

Proposed Hazard Identification Handling Using Hazard Identification Risk Assessment and Determining Control (HIRADC) Techniques (Study Case at PT. DGEX Indonesia Soekarno-Hatta)

Krismonila Febriariesta¹, Muhammad Rafly Al Fadly², M Rifni³, Nursery Nasution⁴

^{1,2,3,4} Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia

*Corresponding author: krismonilafebr@yahoo.com

Abstract. This study discusses the proposed handling of hazard identification using the study case Hazard Identification Risk Assessment and Determining Control (HIRADC) technique at PT. DGEX Indonesia. The situation in the work environment that uses energy is one of the causes of the potential danger of workplace accidents in the work environment. With the existence of OHS can reduce the risk of workplace accidents, and can also reduce losses both in the costs and productivity of the workers themselves. The purpose of this study is to obtain a culture profile of Occupational Health and Safety (OHS) and find out the potential hazards that arise. This study uses the HIRADC method (hazard identification, risk assessment, and determining control). Data processed with HIRADC is obtained from interviews, observations, and company data. The results of the health and safety evaluation with the HIRADC method through PT DGEX Indonesia is that there are still many dangerous activities. For example, an activity that has a very high, high, and normal risk rating.

Keywords: hazard identification, risk assessment, determining control, occupational health and safety

1. Introduction

PT. DGEX Indonesia is an OHSAS 18001:2007 certified company that provides complete solutions in handling Dangerous Goods precisely and safely in accordance with applicable transportation regulations. DGEX Indonesia was established and operated since October 2010. The growth target in DGEX Indonesia is to develop in Local (Indonesia) and Global.

Transporting dangerous goods by Air, Sea & Land is a complicated procedure and requires detailed understanding and knowledge of relevant regulations. PT. DGEX Indonesia focuses on servicing customers with the highest level of dangerous goods. Knowledge, Experiences, Packaging, Transportation as well documenting and Training.

In handling dangerous goods that require special handling where the handling process must be based on the International Air Transport Association (IATA) standard air cargo regulation for documents, packing, marking, labeling, storage. According to the International Civil Aviation Organization Annex 18 concerning The Safe Transport of Dangerous Goods by Air, "dangerous goods are those that are capable of positioning a significant risk to health, safety or property when transported by water". Dangerous goods are materials or substances that have the potential to significantly endanger health, safety or property when transported by airplane or in storage.

Be observed from the types of dangerous goods handled and the risks that can be caused by the company must pay attention to occupational health and safety (OHS) for the employees. OHS is a form of effort to create a workplace that is safe, healthy, free from environmental pollution, so that it can protect and be free from workplace accidents, which in turn can improve work efficiency and productivity. Work accidents not only cause victims but also material

losses for workers and also companies, especially the items handled are dangerous goods which are likely to have a greater risk of accidents.

Occupational Health and Safety (OHS) is inseparable from the employment system and human resources. Therefore, there must be a clear Standard Operating Procedures (SOP) to regulate the use of Personal Protective Equipment (PPE). But in each different area, some employees still do not follow the SOP that has been made by the company, which can lead to accidents.

To prevent and reduce the level of risk of accidents, the company should implement a OHS program so that employees can understand the procedures for carrying out safe work.

Based on the background of the problem, this study will explain "Proposed Hazard Identification Handling Using Hazard Identification Risk Assessment and Determining Control (HIRADC) Technique (Study Case at PT. DGEX Indonesia Soekarno-Hatta)".

2. Study literature

2.1 Occupational Health and Safety

According to UU No. 1/1970, occupational health and safety is one of the safeguards with the aim that the workforce with other people who are different in the workplace is safe and sound. There are several notions of occupational safety and health:

1. Causes of accidents.
2. Classification of work-related accidents.

2.2 Occupational Health and Safety Management System

Occupational health and safety must be managed as with other aspects of the company such as operations, products, logistics, human resources, finance and marketing. OHS aspects cannot work as they are without management intervention in the form of planned efforts to manage them. There are several insights regarding occupational safety and health management systems:

1. Definition of Occupational Health and Safety Management System.

According to Permenaker 05 of 1996, the OHS management system is part of the overall management system which includes the organizational structure, planning, responsibilities, implementation, procedures, processes and resources needed for the development, implementation, achievement, assessment and maintenance of safety policies and occupational health in risk control related to work activities in order to create a safe, efficient and productive workplace.

