CHAPTER I INTRODUCTION

I.1 Background

The development of Indonesian industry in the modern era of globalization seems to be accelerating. This is supported by advances in science and technology, as well as the opportunity and freedom to learn a lot about the latest things. This technological advancement is utilized by many companies and institutions that wish to improve their performance and productivity by using sophisticated technical equipment with high-quality raw materials and resources. Progress in the industrial sector can cause several negative consequences, including work accidents. Occupational accidents can affect many factors, including job loss, care, and medical costs, decreased production quantity and quality, and people suffering injuries, disabilities, and even death. Figure I.1 shows that the number of work accidents in Indonesia continues to increase from 2017 to 2022.

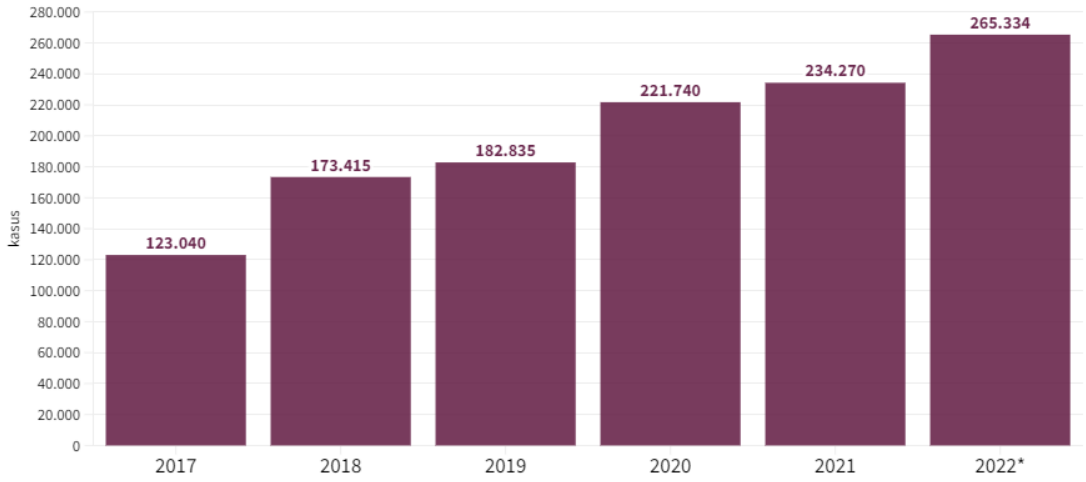

Figure I. 1 Number of Work Accidents in Indonesia (2017-2022)

(Source: Pratiwi, 2023)

There are so many factors that cause accidents, and to prevent and minimize accidents, the factors that cause accidents need to be managed properly. Accurate and programmed numerical data is important for every company to provide accurate and useful information about work accidents. In an operational activity, occupational safety and health is very important in all sectors, from traditional to modern. In the current transitional conditions, where production processes in various industries are in full swing, it will give rise to new habits, which will create new problems and need to be handled carefully before they cause various consequences. Things like work accidents can be a big problem for the company, both internally and externally, in terms of morale and material costs related to medical expenses and production delays.

Therefore, in dealing with occupational safety and health risks, companies must anticipate things that have the potential to cause accidents. Work accidents often occur in industries that use manual or high-tech machines or work equipment. Companies need to take preventive measures against work accidents. Efforts to prevent work accidents can take the form of equipment management, administrative control, and the procurement of personal protective equipment. All of these controls are carried out to achieve the company's goal of "zero accidents." By avoiding work accidents, companies take steps to bring available resources within the company. If the company is in a condition where an accident does not occur that makes the worker unable to work for 2 x 24 hours and results in a cessation of the process or damage to equipment without loss of life, the loss of working time does not exceed the next shift and a certain number of working hours. The basic law of implementing a zero-accident program in the workplace

- Law No. 1 of 1970 concerning work safety.
- Law No. 13 of 2013 concerning Manpower.
- RI Minister of Manpower No. 5 of 1996 concerning the Occupational Health and Safety Management System.

PT Pindad is a company engaged in the manufacturing industry, services, and trading of defense and security products and industrial products to be able to independently provide the main equipment needs of the Armament Systems, support the defense and security of the Republic of Indonesia, and increase the company's potential to get good business opportunities. ensure the future of the company through internal and external synergies as the company's goal.

Given that PT Pindad is a company engaged in the manufacturing industry, which involves the production process as well as a lot of critical operational work, this raises concerns regarding the continuity of the activity process, where it is possible to cause work accidents ranging from minor accidents such as scratches and slipping, which cause minor injuries, to major accidents such as being hit by an iron on the head, which causes serious injuries and even death.

