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Evaluation Of Hazardous and Toxic Waste Management at PKU Muhammadiyah Hospital Surabaya Using the CIPP Method

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ABSTRACT Hospitals, as healthcare service facilities, generate hazardous and toxic waste. This study aims to examine the management of hazardous and toxic waste produced by RSU PKU Muhammadiyah Surabaya. The research employs a descriptive method, involving the collection of both primary and secondary data. The subjects of this study are the individuals responsible for the management of hazardous and toxic waste. The collected data are then analyzed descriptively using the CIPP evaluation model. The evaluation of the context of hazardous and toxic waste management, based on interviews and observations, is categorized as good, while evaluations of input, process, and product, based on interviews, are also categorized as good. However, based on observations, these evaluations fall into the sufficient category. This discrepancy is due to some CIPP evaluation variables not fully meeting the assessment criteria. It is hoped that the results of this evaluation can serve as feedback to improve the quality of hazardous and toxic waste management at RSU PKU Muhammadiyah Surabaya. Based on the research findings, it can be concluded that the management of hazardous and toxic waste at RSU PKU Muhammadiyah Surabaya generally complies with Ministry of Health Regulation No. 2 of 2023. However, its implementation is not yet optimal, as it is adjusted to the hospital's conditions and capabilities. Therefore, the hospital should enhance and update its facilities and infrastructure for managing hazardous and toxic waste to prevent health issues both within the hospital environment and in the surrounding community.

INDEX TERMS Hazardous and Toxic Waste, Hospital, CIPP Evaluation.

I. INTRODUCTION

Hospitals are institutions or facilities designed to provide care, treatment, and medical services to patients requiring health attention from professionally trained healthcare personnel [1]. The growth of hospitals in Indonesia has seen significant development, and with the increasing number of hospitals, the waste generated, including hazardous and toxic waste, has also increased [2]. Since their operation, hospitals produce two types of waste: non-medical waste, also known as household waste, and medical waste, which falls into the category of hazardous and toxic waste [3]. In accordance with current regulations, hospitals are required to manage both types of waste [4]. Inadequate management of hospital waste can lead to various medical disruptions both within and around the hospital [5].

Nationally, hospitals generate 48,985 tons of liquid medical waste and 376,089 tons of solid medical waste

daily. Out of 12,831 healthcare facilities, including hospitals and community health centers, 3,421 facilities manage their waste. In 2021, 26.7% of healthcare facilities managed waste according to established standards, an increase from 18.9% in 2020, with East Java Province reaching 48.3% [6]. Regulation Number 2 of 2023 from the Ministry of Health of the Republic of Indonesia defines hazardous and toxic materials as substances, energy, or other elements that, in certain quantities and concentrations, can contaminate the environment, damage habitats, and pose risks to human health and the survival of other living beings [7].

Hazardous and toxic waste from hospitals can pose environmental risks if not properly managed [8]. Therefore, waste management in hospitals must receive thorough and adequate attention to avoid or mitigate potential negative impacts. If hazardous and toxic materials are not managed appropriately, they can pose risks to human health, other

organisms, and the environment. The resulting harm may include air, soil, water, and marine pollution. Hence, managing hazardous waste in hospitals is crucial to prevent such pollution [9]. Management of Hazardous and toxic waste must be conducted meticulously, following technical procedures such as reducing, segregating, properly storing, internally transporting, and externally processing the waste in accordance with technical requirements [10]. The goal of managing B3 waste in hospitals is to mitigate the negative effects of such waste by reducing or eliminating its hazardous characteristics [11]. The Hazardous and toxic waste management process must adhere to principles and implement waste management programs that consider environmental health [12].

Similar issues with Hazardous and toxic waste management have been identified in studies conducted by Sitepu [13] and Ginting [14]. In hospital settings, the mixing of sharp medical and non-medical waste still frequently occurs. Additionally, brown plastic bags intended for chemical and pharmaceutical waste are often unavailable, and there are no designated routes designed for the transport of B3 waste through areas frequently accessed by people.

