

# Health Safety in Cosmetics Industries: A Case Study of Evaluation on Physical Environmental Safety

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**Abstract:** ***Background:** Cosmetics production must contains some risks. This study aimed to evaluate the aspects of occupational health and safety in physical environmental aspects on cosmetics production in a cosmetic industry. **Methods:** This study was an evaluation study. It used qualitative approach to obtain information concerning on safety risk of employees who worked in this cosmetic industry. The researcher combined the interview data with the observation results to determine the risks as occupational level using HIRARC (Hazard Identification, Risk Assessment and Risk Control). Data were obtained by interview, observation and risks assessment. **Results:** The Result found that cosmetic production process had three categories of risk. They are low 23, 8%, medium 71,4% and high 4,7%. The highest risk in working activity was mixing substances using big blender. Further, there were 21 hazard risks based on HIRARC identification. Moreover, the cosmetics production had fulfilled standard of occupational health and safety, especially in the physical environmental aspect.*

**Keywords:** health safety, cosmetic industries, environmental safety, occupational health

## 1. Introduction

Cosmetics industry is a licensed industry to conduct cosmetic production process. Cosmetic industry must apply Good Manufacturing Product (GMP) to produce safe and high quality products. It includes management system of quality, human resource, building, supporting facility, equipment, sanitation & hygiene, production, quality control, documentation, complaint management and product withdrawal [1]. Cosmetics were produced from licensed and standardized substances. The substances were weighted using scale and then calibrated annually. Then it will be preceded using machine into primary bulk product and ready to be packed into bottle or cosmetic pot. Further, secondary packing were done by labeling, plastic sealing, and boxing cosmetics. Finally, the cosmetics are ready for sale.

Each step of production processes, the usage of tools or machines and work place has potential danger. It requires special attention to prevent occupational accidents [2]. Occupational accidents that may happen are chemical factors (dust, metal steam and water gas); physical factors (noise, lighting, vibrating, working climate and fall); work manner and ergonomic factor (chair position, repetitive work and long working time); pollution emergence in society; fire; bad house-keeping and work exhaustion or stress [3].

Occupational health and safety in Industry is an important matter for businessmen, employees and produced-products. If accidents occur as the production effects, it will affect all of company members. It is responsibility of all members of a company to maintain occupational health and safety. Occupational health and safety is maintained to prevent occupational accidents that cause loss such as injury, disability, and mortality. Moreover, it also causes property loss, machine damage and extensively environmental damage [4].

Occupational risks and accidents depend on production types used, spatial structure, building environment, management, executive staff and labors quality. The highest number of work-related accidents in 2011-2014 in 2013 was 35,917 work accident cases (2011 = 9,891; 2012 = 21,735; 2014 = 24,910). The provinces with the highest number of work-related accidents in 2011 were Banten, Central Kalimantan and East Java; In 2012 Jambi, Maluku and Central Sulawesi Provinces; In 2013 the provinces were Aceh, North Sulawesi and Jambi, in 2014 were the provinces of South Sulawesi, Riau and Bali [5].

Although occupational health and safety has been developed to prevent injuries and accidents in work environment, the risks remain. Risks may affect labors, tools and environmental safety. Furthermore, it also affects economic competition and performance of industry and community. Occupational accidents and diseases have many disadvantages such as labour injury, tools damage, low production quality and quantity. Furthermore, it cause early retirement and staff absent that adverse the industry [6].

Workers need protection from occupational hazards and diseases or as a result of the work environment. So that the workforce will feel safe and comfortable at work, and labor productivity can increase even more.

Some production environments do have the safety aspects of their respective work environments, the same as the cosmetic production factory, which is the author's focus on writing this journal. So the authors are interested in conducting an evaluation study on the Cosmetics Industry with the title "Evaluation of the Safety Aspects of the Physical Environment in the Process of Cosmetic Product Production."

