Evaluation of the Globally Harmonized System Implementation in the Occupational Safety Division of the Manpower and Transmigration Department Surabaya

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ABSTRACT

Introduction: The number of chemicals is increasing every year. Laboratories record work accidents because there are several chemicals that are not labeled and unidentified but are stored in an inappropriate place. The Globally Harmonized System (GHS) is a Global System for standardizing criteria and harmonizing hazard classification systems, Safety Data Sheets (SDSs) and Labeling. This research aims to assess and evaluate the implementation of the GHS at the Occupational Safety Division of the Manpower and Transmigration Department Surabaya. **Methods:** This research was a descriptive observational study. Data were collected by assessing 80 types of chemicals through assessment sheets and an interview with the analyst supervisor, who had responsibility and authority in the application of the GHS. This research aims to apply the GHS with hazard classification variables, SDS availability and suitability, and labelling availability and suitability. **Results:** The results showed that the implementation of the GHS at the Occupational Safety Division of the Manpower and Transmigration Department Surabaya was 66.67%, categorized as good, with a good availability and suitability assessment of SDSs of 91%, and a good availability and appropriateness assessment of labelling of 98.1%. **Conclusion:** The results showed that the Occupational Safety Division of the Manpower and Transmigration Department Surabaya has been very good at implementing the GHS, but some points must be made to maintain and improve the application of the GHS as an effort to prevent accidents with hazard communication.

Keywords: chemical laboratory, hazard chemical, globally harmonized system, SDGs12

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INTRODUCTION

To improve safety in handling chemicals, it is necessary to know that each chemical has its potential dangers (Hara *et al*., 2007). Various problems can arise due to inappropriate chemical handling. Chemicals are an absolute necessity in a laboratory, usually used for analysis or sample calibration.

Before publicly published, it is essential to classify the hazards from chemicals according to cut-off values or endpoints. Several countries have systems for classifying chemical hazards. Although the hazard classifications between countries can be similar, there are some differences in the actual classification. For example, a chemical is classified as flammable, but the same chemical can also be classified as highly flammable. There is no general prioritization of hazard in the sense that a certain hazard class is not applicable if another one has been assigned (Wilrich *et al*., 2017).

The World Health Organization (WHO) estimates that 150,000 chemicals have been produced, and there are about 200 to 1,000 new types of chemicals each year. Various industries in the world at present use an estimated 100,000 chemicals, approximately 12.000 of which harm human health. Meanwhile, based on the Chemical

Citethisas: Harjono, A. E. etal. (2022) 'Evaluation of the Globally Harmonized System Implementation in the Occupational Safety Division of the Manpower and Transmigration Department Surabaya', *The Indonesian Journal of Occupational Safety and Health*, 11(2), pp. 256-265.

 doi:10.20473/ijosh.v11i2.2022.256-265
Received February 04, 2021, received in revised form April 16, 2021, Accepted May 11, 2021, Published: August 2022

Abstract Services (CAS), the number of chemical substances consists of 167 million organic and inorganic chemicals, mixed chemicals, and 68 million biosequences. Chemicals used in a certain period will cause fatal health problems for workers, causing diseases and malignancy. This is in accordance with Warnasooriya and Gunasekera's research (2017) stating that long term exposure of chemicals is considered as the most primary source of hazards for workers in chemical plants.

Records of work accidents in chemical laboratories show that the storage of explosive and flammable materials can cause fires. It happens because one chemical and the others are not compatible. Besides, other cases occur due to pesticide poisoning because of errors in storage and use. Lack of knowledge and understanding of chemicals and equipment as well as disobedience of the instructions for storage and use of chemicals are also known to cause accidents in the laboratory. Human factors that can lead to an accident in the laboratory include violations of operating rules, improper operation, and careless operation or improper use. Casualties caused by these three causes are as high as 88% (Zhu *et al*., 2020).

