Work Accident Analysis Using Hirarc Method (Hazard Identification, Risk Assessment And Risk Control) In Maintenance Division CV. Prosperous Utama Dira

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ABSTRACT

Human resources are an important asset in a company and need to be developed. Human resource development is related to the performance generated in achieving the company's targets. The sustainability of human resource performance cannot be separated from work accidents. Many factors often cause work accidents such as: human error, electric shock, etc. This study aims to identify potential hazards, calculate risk level values, analyze the results of risk assessment calculations, and propose controls and solutions to reduce potential hazards and work accidents. The research was conducted in the maintenance division of CV. Main Director of Prosperity. It's a manufacturing company engaged in the field of line pipe. The research was conducted using the Hazard Identification, Risk Assessment, and Risk Control (HIRARC) method. The results showed that there were 9 potential hazards, namely collision on the feet or head, electric shock, falling from the pipeline, pinched between pipelines, chemical explosion, hands hit by hot pipes, splashed by material, hands hit by drill bits, and slipped until the leg is sprained. The results of the risk level assessment that 11.1% fall into the category of low risk and extreme, 33.3% moderate risk, and 44.4% high risk. For risk control, it is proposed by elimination, administrative control, engineering control, and the use of Personal Protective Equipment (PPE). The results of the risk level assessment that 11.1% fall into the category of low risk and extreme, 33.3% moderate risk, and 44.4% high risk. For risk control, it is proposed by elimination, administrative control, engineering control, and the use of Personal Protective Equipment (PPE). The results of the risk level assessment that 11.1% fall into the category of low risk and extreme, 33.3% moderate risk, and 44.4% high risk. For risk control, it is proposed by elimination, administrative control, engineering control, and the use of Personal Protective Equipment (PPE).

Keywords : Work Accidents, Line Pipe Company, HIRARC Method.

INTRODUCTION

Human resources are very important assets in the company. Human resources have a function as a driver in a company that must be trained and developed (Susan, 2019). The development of these capabilities is related to the performance produced in achieving the company's targets. On the sustainability of the performance of human resources can not be separated from the danger of work accidents. A work accident is an unexpected and unplanned event that can disrupt the continuity of the company's production process, injure people, damage the environment, or company property and assets (Triswandana, 2020). Several factors that often cause work accidents are human error, electric shock, and falling objects from a certain height (Soekiswara, 2020). The impact of work accidents also varies from minor injuries due to tripping over materials to major accidents resulting in death. To prevent work accidents and the diseases they cause, companies need to pay attention to the

occupational safety and health system.

The occupational safety and health management system (SMK3) is an effort to implement a structured, planned, measurable and integrated occupational safety and health to prevent work accidents, increase the effectiveness of occupational safety and health protection, and create a comfortable workplace (Srisantyorini & Safitriana, 2020). Application SMK3 aims to reduce and prevent accidents that result in injury or material loss (Ihsan et al., 2016).

CV. Dira Utama Sejahtera (DUS) is a manufacturing company engaged in sub-contracting line pipe work at PT. Wilmar Nabati Indonesia Gresik. CV. Dira Utama Sejahtera was established 12 years ago with an ineffective OHS management system. This can be seen in the application of personal protective equipment (PPE) which is still not optimal for its employees, especially in the maintenance division. On CV. Dira Utama Sejahtera, his main job is related to the fabrication process, which is directly related to the marking, cutting, grinding, fit-up, welding, and painting processes which have a high risk of work accidents and are dangerous for workers. However, the company does not have a specific program to prevent and reduce accidents in the fabrication process. Based on interviews with the manager CV. Dira Utama Sejahtera, in 2021 there were still 94 work accidents.

The results of interviews with the manager CV. Dira Utama Sejahtera is also known for the impact of the work accident, which causes workers to suffer minor injuries so that they cannot work for a certain period of time. Workers who cannot work for a certain period of time. This also resulted in a loss for the company, namely the company was unable to complete the work on time due to the late completion of the work due to the absence of workers who at that time could not be backed up by other workers at the same time. The next identified problem is the low awareness of the importance of the OHS system in the company so that there are still unsafe working conditions, such as: puddles of water around welding sites, and so on. This means the application of occupational safety and health on CV. DUS has not been implemented properly so that a deeper analysis is needed regarding the identification of factors that lead to the risk of work accidents.

