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ANALYSIS OF POTENTIAL HAZARDS FOR PALM OIL MILL PRODUCTION WORKERS USING THE (HIRARC) METHOD IN PT. X

Tri Niswati Utami *, Mutiara Ashifa, Yusuf Syahputra Siregar, Ella Asri Fauziah, Fatma Salsabila, Priska Karina Nasution, Nurly Fadilah
Faculty of Public Health, Universitas Islam Negeri Sumatera Utara
Jl. Lap. Golf No. 120, Kab. Deli Serdang, 20353, Medan, Sumatera Utara, Indonesia
Email: triniswatiutami@uinsu.ac.id

Abstrak

The production process in palm oil mills is inseparable from potential hazards in the workplace such as the FFB Receiving Station area (Scales, Sorting/Loading ramp), then the Boiling Station (Sterilizer), the Grinding Station (Threshing/Theresser/autofeeder), the Felt/Pumping Station (Screw Press, Slamming Station, Clarification Station, CPO Storage Tank (Storange Tank), Boiler Station and Engine Room Station (Power House), Demint Plant Station. Efforts that can be made are by conducting risk management through the identification of potential occupational safety and health hazards, using the HIRARC method. The goal of HIRARC is to recognize potential hazards and various operational problems in each process. Based on the risk assessment, there are four categories of risk levels identified, namely risk levels, namely Low Risk, Modarate Risk, High Risk, and Extreme Risk. The risk rating provides a level for each risk category, which results in the most dangerous risk, namely the Stockpile Tank Station and Engine Room get a level of 15 High Risk, then at the Boiling, Slamming, Clarification, Steam Boiler Station get a level of 12 High Risk. Risk Control that must be carried out on potential hazards at PT. X is Required to Wear Complete PPE that has been given (gloves, anti-slip shoes, mask, ear plug/ear, helmet, safety glasses), Obey signs, Work according to SOPs and Work instructions, clean the workplace area, monitor to work according to procedures, Carry out periodic Maintanetance, and the author hopes that at PT. X establishes new policies and regulations for workers by providing penalties such as issuing first warning letters or fines for workers who do not comply with SOPs and do not wear PPE. Instead, appreciation is given to workers who comply with SOPs and use PPE properly and correctly.

Keywords: CPO, HIRARC, Identification, Risk Assessment

Introduction

Currently, many palm oil mills have been established, causing increasingly fierce competition that requires companies to increase all the resources they have to produce quality products. One of the factors that determine to achieve quality products is Human Resources (HR) or workers owned by the company, which of course is always related to problems related to safety and health at work. All jobs have a risk of danger or potential accidents in the work area. The high or low risk depends on the company's innovation which is intended to anticipate incidents and work accidents in the industry (Saputra & Putra, 2022). The factors that cause industrial accident incidents are because the work environment and labor are not in safe conditions (human negligence) in paying attention to their occupational safety and health (Nita, Musnadi, Fahlevi, & Yarmaliza, 2022)

PT X is a company operating in the oil palm processing/producing sector, which is essentially crude palm oil CPO or Crude Palm Oil. In producing or processing it, PT. X has 62 employees/workers

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occupying several stations. The production process starts at the FFB Receiving Station (Weighing Station, Sorting Station/Loading ramp), then the Boiling Station (Sterilizer), the Grinding Station (Threshing/Theresser/autofeeder), the Felt/Pumping Station (Screw Press, Slamming Station, Clarification Station, CPO Storage Tank (Storange Tank), Boiler Station and Engine Room Station (power house), Demint Plant Station. The process at each station uses equipment and machines that have the potential to be dangerous for workers or employees. It is necessary to carry out control to reduce the risk of work accidents in every production process. One way is to implement risk management through the identification of potential occupational safety and health hazards. (Purnamasari, 2020).

