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Literature Review: Using HIRADC Method Analyzing the Risk of Work Accidents in The Manufacturing Sector in Indonesia

Uyun Nafa Khusufi, **Abdul Hakim Zakkiy Fasya, Dwi Handayani, Satria Wijaya**
Student of Public Health, Universitas Nahdlatul Ulama Surabaya, Indonesia
uynnafa@gmail.com, abdul.hakim@unusa.ac.id, handayani.dwi@unusa.ac.id, swijaya7@unusa.ac.id

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Abstract
Introduction: *The development of industrialization in Indonesia has a fairly high level of development. These developments can give rise to new industry challenges and problems. One of them is the risk of work accidents in the work environment.* ***Objective:*** *This study aims to describe the risk of work accidents based on the HIRADC method in the manufacturing sector in Indonesia.* ***Method:*** *This study is a literature review. The data sources obtained come from various databases, namely Google Scholar and the Garuda Portal in the 2017-2021 period.* ***Result and Discussion:*** *The results of the literature review show that physical hazards that are found in various industries such as, industries such as slipping, noise, falls and chemical hazards are hazards that are often found in basic and chemical industries.* ***Conclusion****: The conclusion of this literature review describes the process of occupational risk analysis based on OHSAS 18001:2007. There are 5 types of hazards in the manufacturing sector. The classification of risks with high or extreme risks is the top priority to be given control. The use of HIRADC based on OHSAS 18001:2007 in the manufacturing sector shows that there are conditions that are not optimally carried out.*
Keywords: HIRADC; Risk; Manufacturing; Work Accidents;

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Introduction

The development of industrialization in Indonesia has a fairly high level of development. The development in the industrial sector can be seen from the increasingly rapid technology used to carry out the production process. These developments can give rise to new industry challenges and problems. One of them is the risk of work accidents in the work environment. The risk of work accidents can result in injury and reduce company productivity. Companies that have workers and there are risks must pay attention to Occupational Health and Safety (OHS). Implementation of Safety and Health in a company or industry an effort to create protection and safety of workers from various risks of accidents and dangers, both physical, mental, and emotional (Sucipto, 2014).

According to BPJS Employment, there has been an increase in the number of work accidents in the last 2 years, in 2019 it was 114,000 cases and in 2020 it was 177,00 cases. The largest work accidents were contributed by the construction and manufacturing sector 63.6%, the transportation sector 9.3%, the forestry sector 3.8%, the mining sector 2.6% and the rest 20.7% (Santia, 2021).

According to Irpan et al, the way to implement Occupational Health and Safety starts with good planning including, hazard identification, risk assessment, risk identification and control (Irpan, Ginanjar, & Fathimah, 2019). The HIRADC method is a series of hazard identification processes that occur in routine and non-routine activities in the company and is part of the OHSAS management standard 18001: 2007 clause 4.3.1, that organizations must implement procedures for hazard identification, risk assessment, and application of existing controls (Ihsan, Safitri, & Dharossa, 2020). The HIRADC method was chosen in order to find out the picture of the risks arising from each job, the magnitude of the impact of these risks and know the right way to overcome (Pujiono, Tama, & Efranto, 2013). HIRADC aims to identify the occurrence of hazards based on a systematic operating process.

HIRADC results will be used as the main basis in formulating OHS goals and targets to be achieved by an industry. According to the use of the HIRADC method, it is considered very helpful to minimize the occurrence of accidents, where the work area is the area with the most potential dangers Cholil dkk (Cholil, Santoso, Syahrial, Sinulingga, & Nasution, 2020). This method used directly so it must be reviewed and updated regularly. The preparation of HIRADC begins with the identification of hazards in work areas that have work activities, assessment and planning or providing recommendations for systematic risk control.

Method

The method used in literature review research is *traditional literature review*. The source of the article comes from the *Garuda Portal*, and *Google scholar*. There is a screening stage in choosing a journal which consists of 3 stages, namely screening 1 choosing paid and unpaid journals, *screening* 2 reviewing titles and abstracts, *screening* 3 review background, methods, results and discussion. Data processing in *traditional*

literature review uses evidence derived from previous research in the form of published national articles.

