculoskeletal injuries (MSDs) |
| 8                     | Packaging              | ✓         |    |   | Heavy load (rice sack)       | Manually lifted              | Back/knee injuries                                  |
|                       |                        |           |    |   | Sharp tool (sack stitching)  | Exposed while sewing         | Minor puncture wounds                               |
| 9                     | Storage & Distribution | ✓         |    |   | High sack stack              | Sack drops                   | Affecting workers                                   |
|                       |                        |           |    |   | Smooth warehouse floor       | Slip                         | Slip injuries                                       |

The consequences of these hazards are very diverse, ranging from minor injuries, moderate injuries to serious work accidents that can interfere with the safety and health of workers and reduce productivity. This identification is an important basis for the next step, namely risk assessment and determining control, in order to establish the right control strategy to create a safe and healthy work environment.

#### 4.2.2 Risk Assessment

Risk assessments are carried out to identify and evaluate potential hazards that may occur during the delivery and unloading of goods work process. This analysis was carried out by reviewing each sub-activity, the source of the hazard, the potential impact, and the level of risk, using a risk assessment matrix method that combines the level of opportunity (P) and severity (S). Below is **Table 4.5** Risk Assessment.

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**Table 4. 5 Risk Assesment**

| Risk Assesment |                        |                              |                              |                                                     |                      |              |             |               |
|----------------|------------------------|------------------------------|------------------------------|-----------------------------------------------------|----------------------|--------------|-------------|---------------|
| No.            | Sub-Activity           | Source of Danger             | Risk                         | Impact                                              | Risk Assesment Level |              |             |               |
|                |                        |                              |                              |                                                     | Likelihood (L)       | Severity (S) | Risk Rating | Risk Level    |
| 1              | Penerimaan Gabah       | Grain dust                   | Inhaled                      | Mild to moderate respiratory distress               | 3                    | 2            | 6           | Moderate Risk |
|                |                        | Heavy sack of grain          | Smashed                      | Physical injuries (back, legs)                      | 2                    | 3            | 6           | Moderate Risk |
| 2              | Drying (if necessary)  | Exposure to the sun's heat   | Prolonged exposure           | Dehydration, heatstroke                             | 2                    | 4            | 8           | High Risk     |
|                |                        | Tarpaulins/tools             | Stumble                      | Minor injuries due to tripping                      | 2                    | 2            | 4           | Moderate Risk |
|                |                        | Insect                       | Bite                         | Allergic/itchy reactions                            | 3                    | 1            | 3           | Low Risk      |
| 3              | Grain Cleaning         | Fine dust & particle         | Inhaled/affected by the eyes | Eye irritation, respiratory distress                | 3                    | 2            | 6           | Moderate Risk |
|                |                        | Blower tool                  | Electrical contact           | Mild electric shock                                 | 2                    | 3            | 6           | Moderate Risk |
| 4              | Hulling                | Unguarded machine            | Hand exposed to moving parts | Heavy finger/hand injuries                          | 4                    | 4            | 16          | High Risk     |
|                |                        | Feeding port open            | Hand entry into the machine  | Stuck in the machine                                | 4                    | 4            | 16          | High Risk     |
| 5              | Husk Separation        | Husk dust                    | inhaled                      | Respiratory disorders, allergies                    | 3                    | 2            | 6           | Moderate Risk |
|                |                        | Blower engine sound          | Exposure to noise            | Long-term hearing damage                            | 2                    | 3            | 6           | Moderate Risk |
| 6              | Polishing              | Machine friction             | Skin contact                 | Minor burns due to friction                         | 2                    | 1            | 2           | Low Risk      |
|                |                        | Rice particles and dust      | Exposed                      | Skin and respiratory tract irritation               | 3                    | 2            | 6           | Moderate Risk |
| 7              | Sorting                | Repetitive manual activities | Imideal posture              | Aches, muscle pain, musculoskeletal injuries (MSDs) | 3                    | 3            | 9           | High Risk     |
| 8              | Packaging              | Heavy load (rice sack)       | Manually lifted              | Back/knee injuries                                  | 2                    | 3            | 6           | Moderate Risk |
|                |                        | Sharp tool (sack stitching)  | Exposed while sewing         | Minor puncture wounds                               | 2                    | 2            | 4           | Moderate Risk |
| 9              | Storage & Distribution | High sack stack              | Sack drops                   | Affecting workers                                   | 3                    | 4            | 12          | High Risk     |
|                |                        | Smooth warehouse floor       | Slip                         | Slip injuries                                       | 2                    | 2            | 4           | Moderate Risk |