In a preliminary survey conducted on waste management at PKU Muhammadiyah Hospital Surabaya, it was observed that the reduction phase of Hazardous and toxic waste was carried out in accordance with Standard Operating Procedures (SOP) and implemented a first-in, first-out (FIFO) system. However, during the segregation and packaging stages, it was noted that the packaging for chemical or pharmaceutical waste did not comply with the brown plastic bags specified by government regulations, despite efforts to separate infectious and non-infectious waste. There were no Hazardous and toxic waste symbols on the waste bins or on the plastic bags. Internal transportation of waste was carried out by staff, but they did not use complete personal protective equipment and used the same pathways as patients. During the temporary storage phase at the waste storage building, it was observed that the exhaust system was non-functional. External processing of waste was performed by a third party, with the process supported by SOPs and manifests.

Based on the issues outlined, the researcher aims to examine how hospitals manage hazardous and toxic waste to comply with the regulations set forth by Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 on health. The researcher intends to explore the issues or problems that arise in Hazardous and toxic waste management by utilizing the CIPP (Context, Input, Process, Product) evaluation model, which consists of four components. Firstly, context includes the foundation, objectives, and goals. Secondly, input encompasses facilities and infrastructure, budget, and human resources. Thirdly, process involves reduction, segregation, packaging, internal transportation, and temporary storage, as well as external management. Finally, product refers to the conformity of Hazardous and toxic

waste management in hospitals with Ministerial Regulation No. 2 of 2023 and waste management policies.

II. METODS

The research method used is descriptive research with the CIPP evaluation model. This study focuses on the implementation of hazardous and toxic waste management systems at PKU Muhammadiyah Hospital in Surabaya. The subjects of this research are the individuals responsible for hazardous and toxic waste management, and the object is the implementation of hazardous and toxic waste management at PKU Muhammadiyah Hospital Surabaya. Data were obtained through interview sheets and observations containing a list of questions regarding the management of hazardous and toxic waste, answered with "yes" or "no." Descriptive analysis techniques were applied to analyze the data by describing or depicting the collected data.

The variables studied include the components of context, input, process, and product. The analysis was conducted descriptively by interpreting data from each component evaluated using the CIPP evaluation model. This evaluation includes the context component, which assesses the extent to which the goals and objectives of a program align with the needs. The input component is used to identify human resources and describe the facilities and infrastructure that support the achievement of a program [15]. The process component involves assessing how the program is implemented and carried out, as well as the extent to which it is executed according to the established plan. The product component involves evaluating the final results or outputs of the ongoing program [16].

III. RESULT

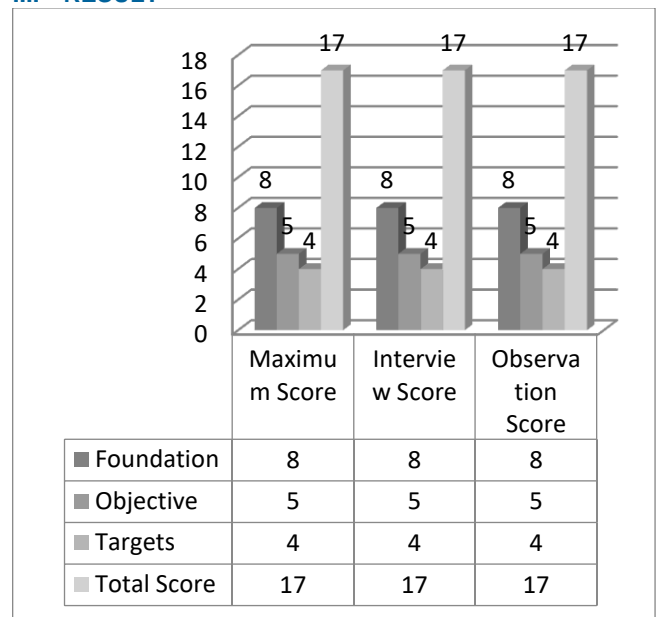


Figure 1. Evaluation Results of the Context of Hazardous and Toxic Waste Management at PKU Muhammadiyah Hospital Surabaya