Managing chemical storage is necessary so that the stored chemicals do not cause interactions that can lead to work accidents. Adjusting the chemical labels and chemical layouts based on properties is an alternative solution that can be applied to reduce the risk of interactions between chemicals. Chemical labels become an option to communicate information related to chemical hazards. Hazardous chemical communication tools will provide information about hazards from the chemical itself and the particular chemical for informed risk decision making, as well as will promote scientifically determined cautionary behaviours required to prevent hazardous exposures (Dalvie, Rother and London, 2014).

A laboratory is a place to apply a scientific theory, proof of trials, theoretical testing and so on by using adequate completeness and quality tools (Emda, 2017). Chemical laboratories generally use chemicals, chemical spills and gas leakage which have been the main safety concerns, and which occasionally happen due to human error or equipment failure (He *et al*., 2021).

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) has formed a global system in terms of the hazard communication, hazard classification, Safety Data Sheet (SDS) and chemical labeling. The GHS contains important information about the elements of the compound or chemical mixture used. In 2013, member states of the United Nations were expected to adopt the GHS systems worldwide.

Based on the Survey of Asia-Pacific Countries regarding the GHS Implementation, Indonesia is one of the Asia Pasific Economic Cooperation (APEC) members which was appointed to be one of the Pilot Country Projects to implement the GHS in the Asia Pacific region, especially The Association Of Southeast Asian Nations (ASEAN) level. The adoption of GHS has a lot of advantages because it is easy to implement, and it provides detailed and consistent information. Harmonization of the SDS format and labelling. The SDS in the GHS uses 16 sections and six important points for labels.

The Occupational Safety Division of the Manpower and Transmigration Department Surabaya is an institution that has a chemical laboratory. There are various activities involving the use of hazardous chemicals in liquid, solid, and gaseous forms. The chemicals used in the preparation process for sampling and sample analysis are stored in a superior and restricted room.

According to Morgado, Silva and Fonseca (2019), the use of advanced quality management systems has helped to reduce accident rates since the quality management methods are based on the prevention principle rather than corrective action.

An identified risk control is one of the preventive measures that can be done. The concept behind the hierarchy is that the control methods at the top level are more effective than those at the bottom. The methods start from the elimination, substitution, engineering controls, administrative controls to personal Protective Equipment (PPE). Following the hierarchy can lead to safer work system where the risk of injury will substantially decrease (Iqbal *et al*., 2020).

The GHS can be an administrative control option in controlling chemical hazards in the workplace. Apart from being a form of unified hazard communication, the application of the GHS can also help make a plan to reduce the risk of reactions due to unsuitable and incompatible chemical storage.

There are several differences between a GHS assessment and an audit. The GHS assessment in this research just assessed the availability and suitability of safety data sheets and labelling according to the Purple Book: The Globally Harmonized System of Classification and Labelling of Chemicals. Eight

revised edition. Meanwhile, the audit assessed similar matters but also more concrete and detailed matters, for example audit concern and the flow of chemical ordering, chemical storage, chemical handling and chemical disposal in the laboratory.

In this study, the researchers are interested in researching the evaluation of the GHS implementation at the Occupational Safety Division of Manpower and Transmigration Department Surabaya

METHODS

This study was a descriptive observational method with a cross-sectional approach because the research was carried out without giving additional treatment to the object of research , and the observations were made at a certain period. Data were collected through assessment sheets. The number of chemicals from the observation was 80 types of chemicals.

Interview was conducted with an analyst supervisor as an informant who gave some information about the flow of chemical ordering, chemical storage, chemical handling and chemical disposal in the laboratory. The analyst supervisor had responsibility and authority in the application of the GHS in the chemical laboratory. The aim of this study is to describe the application of the Globally Harmonized System (GHS) at the Occupational Safety Division of Manpower and Transmigration Department Surabaya

The study was conducted at the Occupational Safety Division of Manpower and Transmigration Department Surabaya for 2 months starting from Augustus to October 2020. The objects examined in this study were the safety data sheets and labels in the chemical laboratory, especially in the chemical storage areas.

Primary data collection was done with observation and assessment sheets. Meanwhile, secondary data were obtained by looking at company documents such as company profiles, Occupational Safety and Health policies, etc. Safety Data Sheets (SDSs) labels were assessed using assessment sheets according to the Purple Book: the Globally Harmonized System of Classification and Labelling of Chemicals. Eight revised edition.