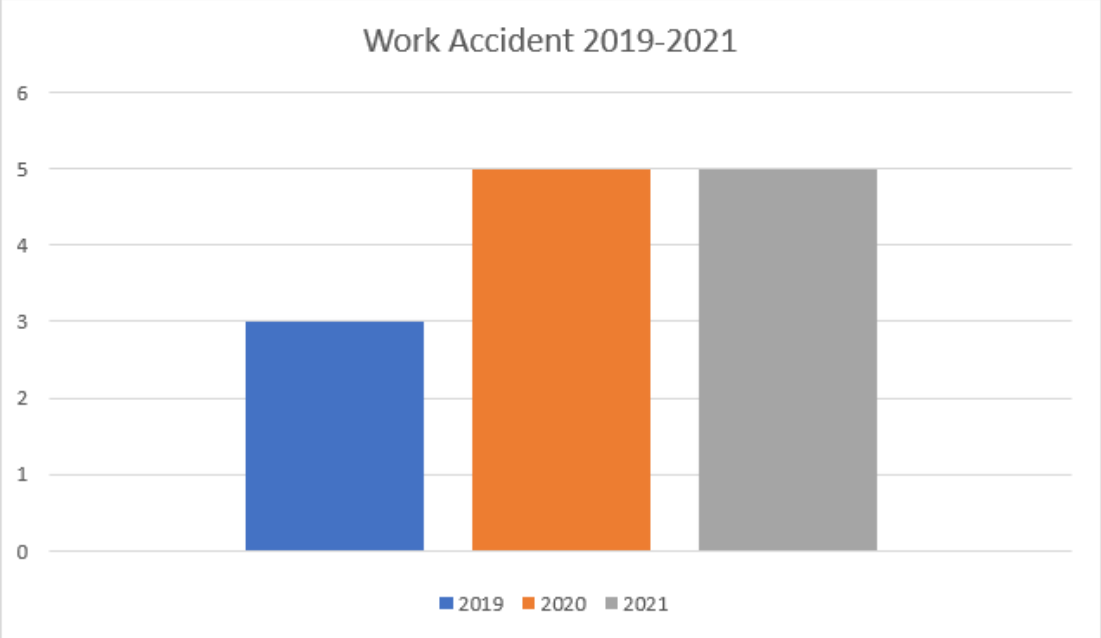

Figure I. 2 Work Accidents 2019 – 2021

(Source: PT Pindad, HSE Division)

In the range from 2019 to 2021, PT Pindad experienced a significant increase in the number of accidents that occurred within its company environment. This increase is a deep issue and requires serious attention from various related parties. This phenomenon illustrates the challenges faced by companies in maintaining the safety and welfare of employees and visitors in the company area. Various aspects may have influenced the trend of increasing accident rates during this period. Internal factors such as inadequate supervision and poor adherence by employees to safety protocols.

For three consecutive years, from 2019 to 2021, PT Pindad has faced serious challenges related to work accidents in the company environment. The data shows that in 2019, there were three work accidents that occurred at their workplace. While this number may seem relatively low, this accident has served as a warning to companies about the importance of prioritizing the safety and well-being of their employees. In 2020, the number of work accidents will increase to five incidents. This increase shows that the company's efforts to minimize the risk of accidents have not yielded the expected results. There may be several factors causing this increase, such as a lack of adherence to safety protocols or perhaps external factors affecting working conditions.

In 2021, because there are still five incidents of work accidents. This shows that although PT Pindad may have made great efforts to improve safety and reduce the risk of accidents, these challenges have not been completely overcome. In a situation like this, it is very important for the company to carry out an in-depth evaluation of the causes of the accidents that occurred during the three years. Possible gaps in training, supervision, or perhaps work culture that need improvement need to be carefully analyzed. PT Pindad also needs to involve all related parties, including employees and management, to design and implement effective solutions to ensure safety is a top priority in their work environment.

Occupational accidents in the transportation infrastructure division, particularly in the assembly process for welding 50 kg gas cylinders, are an issue that requires serious and in-depth attention. Occupational accidents can have a detrimental impact not only on the welfare of workers but also on product integrity, the environment, and the image of

safety in the industry. The background of work accidents in the assembly process of welding 50-kg gas cylinders includes several important reasons. The gas cylinder assembly welding process involves a variety of high-risk activities. Accidents at this stage can cause serious injury or even the loss of life for the workers involved. This condition requires an in-depth understanding of work risks and the need to implement safe work practices. Occupational accidents often occur due to non-compliance with established safety guidelines and procedures. This may be due to a lack of understanding, inadequate training, or even negligence. In some cases, accidents occur due to a lack of adequate supervision or training for workers involved in the assembly welding process. This indicates the need for a stronger supervisory role and improvements in safety training.