Based on the interviews and observations conducted by the researcher in the field of environmental health at PKU Muhammadiyah Hospital Surabaya, the context evaluation depicted in Figure 1 shows that there are no differences in the assessment results among the variables of foundation, objectives, and goals of hazardous and toxic waste management. The foundation variable received a score of 8 out of a maximum of 8, the objectives variable received a score of 5 out of a maximum of 5, and the goals variable received a score of 4 out of a maximum of 4. The total score from the interviews and observations for the context evaluation achieved a final score of 17 (100%) out of a maximum of 17 (100%). The comparison of context evaluation scores for B3 waste management falls within the criteria of a good assessment.

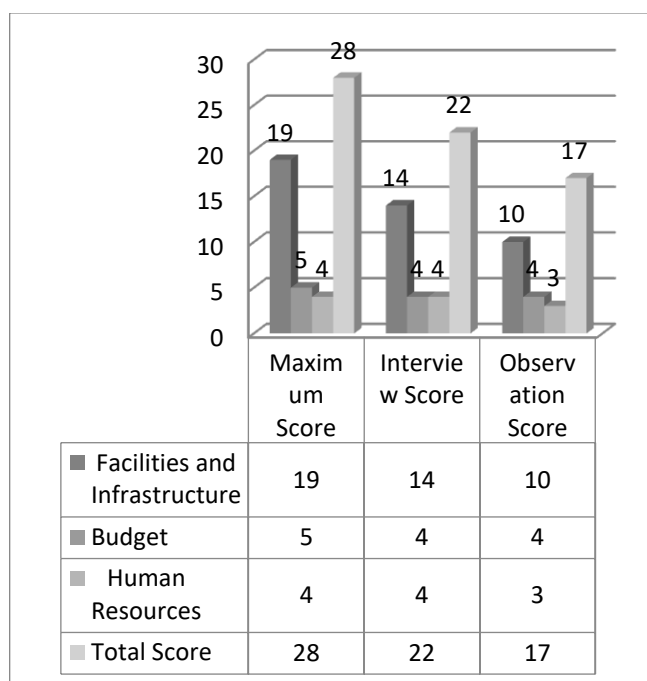


Figure 2. Evaluation Result of the Input for Hazardous and Toxic Waste Management at PKU Muhammadiyah Hospital Surabaya

Based on the interviews and observations conducted by the researcher in the field of environmental health at PKU Muhammadiyah Hospital Surabaya, the input evaluation shown in Figure 2 indicates differences in the assessment results between interviews and observations. The infrastructure variable received a score of 14 from interviews and a score of 10 from observations, out of a maximum of 19. The budget variable received a score of 4 from both interviews and observations, out of a maximum of 5. The human resources variable received a score of 4 from interviews and a score of 3 from observations, out of a maximum of 4. The total input evaluation score from interviews was 22 (78%) and from observations was 17 (60%), out of a maximum of 28 (100%). The comparison of input evaluation scores for hazardous and toxic waste management from interviews falls within the criteria of a

good assessment, while the observation results fall within the criteria of a sufficient assessment.