There were 17 items of questions to assess the SDS availability i.e availability of product information, hazard identification information, chemical composition information, information on first aid measures, leak or spill response information, handling and storage information, exposure control or personal protection information, information on physical and chemical properties, stability and reactivity information, toxicological information, ecological information, waste disposal information, transportation information, regulatory information, and other information, as well as to assess the use of Indonesian language.

Labelling availability assessed using assessment sheets consisted of 6 questions i.e availability of products' name, availability of pictograms, availability of signal words, availability of information about hazard statements, availability of information about statements of caution, and availability of information about producers' identity.

The assessment results would come out as a percentage and be put into categories. These categories were then divided into three, namely good, moderate, and poor. Good categories were categories with a percentage of availability and suitability > 66%, medium categories were categories with a percentage of availability and suitability between 33-66%, and poor categories were categories with a percentage of availability and suitability <33%. The data obtained were afterwards described in a complete explanation with tables, and then were adjusted to the regulations governing the application of the GHS.

RESULTS

Overview of the Chemical Laboratory of the Occupational Safety Division of Manpower and Transmigration Department Surabaya

The Occupational Safety Division of Manpower and Transmigration Department Surabaya, the place chosen by researchers in this research, is an institution engaged in public services in carrying out testing, inspection, research, and training in industrial hygiene.

The Occupational Safety Division of the Manpower and Transmigration Department Surabaya has two laboratories located on different floors. The focus of this research was the chemistry laboratory located on the 3rd floor. The chemistry laboratory was used to carry out field sampling preparations and analyze test samples of emission, ambient, and work place environment.

Activities in the chemical laboratory room involve hazardous chemicals in liquid, solid, and gas forms. The chemicals used in the preparation process for sampling and sample analysis in this research were stored in a superior room and were limited to officers. The stored chemicals have been sorted and arranged not to cause reactions with one another.

Table 1 shows the hazard classification of chemicals stored in the chemical laboratory. It was found that there were 18 harmless chemicals, 14 flammable liquid chemicals, 1 solid chemical that could cause combustible gases when reacting with water, 9 oxidizing chemicals, 13 corrosive chemicals, 17 toxic chemicals, and 8 chemical carcinogens.

The chemical storage applied by the Occupational Safety Division of the Manpower and Transmigration Department Surabaya refers to the recommendations of the chemical's producer, MERCK Millipore's. MERCK has released safe storage recommendations to be applied by users to store chemicals safely.

Application of the Globally Harmonized System

Based on the results of observations and interviews with the analyst supervisor of the Occupational Safety Division of the Manpower and Transmigration Department Surabaya, it was found that the GHS has not been implemented yet in the Occupational Safety Division of Manpower and Transmigration Department Surabaya. There were no rules or policies communicated to those responsible for managing chemicals in the laboratory for applying the GHS in the chemical storage areas.

Three important points must be applied according to the GHS Guidelines, namely hazard classification, availability and suitability of the SDS, and label availability and suitability. These three points are the core of the GHS as an effort to prevent chemical accidents. In this research, it was found that hazard classification has not been fully implemented in the Occupational Safety Division of Manpower and Transmigration Department Surabaya, but the application was quite good.

Table 2 shows that the overall percentage of the GHS implementation in the Occupational Safety Division of Manpower and Transmigration Department Surabaya was 66.67%, categorized in a good category. Based on the three points assessed, only the hazard classification point not following the GHS recommendations. The Globally Harmonized System (GHS) to harmonize the chemical hazard classification system and communicate it through labels and safety data sheets is still not fully implemented by the Occupational Safety Division of Manpower and Transmigration Department Surabaya.

The work was proceeded by examining the scientific basis for the criteria, gaining consensus on the test methods, doing data interpretation, and making the criteria. For most hazard classes, the existing schemes were already in place and being used by the transport sector.