Fatimahhayati et al. (2019) conducted a similar study related to K3 using the HIRARC method in the tofu and tempeh industry in Selili Village, Samarinda and it was found that there were 95 potential hazards in tofu manufacture with 66.3% being a low risk category, 23.2% a low risk category. medium risk, and 10.5% high risk category. Risk control is carried out by using PPE and installing warning signs in every corner of the production room. Another previous research conducted by Karundeng et al. (2018), namely the analysis of hazards and risks of work accidents at PT. Samudera Mulia Abadi Likupang North Minahasa using the HIRARC method. The results obtained are 2 types of risk in the high category, 3 types of risk in the medium category, and 1 type of risk in the low category. Control is carried out by engineering,

Based on the preliminary explanation, a more in-depth analysis of work accidents, hazards, and risks is carried out in CV. Dira Utama Sejahtera uses the HIRARC method. The HIRARC method is a process of identifying hazards (Hazard Identification) that can occur in all company activities by conducting a risk assessment (Risk Assessment) and then carrying out risk control (Risk Control) in order to reduce the level of risk (Gunawan & Bendatu, 2015). The HIRARC method was chosen in this study because it is simple and easy to understand, can be applied to changing processes, and the results of the analysis can be used as material for future audits and training of new workers (Mayadilanuari, 2020). The purpose of this study was to identify potential hazards in the maintenance division of CV. Dira Utama Sejahtera, calculates the value of the risk level, analyzes the results of the risk assessment calculation, and proposes controls and solutions to reduce potential hazards and work accidents at CV. Main Director of Prosperity.

Method *Hazard Identification, Risk Assessment, and Risk Control (HIRARC)*

The HIRARC method is an approach that begins with determining work activities for further identification of hazard sources so that risks are obtained, then risk assessment and risk control are carried out to minimize hazards in each type of work activity (Trisaid, 2020). The HIRARC method consists of three processes, namely Hazard Identification, Risk Assessment, and Risk Control.

Hazard Identification (Hazard Identification)

Hazard Identification is the first step or step in the HIRARC method. Hazard identification is

carried out by examining each work area in the form of hazard identification which aims to identify all the hazards that exist in a job (Giananta et al., 2020). This means that identification is carried out thoroughly in each work area so that the results obtained can later be used as a reference in minimizing the potential hazards that occur. The more complex the identified hazards, the easier it will be to determine control and minimize the occurrence of accidents in the work area.

Risk Assessment

After the hazard identification has been carried out, the next step in the HIRARC method is a risk assessment. Risk assessment is carried out by considering the possibility of occurrence of the event (likelihood/probability) and the impact of the event (consequence/severity) (Afredo & Tarigan, 2021). Risk Assessment aims to identify the value of the potential risk of work accidents (Dwisetiono & Fairussihan, 2022). Risk assessment is usually inseparable from the standards used, one of which is the AS/NZS 4360 standard. The likelihood/probability and severity/consequence parameters according to the AS/NZS 4360 standard are as follows:

Table 1. Likelihood or Probability Parameters

Level	Description	Information
5	*Almost Certain*	Happens every time
4	*Likely*	Often occur
3	*Prossible*	Happens occasionally or occasionally
2	*Unlikely*	Rarely happening
1	*Rare*	Almost never happened

Source: (Standard AS/NZS 4360, 2004)

Table 2. Parameter Severity or Consequence

Level	Description	Information
1	*Insignificant*	No injuries found, small financial losses
2	*Minor*	Injuries in the minor category, small financial losses
3	*Moderate*	Injuries in moderate to necessary category medical treatment, financial loss is quite large
4	*Major*	Injury in the severe category and occurs in more than 1 person, a big loss to have an impact on disturbance production activities
5	*Catastropic*	There is a death toll of more than 1 person, the losses incurred are very large, disrupting the whole process company activities, the impact is very broad in the company

Source: (Standard AS/NZS 4360, 2004)

After assessing the likelihood and consequence, the risk level is then determined. Risk assessment can be done by looking at the probability and impact matrix (Saputro & Lombardo, 2021). The risk matrix table according to the AS/NZS 4360 standard is as follows:

Tabel 3. Risk Matriks

Almost Certain	H	H	E	E	E
Likely	M	H	H	E	E

Prossible	L	M	H	E	E
Unlikely	L	L	M	H	E
Rare	L	L	M	H	H

Source: (Standard AS/NZS 4360, 2004)

Information:

L	*Low Risk*	H	*High Risk*
M	*Medium Risk*	E	*Extreme Risk*

Risk Control

The last stage in HIRARC is risk control, namely controlling the identified risks starting from the highest level of risk to the lowest level. In risk control, there are 5 types of control that can be done, namely eliminating hazardous work (elimination), replacing hazardous materials or processes (substitution), changing hazard transmission lines (engineering control), modifying the interaction between workers and the environment (administrative control), and Personal Protective Equipment (PPE) (Saputro & Lombardo, 2021).

METHOD
Activity Plan

The research was conducted using a quantitative descriptive approach, namely describing the results of data processing carried out by the HIRARC method. The object of research is the maintenance division of CV. Main Director of Prosperity. The method of data collection is by direct observation to the field and interviews with management.