**Table 4.5** above contains nine main sub-activities in the field work process, including potential hazards such as vehicle collisions, slipping due to floor conditions, falling items, and ergonomic risks from manual lifting. For each sub-activity, the source of the hazard, the consequences caused, and the level of risk are listed based on the results of the assessment. The risk level is categorized as Low, Moderate, or High Risk, depending on the combination of likelihood and impact on occupational safety. Below is **Table 4.6** Risk Assessment Matrix.

**Table 4. 6 Risk Assessment Matrix**

|                |   | Severity (S)  |               |               |               |               |
|----------------|---|---------------|---------------|---------------|---------------|---------------|
|                |   | Insignificant | Minor         | Moderate      | Major         | Catastrophic  |
| Likelihood (L) |   | 1             | 2             | 3             | 4             | 5             |
| Almost certain | 5 | Moderate Risk | High Risk     | High Risk     | Critical Risk | Critical Risk |
| Likely         | 4 | Moderate Risk | Moderate Risk | High Risk     | High Risk     | Critical Risk |
| Possible       | 3 | Low Risk      | Moderate Risk | High Risk     | High Risk     | Critical Risk |
| Unlikely       | 2 | Low Risk      | Moderate Risk | Moderate Risk | High Risk     | High Risk     |
| Rare           | 1 | Low Risk      | Low risk      | Moderate Risk | Moderate Risk | High Risk     |

Description of **Table 4.6** Risk Assessment Matrix:

Opportunities (P) based on the nature of the job/exposure:

- Almost certain = Continuous
- Likely = Hourly
- Possible = Every day

- Unlikely = Weekly
- Sweet = Annually

Risk assessments are carried out based on two main parameters:

1. Likelihood = Frequency of possible events, classified from Sweet (1) to Almost Certain (8).
2. Severity = Impact of the event, classified from Insignificant (1) to Catastrophic (8).

Example:

If it is known from the data that:

- One of the accidents in production occurred 3 times in 5 years → Likelihood Level = 3 (Possible)
- The accident caused moderate injuries and losses of IDR 10 million → Severity Level = 3 (Moderate)

So:

- Risk Level = Possible (3) × Moderate (3) = High Risk

This means that immediate control measures need to be taken to reduce the potential for recurrence of incidents. By multiplying the values of P and S, the final risk level shown in **Table 4.7** of the risk categories is obtained as follows:

**Table 4. 7** Category Risk

| Color/Category | Explanation                         | Action                                                                       |
|----------------|-------------------------------------|------------------------------------------------------------------------------|
| <b>Low</b>     | Small risk; Acceptable              | Standard control, monitor periodically.                                      |
| <b>Medium</b>  | Moderate risk; Need attention       | Make repairs and controls to reduce risk.                                    |
| <b>High</b>    | High risk; Cannot be ignored        | It requires immediate control, causation analysis, and effective mitigation. |
| <b>Extreme</b> | The risk is very high; Unacceptable | Stop activities, conduct a thorough investigation and emergency measures.    |

#### 4.2.3 Determining Control

In an effort to maintain occupational safety and health in the grain processing environment, risk analysis is carried out based on work activities that involve potential hazards. The approach used to control these hazards follows a risk control hierarchy, ranging from elimination, substitution, technical control (engineering), administrative, to the use of personal protective equipment (PPE). Below is **Table 4.8 of the current** determining control in the company and can be seen more clearly in **Appendix 6** of the current determining control table in the company.