Results and Discussion

1. Identify hazards in the manufacturing sector in Indonesia using the HIRADC method

Which Journal discusses the identification of hazards in the manufacturing sector in Indonesia using the HIRADC 100% method there is a clear relationship between journals and the specific purpose of research, namely hazard identification in sektor manufacturing in Indonesia using the HIRADC method.

Overview of the dangers that exist in the manufacturing sector, based on research conducted on various Ponda and Fatma industries there are 24 potential hazards from the *Foundry* Department in the producing industry electrical equipment, dangers that occur such as pinched hands crushed by goods (Ponda & Fatma, 2019). This danger is more commonly found in various industries, not infrequently also found physical hazards in basic and chemical industries. Various industries have more physical hazards because of the risk of hazards that cause physical injury to workers. This danger is also found in the basic and chemical industries in small quantities such as noise, the work activities carried out in these industries less frequently cause risk of physical injury.

In contrast to the research conducted on the Mitasari, *tank cleansing* process in the early stages of cleaning activities in the early stage cleaning lubricating oil processing industry, there are chemical hazards identified comes from inhaling toxic gases which when inhaled can result in health problems. Based on the guidelines ILO (2013) that chemicals can cause respiratory disorders, nausea, irritation, heart and fainting (Mitasari, Subekti, & Khairansyah, 2018).

Based on the description of the results of the article, it was found that there are still many dangers, types of physical dangers with the risk of bruises, wounds on body parts become a type of danger that often appears compared to the other kind of danger. The hazard identification process is inseparable from competent people or experts in the field of OHS. The process of interviews and discussions with workers and HSE is carried out to obtain hazard identification results. Identification methods must be proactive or predictive so that they are expected to reach all hazards both existing and potential (Abbas, 2017).

2. Identification of risk assessment in the manufacturing sector using the HIRADC method

Which Journal discusses risk assessment in the manufacturing sector using the HIRADC method 100% risk assessment process is very important. Risk assessment is generally carried out with due regard to severity and degree of probability. Risk values help indicate hazards that require control priority or require oversight measures without providing additional control measures.

Risk assessment is obtained from the value of probability and severity and continues to determine the value of risk obtained from multiplication of *likehood* and *severity*, in determining the magnitude of an appropriate risk by taking into account the conditions, facilities and types of hazards that exist. The study conducted Mitasari severity and *likehood* assessment according to the standard industri of lubricating oil processing in the early stages of cleaning activities had an impact on the risk of inhaling toxic gases, obtained a severity value of 3 because and a probability value of 4 with a risk value of 12. Given the number 4 because the frequency of the possibility can occur in one year and for severity is given the number 3 because of the serious severity, giving the impact of lost work time and the impact on the environment that causes pollution (Mitasari et al., 2018). The assessment is based on the results of discussions with *the safety supervisor* and reflects on cases of work accidents due to inhalation of *base* oil (a mixture of used oil and sludge).

In contrast to the research conducted by on Broom and Lombardo metal making activities, the use of *coolant* liquids that are not appropriate has an impact on eye irritation including the low category. Hazards in the company are required supervisory measures against accident prevention measures in accordance with the procedure, the potential for hazards that fall into the low category occurs once a month or more and mild severity. If work hazards often occur and require medical treatment and handlers are included in the middle category (medium) (Kartika, Purnawati Rahayu, Zaman, Master of Public Health Studies, & Hang Tuah Pekanbaru, 2022).

Determination of value on each potential hazard recorded through a meeting or meeting with the selected company. In line with the research of Ikrar et al, the assessment was carried out by management and the head of the work unit and determined by mutual agreement (Mohammad Ikrar Pramadi, Hadi Suprapto, & Ria Rahma Yanti, 2020).

3. Identify control efforts in the manufacturing sector in Indonesia using the HIRADC method

Who journal discussed the identification of control efforts in the manufacturing sector in Indonesia using the HIRADC method 100% recommends control efforts, namely elimination, substitution control and administrative control. Administrative control is a control that often appears in review articles such as, providing SOPs, *signs*, *safety talks*, work instructions, job training for new workers (Abbas, 2017). The explanation is in accordance with research conducted by Ponda and Fatma, administrative control is given such as making SOPs and installing OHS signs (Ponda & Fatma, 2019). (Ponda & Fatma, 2019)

Based on this description, hazard control efforts are carried out to provide prevention of the identified risks. In risk control, what is widely done is administrative control. Administrative control is carried out by making SOPs and installing OHS signs to minimize potential hazards in each job.

