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STORAGE IS THE MOST INFLUENCING FACTOR OF HOSPITAL SOLID WASTE TREATMENT: SEM ANALYSIS

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ABSTRACT

Introduction: From primary data, it was found that 65% of solid waste generation occurred in 12 hospitals in West Sumatra. "2,839 health facilities in West Sumatra, produced 1,899.15 tonnes of medical solid waste including hazardous and toxic materials (B3)," the government stated in March 2020. If nothing is done to address this poor waste management, it will negatively affect society. It is difficult for hospital managers to improve the waste processing system because the stages or factors that have a significant impact on poor waste processing are unknown. **Aims:** This research aims to find an appropriate medical solid waste treatment model that can be used in hospitals by analyzing the stages and factors involved in processing medical solid waste. **Method:** Structural Equation Modeling analysis was used in this cross-sectional research. The population study was 12 hospitals and the research sample was taken by calculating Wayne W. Daniel's formula to obtain 120 hospital waste treatment officers. This study started in September 2021 to March 2022. Primary data was collected by writing notes from observations by recording the results of observations, documentation, asking sources, and questionnaires filled out by waste managers and waste cleaning officers**. Results:** The research results show that of the 4 independent variables influencing medical solid waste processing, storage is the most dominant factor affecting waste processing. **Conclusion:** Sorting and storage variables influence poor hospital waste management in West Sumatra.

Keywords: Hospital, Medical Waste Treatment, Structural Equational Modeling (SEM)

INTRODUCTION

Safety hazards and deteriorating health problems for health workers and patients can arise from waste materials in hospitals that are not processed properly. H uman health and the environment can suffer huge potential losses. Although there are guidelines regarding waste prevention and management, unfortunately, their implementation still faces obstacles and difficulties (Letho et al. 2021)

Hospitals generate solid, liquid, and gas waste. B3 is the name of some types of hospital waste. "Hazardous and Toxic Waste, abbreviated as B3, is a substance, energy, and/or other component which, due to its nature, concentration, and/or amount, either directly or indirectly, can pollute and/or damage the environment, and/or endanger life, health, and survival of humans and other living creatures," according to Government Regulation of the Republic of Indonesia Number 101 of 2014, Chapter I Paragraph 1 (Indonesian Government 2014).

A hospital is a multifunctional health service facility . According to (Kumar, Somrongthong, and Ahmed 2016) hospitals produce various types and amounts of waste as a result of these various activities (Caniato, Tudor, and Vaccari 2015; Chen et al. 2012; Debere et al. 2013). Hospital administrators in many countries admit that they experience difficulties in collecting, separating, and disposing of

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medical waste. However, staff must be able to avoid repeated cross-contamination, and the risk of injury and infection. Safety procedures must be adhered to by waste processing officers (Attrah et al. 2022), but unfortunately, many officers have not implemented these procedures. Lack of prevention efforts, or the lack of efforts to reduce the amount of waste reflects poor processing of hospital waste, lack of a system for sorting, storing, transporting, inappropriate temporary storage, placement, or collection of waste regulations, as well as inconsistencies in final processing and waste disposal systems (Korkut 2018; Mantzaras and Voudrias 2017; Muduli and Barve 2012). Medical waste contains type B3 waste, which has certain characteristics. If the handling is not appropriate, this can cause the spread of disease and secondary pollution in the form of dioxin (Jiang et al. 2012). The variety of hospital activities can produce waste in different forms, compositions, and amounts from time to time so they require good and consistent strategies and management (Indonesian Ministry of Health 2014). Medical solid waste processing is carried out by minimizing and sorting, storing, transporting, temporarily storing, processing, or final disposal of the waste (Indonesian Ministry of Environment 2018). Waste processing staff are not yet trained, so solid waste processing in hospitals has been worsening (Clark 2018) The lack of waste processing facilities causes the operational costs of health services in hospitals to increase due to the high costs of hospital waste processing facilities which require large investment costs. As a result, many decision-makers at the management level provide basic facilities that do not meet minimum standards. This further adds to the poor processing of hospital medical solid waste (Kuchibanda and Mayo 2015; World Health Organization 2018)

Hospital medical solid waste processing includes processes consisting of sorting, collection or storage , and transportation. Directly or indirectly, this must include financing, the role of policymakers, the role of implementing staff, and existing facilities and infrastructure related to the reasons for processing medical waste. Environmental and public health problems will arise if solid medical waste is not managed according to standard operating procedures (Nguyen, Bui, and Nguyen 2014; Udofia, Fobil, and Gulis 2015).