## 2. Research Methods

### 2.1 Type and Design of Research

This study was an evaluation study to evaluate workers' safety. This study observed employees' activities that may emerge hazard and disease. Therefore, the object of this study was working activities of employees to identify potential hazard that may happen in company's routine and non-routine activities. Data were obtained by interview and observation. Then, the researcher compares both of them to determine risk of occupational safety using HIRARC.

HIRARC is started from determining work activity, then identifying hazard sources, so the risk obtained. Further, conducting risk assessment and risk control to reduce hazard exposure in every work activity.

#### a) Hazard Identification

Hazard identification is a process to identify whole situation or incident that potentially causes hazard and disease that probably happen in work place. Hazard identification is conducted to identify potential hazard of a substance, machine or system [7]. First step of HIRARC process was done by identifying all activities in cosmetic industry, both routine and non-routine activities. Then, identifying hazard sources. Further, identifying the hazard sources related to identified-activities.

#### b) Risk Assessment

After identifying all risks, risk assessment is conducted by analyzing and evaluating risk to determine risk level. It was conducted by measuring the likelihood and consequences. After analysis, risk level could be identified so it can be classified into low risk or ignorable risk. Further, the analysis results could be compared with standard criteria and norm to determine the risks. If the risk was acceptable, it must be managed well. Risk assessment includes two process, they were risk analysis and risk evaluation. These two steps were important to determine strategy to control the risks.

After determining risk levels of an activity, the next step was to classify the risk from the lowest level to the high level. The classification was done to determine risk resolution and control [8].

#### c) Risk Control

Controlling of hazards in working environment is any kind of action taken to minimize or eliminate risk of occupational accidents. It is done by eliminating, substituting, and engineering control, warning system, administrative control, and personal protective equipment's [9].

### 2.2 Instruments

This study used some instruments to conduct an evaluation. The instruments are: Sound Level meter, Reaction Timer Tester, Lux meter, RULA and REBA, questioner, camera and writing tools.

## 3. Results

### 3.1 Main Interviewees

Main interviewees informed that chemical substance was the main hazard in company. The potential hazards were NaOH, slippery, and waste products. According to the main informants, the risk that has happened were skin irritation, hearing disorder, squeezed by machine and slipped.

Concerning on occupational accidents, two main interviewees stated that an employee had sliced by a razor blade some time ago. It was happened when employees fixed up labels. However, the accident did not interrupt production process. The company has provided First Aid Box to solve that problem and employees can medicate themselves. Furthermore, company also evaluated the accidents to prevent it happen in the future.

Moreover, both main interviewees stated that personal protective equipment must be used in working time. The employee who did not use personal protective equipment will be granted a warning and demanded to use personal protective equipment. Furthermore, company also gave training based on SOP and training about personal protective equipment usage.

Hazard sources emerge from equipment and substances such as mixer, printing, and soap liquid. Furthermore, other hazard sources come from equipment such as stove and razor blade. Moreover, hazard was sourced from chemical substances such as NaOH and soap mixture. Risk emerged was skin irritation. It was characterized with speckled skin because of itchy skin because of substances' splash. NaOH chemical substances caused itch and harm human's skin. Other hazard sources emerge from steam heat exposure and sliced by razor blade.

Minor accident happened on 2017 caused by NaOH. Employee medicated themselves by taking medicines in first aid box. Meanwhile, the company would evaluate and remind to be carefully and always using personal protective equipment. Furthermore, company also gave training based on SOP and training about personal protective equipment usage.

### 3.2 Hazard Evaluation

#### 3.2.1 Based on HIRARC Identification

Based on HIRARC identification that had been conducted in cosmetic industry, the hazards potential were divided into five levels, as follows:

- Very rare
- Rarely happen
- Probably happen
- Often happen
- Very often

Severity assessment was the severity of effects of potential hazard toward employees. It was also divided into five levels, they are:

- Insignificant
- Small Injury

- c) Severe Injury
- d) Death
- e) Disaster

The result above is illustrated in figure

Table 1: Risk Level

		Severity				
		Minor wounds	Minor Injury	Medium Injury	Severe Injury	Fatal
Likelihood	1	1x1= VeryLow	1x2= Low	1x3= Low	1x4= Low	1x5= Medium
	2	2x1= Low	2x2= Low	2x3= Medium	2x4= Medium	2x5= High
	3	3x1= Low	3x2= Medium	3x3= Medium	3x4= High	3x5= High
	4	4x1= Low	4x2= Medium	4x3= Medium	4x4= High	4x5= Very High
	5	5x1= Medium	5x2= High	5x3= High	5x4= VeryHigh	5x5= Very High

Figure 1

Moreover, the result of probability assessment and severity were multiplied, so then risk assessment showed 4 result, that was four levels of risks, they were: Low, Medium, High and Extreme [10]. There were 21 hazard risks based on HIRARC identification.

Table 2: Risks Level in CV. X

No	Activity	Risk Level	Explanation
1	Blending substances with Blender	15	High
2	Packing to paper box	9	Medium
3	Packing primer liquid into bottle	9	Medium
4	Packing primer liquid into bottle	9	Medium
5	Attaching labels	9	Medium
6	Closing liquid's bottle	8	Medium
7	Closing liquid's bottle using rubber hummer	8	Medium
8	Packing product with steam	8	Medium
9	Taking chemical substances	6	Medium
10	Pouring into small containers	6	Medium
11	Packing liquid into bottle	5	Medium
12	Closing liquid of bottle	5	Medium
13	Packing liquid into bottle	5	Medium
14	Closing liquid's bottle using rubber hammer	5	Medium
15	Fixing up the package using razor blade	5	Medium
16	Pouring cream into bottle	5	Medium
17	Weighing chemical substances	4	Low
18	Weighing chemical substances	4	Low
19	Forming soap using soap print	4	Low
20	Mixing NaOH with perfume in mixer	4	Low
21	Pouring into container	2	Low

3.2.2 Physical Environment

Physical environment is an element that must be utilized by an organization to emerge safe and peaceful feelings. Moreover, it also can improve work results and enhance organization's performance. Physical environment is everything around employees that can influence the employees when they work. For instance, lighting, air temperature, movement space, security, hygiene, music, etc [11]. From the definition above, it can be concluded that physical environment is situation around workplace such as air temperature, lighting, noise, hygiene and work attitude that influence workers. Quality of physical environment

must meet standard of Occupational health and safety. It must be utilized by organization to emerge safe and peaceful feelings and enhance work results and improve the organization's performance. Such as Lightning, Noise, Work ergonomic, and Hygiene.

a) Lightning

Lightning is an exposure to working field that needed while doing work activities.<sup>(12)</sup> Based on the research result, the lightning measurement for the office area had the lowest light intensity for 34 Lux. While for the general lightning for secondary packing area also had low light intensity for 65 Lux. Based on the result, the lightning in CV. X areas were still under the standard of Industrial Lightning Environment. Additional, the observation was done while the climate in CV. X area was cloudy and rain.

b) Noise

Noise is a sound which its existence is not desired.<sup>(13)</sup> It could be seen from the research result of noise measurement that from the seventh point measurement in CV.X area, the liquid room area had the most noise intensity for 78.45 dBA. This noise intensity was claimed as safe since it was still under the standard of Industrial Environment for 85 dBA.

c) Work Ergonomic

Ergonomic is a study of complex interaction between working aspect, including working tools, working manners, and process or working systems, and working environment with physical condition, physiology, human's physics in adjusting the working aspect with workers condition. Thus, the workers could work in a safe, comfort, efficient, and more productive [14]. Based on the research result, work ergonomic measurement from the seventh sample of RULA and REBA measurement in CV. X area could be discovered. For RULA measurement, the solid soap area had the highest result for 7. Similar to RULA, REBA measurement also had the highest measurement score for 9 in the solid soap area. In the solid soap area, the workers had to work in standing position. Working with standing position for a long time could probably cause blood and fluid build-up in legs. Hence, providing ergonomic chairs were needed. Based on the work exhaustion measurement, most workers had work exhaustion in normal category for about 7 workers (100%). The measurement had been done in an hour before the informant taking a break. Therefore, it could be concluded that the working activities in CV. X for workers' work exhaustion were safe.