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**Table 4.8** Determining Current Control in the Company

| No | Sub-Activity           | Hazard Identification                                                                                    |                                     | Risk Assessment Level |              |             |               | Current Conditions                                                                                                                                          | Current Risk Control in the Company |              |                     |                        |                                      |
|----|------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------|--------------|-------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------|---------------------|------------------------|--------------------------------------|
|    |                        | Hazard                                                                                                   | Impact                              | Likelihood (L)        | Severity (S) | Risk Rating | Risk Level    |                                                                                                                                                             | Elimination                         | Substitution | Engineering Control | Administrative Control | Personal Protective Equipment (APD)  |
| 1  | Grain Reception        | Inhalation of dust above threshold limit value (3 times/week, avg 8 hours/day) at 0.72 mg/m <sup>3</sup> | Mild to moderate respiratory issues | 3                     | 2            | 6           | Moderate Risk | There is only natural ventilation (windows without glass), there is no local vacuum system yet                                                              | ×                                   | ×            | ×                   | ×                      | 1-layer cloth mask, but not standard |
|    |                        | Struck by falling sack                                                                                   | Physical injury (bruises, etc.)     | 2                     | 3            | 6           | Moderate Risk | Transport is still manual, trolley or lifting aids are not yet available                                                                                    | ×                                   | ×            | ×                   | ×                      | ×                                    |
| 2  | Drying (if necessary)  | Heat exposure                                                                                            | Dehydration, heat stroke            | 2                     | 4            | 8           | High Risk     | Activities are carried out in open areas without roofs, workers are directly exposed to the heat of the sun                                                 | ×                                   | ×            | ×                   | ×                      | Short-sleeved dresses, plain hats    |
|    |                        | Tripping over tools                                                                                      | Physical injury                     | 2                     | 2            | 4           | Moderate Risk | equipment is placed carelessly in the work area                                                                                                             | ×                                   | ×            | ×                   | ×                      | Plain clothes without body armor     |
|    |                        | Insect bites                                                                                             | Allergic reaction                   | 3                     | 1            | 3           | Low Risk      | Regular spraying/pest control has not been carried out                                                                                                      | ×                                   | ×            | ×                   | ×                      | ×                                    |
| 3  | Grain Cleaning         | Exposure to dust with dust levels during the morning, afternoon and evening of 0.27mg/m <sup>3</sup>     | Eye irritation/ respiratory         | 3                     | 2            | 6           | Moderate Risk | There is only natural ventilation (windows without glass), there is no local vacuum system yet                                                              | ×                                   | ×            | ×                   | ×                      | Face masks, but no glasses           |
|    |                        | Electrical contact                                                                                       | Mild sting                          | 2                     | 3            | 6           | Moderate Risk | Cables and electrical connections are open, no obvious grounding system                                                                                     | ×                                   | ×            | ×                   | ×                      | ×                                    |
| 4  | Hulling                | Hands are on the move.                                                                                   | Finger/hand injuries                | 4                     | 4            | 16          | High Risk     | Some machines are not equipped with moving parts protection, SOPs have not been strictly implemented                                                        | ×                                   | ×            | ×                   | ×                      | Regular gloves (not anti-cut)        |
|    |                        | Hand entry into the machine                                                                              | Stuck in the machine                | 4                     | 4            | 16          | High Risk     | No automatic sensors or interlocks available, the machine can be accessed while operating                                                                   | ×                                   | ×            | ×                   | ×                      | ×                                    |
| 5  | Husk Separation        | Inhaled husk dust with dust levels during the morning, afternoon and evening of 0.27mg/m <sup>3</sup>    | Respiratory disorders               | 3                     | 2            | 6           | Moderate Risk | dust can be seen flying in the work area because there is no local vacuum system available and there is only natural air ventilation (Window without glass) | ×                                   | ×            | ×                   | ×                      | Plain cloth mask                     |
|    |                        | Exposure to noise with a noise level of 92 dB                                                            | Hearing loss                        | 2                     | 3            | 6           | Moderate Risk | Workers do not use ear protection                                                                                                                           | ×                                   | ×            | ×                   | ×                      | ×                                    |
| 6  | Polishing              | Machine friction                                                                                         | Minor burns                         | 2                     | 1            | 2           | Low Risk      | The machine is not equipped with heat or moving parts, workers do not wear hand PPE                                                                         | ×                                   | ×            | ×                   | ×                      | ×                                    |
|    |                        | Exposed to dust with dust levels during the morning, afternoon and evening of 0.27mg/m <sup>3</sup>      | Skin and respiratory irritation     | 3                     | 2            | 6           | Moderate Risk | dust can be seen flying in the work area because there is no local vacuum system available and there is only natural air ventilation (Window without glass) | ×                                   | ×            | ×                   | ×                      | Regular masks                        |
| 7  | Sorting                | Posture is not ideal                                                                                     | Muscle injury/MSDs                  | 3                     | 3            | 9           | High Risk     | The worktable cannot be height-adjusted, the monotonous working position without rotation                                                                   | ×                                   | ×            | ×                   | ×                      | ×                                    |
| 8  | Packaging              | Manual lifted                                                                                            | Back/knee injuries                  | 2                     | 3            | 6           | Moderate Risk | Sack lifting is done manually without lifting aids                                                                                                          | ×                                   | ×            | ×                   | ×                      | ×                                    |
|    |                        | Exposure to sharp tools                                                                                  | Minor puncture wounds               | 2                     | 2            | 4           | Moderate Risk | Workers do not wear gloves and the SOP for the use of sharp tools is not available                                                                          | ×                                   | ×            | ×                   | ×                      | ×                                    |
| 9  | Storage & Distribution | Sack drops                                                                                               | Affecting workers                   | 3                     | 4            | 12          | High Risk     | Highly stacked sacks without standard pallets                                                                                                               | ×                                   | ×            | ×                   | ×                      | ×                                    |
|    |                        | Slipping slipping on slippery floors                                                                     | Fall injuries                       | 2                     | 2            | 4           | Moderate Risk | Some areas of slippery floors are not marked with warning signs                                                                                             | ×                                   | ×            | ×                   | ×                      | ×                                    |