One of the points recommended in the GHS is the classification of chemical hazards. Chemical hazard classification is carried out to determine and classify the level of chemical hazards. Chemical hazard classification can be determined by

Table 1. Description of the Types of Chemicals at Occupational Safety Division of Manpower and Transmigration Department Surabaya in 2020

Criteria	Total
Not classified as a hazardous chemical	18
Flammable liquid chemical	14
Solid chemicals that give rise to flammable gases (when reacted with water)	1
Oxidizing chemicals	9
Corrosive chemicals	13
Toxic chemicals	17
Chemical carcinogens	8
Total	80

Table 2. Overall GHS Application at Occupational Safety Division of Manpower and Transmigration Department Surabaya in 2020

Criteria	Following GHS	Not following GHS
Hazard Classification		√
SDS Availability and Compliance	√	
Label Availability and Compliance	√	
Total	66.67%	

employing decision logic and viewing test data. Based on the interview results, the classification of chemical hazards in the Occupational Safety Division of Manpower and Transmigration Department Surabaya was still not based on the GHS. The chemicals contained in the storage area in the chemical laboratory were still based on the recommendations from MERCK, which was used to determine the layout of chemical storage. Hence, there were no interaction reactions that could happen between chemicals.

The classification of the chemical hazards applied by the Occupational Safety Division of Manpower and Transmigration Department Surabaya should be based on the classification recommended by the GHS according to Regulation of the Minister of Industry No. 23/M-IND/PER/4 2013 Clause 4, which states that the classification is based on hazard criteria consisting of 16 physical hazards, 10 health hazards and 3 environmental hazards.

Safety Data Sheet (SDS) Availability and Suitability

The results of observations that have been done show that there were several chemicals not equipped with the SDS. Table 3 shows that there were 73 out of 80 chemicals equipped with the SDS and follow the GHS recommendations. Thus, the total percentage obtained for the SDS availability was 91.25%, and the suitability with the GHS recommendations was 90.75%, which means that both were in a good category.

The SDS was published by the producer and given to the Occupational Safety Division of Manpower and Transmigration Department Surabaya as the chemical consumer. Therefore, there was only one type of SDS from MERCK as a chemical producer. Meanwhile, seven types of chemicals were not produced by MERCK, which means that those chemicals were not under the GHS recommendations and Regulation of the Minister of Industry No. 23/M-IND/PER/4 2013.

Table 3. GHS Application Level on SDS Availability and Suitability Points at Occupational Safety Division of Manpower and Transmigration Department Surabaya in 2020

Criteria	Total	(%)
Available	73	91.25
In accordance with GHS recommendations	73	90.75
Total	91%	

The GHS recommendations were assessed by looking at the points contained in the SDS of chemicals. Compliance with the GHS recommendations can be seen at the Regulation of the Minister of Industry No. 23/M-IND/PER/4 2013, which states that each SDS must be presented in a consistent 16-point format in accordance to the regulation.

The SDSs were provided and stored as a Compact Disc (CD) by the Occupational Safety Division of Manpower and Transmigration Department Surabaya. The CDs contained a list of chemicals and had full access to find the SDSs on the chemical manufacturer's official website. The CDs were placed on the host computer, near the chemical storage room.

According to the observation results, it was found that chemicals without being equipped with the SDSs were chemicals that were not produced

Table 4. SDS Conformity at Occupational Safety Division of Manpower and Transmigration Department Surabaya in 2020

Criteria	Total	(%)
Product Information	73	5.36
Hazard Identification	73	5.36
Composition	73	5.36
First-aid measures	73	5.36
Fire Fighting Measures	73	5.36
Leak or spill response measures	73	5.36
Handling and storage	73	5.36
Exposure control or personal protection	73	5.36
Physical and chemical properties	73	5.36
Stability and reactivity	73	5.36
Toxicological information	73	5.36
Ecological information	73	5.36
Waste disposal	73	5.36
Transportation information	73	5.36
Regulatory information	73	5.36
Other information	73	5.36
Indonesian Language	68	4.99
Total	90.75%	

by MERCK, and hence the Occupational Safety Division of Manpower and Transmigration Department Surabaya needs to complete the SDSs from chemicals that do not have SDS. Completing the SDSs can be done by contacting the chemical producer, or creating a new SDS based on the type of chemical.

