

Evaluation of Occupational Health and Safety at the Sterilizer Station with the HIRARC Method at PT. Beurata Subur Persada

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ABSTRACT

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PT. Beurata Subur Peusada is a factory engaged in the palm oil processing industry (PMKS). PT. Beurata Subur Persada is in the area of Babah Dua Village, Tadu Raya District, Nagan Raya Regency. Based on the company's historical data during the 2019-2022 period there have been 5 cases of accidents at the PT. Beurata Subur Peusada. The purpose of this research is to condition a significant level of work accident rates at the sterilizer station. The method used is Hazard Identification Risk Assessment and Risk Control (HIRARC). The results of the risk assessment of the PT. Beurata Subur Peusada consists of 25% extreme risk, 50% medium risk, and 25% high risk, and 0% low risk. Control measures that can be taken are to provide instructions to workers to work according to company SOPs and always use PPE, conduct training or seminars for workers in which there are recommendations for using PPE and always work according to SOPs and tighten regulations.

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I. Introduction

Occupational Health and Safety (K3) is an important thing that must be implemented in a company, this is due to the impact of work accidents not only felt by workers but also felt by companies [1]. Different potential hazards have different levels of risk [2].

PT. Beurata Subur Peusada is a factory engaged in the palm oil processing industry (PMKS). PT. Beurata Subur Persada is in the area of Babah Dua Village, Tadu Raya District, Nagan Raya Regency. In the production process PT. Beurata Subur Peusada has implemented an OHS management system, but this is still inseparable from the hazards and risks that can cause work accidents.

The sterilizer station itself is a place where the FFB boiling process is carried out [3]. The processes that occur in it are not immune from various hazards that can cause work accidents. The hazards that occur at the sterilizer station can be hot steam, burns, slips/falls, and some can even cause death. Therefore, it is necessary to evaluate the K3 application system at the sterilizer station so that the existing K3 management system can run well and can reduce the level of hazard risks found at the sterilizer station. Based on the company's historical data in the 2019-2022 period there have been 5 accident cases at PT. Beurata Subur Peusada. The purpose of this study is to determine the risk scale at the sterilizer station as well as recommendations for material improvement steps.

Several previous studies have discussed how to minimize the number of work accidents at factory locations, including [4] where the results of the research are taking risk control measures in the form of providing fire extinguishers, administrative controls such as providing information regarding procedures for carrying out pressing activities to employees and training. employees and use of PPE. Another research is by [5] where the results of his research are taking control measures using personal protective equipment in the factory environment, engineering in each production



process to minimize hazards and administration such as standard operating procedures to comply with standards set by the company

The method used to evaluate the K3 system at the sterilizer station at PT. Beurata Subur Peusada is HIRARC (Hazard Identification Risk Assessment and Risk Control).

II. Literatur Review

A. *Healthy Safety Work*

Occupational health and safety or commonly abbreviated as K3 is a system created to protect workers, companies, the environment, and the surrounding community from potential hazards that can cause work accidents [6]. K3 is a mandatory thing that must be implemented by the company so that the continuity of life in the company is maintained.

One manifestation of the implementation of the implementation of OSH in companies is by wearing personal protective equipment (PPE) such as safety helmets, safety clothing, safety glasses, safety shoes, safety gloves and others [7].

B. *Work Accident*

A work accident is something unexpected and unwanted that messes up the process that has been arranged from an activity and can cause loss of both human casualties and property [8]. A work accident is an accident that occurs related to a work relationship, including an illness that arises because of a work relationship, as well as an accident that occurs on the way home to work [9]

C. *Metode HIRARC*

The HIRARC (Hazard Identification Risk Assessment and Risk Control) method (HIRARC) is a series of hazard identification processes followed by risk assessment and then controlling the hazard in order to minimize the risk [10]. HIRARC aims to identify potential hazards and identify various kinds of operational capability problems in each process due to deviations from the purpose of designing processes in the factory.

Hazard Identification Risk Assessment and Risk Control (HIRARC) is a method for preventing or minimizing work accidents. HIRARC is a method that starts from determining the type of work activity and then identifying the source of the hazard so that the risks are identified. then a risk assessment and risk control will be carried out to reduce exposure to hazards found in each type of work [11].

III. Method

A. *Time and Place Of Research*

This research was conducted at PT. Beurata Subur Peusada which is located in the area of Babah Dua Village, Tadu Raya District, Nagan Raya Regency. The time for conducting this research is July-November 2022.