To find out what processes can worsen medical waste processing as a whole, a model is needed that can help explain what stages/factors have a strong influence on poor medical waste processing. Structural Equation Modeling (SEM), a multivariate analysis that can analyze multiple variables and multilevel models simultaneously, was chosen as the quantitative model (Ramadiani 2016; Yasril and Wijayantono 2022). According to (Pratiwi 2020) "In SEM, latent variables are formed by indicators based on the reflective model. As a result, this tool can demonstrate cause-and-effect relationships between variables that are not observed or latent as well as their impact on the dependent variable". (Ramadiani 2016), namely: a structural model that measures the relationship between independent and dependent constructs, as well as the measurement model measuring the relationship (loading value) between indicator variables and constructs (latent variable). Combining structural testing and measurement models allows researchers to find the influence between the stages/factors included in the medical solid waste processing stream. Medical solid waste processing is necessary because improper management can result in injury, environmental pollution, and nosocomial diseases. Effective medical solid waste processing practices are expected to minimize these impacts (Valonda and Hermawati 2022).

The number of patients in 12 hospitals in West Sumatra in 2021 is around 2.5 million people, which means that hospitals produce ±4000 kg/day of medical waste in providing health services. Therefore, hospitals must have integrated and sustainable medical solid waste processing. Proper processing of medical solid waste is very important to prevent environmental hazards to public health (El-Ramady et al. 2021; Garson 2022). Therefore, the following questions were asked in this study to test the assumptions: What variables influence the poor processing of medical solid waste in hospitals in West Sumatra?

The aim of this test is to find an appropriate medical solid waste processing model that can be used in all hospitals in West Sumatra. In addition, this research seeks to identify interactions between parts or variables in the hospital medical solid waste processing process. This is to see the relationship between the magnitude of the influence of each part, so that it can be used as input by decision makers in better management of hospital solid waste processing.

METHODS

The approach used was a cross-sectional quantitative approach using a survey method by distributing questionnaires. The Health Research Ethics Committee of RSUP Dr. M. Djamil Padang, must provide ethical approval before the distribution of research instruments.

The participants in this study were management section employees, namely decision makers in waste management, storage rooms and hospital waste management/IPRS, treatment room sections, and cleaning service officers in 12 hospitals throughout West Sumatra as many as 175 people, while the number of the sample for filling out the questionnaire in this study was 120 people, with sample size calculations based on Wayne W.D. Formula calculations (Liu, Medlar, and Glowacka 2023). Ethical permission, and ethical approval from RSUP's Dr. M. Djamil Padang Health Research Ethics Committee's for the use of research tools was obtained on September 13, 2021, with code [Number: 371/KEPK/2021].

Population and sample of the study

From September 2021 to March 2022, the population consisted of 175 people, the target sample was 120 individuals responsible for managing medical solid waste from functional staff and management staff, distributed across the environmental health installation or hospital waste treatment installation, treatment rooms, and cleaning service officers.

Instrument of the study

To prepare research tools, the research problem and its components are identified. Then previous studies related to the current research topic, and their tools or instruments are referred to and analyzed. Management and personnel involved in the treatment of solid waste received the questionnaire tool. Based on theoretical literature and previous research, a questionnaire was developed for data collection. It uses a four-point Likert scale to analyze the responses in the second section (strongly agree, agree, disagree, and strongly disagree), and scores (4, 3, 2, 1) are given to determine the respondent's scores.

Reliability and Validity

The investigation tool's original publication (in the field of environmental health) demonstrated its validity. They looked at how well the tool met the goals of the research. Experts have stated that the designed measurement tool is valid. Consequently, the final version of the tool, with its fifty questions, was validated. The validity of the tool was tested by calculating the reliability coefficient using the test-retest technique. It is one of the most popular methods used by researchers to measure correlation coefficients in scientific research and to verify the reliability of tools and results in the future.

