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Submission date: 17-Jun-2022 11:33AM (UTC+0700)

Submission ID: 1858320372

File name: P3._Prosiding_Analysis_potential_workplace.pdf (177.44K)

Word count: 2916

Character count: 15553

The Analysis of Potential Workplace Accidents Using Hazard Identification and Risk Assessment Method

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Abstract. Nowadays, in this globalization era, most of the companies develop machinery and tools roomates supported by a sophisticated technology. They do believe that by using the technology, hope the process of production Becomes faster then using pure man power, moreover the company can produce a huge number of products. However, on the other hands, sometimes an operator who work in a particularly subject to improper machine has skill. Therefore, it is Able to cause the work accident wich is in the Several cases can be fatal. There was a company the which has a textile bussiness. It produced strings as an essential material for driperies and carpets. During the operators operate and the production machinery, an unexpected accident occured Often if did not using the right or standard procedure. Refers to that background, the researcher do analysis the potential of workplace accidents in the spinning department by using Hazard Identification and Risk Assessment Method. The results of the research that has conducted in that department was a potential of hazards commonly occur in that workplace are as follows: the worker's fingers has pinched by the machine, the worker's fingers has run over by the machine, unconscious, being Injured in hands , and have the material downfall. As for, the hazard that has inflicted be included into the high level of risk, the which is: the worker's fingers has pinched by the machine, the worker's fingers has run over by the machine, unconscious, and being Injured in hands. Furthermore the medium level of risk the which is: have the material downfall, and lower level of risk the which is: have a syock and legs Injured. In addition, Refers to the results of the research, the researcher could recommended Several inputs to the company, exactly to the worker, the which is: keep fit, wearing a mask during do the job, arranging a space (safe distance) between the worker and the machine, wearing safety tools (safety gloves and shoes included), checking the condition before do the job, making sure that the fiber in the balanced position.

Keywords: Hazard, Hazard Identification, Risk, Risk Assessment, Workplace Accidents, Potential Workplace Accidents.

I. INTRODUCTION

In this globalization era, most companies are actively developing the machinery and equipment with high-tech machines. With high-tech machinery that is expected to amount resulting production will be. Lack of knowledge and employee carelessness can cause accidents that result in very fatal. More away, if the use or operation of the machine does not heed a standard procedure could pose a danger to the operators themselves.

Therefore, it needs supervision in equipment reliability and smooth the process of machining. It is also intended to avoid *shut down* unexpected of the machining process. The rest is also aimed at ensuring safety for workers, making it easier in terms of control and supervision of the health and safety works.

This research was conducted at a company located in East Java, which is engaged in the field of textiles that produce yarn as raw material for fabrics and carpets. Where in operating machinery and other production facilities, it is accompanied with the risk, can sometimes pose a danger to workers or operators if not using standard procedures. Should it be supported by the attention of a company in the field of occupational safety and health. Where it is natural to be a major concern for every company.

From the daily newspaper Pos Kota, Jakarta, number of work accidents tend to rise the last five years. In 2011 there were 99 491 cases or an average of 414 cases of occupational accidents per day, whereas in the previous year dropped to 98 711 cases of occupational accidents, in 2009 there were 96 314 cases, in 2008 there were 94 736 cases and in 2007 there were 83 714 cases. Meanwhile, in East Java, an effort to increase cultural participation K3 and K3 Management System (SMK3) in the company is done by setting the month K3, socialization, coaching and awards K3 and SMK3. The result in 2012, Java has received awards for Pembina Occupational Health and Safety (K3) related to the increasing number of companies cultured K3 in East Java.

Talking about the implementation of K3 in the textile company, which according to the author's observation, that employees often ignore the use of Personal Protective Equipment (PPE). More companies are already providing some facilities to support health clinic for employees in the form of occupational safety and K3 called *Safety* and *EPR (Emergency Preparedness Response)*.

Associated with one of the activities is the production process of spinning yarn in that company are some departments in parts production division include *Spinning Department (Spinning Top)*. In this department

there are several stages of the process, including the mixing of raw materials (*rayon* and polyester), *blowing*, *carding*, *drawing*, *simplex*, *ring frame*, *winding*, *packing* and *multifold*. According to the writer's observation, more and more of the production process, the opportunities and the potential for accidents and occupational diseases are also high. Due to the use of any production machinery must be accompanied by a risk, albeit small. These risks could affect the health and safety of employees or operators.

Based on the background as well as some scientific articles references used by the author to conduct this study, the authors take the title " Potential Analysis Using Work Accident *Hazard Identification And Risk Assessment* "

Problem Formulation

From uraian- the description of the authors formulate the problem as follows:

- a. the points are the potential dangers of what happened at the Spinning in the company?
- b. What are the risks posed by each hazard points that could potentially occur in the Spinning in the company?
- c. What are the recommendations provided by the company due to the emergence dots potential hazards at the Spinning in the company?