The hot work environment, the noise of unsafe work area conditions, and the existence of various complaints from workers prompted the researcher to conduct this study. From the results of observations and interviews conducted by researchers in carrying out production at PT. X there are problems in occupational safety risks, one of which is the risk of danger that has occurred in the form of slipping, being exposed to hot steam, being pinched at the boiling station. From these problems, the author decided to use the HIRARC method to identify occupational safety risks and explore the most likely risks. The HIRARC method is used to identify potential hazards in production activities and conduct risk assessments, as well as control existing risks (Alfaret & Fadhilah, 2021). By adopting the Hazard Identification Risk Assessment Control (HIRAC) method, it is hoped that efforts to prevent work accidents in the company can be more effective, and these risks can be avoided and overcome with appropriate steps (Afredo & Tarigan, 2021).

Method

The time of this research will be carried out from September 18, 2024 to October 2, 2024. At PT X and data taken from interviews, literature studies, observations or observations are directly analyzed.

The method used for this study is HIRARC (Hazard Identification, Risk Assessment and Risk Control) method of identification, hazard analysis, assessing potential hazards and risk control used to reduce the occurrence of work accidents.

Table 1. Consequence Criteria

Level	Explanation
1	No injuries, minor material losses
2	Minor injury/P3K, moderate material loss
3	Lost working days, Considerable losses
4	Defects, major material losses
5	Death, material losses are huge

Table 2. Likehood Criteria (Opportunity)

Level	Explanation
1	Rare
2	It is unlikely to happen/ Un;
3	Modrate
4	Likely
5	Almost certain

Tabel 3. ***Risk Matrix***

Likehoold L	Consequence C					Risk Level (Result of Multiplication Between Opportunities by Consequences)		
	1	2	3	4	5			
1	1	2	3	4	5	L	1-4 (Low)	Control with routine procedures
2	2	4	6	8	10	M	5-9 (Moderate)	Handling by related area management & scheduling as per procedure
3	3	6	9	12	15	H	10-16	Requires management & scheduling Corrective actions as soon as possible
4	4	8	12	16	20	And	>16	Immediate handling or cessation of activities or
5	5	10	15	20	25			involvement of top management and remediation of causal threats of opportunity (ASAP)

Result

The data collected will be analyzed through hazard identification and risk assessment to identify hazard factors and potential hazards, as well as the magnitude of risks that arise in the production process. Furthermore, risk and hazard control is carried out by integrating hazard identification, assessment, and risk control into the ongoing planning process.

HIRARC aims to identify potential hazards and operational problems that arise due to irregularities in the design process in the factory. This method consists of three main stages: Hazard Identification, Risk Assessment, and Risk Control. (Giananta, Hutabarat, & Soemanto, 2022).

Hazard Identification (Risk)

The first stage in hazard management is to identify potential threats, with the aim of identifying hazards that may threaten the safety of workers while performing work in the work area.

There are different types of hazards, including: physical, chemical, mechanical, electrical, ergonomic, habitual, environmental, biological, and psychological hazards. (Soesanto & Susanto, 2024).

The hazard identification process is a structured step to uncover potential threats in an organization's activities. or companies (Aldini, Hutapea, & Sahri, 2022). Hazard can be interpreted as any form of checking inspection process in the work environment which aims to find out what types of hazards may occur in the work environment. The sources of danger are categorized into 5 namely man, machine, methode, material, environment (Urrohmah & Riandadari, 2019).

Risk Assessment

Risk assessment can be carried out with a risk matrix approach to obtain a score value. Likelihood (L), Consequency (C) and Score (S). Likelihood or chance consists of five levels or levels with Level One indicating that the event occurred under certain circumstances or rarely (Rare). The second level means that the event is unlikely to occur. The third level shows that an event may be possible (Moderate). The fourth level means that events that may be likely to occur (Likely). While the fifth level shows that it almost certainly happens in any situation (Almost Certain).

The consequences are divided into 5 levels, Level 1 has no injuries and only minor material losses (Insignificant). Level 2 minor injuries that can be overcome with P3K in place, moderate material loss (Minor). Level 3 lost working days, material losses were quite large (Moderate). Level 4 disability or severe injury, loss of production capability, handling outside the area with negative effects, major financial losses (Major). Level 5 death, poisoning that spreads out of the area with the effects of distraction, material or financial loss is enormous (Catastrophic).