This questionnaire was originally created by a writer named Syukra Alhamda. This questionnaire tool was used on sample subjects who were not included in the investigation population. A sample of (20) officers was obtained from 2 different hospitals. The same participants were used again with the same conditions two weeks later. After that, the two sets of sampling results were used to calculate the Pearson correlation coefficient, which came out to be 0.85. This is a high and acceptable coefficient indicating good reliability of the tool and results .

Statistical processing

In this research, SEM analysis was used to answer the first question about how the variables interact in the context of solid medical waste treatment in the sample hospitals. The T-value of the results of the SEM test examined how much interaction there is between the independent variables, namely sorting, containerization, storage, and transportation, and the dependent variable, namely solid waste treatment.

A path analysis was then conducted to respond to the second question, which asked about the factors that influence the management of solid medical waste in the hospitals of the research sample. By looking at the magnitude of the coefficient for the stages and factors that influence the Hospital Solid Waste treatment model in West Sumatra, this parametric test was used to determine the level of significance and the magnitude of the influence/coefficient of path analysis. SEM analysis demonstrates the degree to which variables influence the management of medical solid waste in this study.

RESULT

By using SEM to display the analysis results, invalid data from the observation variables were removed, leaving only valid values from the observation variables. Therefore, values with a large influence were obtained. Figures 1 and 2 depict the coefficient values for each component of the waste treatment system flow for each factor.

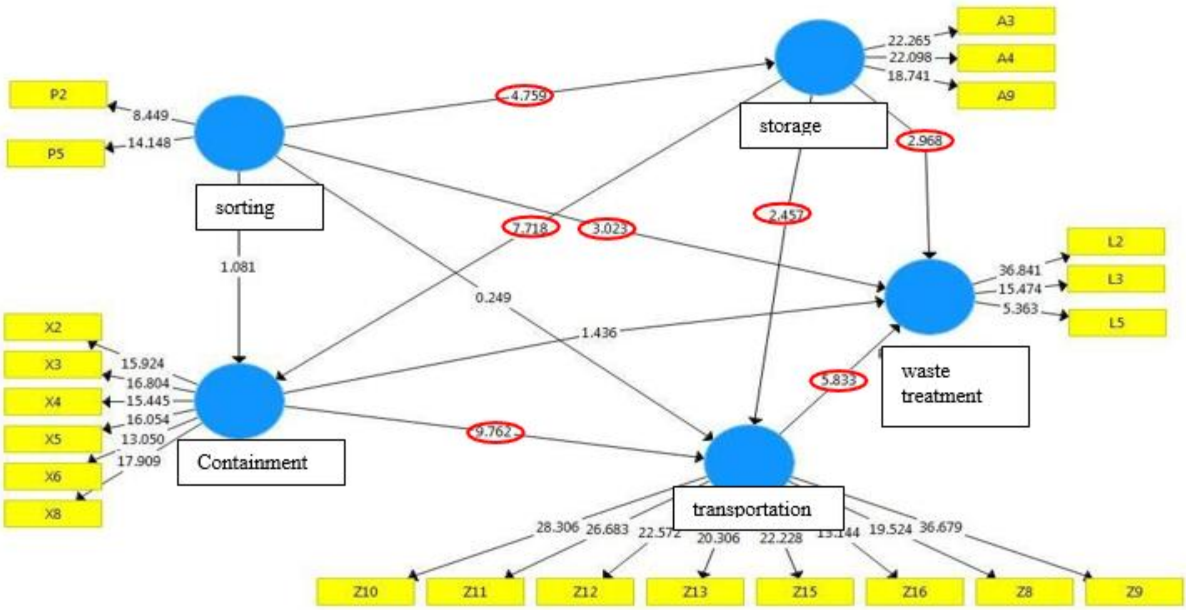

Figure 1 Path Coefficient T-value/ Large Influence of Solid Medical Waste Treatment Using the SEM Method