Based on **Table 4.8** of the current risk control in the company, it can be seen that most of the operational activities in the company have not implemented risk control optimally in accordance with the control hierarchy. The elimination and substitution approach, which should be a top priority in risk control, has not been implemented. The engineering control used is still as simple as natural ventilation, without the support of a mechanical ventilation system or an automatic vacuum cleaner. Meanwhile, administrative control is also still minimal, characterized by the absence of routine training, written SOPs, or work procedures that are carried out consistently. This shows that the workplace safety culture has not been fully established in the company's work environment.

On the other hand, the use of Personal Protective Equipment (PPE) is also not in accordance with the set standards. Most workers only wear makeshift PPE such as regular cloth masks or work clothes that do not fully protect. In fact, in some activities that have a high level of risk such as injury due to unprotected engine parts, there is still no adequate technical safety or training. This condition reflects that the Occupational Safety and Health (K3) management system is still not running effectively and requires improvements in the form of structured risk planning and the implementation of controls in accordance with standards.

Based on the results of the current risk control identification, it can be concluded that most operational activities still do not have adequate protections. Existing controls mostly rely only on natural ventilation and the use of personal protective equipment (PPE) that is not up to standard, without significant technical or procedural control efforts. This indicates that protection against potential hazards in the workplace is still very limited. As an improvement

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step, companies need to strengthen risk control based on the principle of control hierarchy. Below is **Table 4.9** of the determining control improvement and can be seen more clearly in **Appendix 7** of the Determining Control Improvement Table.