According to AS/NZS 4360:2004, risk is the chance of an event that can affect an object. Risk is measured based on the value of likelihood (the likelihood of an event occurring) and consequence (the

impact caused by the event). Risk can be assessed qualitatively, semi-qualitatively, or quantitatively (Afredo & Tarigan, 2021).

The following is a table of identification and risk assessment of hazards in work accidents.

Table 4. Risk Assessment of the Processing Section of the FFB Scale Location

No.	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Weighing for FFB from Afdeling	Dusted	Shortness of breath	1	4	4	L
		Hit by fruit	Wounds to the limbs	1	4	4	L
		Fall	Sprains	1	4	4	L
2.	Weighing Tankos Truck						

Table 5. Risk Assessment of Processing Parts at Sorting Stations/Loading Ramps

No.	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Sorting Fruit	Affected by the gantry	Wounds to the limbs	5	1	5	L
		The Stand	Wounds to the limbs	5	1	5	L
		Hit by Fruit	Wounds to the limbs	5	1	5	L
		Hit by Palm Snow Dust	Irritation and Infection	5	1	5	L
2.	Operating a hydraulic pump (capstain)	Terimpa TBS	Wounds to the limbs	5	1	5	L
		Nice Chapel	Shock	5	1	5	L
		Pinched by Loris	Injuries to limbs/Injuries	5	1	5	L
3.	Operating a carrier transfer	Pinched truck	limbs/injuries	5	1	5	L
		Hit by fruit	limbs/injuries	5	1	5	L
		Chained	limbs/Cider	5	1	5	L

Table 6. Risk Assessment of Processing Parts at *Sterilizers*

It	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Operating the Sterilizer	Exposed to Hot Steam	Body burns	4	2	8	M
		Fall	Sprains, limb injuries	5	1	5	L
		Inhalation of steam	Shortness of breath	5	1	5	L
2.	Operating the Trackiler	Nice Chapel	Limb injuries	5	1	5	L
		Pinched truck	Wounds to the limbs	5	2	10	M
		Dusted	Shortness of breath	5	1	5	L
3.	Operating a hosting crane	Fall	Limb disability	5	3	15	H
		Hit by cables and chains	Wounds to the limbs	5	2	10	M
		Inhalation of steam	Shortness of breath	5	1	5	L
		Hit by a truck	Wounds to the limbs	5	1	5	L
4.	Operating tressing (autofeeder)	Hit by a truck or chain	Wounds to the limbs	5	1	5	L
		Inhalation of steam	Shortness of breath	5	1	5	L
		Slip	Dislocated limb	5	1	5	L

Table 7. Risk Assessment of Processing Parts in Thresser/Autofeeder

No	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Setting the feed to the tresor	Hot Fall	Steam Pressure Wounds/Fractures Respiratory Disorders	3	3	9	M

Table 8. Risk Assessment of Processing Section at Kempa Station

No.	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Operate felts	Exposed to hot steam	Blister	1	2	2	L
		Hit by ash	Shortness of breath	1	1	1	L
		Fall	Sprains	1	1	1	L
		Slip	Sprains	1	1	1	L
2.	Operating the digester	Exposed to hot steam	Blister	1	2	1	L
		Fall	Sprains	1	1	1	L
		Slip	Sprains	1	1	1	L
3.	Operate CBC (cake break conveyer)	Fall	Sprains	1	1	1	L
		Hit by ash	Shortness of breath	1	1	1	L
		Crushed CBC	Limb disability	1	3	1	L
		Exposed to hot steam	Blister	1	2	2	L

Table 9. Risk Assessment of Processing Section at Bantingan Station

No	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Separating palm fruit from janjangan	Hit by a lorry due to a broken chain	Injuries/fractures	3	4	12	H