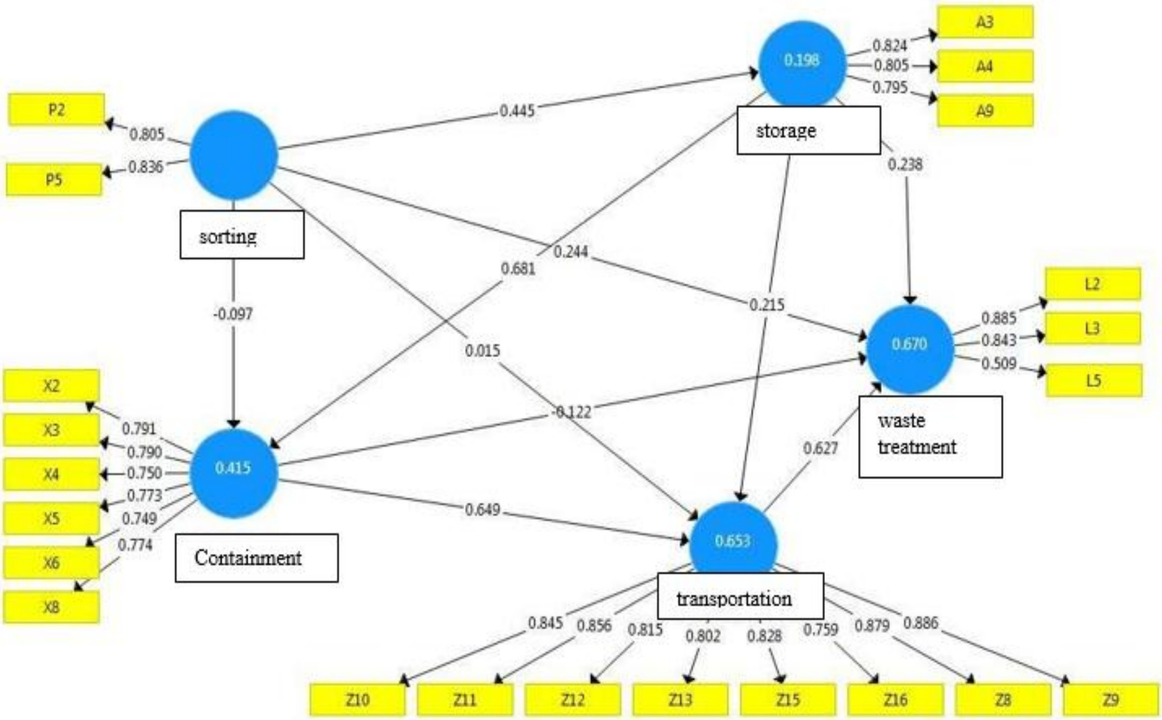

Figure 2 Significance Level Value (T-Value) of the West Sumatra Hospital Solid Medical Waste Treatment Model