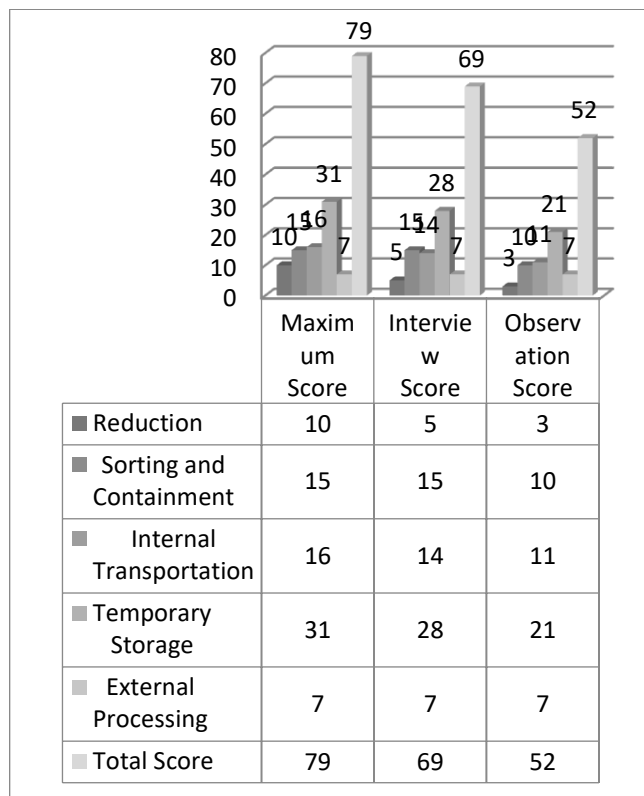


Figure 3. Evaluation Results of the Process for Hazardous and Toxic Waste Management at PKU Muhammadiyah Hospital Surabaya

Based on the interviews and observations conducted by the researcher in the field of environmental health at PKU Muhammadiyah Hospital Surabaya, the process evaluation depicted in Figure 3 shows differences in assessment results between interviews and observations. The reduction variable received a score of 5 from interviews and 3 from observations, out of a maximum of 10. The segregation and packaging variables received a score of 15 from interviews and 10 from observations, out of a maximum of 15. The internal transportation variable received a score of 14 from interviews and 11 from observations, out of a maximum of 16. The temporary storage variable received a score of 28 from interviews and 21 from observations, out of a maximum of 31. The external processing variable received a score of 7 from both interviews and observations, out of a maximum of 7. The total process evaluation score from interviews was 69 (87%) and from observations was 52 (65%), out of a maximum of 79 (100%). The comparison of process evaluation scores for hazardous and toxic waste management from interviews falls within the criteria of a good assessment, while the observation results fall within the criteria of a sufficient assessment.

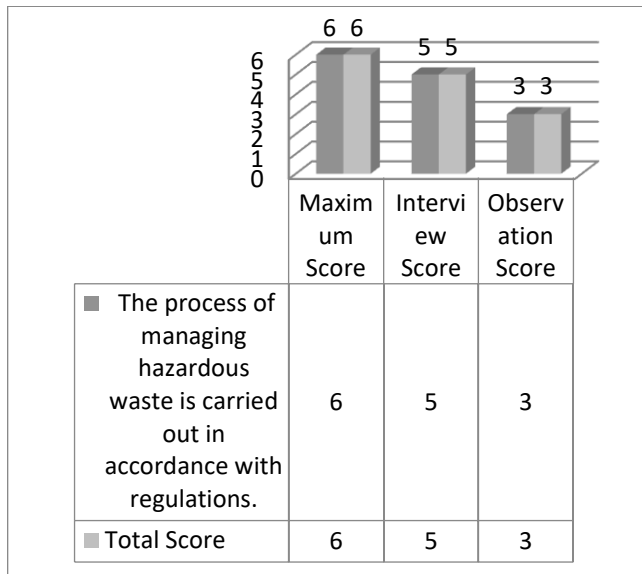


Figure 4. Evaluation Results of the Product for Hazardous and Toxic Waste Management at PKU Muhammadiyah Hospital Surabaya

Based on the interviews and observations conducted by the researcher in the field of environmental health at PKU Muhammadiyah Hospital Surabaya, the product evaluation shown in Figure 4 indicates differences in the assessment results between interviews and observations. The total score from interviews was 5 (83%) and the total score from observations was 3 (50%), out of a maximum of 6 (100%). The comparison of product evaluation scores for hazardous and toxic waste management from interviews falls within the criteria of a good assessment, while the observation results fall within the criteria of a sufficient assessment.

IV. DISCUSSIONS

Management actions must encompass various aspects, with planning, organization, implementation, and supervision (control) being the most fundamental and significant. In practice, management is necessary in every situation where individuals within an organization collaborate to achieve common goals [17]. Based on interviews and direct field observations conducted by the researcher and the person responsible for B3 waste management at PKU Muhammadiyah Hospital Surabaya, several issues were identified in the actual management of B3 waste. Below are the research findings that have been conducted by the researcher to identify aspects of the CIPP model.