B. *Method Of Collectin Data*

Data collection techniques used are Observation and Interview. Observation is a data acquisition technique that is carried out by observation which involves recording the state or behavior of the target object [12].

The interview is a data collection technique through a one-way question and answer process, meaning that the questions come from the interviewer and the answers are given by the interviewee [13].

C. *Data Analysis Method*

The method used in this research is HIRARC (Hazard Identification Risk Assessment and Risk Control). This method consists of a series of OSH implementations that include recognizing hazards, assessing risks, and carrying out control measures based on the data collected [14].

The following are the steps for implementing the HIRARC method [15]:

- Hazzard Identification

Identifying each work area with the aim of identifying all existing hazards [16]. In this case the observed work area is the sterilizer area.

- Risk Assessment

Risk assessment is an attempt to calculate the magnitude of a risk and determine whether the risk is acceptable or not [17]. Risk assessment is used to determine the level of risk in terms of likelihood and severity.

The following is a severity measuring scale used in risk assessment:

Table 1. Measuring scale of severity

Levels	Description	Definition
1	<i>Negligible</i>	If there is no impact caused very little to humans, production processes, property or causing physical harm in at least 15 minutes
2	<i>Minor</i>	If there is a minor injury, it is sufficient to only be treated by the first aid team and/or cause one working day to be lost or less
3	<i>Moderate</i>	If moderate injuries occur, medical attention is required, causing at least two days lost from work
4	<i>major</i>	If there is a serious injury that requires hospital treatment and or causes work days to be lost for more than 2 days
5	<i>Catastrophic</i>	If the impact occurs it results in permanent or partial disability or even death

The following is a scale of how often an accident will occur:

Table 2. Scale for measuring the probability of occurrence

Levels	Description	Definition
5	<i>almost</i>	Accidents happen once a month
4	<i>Likely</i>	Accidents happen every 2-10 months
3	<i>Possible</i>	Accidents occur with a range of 1-2 years
2	<i>Unlikely</i>	Accidents occur with a span of 2-5 years
1	<i>Rare Certain</i>	Accidents happen every 5 years

The results of the identification of the level of severity and the level of probability of occurrence are combined in the risk matrix table which functions to combine the level of severity and the level of probability that the accident will occur. The risk matrix table is a table that displays the relationship between the two variables between likelihood (level of possibility) and consequence (severity level) where the two things have a risk relationship. The following is a risk matrix table:

Table 3. Risk Matrix

Risk Frequency	Risk Impact				
	1	2	3	4	5
5	H	H	E	E	E
4	M	H	H	E	E
3	L	M	H	E	E
2	L	L	M	H	E
1	L	L	M	H	H

Description:

L = Low (Low risk)

M = Medium (Medium risk)

H = High (big risk)

E = Extremely (Very risky)

- Risk Control
 Risk control is a way to deal with potential hazards in the work environment.

IV. Result and Discussion

A. Hazard Identification

The results of hazard identification carried out at the sterilizer station of PT. Beurata Subur Peusada found that there are many potential hazards found in the work processes carried out at the sterilizer station. The identification results will be presented in table 4 below:

Table 4. Hazard Identification

Danger Factor	Emerging Danger
Work process	When opening or closing the boiling door, workers may be caught in the boiling door and exposed to hot steam (steam).
Work process	When checking the maturity level of FFB workers can be exposed to hot steam
Work environment	Slippery floors can cause workers to slip/fall/sprain when pushing or sliding the lorry connecting line to the sterilizer tube
Work process	When operating the control room sterilizer an explosion can occur in the sterilizer if the pressure inside is unstable besides that there is a danger to the electrical panel which can be at risk if workers are not

B. Risk Assessment

Based on the results of hazard identification conducted by interviewing PT. Beurata Subur Peusada, there are 4 potential hazards that are most at risk at the sterilizer station, namely when opening or closing the boiling door, checking the maturity level of FFB, slippery floors in the sterilizer area, and when operating the control room sterilizer. Risk Assessment or risk assessment is carried out by assessing the severity of work accidents caused by these potential hazards, then assessing the likelihood of work accidents. Then after that categorize the potential hazards based on the risk matrix table in table 3

For example, risk assessment stems from the work process of opening or closing the boiling door. The potential hazard is that workers can get stuck in the boiling door and exposed to hot steam. The potential risk is that workers can experience burns and even amputations. The severity value for the hazard risk is 4, i.e. if an accident occurs, serious injuries will occur and require hospital treatment or cause workdays to be lost for more than 2 days. The likelihood value for this hazard risk is 3, which means that accidents occur once every 1-2 years. After being categorized, this hazard risk is included in the Extreme category. The following is a table of other hazard risk assessment results:

Table 5. Risk Assessment

Danger Source	Potential hazard	Risk Potential	L	S	Risk Rating
The work process when opening or closing the boiling door	Stuck in the boiling door and exposed to hot steam	Burns and can also be amputated	3	4	extreme
The work process checks the maturity level of FFB	Exposure to hot steam (steam)	Burns	3	2	Medium
The working environment is a slippery floor in the sterilizer area	Slipped/ fell	Sprain	3	2	Medium
Work Process operating the control room sterilizer	Danger of contact with the electrical panel and the explosion of the sterilizer tube	Burns can be fatal as well as cause fires and stop production activities	1	5	high

Based on the results of the risk assessment on the 4 most risky activities in the sterilizer area, each consists of 25% extreme risk, 50% medium risk, and 25% high risk, and 0% low risk. The following is a graph of the results of the risk assessment in the sterilizer area:

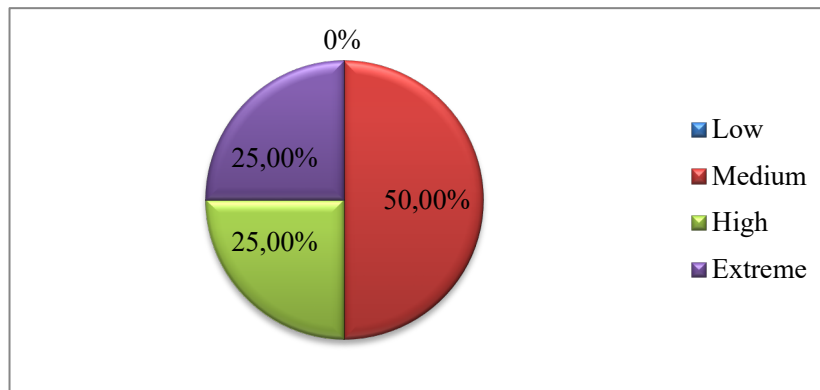


Fig. 1. Percentage of risk assessment on the riskiest activities in the area sterilizer

C. Risk Control

Risk control is to reduce or minimize the risks from potential hazards that exist. The following are the results of risk control presented in table 6.

Table 6. Risk Control

Risk Rating	Potential hazard	Risk Potential	Risk Control
<i>extreme</i>	Stuck in the boiling door and exposed to hot steam	Burns and can also be amputated	Conduct further guidance to workers to work according to SOPs and tighten the mandatory wearing of PPE regulations
<i>Medium</i>	Exposure to hot steam (<i>steam</i>)	Burns	Wear PPE such as safety clothing, <i>safety</i> gloves, <i>safety</i> glasses, masks, and <i>safety</i> shoes
<i>Medium</i>	Slipped/ fell	Sprain	Workers must routinely clean slippery floor areas
<i>high</i>	Danger of contact with the electrical panel and the explosion of the sterilizer tube	Burns can be fatal as well as cause fires and stop production activities	Provide further guidance to workers so that they always work according to company SOPs

Based on the risk control results above, it can be seen that the cause of all risks that occur in general is human error or negligence and disobedience of workers in carrying out work in accordance with company SOPs. Therefore, it is better for the company to routinely hold seminars or training for workers which contain suggestions for carrying out work according to the SOP. If necessary, make strict regulations regarding this matter and provide sanctions or fines for anyone who violates them. This needs to be done in order to increase worker discipline and reduce the level of risk from potential hazards that exist.

V. Conclusion

1. The conclusions that can be drawn from the discussion above are:
2. The results of using the HIRARC method show that there are several potential hazards, namely when opening or closing the boiling door workers can be pinched by the boiling door and exposed to hot steam (*steam*), When checking the maturity level of FFB workers can be exposed to hot steam, slippery floors can cause workers to slip/slip. fall / sprain when pushing or shifting the path connecting the truck to the sterilizer tube, and when operating the control room sterilizer an explosion can occur in the sterilizer if the pressure inside is unstable besides that there is a danger to the electrical panel which can be at risk if workers are not

3. The results of the risk assessment of the 4 activities at the PT. The potentially dangerous Beurata Subur Peusada consists of 25% extreme risk, 50% medium risk, and 25% high risk, and 0% low risk.
4. The results of risk control are to provide direction to workers to work according to company SOPs and always use PPE, conduct training or seminars for workers in which there are recommendations for using PPE and always work according to SOPs and tighten regulations

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