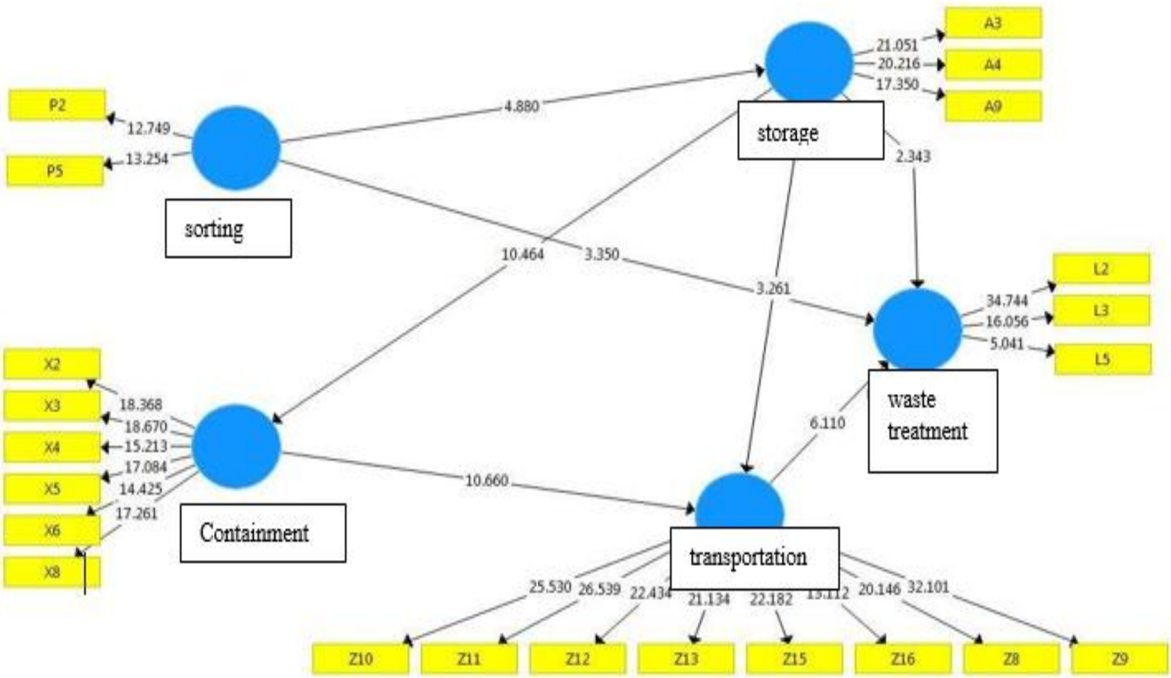

Figure 3. Significance Level (T-Value) of Stages/ factors Influencing Medical Solid Waste treatment

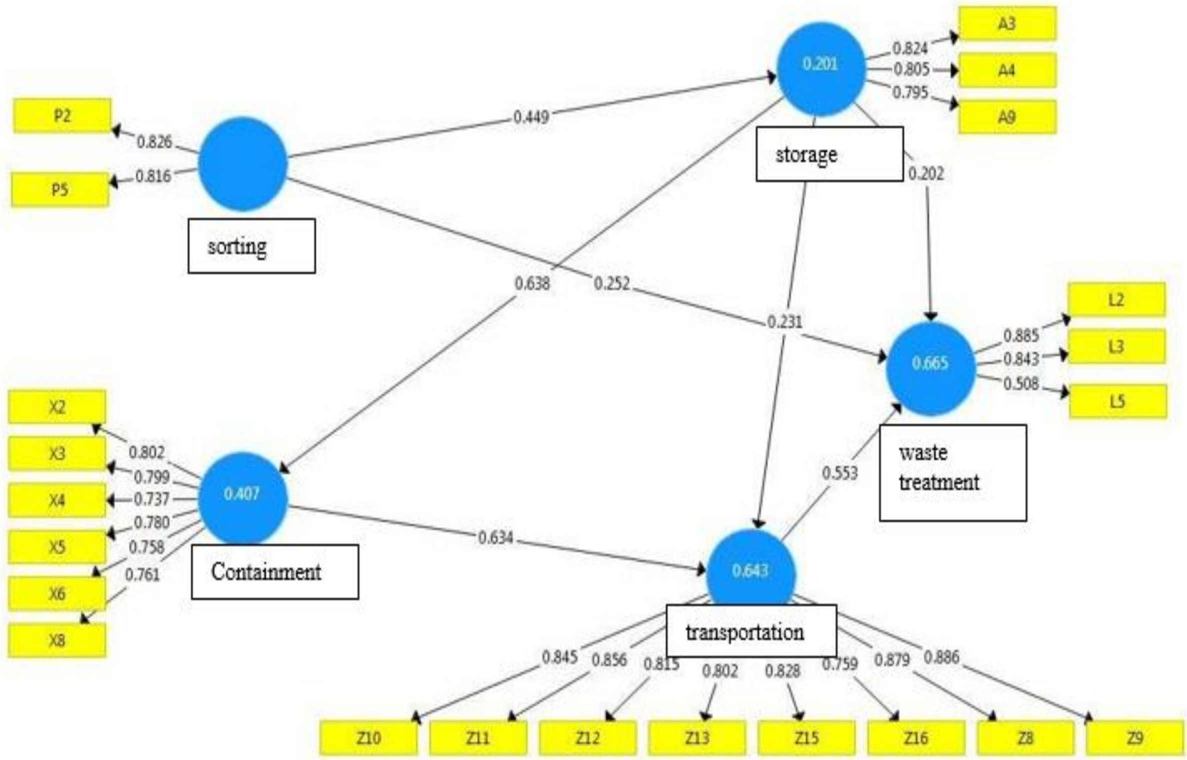

Figure 4. The magnitude and path coefficient of the stages /factors that have an effect on the treatment of solid medical waste

Path Analysis Results

Below, we present Table 1, which shows the results of the path analysis through SEM analysis. It is shown in Table 1 that the path coefficient with the smallest T-value is Storage (X4) to Waste treatment (Y) with a T-value of 2,343. This can be seen in more detail in the following explanation.