Table 10. Risk Assessment of Processing Section at Clarification Station

No	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1	Open/close the oil puriffer faucet	Rubber Hose Burst	Skin exposed to hot oil	3	3	9	M
2	Up Oil Tank	Height	Jatuh	3	4	12	H
3	Electrical Panel	Electric Current	Shock	3	2	6	M

Table 11. Risk Assessment of Processing Parts at Stockpile Tank Stations

No	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	CPO filling to railway tank	Jatuh	Wounds/Fractures/Death	3	3	9	M
2.	Interesting in the tank	Hit		3	5	15	H
3.	Tank weighing	Stuck		3	4	12	H

Table 12. Risk Assessment of Processing Parts in Boiler Stations

No	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Fire Up	Dusted	Shortness of breath	5	1	5	M
2.	Boiler Scale Cracker	Noise	Damaged eardrum	5	1	5	M
		Flame Light	Buta	5	1	5	M
		Slip	Sprains	5	1	5	M
		Hot iron	Blister	5	1	5	M
3.	Fire Glass	Dusted	Shortness of breath	5	1	5	M
		Flame Light	Buta	5	1	5	M
		Noise	Deafness	5	1	5	M

Table 13. Risk Assessment of Processing Parts in Steam Boiler Stations

No	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	**C**	**S**	
1.	Open/close the main steam faucet	Exposed to steam	Blistered skin	3	3	9	M
2.	Dredging	Flame Burst	Burns	3	4	12	H
			Vision impairment	3	3	9	M
3.	Cleaning	inhaled dust	Respiratory disorders	2	3	6	M
		Falling from a height	Fracture / death	3	5	15	H

Table 14. Risk Assessment of Processing Parts at Demint Plant

No	Activities	Danger	Risk	Risk Assessment			Risk Level
				L	C	S	
1.	Lifting and pouring chemicals	Dusted	Shortness of breath	4	1	4	L
2.	Perform kartion and anion regeneration	Exposed to chemicals	Blister	4	1	4	L
	Performing a Urine Injection	Inhalation of chemical vapors	Shortness of breath	4	1	4	L
		Slip	Sprains	4	1	4	L
		Hot water	Blister	4	1	4	L
		Noise	Deafness	4	1	4	L
4.	Sampling (water sample)	Dusted	Shortness of breath	4	1	4	L
		Hot water	Blister	4	1	4	L
		Noise	Deafness	4	1	4	L

Risk Control

Risk control is used to understand all hazards found when identifying hazards as well as to know the level of risk to choose priorities and how to deal with them (Jamil, Purnomo, & Malikhatun, 2022). The results of the Risk Control that has been determined on the potential hazards at PT. X is the Mandatory Wearing of complete PPE that has been given (gloves, anti-slip shoes, mask, ear plug/ear, helmet, safety glasses). Furthermore, comply with and add K3 signs, work according to SOPs and work instructions, maintain the cleanliness of the work production area, monitor to work according to procedures, carry out periodic maintanetance, carry out routine inspections and maintenance, and the author hopes that at PT. X establishes new policies and regulations for workers by providing penalties such as issuing first warning letters or fines for workers who do not comply with SOPs and do not wear PPE. Instead, appreciation is given to workers who comply with SOPs and use PPE properly and correctly.

Conclusion

Based on the risk assessment obtained, four risk level categories were identified, namely Low Risk, Modarate Risk, High Risk, and Extreme Risk. The risk rating provides a level for each risk category, resulting in the most dangerous risk, i.e. at the station. The Stockpile Tank and Engine Room get level 15 High Risk, then at the Boiling Station, Slamming, Clarification, Steam Boiler gets level 12 High Risk. Risk control that has been carried out on potential hazards at PT. X is Required to Wear Complete PPE that has been given (gloves, anti-slip shoes, mask, ear plug/ear, helmet, safety glasses), Obey signs, Work according to SOPs and Work instructions, clean the workplace area, monitor to work according to procedures, Carry out periodic Maintanetance.

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