2. Purpose of Occupational Health and Safety Management System.

As a performance measurement tool in the organization, the OHS management system is used to assess and measure the performance of OHS implementation in the organization. By comparing the achievement of organizational OHS with these requirements, the organization can achieve the level of achievement of OHS. This measurement is carried out through an audit of the OHS management system.

2.3 Risk Management

Risk is a combination of the possibility of danger or exposure to the severity of an injury or health disorder caused by the event or exposure. The purpose of the OHS effort is to prevent accidents caused by a hazard in the work environment. Therefore the development of an OHS management system must be based on risk control in accordance with the nature and conditions of the existing hazards.

In accordance with OHSAS 18001 requirements, the organization must obtain a hazard identification procedure, assess risk (risk assessment), and determine control (determining control) or abbreviated as HIRADC. This whole process is called risk management.

There are several techniques for identifying potential hazards:

1. *Human Error Assessment and Reduction Technique (HEART)*.

The HEART technique was developed by Williams in 1986. The technique is used with the purpose of evaluating the probability of a human error occurring throughout the completion of a particular task.

2. *Hazard Identification Risk Assessment and Determining Control (HIRADC)*.

An OHSAS 18001 requirement, the organization must establish procedures for Hazards Identification, Risk Assessment, and determine its Control (Determining Control), or abbreviated as HIRADC, the entire program is also called risk management.

3. *Technique for Human Error Rate Prediction (THERP)*.

This technique was developed by Alan Swain in 1950. Determination of errors is based on an assessment given by an expert. This error can be found by making a task analysis first. Output from THERP besides probability values are taxonomy errors, behavioral taxonomies, performance shaping factors (PSF) and human error tables.

4. *Skill, rule, and knowledge-based behavior approach (The SRK)*.

The SRK was developed based on the classifications of error taxonomy developed by Rasmussen. Methods for identifying potential hazards based on skill, rule, and knowledge-based behavior.

5. *Systematic Human Error Reduction and Prediction Approach (SHERPA)*.

The SHERPA technique was developed by Embrey. The SHERPA technique not only analyzes work in a structured manner but also provides solutions to errors that might occur. The basis for doing this technique is hierarchical task analysis (HTA). This SHERPA technique serves to analyze errors that might occur.

3. Method

The research methodology is the steps that will be taken in research to achieve the desired goals. The problem solving steps in handling this hazard identification are as follows:

1. Identification of problems

The process of identifying problems at PT. DGEX Indonesia by looking at the number of work accidents in the past in every activity in the area, looking at standard operating procedures and conducting interviews with employees.

2. Literature study

Literature studies in research use occupational health and safety management systems, hazard identification techniques (HEART), (HIRADC), (THERP), (The SRK), (SHERPA).

3. Identification of potential hazards

Identification of potential hazards is carried out in every area in the company, starting from the warehouse area, offices, field operations, transportation, training rooms.

4. Risk assessment

Risk assessment is a risk assessment process in each area in a company that has a potential value of danger.

Table 1. Scale of "Probability"

Level	Description	Information
A	<i>Almost Certain</i>	Almost certainly will happen
B	<i>Likely</i>	Inclined to happen
C	<i>Possible</i>	Perhaps can happen
D	<i>Unlikely</i>	Small perhaps can happen
E	<i>Rare</i>	Rarely happening

Table 2. Scale of "Severity"

Level	Description	Information
1	<i>No injury</i>	No injury, low material losses
2	<i>Light injury</i>	light injury, middle material losses
3	<i>Loosing work Time</i>	Loosing work Time, high material losses
4	<i>Permanent disability</i>	Permanent disability, very high material losses
5	<i>Fatality</i>	Fatality, uncountable material losses

Table 3. Scale of "Risk Rating"

Probability / Kemungkinan	Severity / Keparahan				
	1	2	3	4	5
A	M	H	H	E	E
B	M	M	H	H	E
C	L	M	M	H	E
D	L	M	M	M	H
E	L	L	M	M	H

Information:

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

5. Determining Controls

Having completed a risk assessment and having taken account of existing controls, the organization should determine whether existing controls are adequate or need improving or new controls are required.

6. Conclusions and suggestions

Conclusions and suggestions include a summary of data processing and analysis of proposed potential hazards in the research and provide proposals for handling potential hazards at PT. DGEX Indonesia.

4. Result and Discussion

Data processing will be carried out by the HIRADC method which consists of hazard identification, risk assessment, and determining control in a specified area. Potential reduction in risk rating will be made after making risk control.