A. CONTEXT EVALUATION OF HAZARDOUS AND TOXIC WASTE MANAGEMENT AT PKU MUHAMMADIYAH HOSPITAL SURABAYA

Context evaluation includes the variables of foundation, objectives, and targets, which serve as guidelines for implementing programs to diagnose the issues encountered.

1. FOUNDATION OF HAZARDOUS AND TOXIC WASTE MANAGEMENT

The foundation is the basis of a program that significantly impacts its implementation, thereby influencing the procedural execution and the anticipated outcomes of the program. Ministerial Regulation No. 2 of 2023 governs the management of hazardous and toxic waste from healthcare facilities, which serves as the foundation for hazardous and toxic waste management at PKU Muhammadiyah Hospital Surabaya. Additionally, the parties collaborating with the hospital have clear regulations on how to manage hazardous and toxic waste. These regulations are outlined in the Standard Operating Procedures (SOP) for hazardous and toxic waste management. SOPs are essential as a foundation and guide for achieving organizational goals, both operationally and administratively [18]. Furthermore, to ensure the safety of workers involved in the waste management process, the use of Personal Protective Equipment is also crucial. The hospital and its partner organizations have signed a binding written agreement for a duration of one year.

2. OBJECTIVES OF HAZARDOUS AND TOXIC WASTE MANAGEMENT

The objective is to protect the community from environmental contamination caused by waste [19]. At PKU Muhammadiyah Hospital Surabaya, hazardous and toxic waste management is conducted by a partnering entity twice a week, with internal transportation carried out daily. B3 waste management is an integral part of the work program at PKU Muhammadiyah Hospital Surabaya, which is equipped with adequate facilities for handling hazardous and toxic waste, including a Temporary Storage Facility. Evaluation reports are also generated weekly, monthly, and annually to assess the effectiveness of the program and to continually improve the hazardous and toxic waste management system at the hospital.

3. TARGETS OF HAZARDOUS AND TOXIC WASTE MANAGEMENT

The management of hazardous and toxic waste in hospitals is designed to handle and dispose of hazardous waste in an economically viable and environmentally sustainable manner, using an efficient management system, particularly in sectors with high levels of hazardous and toxic waste production [4]. PKU Muhammadiyah Hospital Surabaya provides specialized bins for hazardous and toxic waste generated from each waste-producing room. However, these bins are not equipped with clear symbols. To optimize hazardous and toxic waste management at PKU Muhammadiyah Hospital Surabaya, bin labeling needs to be improved, and awareness programs should be incorporated into the annual work plan for each unit. These steps are crucial for achieving the desired outcomes and ensuring that hazardous and toxic waste management adheres to established safety and health standards. This

research indicates that proper implementation can lead to the achievement of the set objectives and targets.

B. INPUT EVALUATION OF HAZARDOUS AND TOXIC WASTE MANAGEMENT AT PKU MUHAMMADIYAH HOSPITAL SURABAYA

In the input evaluation, variables such as facilities and infrastructure, budget/funding, and human resources are considered. Input evaluation plays a crucial role in assisting clients to avoid innovative efforts that do not yield productive results or are at risk of failure, as well as to minimize resource wastage [20].

1. FACILITIES AND INFRASTRUCTURE FOR HAZARDOUS AND TOXIC WASTE MANAGEMENT

Based on observations, several deficiencies were found in the facilities and infrastructure supporting hazardous and toxic waste management. In the spill kit, there was no hand rub available, and in the Personal Protective Equipment used by the staff, long-sleeved shirts and aprons/overalls were missing. Additionally, the staff lacked specific uniforms for hazardous and toxic waste management and only wore everyday clothing without aprons/overalls. It is critical to ensure the availability of spill response equipment to guarantee that, in the event of spills involving blood, vomit, urine, sputum, chemicals, or other substances, appropriate tools are immediately available to prevent risks to both staff and the surrounding environment [21].