**Table 4.9** Determining Control Fixes

| Hazard Identification |                        | Risk Assessment Level                                                                                    |                                     |                |              |             | Determining Control |             |              |                                                                                                      |                                                                                                                                 |                                                                                                                 |                                                                                                                                                                                                                                                        |
|-----------------------|------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------|----------------|--------------|-------------|---------------------|-------------|--------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No                    | Sub-Activity           | Hazard                                                                                                   | Impact                              | Likelihood (L) | Severity (S) | Risk Rating | Risk Level          | Elimination | Substitution | Engineering Control                                                                                  | Administrative Control                                                                                                          | Personal Protective Equipment (APD)                                                                             | Regulasi                                                                                                                                                                                                                                               |
| 1                     | Grain Reception        | Inhalation of dust above threshold limit value (3 times/week, avg 8 hours/day) at 0.72 mg/m <sup>3</sup> | Mild to moderate respiratory issues | 3              | 2            | 6           | Moderate Risk       | ×           | ×            | Installing exhaust fan near dust source                                                              | Hazard awareness training before work, safety induction                                                                         | Mask N95 or 3-layer cloth mask with filter, face shield/anti-fog goggles                                        | Ministerial Decree No. 5 of 2010, Minister of Health Regulation No. 1405/MENKES/SK/XI/2012, PP No. 50 of 2012                                                                                                                                          |
|                       |                        | Struck by falling sack                                                                                   | Physical injury (bruises, etc.)     | 2              | 3            | 6           | Moderate Risk       | ×           |              | Trolley with lock wheels                                                                             | Standard wooden or plastic pallets, lifting aids such as hoists                                                                 | Safety shoes with anti-slip soles, nitrile gloves, knicker, or keelar                                           | Permenaker No. 5 of 2018, SNI ISO 45001:2018 on international standards for K3 management systems                                                                                                                                                      |
| 2                     | Drying (if necessary)  | Heat exposure                                                                                            | Dehydration, heat stroke            | 2              | 4            | 8           | High Risk           | ×           | ×            | Protective roof                                                                                      | Working time is set such as rotation shifts of up to 8 hours/day in very hot areas                                              | Heat-resistant long-sleeved clothing (cotton/polyester)                                                         | Permenaker No. 5 of 2018 concerning Occupational Safety and Health of the Work Environment                                                                                                                                                             |
|                       |                        | Tipping over tools                                                                                       | Physical injury                     | 2              | 2            | 4           | Moderate Risk       | ×           | ×            | Arrangement of work areas such as storage zones, marked pedestrian paths                             | Socialization of regulatory such as education on the importance of PPE, posture, safety induction videos                        | Safety shoes with anti-slip sole                                                                                | Permenaker No. 5 of 2018 concerning K3 Production Machinery, BO 12100/2012 Machine safety                                                                                                                                                              |
|                       |                        | Insect bites                                                                                             | Allergic reaction                   | 3              | 1            | 3           | Low Risk            | ×           | ×            | ×                                                                                                    | Insecticide spraying                                                                                                            | Heat-resistant long-sleeved clothing (cotton/polyester), insect repellent lotion                                | Decision of the Minister of Manpower Number 107/MEN/1999 concerning the control of hazardous chemicals in the workplace, Law No. 12 of 1997 concerning Plant Cultivation System                                                                        |
| 3                     | Grain Cleaning         | Exposure to dust with dust levels during the morning, afternoon and evening of 0.27mg/m <sup>3</sup>     | Eye irritation/ respiratory         | 3              | 2            | 6           | Moderate Risk       | ×           | ×            | ×                                                                                                    | Periodic cleaning                                                                                                               | N95 masks or 3-layer cloth masks with filters, protective goggles, safety goggles with ventilation and anti-fog | Permenaker No. 5 of 2010, Decree of the Minister of Health of the Republic of Indonesia No. 1405/MENKES/SK/XI/2012 concerning health requirements for the office and industrial work environment, Government Regulation No. 50 of 2012 concerning SMK3 |
|                       |                        | Electrical contact                                                                                       | Mild sting                          | 2              | 3            | 6           | Moderate Risk       | ×           | ×            | Grounding & insulation                                                                               | SOP for the use of the appliance                                                                                                | Insulation gloves                                                                                               | Permenaker No. 12 of 2015 concerning K3 Electricity, PUBL 2011 Electrical Hazards, SNI IEC 60364 on low-voltage electrical installation                                                                                                                |
| 4                     | Hulling                | Hands are on the move                                                                                    | Finger/hand injuries                | 4              | 4            | 16          | High Risk           | ×           | ×            | Machine guard                                                                                        | SOP for the use of Hulling machines and routine maintenance                                                                     | Anti-cut gloves, work apron                                                                                     | SNI ISO 45001:2018 - Occupational Safety and Health Management System Standards, SNI ISO 12100:2012 about machine safety                                                                                                                               |