The first step in the research is to identify problems in the CV. Dira Utama Sejahtera by going directly to the field (field studies) accompanied by a literature study, namely reading some literature related to the research topic. Furthermore, the identification results are formulated and then continued with data collection, namely primary data in the form of accident history data during the 2021 period, namely January 2021-September 2021 and secondary data in the form of information from interviews with the company.

The next step is to perform data processing using the HIRARC method. The first step in data processing is the identification of hazards in the CV maintenance division. Main Director of Prosperity. Then a risk assessment is carried out and the results of the risk assessor are analyzed further.

The next step is to control risk by proposing solutions that can be taken by the company in minimizing the risk of work accidents. After the proposal recommendation process is complete, the results of the research that have been carried out are then concluded.

Research Sites

The research was carried out at CV. Dira Utama Sejahtera which was established 12 years ago is located on Jl. Captain Darmo Sugondo No. 56, Indro Legi, Gresik District, Gresik Regency, East Java 61124.

Data Types and Sources

The data used in this study consisted of two types of data, namely: Primary data includes observations or direct observations in CV. Dira Utama Sejahtera and Secondary Data include interviews with company experts. The results of the observations obtained data in the form of a history of work accidents in the period January 2021-September 2021, while the results of the interviews obtained data in the form of information regarding occupational safety and health conditions in CV. Main Director of Prosperity.

Methodology

The flow chart of the research methodology on problem solving in this study is as follows:
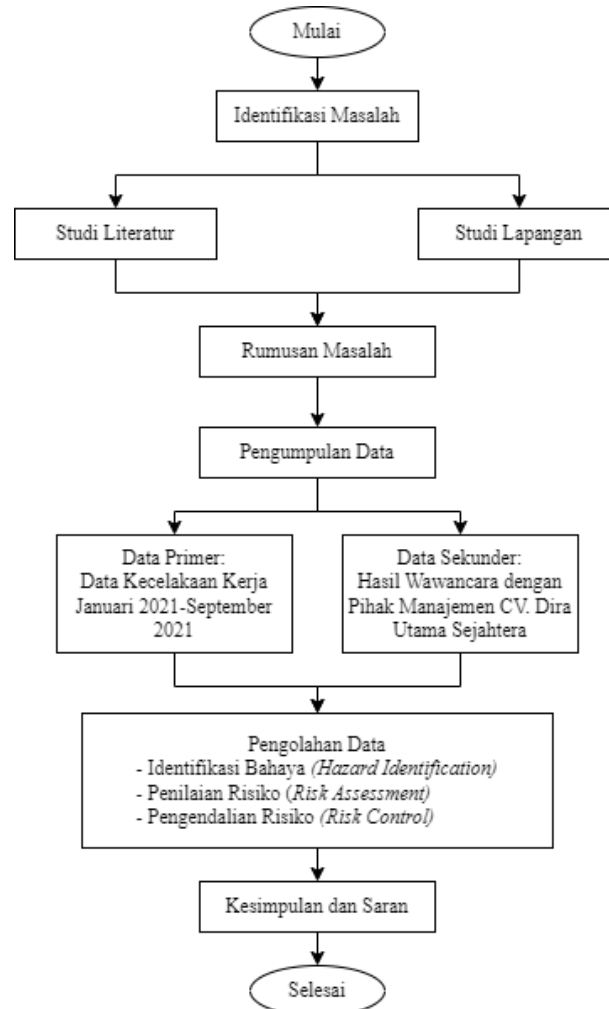
Figure 1. Research Methodology Flowchart

RESULTS AND DISCUSSION

The results and discussion will explain the results of the analysis using the HIRARC method starting from hazard identification, risk assessment, and risk control.

Hazard Identification (Hazard Identification)
Hazard identification is done to find out the potential danger of a material, tool, or system. The results of hazard identification in CV. The Main Director of Prosperity is as follows: The machine hazard factor also has 2 potential hazards that arise, namely the danger of lathes and welding which result in material splashes and the danger of drilling machines that are exposed to sharp drill bits. For environmental factors, there is 1 potential hazard, namely an environment that is not clean from liquids, resulting in workers who easily slip when passing through it.