2. BUDGET FOR HAZARDOUS AND TOXIC WASTE MANAGEMENT

The budget supports managerial planning, effective planning ensures the smooth operation of work schedules, while poor planning can disrupt the implementation of established procurement procedures [22]. For hazardous and toxic waste management, hospitals, particularly the environmental health team, have a dedicated budget outlined in their work program, providing operational funds specifically for managing B3 waste. The environmental health team has an annual budget for the continuity of hazardous and toxic waste management and a weekly budget for addressing urgent issues. This indicates that the hospital has allocated a specific budget for hazardous and toxic waste management, thus minimizing the risk of financial issues. The implementation of hazardous and toxic waste management also proceeds smoothly without financing-related constraints.

3. HUMAN RESOURCES FOR HAZARDOUS AND TOXIC WASTE MANAGEMENT

Human resources are a vital component within an organization, playing a crucial role in achieving organizational goals [23]. The hospital has competent personnel for hazardous and toxic waste management within the environmental health department and is supported in practice by partner entities. Additionally, the head of the housekeeping department at PKU

Muhammadiyah Hospital Surabaya plays an important role in managing hazardous and toxic waste. Interviews indicated that all employees are involved in hazardous and toxic waste management, but observations showed that only the designated staff members were actively engaged in this task.

The success of a program depends on having human resources with appropriate knowledge and skills for their roles, as well as the ability to work effectively, efficiently, and accurately. During observations conducted by the researcher, the environmental health team performed their responsibilities using their expertise to address issues related to hazardous and toxic waste management by contributing creative and innovative ideas.

C. Process Evaluation of Hazardous and Toxic Waste Management at PKU Muhammadiyah Hospital Surabaya

Evaluating the process is a crucial source of information for interpreting the results of product evaluations. Process assessment can revisit organizational plans and previous evaluations to identify key aspects of the organization that need to be monitored [20].

1. REDUCTION IN HAZARDOUS AND TOXIC WASTE MANAGEMENT

In efforts to reduce Hazardous and toxic waste, the hospital has developed and implemented Standard Operating Procedures designed to support Hazardous and toxic waste reduction. Another measure to reduce B3 waste includes applying the "first in, first out" principle for chemical procurement to avoid accumulation and expiration. However, proper management of materials or equipment to prevent deterioration, such as the rusting of gas cylinders, has not yet been fully realized. The hospital's environmental health team has not completely adopted strategies to replace Hazardous and toxic waste containing materials with safer alternatives where available. Additionally, the hospital has not yet embraced reuse policies, such as opting for reusable products over disposable ones. Recycling of components to produce either the same or different products has also not been undertaken, thus the potential for reducing Hazardous and toxic waste has not been fully optimized. Research by Purwanti [24], indicates that reducing solid Hazardous and toxic waste can be achieved by effectively managing materials that have the potential to contaminate the environment or adversely affect health.

2. SORTING AND PACKAGING

The process of packaging hazardous and toxic waste at the hospital begins in the source room before the waste is transferred to the temporary storage area. Waste containers are designed to be watertight, easy to clean, and equipped with tight-fitting lids to prevent contamination and odor spread. In the source rooms, hazardous and toxic waste is placed in bins that are marked and labeled according to the

type of waste generated. However, observations revealed that sorting and packaging of hazardous and toxic waste are not always conducted according to its characteristics on-site. Although labeled bins are available for different types and groups of waste, only one bin is provided in each waste-generating room. Additionally, the placement of these bins is not always optimal, as they are not consistently situated away from general public areas.

Research by Aju [25] indicates that sorting is a crucial step in waste management because it aims to separate hazardous medical hazardous and toxic waste from non-medical waste, while packaging involves placing waste according to its characteristics.