|                       |                        | Hand entry into the machine                                                                              | Stuck in the machine                | 4              | 4            | 16          | High Risk           | ×           | ×            | Guard/Automatic sensor                                                                               | Hazardous areas marked as danger zones are given warning lines & signs                                                          | Anti-cut gloves                                                                                                 | SNI ISO 45001:2018 - Occupational Safety and Health Management System Standards, SNI ISO 12100:2012 about machine safety                                                                                                                               |
| 5                     | Husk Separation        | Inhaled husk dust with dust levels during the morning, afternoon and evening of 0.27mg/m <sup>3</sup>    | Respiratory disorders               | 3              | 2            | 6           | Moderate Risk       | ×           | ×            | Dust collector with HEPA filter                                                                      | Mandatory use of masks                                                                                                          | N95 masks or 3-layer cloth masks with filters, protective goggles, safety goggles with ventilation and anti-fog | Permenaker No. 5 of 2010, Decree of the Minister of Health of the Republic of Indonesia No. 1405/MENKES/SK/XI/2012 concerning health requirements for the office and industrial work environment, SNI on HEPA filter and dust control                  |
|                       |                        | Exposure to noise with a noise level of 92 dB                                                            | Hearing loss                        | 2              | 3            | 6           | Moderate Risk       | ×           | ×            | Noise reduction with dust silencer                                                                   | The duration of work is limited such as rotational shifts of up to 8 hours/day in noisy hot areas                               | Ear plug/ear with 25-30 dB sound cancellation                                                                   | Permenaker No. 5 of 2010, Decree of the Minister of Health of the Republic of Indonesia No. 1405/MENKES/SK/XI/2012 concerning health requirements for the office and industrial work environment, SNI on HEPA filter and dust control                  |
| 6                     | Polishing              | Machine friction                                                                                         | Minor burn                          | 2              | 1            | 2           | Low Risk            | ×           | ×            | Protective cover                                                                                     | SOP for the use of polishing and routine maintenance                                                                            | nitrile, knicker, or keelar gloves                                                                              | Permenaker No. 5 of 2018, SNI ISO 45001:2018 K3 Management System Standards                                                                                                                                                                            |
|                       |                        | Exposure to dust with dust levels during the morning, afternoon and evening of 0.27mg/m <sup>3</sup>     | Skin and respiratory irritation     | 3              | 2            | 6           | Moderate Risk       | ×           | ×            | Installing the exhaust fan near the dust source                                                      | Training on the use of PPE and education on the importance of PPE such as posture, safety induction videos                      | N95 mask or 3-layer cloth mask with filter                                                                      | Permenaker No. 5 of 2010, Decree of the Minister of Health of the Republic of Indonesia No. 1405/MENKES/SK/XI/2012 concerning health requirements for the office and industrial work environment                                                       |
| 7                     | Sorting                | Posture is not ideal                                                                                     | Muscle injury/MSDs                  | 3              | 3            | 9           | High Risk           | ×           | ×            | Ergonomic workbench with adjustable height                                                           | Work rotation & stretching such as correct working posture, training, weightlifting posture workshop, working muscle stretching | Back support belt (if necessary)                                                                                | Permenaker No. 5 of 2018 concerning ergonomics                                                                                                                                                                                                         |
| 8                     | Packaging              | Manual lift/drop                                                                                         | Back/neck injuries                  | 2              | 3            | 6           | Moderate Risk       | ×           | ×            | Trolley                                                                                              | Hair aids                                                                                                                       | Safety shoes, lifting belt (Working Sling)                                                                      | Permenaker No. 5 of 2018 concerning ergonomics, SNI ISO 11228-1 on manual lifting                                                                                                                                                                      |
|                       |                        | Exposure to sharp tools                                                                                  | Minor puncture wounds               | 2              | 2            | 4           | Moderate Risk       | ×           | ×            | ×                                                                                                    | SOP for serving sacks                                                                                                           | Puncture-resistant gloves                                                                                       | Permenaker No. 5 of 2018, SNI ISO 12100:2012                                                                                                                                                                                                           |
| 9                     | Storage & Distribution | Sack drops                                                                                               | Affecting workers                   | 3              | 4            | 12          | High Risk           | ×           | ×            | Standard wooden or plastic pallets                                                                   | FIFO system sack arrangement, heavy goods storage, break order                                                                  | SNI/ANSI standard helmet with safety strap, Safety shoes with anti-slip sole                                    | Permenaker No. 5 of 2018, SNI ISO 45001:2018, K3 regulations related to load storage                                                                                                                                                                   |
|                       |                        | Slipping/slipping on slippery floors                                                                     | Fall injuries                       | 2              | 2            | 4           | Moderate Risk       | ×           | ×            | Anti-slip flooring such as rubber-coated flooring or anti-slip ceramics, equipped with marking lines | Warning boards, hygiene                                                                                                         | Safety shoes with anti-slip sole                                                                                | Permenaker No. 5 of 2018, SNI ISO 45001:2018, Housekeeping and Slip Hazard Control Rules                                                                                                                                                               |