Table 4 shows the details of the number of SDSs of chemicals that fulfil the essential points recommended by the GHS. The SDSs which were available and stored by the Occupational Safety Division of Manpower and Transmigration Department Surabaya were given by the producer, with a total of 73 SDSs from different types of chemicals.

Label Availability and Suitability

A label is any description of a chemical in the form of an image, writing or a combination of both or other forms containing product information, hazard pictograms, signal words, hazard statements and producer identification. Based on observations, all chemicals stored in the chemical laboratory have been equipped with labels. However, several types of chemicals were not following the GHS recommendations.

Table 5 shows that the level of label availability on chemical packaging reached 98.75%, with only one chemical whose packaging not equipped with a label. However, compliance with the GHS recommendations reached 97.45%. The average of both was 98.1%, which means that label availability and suitability according to the GHS recommendations was categorized in a good level.

The application of GHS to the point of label conformity can be seen in Table 6 with the percentage value of conformity reaching 97.45%, which means that the conformity of labelling with those recommended by the GHS was in a good category. However, chemical packaging stored in the chemical laboratory with the SDS obtained from the chemical manufacturer need to be checked periodically to ensure the conformity of the hazard information on the chemical labels and the SDSs. Labels on chemical packaging also need to be considered and maintained in appearance so that they are easy to read, are not damaged and do not fade due to environment.

Observations were done by looking at each chemical package. Furthermore, comparison between the SDS and label of each chemical package aimed at ensuring that the points listed on the label match those written in the SDS.

Chemical labels that are not in accordance with the GHS recommendations were sodium nitrite, 1-propanol, acetone, hydrochloric acid, 47% formaldehyde and phenolphthalein. The labels on these chemicals did not use pictograms recommended by the GHS. The pictograms which

Table 5. GHS Application Level On Availability and Label Accordance Points at Occupational Safety Division of Manpower and Transmigration Department Surabaya in 2020

Criteria	Total	(%)
Available	79	98.75
In accordance with GHS recommendations	73	97.45
Total	98.1%	

Table 6. Labelling Conformity at Occupational Safety Division of Manpower and Transmigration Department Surabaya in 2020

Criteria	Total	(%)
Product's name	79	16.45
Pictograms	73	15.20
Signal word	79	16.45
Hazard statements	79	16.45
Statement of caution	79	16.45
Producer identity	79	16.45
Total	97.45 %	

Table 7. Incompatibility of Labels on Chemical Packaging at Occupational Safety Division of Manpower and Transmigration Department Surabaya in 2020

Chemical material	Incompatibility
Sodium Nitrite	Pictograms
1-Propanol	Pictograms
Acetone	Pictograms
Hydrochloric Acid	Pictograms
Formaldehyde Solution 37%	Pictograms
Phenolphthalein	Pictograms
Sodium Borohydride	Does not meet all the points recommended by GHS

were listed on the labels were pictograms with an orange background and a black symbol. Meanwhile, in the Purple Book: Globally Harmonized System of Classification and Labeling Of Chemicals, it is stated that pictograms are required to use a white background with a red outline and a black symbol. These recommendations intend to harmonize the use of symbols to describe a chemical hazard. Based on Table, 7 it can be seen that the mismatch of chemical packaging labels had several similarities, namely the use of pictograms which were still in the form of old pictograms.

DISCUSSION

In order to improve laboratory safety in the use and handling of chemicals, it must be understood that each chemical has it owns potential hazards (Ta *et al*., 2010). Information about chemical identities and chemical hazards must therefore be available and understandable to workers.

Every industry must first determine the potential risks to worker health and the environment from substances and mixtures by classifying them using the Classification, Labelling and Packaging (CLP) criteria based on the Globally Harmonized System (GHS) (Apatsidou *et al*., 2018). Insufficient training on the use of safety information is a possible factor to poor comprehension of hazard communication among workers (Sathar, Dalvie and Rother, 2016). Thus, there is a need of reliable information so that workers can safeguard their health while handling chemicals and make the right programs to handle and communicate them (Rao, 2019).