4.1. Hazard Identification

Hazard identification process is a continuation process of identification activities, in the process of identification hazards, the risk of each activity that has been identified will be carried out. Risks can be caused by several factors, namely physical hazards, chemical hazards, mechanical hazards, electrical hazards, ergonomic hazards, habit hazards, environmental hazards, biological hazards, and psychological hazards.

4.2. Risk Assessment

Potential Risk assessment is a method to determine the level of risk of an activity. Parameters used to do risk assessments are probability and severity. Probability is the possibility of a work accident. The probability measurement parameters used in this study are how often the occurrence of activities that can trigger work accidents. Risk rating describes the extent of the impact of potential identified hazards which will then be viewed with the help of the risk matrix table. Risk assessment is done by interviewing employees and company manager. Examples of results from hazard identification and risk assessment can be seen in Tables 1, 2, 3, 4 and 5.

Table 1. Identification of Potential Hazards and Risk Levels in Indoor Activities

Activities: Office

NO.	Process/Activities	Hazard	Hazard Effect	Severity	Probability	Risk Level
1	Activities in the office	Carpet dust exposure	Flu and cough	5	E	L
		Wrong sitting position	Back pain	5	D	L
		Exposed to the fill of the stapler	Hand wounds	5	D	L
		Too long in front of the computer	Dizziness and tired eyes	3	C	M
		Exposed to a syringe when filling the cartridge	Finger hand wound	5	E	L
		Contact with Ink Cartridge	Skin irritation	5	D	L
		Doing monotonous work	Headache, Stiff Neck	5	D	L
		Exposed to AC for too long	Dizziness and Tense Neck	5	C	L
		Hand pinched by an emboss device	Hand Swelling	5	E	L
		Slipping down the stairs	Concussion of the brain	3	D	L
		Pinched by door	Hand Swelling	4	C	L
		Slip by wet ceramic	Concussion of the brain	3	C	M
		Lack of Drinking Water	Low back pain	2	C	L
		Drinking Water Spilled	Broken Laptops and Conslets	5	D	L
2	Activity on the toilet	Exposed to cleaning fluid	Skin irritation	4	C	L
		Slipping wet floor	Concussion of the brain	3	D	L
3	Activities when the electricity goes out	Tripping over the table	Bruise	5	D	L
4	Maintenance AC Problem / Leaking	Conslet on cable	Fire	2	D	M
		Slip	Broken bone / injury	3	D	L

Source : PT.DGEX Indonesia

Table 2. Identification of Potential Hazards and Risk Levels at FO (Field Operations)

Activities: Field Operations

NO.	Process/Activities	Hazard	Hazard Effect	Severity	Probability	Risk Level
1	Unpacking when doing the demolition process	Exposed to chemicals	Irritation	3	C	M
		Contact with sharp items (Cutter)	Slashed	3	B	M
		Fall of goods	Bruise	3	C	M
2	Identification goods	Exposed border of the paper	Torn injury, slashed	4	D	L
		Contact with sharp packaging side	Slashed	4	D	L
3	Re-packing process into new packaging	Exposed to chemicals	Central nervous system	3	B	M
		Contact with chemicals	Irritation	4	D	L
		Contact with cutter	Slashed	3	B	M
		Position lifting the wrong load	Back pain	3	C	M
		Contact with crosswise pallet	Fall down resulting in a concussion	3	C	M
		Wrong position of duct tape	Sprained	4	D	L
		Eyes get splashed Chemical liquid	Eye irritation, blindness	2	C	M
		Repeated work	Sleepy because	3	D	L
			Exhaustion	4	C	L
		Pinched by box	Bruises on finger	3	C	M
		Slippery floor slipping	Hit	3	D	L
		Electric current on the panel	Electric shock	5	C	L
4	Placement or attachment of Marking and Labeling	Incorrect lift and attachment position	Back pain	3	C	M
5	Submit goods to customers	Tripping when moving goods	Hit	4	E	L
		Pinched by car door	Bruises on the finger	3	C	M
		Fallen items will be delivered	Bruise	4	E	L
6	Repacking goods at the customer's office	Do not know the chemical hazards of new materials	Irritation, chemical poisoning	2	C	M