Based on **Table 4.9** Determining Control improvement, a thorough analysis of potential risks that arise in each stage of the work process can be carried out, from grain receipt to distribution process. This analysis illustrates how each activity has a different level of risk, and how control is carried out through elimination, substitution, engineering control, administration, and the use of personal protective equipment (PPE) approaches.

In the grain receiving process, two main potential hazards were identified: inhalation of dust that can cause respiratory distress (Moderate Risk) and the risk of being hit by a sack that can cause physical injury (Moderate Risk). Prevention for dust includes the installation of exhaust fans, the use of N95 masks, and protective goggles, while control for the risk of being hit by a sack includes the use of trolleys and safe lifting procedures. In the drying process, the danger of exposure to heat that can cause heatstroke is categorized as High Risk and can be controlled with a protective canopy and proper setting of working hours. At the grain cleaning stage, the risk of fine dust and particles irritating the eyes as well as respiratory distress is categorized as Moderate Risk and can be prevented with the use of N95 masks, protective goggles, and adequate ventilation.

In hulling, the two highest risks were identified: hands being exposed to moving machines and hands entering the machine (High Risk). Controls involve the installation of machine guards, the use of anti-cut gloves, and machine use training. In husk separation, the risk of husk dust that can cause respiratory distress and allergies, as well as the sound of the blower that can damage hearing, both of which are at risk of Moderate Risk, can be controlled with N95 masks, dust collectors, and earplugs. In the spraying process, potential hazards

include burns due to engine friction (Low Risk) and skin irritation as well as respiratory distress due to dust (Moderate Risk), which can be minimized with PPE training.