The Hazard Communication Standard (HCS) is now alligned with the Globally Harmonized System (GHS) of Classification and Labelling of Chemicals. According to the accident theory and the International Loss Causation Institute (ILCI) Loss Causation Model, there are several steps that exist before an accident happens (Alamanda Putri, 2019). Lack of control is the initial step that leads into basic causes and allows the sequence to proceed to the eventual loss. Hazard communication has an important role to prevent an accident from happening. Good hazard communication to every worker leads to the improved knowledge about safe chemical handling. Hazard communication can also take a part as a guide to create effective programs including management and employee training, personal protective equipment (PPE) and engineering controls.

Overview of the Chemical Laboratory of the Occupational Safety Division of Manpower and Transmigration Department Surabaya

The Chemical Laboratory of the Occupational Safety Division of the Manpower and Transmigration Department Surabaya has chemical storage. There were a total of 80 different types of chemicals which were separated based on the hazard of the chemical itself. The chemical storage needs to pay attention to the layout of the chemicals and other storage procedures. The absence of regulations regarding the placement and classification of chemicals will endanger laboratory staff. Research conducted by Rahmantiyoko, Sunarmi and Rahmah (2019) stated that the laboratory space related to chemicals and other equipment should be neatly arranged. In each storage room and shelf, it is necessary to provide a description that describes the places for storing chemicals with the aim to make it easier to search the chemicals later.

Chemical laboratory staff must also be trained how to handle chemicals safely and properly. In this research, the company has provided training but the training given is not specific in chemical handling and hazard communication. Meanwhile, according to Jafarvand (2019) educating laboratory staff on updates to existing chemicals, chemical classifications, signal words, pictograms, and precautionary statements on labels are essential components in disseminating the GHS approach and other occupational information. Improper operation of laboratory staff and flammable chemical leakage are also considered as one of the reasons for chemical explosion condition (Zhu *et al*., 2020). Training and development of competent officers could, therefore, improve skills and knowledge of the laboratory officers as required, and also improve pictogram's GHS comprehension.

Application of the Globally Harmonized System

Hazard classification is the initial step that becomes the basis of hazard communication. Hazard classification includes the identification of a single chemical hazard or a mixture and the determination of the hazard category based on the existing criteria. Hazard classification can be done by testing, literature and practical experience (the United Nation, 2017).

The hazard classification of the Occupational Safety Division of the Manpower and Transmigration Department Surabaya has not

been fully implemented, but its application is quite good. The hazard classification recommended by the GHS can be used as a reference material in preparing and storing chemicals. However, based on observations in the field, many chemicals were not stored according to the hazard classification.

The classification of chemical hazards, guidelines and suggestions regarding chemical storage are also listed in the SDSs sections 7 and 15. Section 7 contains recommendations for safe storage and handling of materials. Meanwhile, section 15 includes the Laws and Regulations related to the products' health and safety and displays the storage classes of these types of chemicals. Chemical classes are openly accessable on the MERCK official website, as a chemical producer, which recommends safe storage for consumers as a reference for storing chemicals safely.

Based on the results of the classification of the chemical hazards, the chemicals are then arranged so as not to cause physical, health or environmental hazards during storage. According to Widuri (2017), the GHS can cover all chemical hazards in the workplace and can be used to cover chemicals in the workplace, transportation and consumers. The chemical classification not only identifies chemical hazards, but also finds out the type of chemical itself. For example, liquid chemical compounds include sulfuric acid, hydrochloric acid, ammonium nitrate, sodium hypochlorite and carbon monoxide (Sivaprakash, Karthikeyan and Joseph, 2014).

Paying attention to chemical storage with hazardous substances is very important in order to maintain safety aspects in the laboratory. This could be achieved with adequate separation distances between storage tanks according to their forms and characteristics (Ricci *et al*., 2021).