Source : PT.DGEX Indonesia

Table 3. Identification of Potential Hazards and Risk Levels in Warehouses

Activities: Warehouse

NO.	Process/Activites	Hazard	Hazard Effect	Severity	Probability	Risk Level
1	Loading dan unloading goods	Hand exposed to the cardboard side	Slashed	4	C	L
		Fallen of the carton box	Bruises on parts of body	3	C	M
		Hit by a handlift	Bruises on the legs	3	C	M
		Smoke exhaust truck	Cough and breathless	4	B	M
		Dust when cleaning the warehouse	Breathless, cough, flu	4	B	M
		Fallen of pallet	Broken leg / crack	3	B	M
		Hit the shelf	Bruises in certain parts	5	A	M
2	Making artwork	Contact with cutter	Scratched wound	4	C	L
		Too long in front of the laptop	Painful eyes, watery	3	C	M
3	Warehouse Cleaning	Exposed to dust	Breathless, Upper Respiratory Infection	5	A	M
		Tripping by pallet	Broken bones / sprains	3	B	M
		Slip	Concussion of the brain	4	C	L
		Fallen by fibreboard boxes	Bruise	3	C	M
		Hit by shelf	Bruise	3	C	M
4	Handling overstock	Incorrect lift position	Spinal pain	3	C	M
		Fallen by material	Foot injury	3	B	M
		Tripping by material	Foot injury	3	B	M
		Falling from a height	Broken bones	3	C	M
		The work position revolves around the object	Dizzy	4	B	M

Source : PT.DGEX Indonesia

Table 4. Identification of Potential Hazards and Risk Levels in Transportation

Activities: Transportation

NO.	Process/ Activities	Hazard	Hazard Effect	Severity	Probability	Risk Level
1	Driving on the highway	Sleepy while driving	Crashing / getting hit	2	C	M
		Shocks when carrying chemicals	Explosion or fire	2	C	M
		Flat tire	Crashing / getting hit	3	D	L
2	Lift or move items from the warehouse to the car and otherwise	Incorrect lift position	Low back pain	2	C	M
		Contact with the side of the package or item to be moved	The injury is torn on the part of the hand	4	C	L
		Contact with chemicals	Irritation	4	D	L
		Pinched by Box	Bruises on the finger	4	C	L
		Fallen by material	Broken leg bones	3	B	M
		Tripping material	Bruises on the legs	3	B	M
		Inhale the smell of chemicals	Breathless	4	C	L
3	Vehicle service	Contact with accu	Get a shock accu	5	D	L

Source : PT.DGEX Indonesia

Table 5. Identification of Potential Hazards and Risk Levels in Training

Activities: Training Room

NO.	Process/Activities	Hazard	Hazard Effect	Severity	Probability	Risk Level
1	Clean the training room	Exposed to dust	Cough, phthisis	2	C	M
2	Drive a vehicle while heading to the training ground	Drive a vehicle at high speed	Crashing or grazing	3	C	M
3	Lift training material	Excessive weight	Low back pain	3	C	M
		Incorrect lifting position	Low back pain	3	C	M
4	Making Training Materials using a laptop	Exhaustion	Headache, Stiff Neck	5	D	L
		Exposed to AC for too long	Headache, Stiff Neck	5	C	L

Source: PT. DGEX Indonesia

5. Repair Analysis and Evaluation

Analysis for evaluate potential hazard minimization by determining the control carried out in each work activity based on the area. This evaluation is carried out at the level of risk that cannot be tolerated starting from extreme risk levels, high, to medium risk value levels, while low risk levels can still be tolerated by the company.

The evaluation analysis of proposed improvements with determining control is carried out for all activities including:

1. Elimination

Control by eliminating the source of danger so that the impact becomes zero.

2. Substitution

Danger control by replacing dangerous tools, materials, systems or procedures with safer or lower dangers, namely by using tools or machines such as trolleys and forklifts. Where the machine can minimize the harmful effects of back pain for employees.

3. Engineering control

Modify the design to eliminate hazards, for example changing the system of places or special shelves to store chemical liquid or flammable items and adding strap straps on the side of the conductor to avoid falling objects caused by shocks or touch on the warehouse.

4. Administration control

Make several systems in the form of procedures to ensure safe work, such as signs, set work schedules, safe work procedures standards, equipment checks, rotations or health checks. For example improving Specific Operation Procedure that is in accordance with the way of handling goods on the IATA DGR and IMDG code.

5. Personal protective equipment (PPE)

Use personal protective equipment to minimize risks such as safety shoes, cloth / rubber gloves, face masks and head protectors in handling dangerous items.

6. Conclusion

1. The results of risk level analysis in each area show a low risk level in the office area with 15 risks and the lowest in the warehouse area with 3 risks. While the medium risk level is the highest in the warehouse area with 16 risks and the lowest in the office area with 3 risks.
2. Proposed risk control is analyzed by the risk control hierarchy containing proposed elimination, substitution, engineering control, administration control, and personal protective equipment(PPE).

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