In sorting & sorting, the risk of unergonomic posture (High Risk) can be overcome with ergonomic desks, work rotations, and posture training. In packaging, the risk of back or knee injury (Moderate Risk) due to manual lifting can be overcome with ergonomics training and the use of assistive devices. The risk of minor puncture wounds due to sharp tools when sewing sacks (Moderate Risk) can be minimized by the SOP for sewing sacks and the use of puncture-resistant gloves. In storage and distribution, the risk of serious injury due to falling sacks (High Risk) can be avoided by the use of safe multi-level storage shelves, while the risk of slipping due to slippery floors (Moderate Risk) can be controlled by installing anti-slip flooring.

Based on the results of the identification and analysis of Occupational Safety and Health (K3) risks from all stages of the rice production process, starting from grain receipt to storage and distribution, it can be concluded that each stage has different potential hazards with varying levels of risk. In the early stages, namely grain receipt, the main danger comes from slippery and narrow road conditions that can cause vehicles to slip or crash accidents, as well as the risk of falling when picking up grain from the car, these risks are generally in the medium category.

Furthermore, at the grain cleaning stage, workers are exposed to fine dust and particles that can cause eye irritation and respiratory distress, as well as the risk of mild electric shock from the blower device. This risk is categorized as moderate risk and can be controlled with the use of masks, eye protection, and regular maintenance of equipment. Entering the hulling process, the risk level increases to high due to the potential for serious injury such as pinched fingers or hands entering the machine. This process requires optimal machine safety and strict job training to avoid severe accidents.

The husk separation stage poses a moderate risk that comes from exposure to husk dust that can cause respiratory distress and allergies, as well as the sound of the blower engine that can damage hearing if you do not use ear protection. At the polishing stage, the risk is still moderate to low, but it is still necessary to be careful, especially exposure to dust and engine friction which can cause irritation and minor injuries. Risk control is carried out through the installation of exhaust fans and the use of proper PPE.

The sorting and sorting stages indicate a high risk of unergonomic working posture, which can lead to muscle injuries and musculoskeletal disorders. Therefore, the application of work ergonomics such as the use of adjustable desks and work posture training is very important to be carried out. Furthermore, in the packaging process, risks are emerging due to manual lifting that can injure the back or knee, as well as potential injuries from sharp tools. For this reason, the use of lifting aids and ergonomics training is an important mitigation step.

In the final stage, namely storage and distribution, a high risk was found due to the potential for sacks to fall and fall on workers, as well as a moderate risk of possible slipping due to slippery floors. The use of safe storage shelves and stable goods storage systems, as well as anti-slip flooring and PPE such as helmets and safety shoes are indispensable to minimize the risk of work accidents.

Overall, the rice production process involves a variety of activities that have potential physical and ergonomic hazards with risk levels ranging from low to high. Therefore, it is important for companies to consistently implement a comprehensive K3 program, starting from

technical control engineering, provision of appropriate PPE, routine job training, to structuring a safe and ergonomic work environment, to ensure the safety and health of all workers at every stage of the work process.

## CONCLUSION

Based on the results of the study, it can be concluded that this study has succeeded in identifying various potential occupational hazards at each stage of the production process in the Production Division of the rice mill plant, using the HIRADC approach. The risk assessment shows that most of the risks are in the Moderate Risk category, with some high risks such as the process of peeling the skin and storing sacks that have the potential for serious injury. This research also succeeded in formulating risk control measures, such as the installation of machine guards, the regulation of the work environment, as well as occupational safety training and the use of personal protective equipment (PPE). The results of this study provide a comprehensive overview of work risks and mitigation solutions to create a safer and healthier work environment. The suggestions given include the implementation of a structured K3 Management System, routine training for employees, installation of safety signs, ergonomics improvements in the work area, improvement of ventilation systems, and regular maintenance of production machinery. In addition, periodic re-evaluation of HIRADC and the provision of health facilities are also recommended to improve occupational safety in the Production Division of rice milling plants.

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