II. RESEARCH METHOD

Research Basic Methods

type of research used in this research is descriptive. Descriptive research is research that describes some data is then analyzed and compared based on the fact that the ongoing further attempt to provide remedies that exist in order to obtain better results than before.

Method of Determining Object Research

Method of determining the area is taken deliberately or purposive making objects deliberately or consideration based on certain criteria (Wiratha, 2006). The location of this research is a company engaged in the textile field, located in Jalan Raya Solo-Surabaya, Nganjuk, East Java. In addition the company needs to implement safety and health policies right so as to enhance the company's reputation and investor.

Data Collection Techniques

Data collection techniques in this study are: a. Interviews, b. Documentation, c. Observation

Data Analysis Methods

In the initial phase of this study, researchers looked for the level of safety risk with the risk analysis method (AZ / NZS) *Australian Standard / New Zealand Standard: 4360, 1999/2004*. By determining the scope to see the spinning process / production process in department. *the spinning* Followed by identification of the risk of using HAZOP to know the causes, consequences / consequences, actions taken and the severity and likelihood and degree of risk of the next step of determining the level of risk to the formula:

Limitations and Assumptions Research

Limitations

In order for the existing problems can be resolved properly and discussion becomes more directional, so in this study are given some problem definition. The limit problem is as follows:

1. Data used for occupational accidents in 2015 alone.
2. The research location is only on the spinning.
3. In this study only discusses methods of *Hazard Identification and Risk Assessment (HIRA)*.

Research Assumptions

Assumptions used in this study are as follows:

- a. The data obtained by the author during the study considered valid.
- b. The situation and the state of the company is considered stable and conducive for this research.
- c. Facilities and ancillary equipment are considered eligible for the study.
- d. Management of companies and research support personnel considered to understand the topics and matters related to the research, and as able to work just as well for research.

Data Collection Method

Data Types and Sources of



Data collection is the process of collecting the data required in both research of secondary data owned companies, as well as primary data based on direct observation and interviews with management and production employees.

- a. Primary data obtained through observation and interviews to all employees about 40 people in the area *spinning*. The primary data required in this study include:
 1. Data findings of potential danger (*hazard*) in the production area of the company.
 2. Data accident in 2015.
- b. Secondary data, obtained from the archives and documents relating to the company's production process in the form of historical data the company during certain periods. The required data are:
 1. Company Profile.
 2. Organizational structure of the company.

$$\text{Value of Risk} = \text{Saverity (S)} \times \text{propability (P)}$$

After getting value risk later determine the risk of any accidents that occur, then calculate the statistics of occupational accidents to determine the performance of employees in the textile company and then analyzed using the method of causal analysis to determine what action should be taken and suggested to the company. Here is an example of a table of risk analysis.

Table I
Risk Analysis

Level risk	value risk	P	S	Impact	Risk	Production Process	Location
High risk	15	5	3	1. Fainting	1. Material (raw material) fine airborne fiber leads to workers	Mixing usable material waste and fresh material using a machine	
High risk	12	3	4	2. sandwiched Hands	2. operating machines At the time workers are not wearing seat	blendomat	
High Risk	12	3	4	1. hand wedged	1. If at any time condenser broken risky hand pinched and injured	Smooth the material that has been mixed in the mixing and sent to a machine carding	
High Risk	15	5	3	hand injured	workers who repair and engine repair		
Low Risk	4	2	2	2. feet injured	2. toe injury / bruise affected clumps fiber		

2 Analysis Hazard and Operability (HAZOP) 2

HAZOP is defined as a system and form of assessment of a design or existing process or operation with a view to identifying and evaluating the issues that represent risks to individuals or equipment or prevent efficient operation.

HAZOP is a qualitative technique that is based on the GUIDE-WORDS and implemented by a team of various disciplines during HAZOP process takes place.

The purpose is to review the use of HAZOP a process or a system operating on a systematic basis, to determine whether the process can lead to the occurrence of irregularities or unwanted accidents.

The following terms terminology (Key Words) is used to facilitate the implementation of HAZOP are as follows:

- a. *Deviation* (Deviation)
Is combination of keywords that are being applied (a combination of your words and parameters).
- b. *Cause* (Cause)
Is the cause that most likely will result in irregularities.
- c. *Consequence* (Effects / consequences)
Is a result of an event that is usually expressed as the loss of an event or risk. In determining the

consequence should not be doing it because they limit the usual detrimental to the conduct of research.