4. Identification of Use of HIRADC method based on OHSAS 18001:2007

Table 1

Identification of Use of HIRADC method based on OHSAS 18001:2007

No.	Author	HIRADC Based on OHSAS 18001:2007							
		Activities		Hazard Identification	Problem Priority	Risk Documentation (Likelihood and Severity)	Previous Control	Additional Control According to OHSAS	Implementing SMOHS
		Routine	Non-Routine						
1	(Handoko and Rahardjo, 2017)	✓	✓	✓	✓	✓	-	✓	✓
2	(Hartono, 2017)	✓	-	✓	✓	✓	-	✓	-
3	(Laksana, Kosasih and Doaly, 2018)	✓	✓	✓	✓	-	✓	✓	✓
4	(Mitasari, 2018)	-	✓	✓	✓	✓	✓	✓	✓
5	(Ponda and Fatma, 2019)	-	✓	✓	✓	✓	✓	✓	✓
6	(Cholil et al., 2020)	✓	✓	✓	✓	✓	-	✓	-
7	(Ihsan, Safitri and Dharossa, 2020)	✓	✓	✓	✓	✓	✓	✓	✓
8	(Mohammad Ikrar Pramadi, Hadi Suprapto and Ria Rahma Yanti, 2020)	✓	✓	✓	✓	✓	-	✓	-
9	(Wijaya, 2020)	✓	✓	✓	✓	-	-	✓	-
10	(Ariyanti et al., 2021)	-	✓	✓	✓	✓	-	✓	-
11	(Muryanto, 2021)	✓	✓	✓	✓	-	✓	✓	✓
12	(Saputro and Lombardo, 2021)	✓	✓	✓	✓	✓	-	✓	✓
13	(Silviya and Purnamawati, 2021)	✓	✓	✓	✓	✓	-	✓	-

Based on Table 1 of the review results of the article, it can be seen that as many as 10 articles carried out a risk analysis process on routine activities, 12 articles on non-routine activities, 13 articles there was a hazard identification process, problem priority and additional control, 10 articles had risk documentation (possibility and severity), 5 articles had previous controls, 6 articles had implemented SMOHS.

Based on the description of the results of the article, it can be concluded that the HIRADC method itself is a method that considers various conditions based on OHSAS 18001:2007 (OHSAS, 2007). It can be seen in the table results that there are still conditions that have not been met. Companies that meet these requirements can have a positive impact on the company with complete conditions, the results of risk analysis using the HIRADC method can facilitate the monitoring and evaluation process carried out by the company periodically with the aim of minimizing the risk of work accidents. In line with the research conducted by Ihsan, Safitri and Dharossa The company uses the HIRADC method in analyzing risks by considering all the conditions in OHSAS incorrectly such as, assessment by including real data and review of SMOHS and conducting so that the company can overcome the implications of OHS on overall activities, minimize work accidents and the impact caused to the sustainability of the company.

Conclusion

Based on the results of the literature review, it was concluded that there are 5 types of hazard identification and physical hazards are frequent hazards such as slipping, noise, falling. In analyzing risks refers to the matrix table. In terms of risk, with a frequent low category, 100% of the articles found state that administrative control by making SOPs, the installation of OHS signs is often carried out to minimize the risk of work accidents. The requirement that there was a previous control was a rare requirement in literature review. There is one of 13 HIRADC-eligible articles under OHSAS 18001:2007.

Advice for companies can use the results of this *literature review* as a reference to be able to find out the potential dangers that occur, risk classification and control efforts in the workplace, especially in the manufacturing sector in Indonesia. Furthermore, researchers can add information and references to international articles related to the description of occupational accident risk based on the HIRADC method in the manufacturing sector with basic industrial types and chemicals and various industries in Indonesia.

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