3. INTERNAL TRANSPORT

The internal transport of hazardous and toxic waste at the hospital is carried out by cleaning service personnel twice a day. Transport occurs in the morning between 08:00 and 09:00, and in the afternoon between 13:00 and 14:00. These cleaning service personnel have received specialized training in hazardous and toxic waste handling. The bins used are labeled "hazardous and toxic waste," are large in size, feature tight-fitting covers, and are equipped with wheels. The transport of hazardous and toxic waste from the source rooms to the TPS involves using public corridors also frequented by patients, visitors, and cleaning staff. During the collection or transport of hazardous and toxic waste, cleaning service personnel do not wear complete Personal Protective Equipment. This condition highlights the need for improvements in hazardous and toxic waste management at the hospital, including better labeling of waste bins with clear hazardous and toxic waste symbols to facilitate waste identification. Furthermore, the implementation of scheduled and thorough cleaning procedures for waste bins and increased awareness regarding the use of personal protective equipment that meets safety standards is essential. These measures are needed to reduce the risk of exposure to hazardous waste for human health and the environment and to ensure compliance with applicable waste management regulations.

Research by Rahimudin Mufti Lubis, Alprida Harahap, and Haslinah Ahmad [26], suggests that understanding the importance of personal protective equipment is a key element in ensuring its proper use by workers. Each hazardous and toxic waste handler in the hospital is expected to adhere to and consistently use complete personal protective equipment while managing hazardous and toxic waste. This study recommends conducting monthly outreach and training sessions on personal protective equipment usage for cleaning staff to ensure they understand that comprehensive personal protective equipment is critical for preventing disease spread.

4. TEMPORARY STORAGE

The temporary storage area is located in a flood-free zone, and the facility is fully enclosed. The security of the TPS is maintained with a locking mechanism on the door. It

is equipped with an adequate ventilation system to ensure good air circulation within the storage area. The temporary storage area also includes a Domestic Wastewater Treatment System. Within the temporary storage area, there is a designated space for storing standard operating procedures used in hazardous and toxic waste management, along with a logbook to record hazardous and toxic waste related activities and coordinates.

Access for hazardous and toxic waste transport vehicles to the temporary storage area has been carefully considered. A sloped, non-staircase road provides vehicle access, as the temporary storage area is situated approximately 60 cm higher than the public pathway. Each type of hazardous and toxic waste is placed in separate containers and labeled according to its nature. The temporary storage area utilizes artificial ventilation systems such as exhaust fans, although their functionality is not optimal. Solid hazardous and toxic waste is stored in small containers placed close to one another, failing to meet ideal separation standards. For liquid hazardous and toxic waste, the storage area lacks a leak-proof floor and is positioned close to a sloped drainage channel. The temporary storage area, located within the hospital premises, has received official authorization as a Temporary Storage Facility for hazardous and toxic waste from the Surabaya Environmental Agency (BLH). However, improvements are needed in the storage and management facilities to meet stricter safety and environmental standards.

5. EXTERNAL PROCESSING

External processing is carried out through cooperation with licensed waste processors or disposal companies. Healthcare facilities (waste generators) are required to collaborate with third parties, namely waste processors and transporters, in an integrated manner as outlined in a memorandum of agreement [7]. According to the interviews and observations conducted, the transportation of Hazardous and Toxic Waste from PKU Muhammadiyah Surabaya hospital is managed externally. This process involves transferring hazardous and toxic waste from the temporary storage area to the designated hazardous and toxic waste processing facility.

The transportation is regulated through an official agreement between the hospital and the waste processor, ensuring a legal and orderly collaboration. The agreement details the responsibilities of each party, including transportation schedules, waste handling procedures, and safety standards that must be adhered to. This document is signed by official representatives from both the hospital and the waste processor, ensuring that every step in the hazardous and toxic waste transportation and processing is in compliance with applicable regulations and protocols.