Safety Data Sheet (SDS) Availability and Suitability

A SDS is a document containing data on the characteristics, types, composition, and physical and health hazards of a particular chemical. A SDS also includes details regarding the recommended handling and storage steps for chemicals, so there is no reaction that occurs between chemicals, which will endanger the users. Sections in the SDS also describe other supporting information that can be used as information or consideration in making a hazard control plan. A SDS is an integral part of creating a safe working environment and place for every worker. A SDS was previously named as a Material Safety Data Sheet (MSDS) in the United States and other jurisdictions, providing effective information to professional and industrial users (Ramos-Peralonso, 2014).

According to Widuri (2017), SDSs should be stored close to the employees' workplace and be always available on every shift. However, based on the Workplace Hazardous Materials Information System (2015), SDSs stored and saved in CDs are allowed as long as laboratory officers have full access and have been trained to use the computers. Computers, therefore, need to stay in standby mode, so they can be used at all times.

Not all of the SDSs that the Occupational Safety Division of the Manpower and Transmigration Department Surabaya used were in Indonesian. According to the Regulation of the Minister of Industry number 23 of 2013 in section 10, the writing of labels and SDSs must use Indonesian, but it can also be accompanied by an International language so that SDSs can be more easily understood by officers who will use the chemicals (Ministry of Industry of the Republic of Indonesia, 2013)

SDSs should be introduced as early as possible to each laboratory officer in order to make them understand the hazards and countermeasures of exposure to certain chemicals. SDSs can be given to every laboratory officer as an effort to do safe handling of chemicals in the event of an incident (the American Institute of Chemical Engineers, 2016).

Label Availability and Suitability

A label is an appropriate group of written or graphic informational elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical. Chemicals that are not accompanied by the label will directly impact the workers who will do the work (Asror and Nawawiwetu, 2018). The Regulation of the Minister of Industry No. 23/M-IND/PER/4 2013 Section 5 states that six crucial elements must be contained on chemical packaging labels: product name, hazard pictograms, signals word, hazard statements and manufacturer identification. Table 7 shows that the mismatch of chemical packaging labels has several similarities, such as the use of pictograms that are still in the form of old pictograms. Furthermore, some chemicals have been transferred into a smaller package from the original packaging because it was felt that it would be easier to use, but transferring the chemicals to secondary containers will limit the amount of

information that must be included on the label (Al-Lami *et al*., 2017). It would be very dangerous during the disposal process of these chemicals. Thus, these chemicals need to be identified before being disposed of.

Chemical labels contain information related to the chemicals in the package. As a piece of communication information, a warning is intended to provide information to people who read it. One indicator of success of the use of chemical labels is whether warning information is received and understood (Sathar, Dalvie and Rother, 2016). Therefore, training is required for information dissemination and evaluation of warnings on chemical labels.

In general, hazard communication related to chemical handling and chemical management can be verbal or non-verbal. Hazard communication is emphasized in the GHS related to labelling guidelines, pictogram symbols and safety data sheets (Rao, 2019). Substandard chemical hazard communication, e.g, the absence of labels and damaged labels or non-conformance with GHS recommendations, can increase the evidence of swapped chemicals and accidents due to incorrect mixing of chemicals because they cannot be identified, and can cause errors in the storage of chemicals.

CONCLUSION

The application of the Globally Harmonized System in the Occupational Safety Division of the Manpower and Transmigration Department Surabaya in general was included in the good category with a percentage of 66.67%. Hazard classification has been applied, but it has not followed the GHS recommendations. The SDSs were in the good category on the availability and suitability points, with 91%. The SDSs owned by the Occupational Safety Division of the Manpower and Transmigration Department Surabaya were the SDSs provided by the chemical producer, in a Compact Disc (CD) format. Meanwhile, labelling availability and suitability points received an average value of 98.1%, meaning that it was in a good category. The Occupational Safety Division of the Manpower and Transmigration Department Surabaya as a chemical user can make alternative labels following the recommendations. It will help laboratory staff not to misidentify the characteristics and hazards of chemicals in the laboratory.

ACKNOWLEDGEMENTS

I would like to thank all people/parties who have been involved in this research either directly or indirectly. My gratitude for my parents, and all members of family who always pray and encourage me. Furthermore, I would like to send my great gratitude to the Faculty of Public Health, especially the Department of Occupational Safety and Health for the insights and experienced I gained .

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