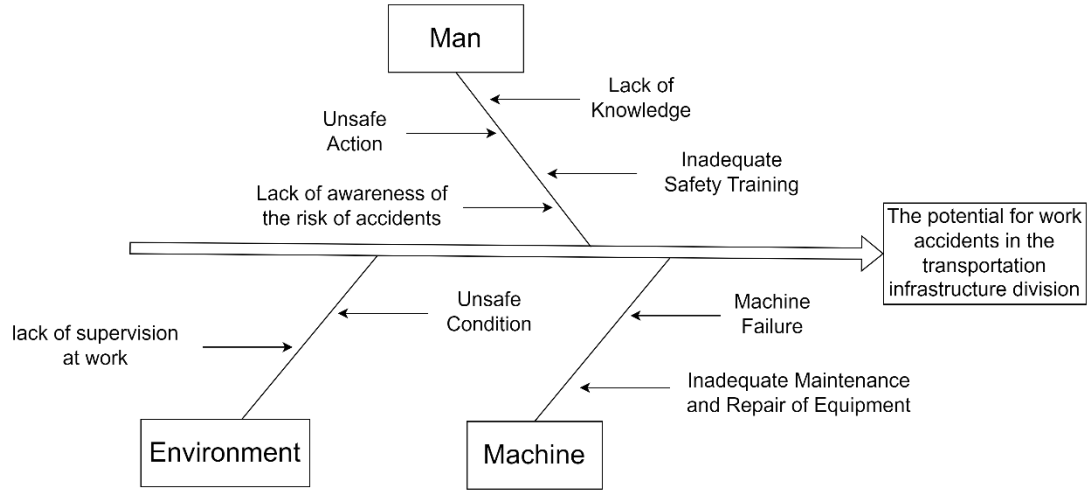

Figure I. 3 Fishbone Diagram

In the context of work accidents at PT Pindad, the diagram above shows several categories of potential factors that can contribute to work accidents at PT Pindad during the period 2019–2021. Each category has specific factors that can cause work accidents. This fishbone diagram can assist in identifying and analyzing factors that need further attention in an effort to improve safety and reduce the risk of accidents in the corporate environment. By using a fishbone diagram, PT Pindad can identify

various factors that cause accidents and take appropriate actions to reduce the risk of work accidents in their workplaces.

The table below shows alternative solutions that can be taken to overcome each of the factors that cause work accidents. Each solution can be adapted to the specific conditions and needs of PT Pindad and needs to be considered carefully before being implemented.

Table I. 1 Alternative Solution

No	Causative Factor	Alternative Solution
1	Lack of Knowledge	• Increase training and socialization of safety protocols. • Perform comprehension tests periodically.
2	Lack of Compliance	• Implement routine monitoring and inspection systems. • Apply sanctions to violations.
3	Non-compliance with Safety Policy	• Increase safety training. • Redesign a safe work environment layout.
4	Inadequate Training	• Design a comprehensive and scheduled training program. • Involve employees in designing training materials.
5	Lack of awareness	• Implement regular safety campaigns • Create rewards for employees who contribute to safety.

6	Inadequate Maintenance and Repair of Equipment	• Scheduled maintenance programs. • Training for Maintenance personels

By combining these alternative solutions, PT Pindad can achieve a safer work environment, reduce the risk of accidents, and improve the overall welfare of employees.

I.2 Problem Formulation

1. What are the risks and causes of events from sources that have the potential to cause high-risk factors in the assembly process for welding 50 kg gas cylinders at the Transportation Infrastructure Division?
2. What are the proposed alternative OHS risk management measures to prevent work accident problems from occurring in the assembly process for welding 50 kg gas cylinders at the Transportation Infrastructure Division?

I.3 Purpose of Research

Based on the formulation of the problems set, the following are the objectives of the research to be carried out:

1. Identify OHS risks and causes of OHS risk events against sources that have the potential to cause risk factors applied at PT Pindad, Transportation Infrastructure Division, assembly process for welding 50 kg gas cylinders.
2. Provide recommendations for improving OHS risk management actions so that work problems that occur can be overcome at PT Pindad, Transportation Infrastructure Division, for the assembly process for welding 50 kg gas cylinders.

I.4 Benefits of Research

1. For Authors

   This research is a means for the author to increase knowledge and apply the knowledge that has been obtained while taking the Industrial Engineering Study Program, especially related to the specialization in Quality System Engineering.

2. For Companies/Institutions

   Obtain suggestions regarding OHS risk management based on what is expected by employees.

3. For Readers

   This research report can be used to gain additional knowledge and insight about the object taken. In addition, it can be used as a reference if the author conducts other research.

I.5 Writing System

In this study, the systematic presentation of the writing is as follows:

CHAPTER 1 INTRODUCTION

This chapter contains the background of the problem, the identification of the problem, the aims and objectives of the research, the limitations of the problem, and the systematics of writing.

CHAPTER II THEORETICAL BASIS

Chapter II contains a description of the study of literature related to research. It consists of an explanation of the theories and methods that support the process of preparing this final project.

CHAPTER III RESEARCH METHODOLOGY

Chapter III contains an explanation of the systematic problem-solving model of this study, which includes the data collection stage consisting of primary and secondary data, the data processing stage, the design stage, the analysis stage, and the conclusions and suggestions stage.

CHAPTER IV COLLECTION AND PROCESSING OF DATA

Chapter IV contains an explanation of the process and results of data collection. The data processing carried out is hazard identification, risk assessment, and risk control using HIRARC.

CHAPTER V ANALYSIS

This chapter V contains the verification and validation of the design of proposed controls that have previously been assessed using HIRARC. In addition, this chapter also contains an analytical description of the proposed design of occupational safety and health controls.

CHAPTER VI CONCLUSIONS AND SUGGESTIONS

Chapter VI contains conclusions that answer the formulation of the problems that have been made and contains suggestions for the company and future researchers.