- d. *Action* (action taken)
When a cause is believed to lead to negative consequences, should decide what actions should be done. The action is divided into two groups, namely measures that reduce or eliminate the causes and measures to eliminate the consequences (consequence). As for what previously decided, it is not always possible, especially when dealing with equipment failure. However, first always endeavored to get rid of the cause, and the only part which needs to reduce the consequences.
- e. *Severity*.
Is the severity of which is expected to occur.
- f. *Likelihood*.
Is the possibility of consequences with existing security systems.
- g. *Risk*
the possibility of a combination of likelihood and severity.

Examples severity value table.

Table II
Value Severity

Description	Rating	Severity
Died world, permanent disability / serious, severe environmental damage, leakage B3, financial losses are very large, the cost of treatment of > 50 million	5	Catastrophic
Lost work days, permanent disability / part, damage to the environment being, a huge financial loss, medical expenses < 50 million	4	Major
requires medical care, disruption of work, substantial financial losses, need outside help, the cost of treatment < 10 million	3	moderate
Handling P3K, does not necessarily need outside help, fees being financial, medical expenses < 1 million	2	Minor
Does not disrupt the work process, no injury / wound, a small financial loss, medical expenses < 100 thousand.	1	negligible

Table III
Value Level Likelihood

Description	Rating	Likelihood / Probability
Always happens	5	Improbable
Frequent	4	Unlikely
Sometimes it can happen	3	Occasional
Maybe it can happen	2	Probable
Very rare	1	Frequent

Once the value of severity and likelihood are known, we then calculated using tables IV to determining the level of risk involved.

Table IV
Risk Assessment

Catastropic	Major	Moderate / Serious	Minor	negligible	Saverity Likelihood
5	4	3	2	1	Improbable
10	8	6	4	2	Unlikely
15	12	9	6	3	Occasional
20	16	12	8	4	Probable
25	20	15	10	5	Frequent

Tabel V
Risk Level

Description	Risk rank
Extrime very high risk-high risk	17-25
high risk-high-risk	10-16
medium risk-moderate risk	5-9
low risk - low risk	1-4

Cause and Effect Analysis (Root Cause Analysis)

This chart is also called fishbone diagrams (*Fishbone Chart*) and are useful for showing the main factors that affect the quality and has resulted in the problem that we are studying, in addition we can also look at the factors that are more detailed influential and has resulted in major factor that we can see of arrows in the form of a fish bone in the *fishbone* diagram.

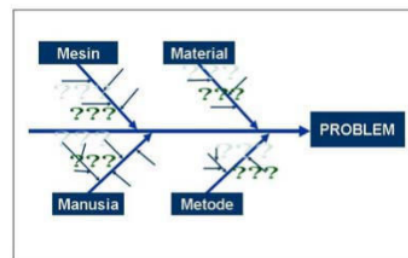
The *Fishbone* diagram was first developed in 1950 by a Japanese quality expert Kaoru Ishikawa who have graphic descriptions of the elements of a process to analyze the potential sources of process deviations. Factors main cause of this can be grouped in:

1. *Material*/ Raw Materials
2. *Machine*/ Machine
3. *Man*/ Labour
4. *Methode*/ Methods
5. *Environment*/ Environmental

Factors that cause lies on the left, while the consequences performing the quality characteristics or quality that is the purpose of the system on the right side of the chart.

The usefulness of a causal diagram are:

1. Analyzing the actual conditions that aim to improve quality improvement.
2. Reduce the conditions that cause incompatibility products with consumer complaints.
3. Determining the standardization of ongoing operations to be implemented.
4. Means of decision-making in determining manpower training.
5. Planning for corrective action.



Source: <https://simiesievenfold.wordpress.com>

Figure 1 Diagram of cause and effect or *fishbone* chart.

III. CONCLUSION

Based on the analysis that has been done on the analyzed data, it could be concluded as follows: The

1. potential dangers that often occurs in the spinning department at the textile company is: finger pinched machine, finger crushed machine, unconscious, injured hand, the fall of the material.
2. Risk is the danger posed a high risk that the hand crushed hand machine wedged unconscious machine, hand injuries, the risk being that the fall of material and low risk that syock and leg injury.
3. The recommendations given to the company, among others:
 - a. Maintain stamina and wear a mask at work.
 - b. Arranging a safe distance with the engine and wear PPE Gloves / *Safety Glove*.
 - c. Ensuring clumps of fiber in a balanced position and in accordance with the communication skills among workers.
 - d. Check the condition before doing the work.

- e. Ensuring sliver in a balanced position and the corresponding position with the ability to use the roll using PPE *safety* shoes.
- f. Communication between workers and ensure the material in a balanced position and according to ability and wear the *safety* shoes.

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