During transportation, hazardous and toxic waste is moved from the temporary storage area using trucks equipped with enclosed bins and clear identification symbols. These trucks are specially designed to prevent spills and contamination during transit. Transportation is conducted in accordance with the established standard

operating procedures, ensuring that each phase is carried out safely and efficiently. The standard operating procedures includes security and handling measures to ensure that hazardous and toxic waste is transported safely and efficiently, minimizing risks to human health and the environment during the transport process. External transportation is scheduled twice a week, on Mondays and Saturdays, and is conducted in the morning. The choice of morning hours aims to avoid disrupting local community activities, allowing the transportation process to proceed smoothly without interfering with the routine activities of nearby residents.

D. PRODUCT EVALUATION OF HAZARDOUS AND TOXIC WASTE MANAGEMENT AT PKU MUHAMMADIYAH HOSPITAL SURABAYA

Evaluation of the Product in Hazardous Waste Management Process. The evaluation of the product in the hazardous waste management process indicates that the hospital's practices comply with the regulations stipulated in the Minister of Health Regulation No. 2 of 2023. The management of hazardous waste is conducted in accordance with procedures for reduction, segregation, containment, internal transportation, temporary storage, and external processing. This product evaluation is expected to provide valuable insights for the executive decision-making process, based on a series of prior evaluations [27]. In the reduction efforts, the hospital has developed and implemented Standard Operating Procedures that support the reduction of generated hazardous waste and apply the first-in-first-out principle to prevent accumulation and expiration. The segregation and containment of hazardous waste are carried out by separating the storage containers for different types of waste, such as providing two bins for medical hazardous waste and domestic waste. However, the hazardous waste bins are provided only according to their type and are not divided into sharp, soft, and other hazardous categories.

For internal transportation, the hospital does not provide trolleys for transporting hazardous waste from the source rooms to the temporary storage area. Instead, plastic waste bins with "hazardous waste" labels, lids, and wheels are used. Given the relatively small size of the hospital, the cleaning service staff, when transporting waste, do not use complete personal protective equipment. The temporary storage area for hazardous waste at the hospital has received authorization from the Environmental Agency (BLH) Surabaya. This indicates that the hospital's waste management facilities need thorough planning and that the hazardous waste storage must be equipped with Standard Operating Procedures that must be followed. For external processing, the hospital collaborates with third parties and has a cooperation agreement with waste management or disposal companies. The licensing is in accordance with regulatory requirements, and a manifest is included with each shipment for record-keeping, and electronic recording is maintained with the Ministry of Environment and Forestry.

The benefits derived from this research include that the context evaluation enables the diagnosis of the problems faced and the assessment of whether the set goals and priorities meet the needs of those managing hazardous and toxic waste in hospitals. The input evaluation helps avoid ineffective innovations that are at risk of failing or, at the very least, prevent the wastage of resources in managing hazardous and toxic waste. The benefit of process evaluation is that it provides feedback that can help hazardous and toxic waste management staff execute the program as planned or modify plans that are ineffective. Process evaluation also serves as an essential source of information for interpreting the results of product evaluation. Product evaluation is useful for assessing the extent to which the needs of the hazardous and toxic waste management program in hospitals are met. The weakness of this research lies in its limited focus on the information needed by decision-makers and hazardous and toxic waste management staff, which may make the evaluator less responsive to significant issues or problems. The evaluation results are primarily directed at top-level leaders, making this model potentially unfair and less democratic.

V. CONCLUSIONS

Based on the research findings on the management of hazardous and toxic waste at PKU Muhammadiyah Hospital Surabaya in 2024, it is concluded that the context evaluation of the hazardous and toxic waste management program is categorized as good. Therefore, the consistency of the responsible parties in implementing the program needs to be maintained. Evaluations of input, process, and product are categorized as sufficient, indicating that the hazardous and toxic waste management program aligns with the Regulation of the Minister of Health No. 2 of 2023 but has not yet reached an optimal level. For instance, facilities and infrastructure such as personal protective equipment are still incomplete, hazardous and toxic waste storage does not use bags appropriate for their type, hazardous and toxic waste bins are not placed far from public reach, and the temporary hazardous and toxic waste storage is equipped with an exhaust fan that does not function properly. So that it can be used by future researchers as a source of comparison and reference for other researchers interested in the management of hazardous and toxic waste in hospitals.

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