Risk Assessment

After identifying the hazards, the next step is risk assessment. Risk assessment is carried out with the aim of knowing the level of risk of each potential hazard. Risk assessment is carried out by filling in

the likelihood and severity values. Filling in the values for the two parameters is done by brainstorming with company experts, namely workers in the maintenance division and managers in the Health and Safety Environment (HSE) field. The results of the risk assessment are as follows:

Table 4. Risk Assessment Results

Source of Danger	Potential hazard	Potential Risk	L	S	Risk Rating
Do not use Complete PPE	Impact on the leg or head due to falling material	bruises on the feet or head	2	2	Low
Not walking on the right path safe	Got electric shock	Burns	4	3	High
Improper work position	Falling off the track pipe	bruises	2	4	High
	Sandwiched between pipeline	bruises	2	3	Medium
Materials chemicalexplosive	Methanol chemical explosion	Burns, died	3	5	Extreme
Pipe material hot	Hand hit hot pipe	blistered hands, Burns	2	3	Medium
Dangers of lathes and welding	Material splash	Eye irritation	4	3	High
Danger of drilling machine	Hand hit drill bit	Incision wound	3	3	High
Presence of fluid scattered	Slip and foot sprain	bruises	2	3	Medium

In table 6 it can be seen that each source of danger has potential hazards and potential risks. Based on the results of the overall risk assessment, the results show that there are 11.1% of risks that fall into the low/low and extreme/extreme categories, 33.3% in the medium/medium risk category, and 44.4% in the high/high risk categories as described above.
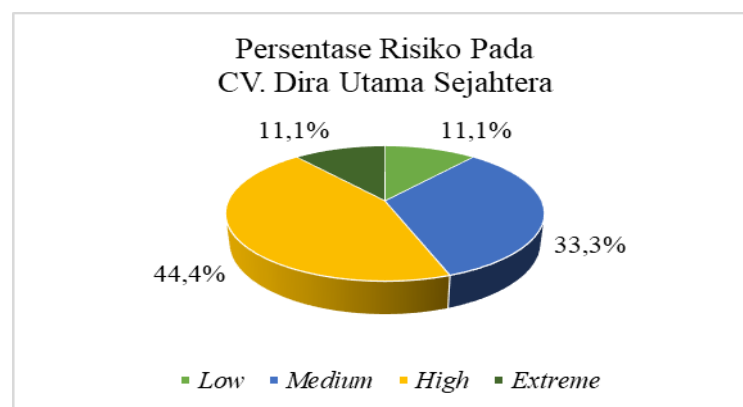
Figure 2. Percentage of Risk in CV. Main Director of Prosperity

Among the several levels of risk, the risk that has the largest percentage is the high category risk of 44.4% so that the source of danger that is included in the high risk must receive special handling and attention starting from human error, namely workers who do not walk on track. safety, improper working position, danger of lathe and welding machine, to danger of drilling machine.

In addition, risks with extreme levels must also get special treatment even though the percentage of risk is only 11.1% but the impact is very fatal, namely loss of life as shown in table 1, namely an accident in June 2021 in the form of an explosion of a methanol tank that killed 3 people. . In this case, even though the frequency of occurrence is not so great, the impact is very fatal, so it still has to get special attention and certain handling so that in the future there will be no recurrence of fatal work accidents.

Risks with other levels or levels also of course need to be handled. The risk with a low level has a percentage of 11.1% while the risk with a medium level has a percentage of 33.3%. Even though both of them have a small percentage, it doesn't mean they don't need to be considered and handled, both of them are still taking action because no matter how small the risk will still have an impact, both for the health and safety of workers.

Risk Control

The next stage is to carry out risk control or risk control. Risk control is carried out with the aim of minimizing the level of risk by providing control recommendations. The following are recommendations for risk control:

CONCLUSION

Based on research resultsWhat has been done can be concluded that there are 9 potential hazards in the CV maintenance division. Dira Utama Sejahtera (DUS) is an impact on the leg or head, electric shock, falling from a pipe line, being squeezed between a pipeline, chemical explosion, hand hit by a hot pipe, splashed by material, hand scratched by a drill bit, and slipped to the foot sprained. From some of these potential hazards, a risk assessment was then carried out and the results of the risk level values were 11.1% included in the low and extreme risk categories, 33.3% moderate risk (medium), and 44.4% high risk (high). The largest percentage is high risk, namely 44.4% which comes from the source of the danger of workers who do not walk on a safe path, improper working position, danger of lathe and welding machine, to danger of drilling machine so that the source of the danger is necessary to get treatment. and special attention. In addition, extreme risks also need to be paid special attention to, although the percentage of risk is only 11.1%, the impact is very fatal, namely taking the victim to death. As for risk control, it is proposed or recommended based on potential hazards and potential risks, namely through elimination by eliminating the liquid that is scattered on the production floor. Engineering control by providing a protective board on the lathe, repairing the methanol chemical storage area, and closing the chipped cable. *Administrative control*by making warning boards, posters, providing training and sanctions to K3 violators, briefings and evaluations, providing SOPs, and establishing safe lines in vulnerable areas. PPE is done by urging to always use complete PPE.

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