d) Hygiene

Hygiene is very important for workers and workplace environment. For workers, the hygiene could be done by washing hands, taking shower, and keeping the food cleanliness.<sup>(15)</sup> The Hygiene in CV. X was done every day which proved from the Standard Operating Procedure (SOP) of room hygiene, tools, and Standard Operating Procedure of pest and bug control. Also from the National Agency of Drug, Food and Cosmetic Control of Semarang audit in sanitation and hygiene point. The evaluation of risk assessment towards working activity in cosmetic production obtained three categories of risk. They are low 23,8%, medium 71,4% and high 4,7%. The highest risk in working activity was

mixing substances using big blender that was located in bar soap production.

### 3.3 Good Cosmetic Manufacture

Cosmetic industry is an industry that produces cosmetics. The cosmetic industry has granted industrial manufacture license. Cosmetic is a substance or material applied on human's external body such as skin, hair, nail, lip, outer genital organs. Cosmetics also can be applied to teeth and mouth, especially to clean, to scent, to transform appearance, to eliminate body odor and to protect and nourish body.

Based on the research, CV. X had been followed the good cosmetic manufacture based on the standard of National Agency of Drug and Food Control. It could be seen through the Standard Operating Procedure from the beginning of until the end of the work. Also the audit results from National Agency of Drug, Food and Cosmetic Control of Semarang on November 2018.

## 4. Recommendation for Physical Environment Facility

### 4.1 Control

#### 4.1.1 Engineering

Engineering control is a control that changes the working structure object to prevent accident potential [16]. The Engineering control had been done in CV. X by covering the generator machine in order to reduce noise production. The job that needed to be done by machine was covering the bottle cap using rubber hammer.

In the ingredients storage, it needed to give safety shelf for ingredients that placed in higher shelf. This was done in order to prevent the falling of ingredients.

#### 4.1.2 Administration

The administration control was done by providing a working system to decrease the probability of person's accident potential [17]. CV. X had been done some administration control, such as good cosmetics manufacture training, including human resource, building and facilities, tools, sanitation and hygiene, production, quality control, documentation of Standard Operating Procedure, internal audit, production contract and examination, complaint handle and product revocation. Furthermore, the Occupational Health and Safety Training was done.

#### 4.1.3 Self-Protection Equipment

Self-protecting equipment is a tool that has ability to protect person. Its function is to isolate a part of or the whole body from hazard potential in workplace [18]. CV. X had providing the self-protection tools as working clothes, cotton masks, plastic gloves, rubber gloves, glasses for production head, head covering and socks. As a danger potential control, plastic or rubber gloves could protect the body from ingredients and razor blade. While the cotton mask could prevent the inhalation of bad air from ingredients which could lead to breathing irritation. The changing of this cotton mask was done once a day or based on the workers need. This mask were required for every workers to protect their respiration system. The socks had function to protect from

slipping if the floor was slippery. Veil was protecting the workers head from ingredients splash, also to avoid the falling of the workers' hair in cosmetic products. The working clothes as the protection from direct hazard source from ingredients. Glasses for production head while producing the cosmetics.

#### 4.1.4 Supporting Facilities

For the supporting facility, CV. X had been prepared Fire Extinguisher for controlling the fire potential. From the observation, the fire extinguisher was placed in a secondary packaging room. Besides, the company also provided the mineral water for workers in order to control the climate for eight hours work. Workers were allowed to take the mineral water outside the cosmetic production area.

## 5. Conclusion

In conclusion, CV. X as a cosmetic industry has fulfilled standard of cosmetic production proses. Moreover, occupational health and safety especially in physical environmental aspect has been applied well though danger always potentially emerges anytime. This study has evaluated hazard and found some hazard and risk levels that can be managed by the cosmetic industry if the employee obey the rules and prioritize their health and safety. Thus, in this study, the evaluation result showed that physical environmental safety in CV X has been fulfilled well.

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