Table 1. Exposure to the SEM Method of Analysis of Influence/Path Coefficients and Significance Levels.

Size/Path Coefficient of Influence and Significance Level	**Path coefficient**	**T – *value***	**p-*value***
Sorting (X1) to Wastetreatment (Y)	0,252	3,35	0.000
Sorting (X1) to Storage (X4)	0,449	4,88	0.000
Container (X2) to Transportation (X3)	0,634	10,66	0.212
Transportation (X3) to Waste treatment (Y)	0,553	6,11	0.000
Storage (X4) to Waste treatment (Y)	0,202	2,343	0.000

Size/Path Coefficient of Influence and Significance Level	Path coefficient	T – *value*	p-*value*
Storage (X4) to Container (X2)	0,638	10,46	0.262
Storage (X4) to Transportation (X3)	0,231	3,261	0.097
Sorting (X1) to Waste treatment (Y)	0,252	3,35	0.000
Sorting (X1) to Storage (X4)	0,449	4,88	0.000
Container (X2) to Transportation (X3)	0,634	10,66	0.212
Transportation (X3) to Waste treatment (Y)	0,553	6,11	0.000
Storage (X4) to Waste treatment (Y)	0,202	2,343	0.000
Storage (X4) to Container (X2)	0,638	10,46	0.262
Storage (X4) to Transportation (X3)	0,231	3,261	0.097

Effects of Sorting (X1)

Based on the Beta table, the formula is as follows:

- Direct Effect of Sorting (X_1) to Storage(X_4)= 0,449

Structure Equation X_1 to X_7: X_7: P_{x7x1} X_1 + ε_4 = 0,449X_1 + ε_4

- Indirect Effect of Sorting(X_1) towards Waste treatment (Y) through Storage (X_4) = 0,449 x 0,202 = 0,090
- Direct Effect of Sorting (X_1) to Waste Treatment (Y) = 0,252

Structure Equation X_1 to Y: P_{yx1} X_1 + ε_y = 0,252X_1 + ε_y

Total of sorting for waste treatment/ processing= 0,252 + 0.090 = 0,342

Based on the presentation of the SEM method path analysis test, it was found that sorting directly affected processing by 0.449. However, apart from directly influencing processing, sorting can also indirectly influence processing through the storage route with a total influence of 0.342 (34.2%), and sorting influences overall processing by 34. 2 %.

Effects of Storage (X4)

Based on the Beta table, the formula continues as follows:

Direct effect of storage (X4) on containerization (X2) = 0,638

Structure Equation X_4 to X2 : P_{X2X4} X_4 + ε_{X2} = 0,638 X_4 + ε_{x2}

Direct effect of Storage (X4) on Transportation (X3) = 0,231

Structure Equation X_4 to X3 : P_{X3X4} X_4 + ε_{X3} = 0,231 X_4 + ε_{x3}

Direct Effect of Storage (X_4) to Processing (Y) = 0,202

Structure Equation X_4 to Y: P_{yx4} X_4 + ε_y = 0,202 X_4 + ε_y

Indirect effect of storage (X4) on waste treatment (Y) through containerization (X2) and transportation (X3) = 0,638 X 0,634 X 0,553 = 0,224

Indirect effect of storage (X4) on waste treatment (Y) through transportation (X3) = 0,231X 0,553 = 0,127

The total of processing facilities is= 0,202 + 0,224 + 0,127 = 0,553 (55,3%)

The SEM path analysis test reveals that waste processing is strongly and significantly influenced by storage with a large effect: of 0.202, but storage also has an indirect effect on waste treatment through containerization and transportation with a total effect of 0. 553 (55. 3%). By the results and interpretation above, the equation for the Solid Medical Waste treatment Model for West Sumatra (Structure Model Equation Y) describes the structure of the hospital solid medical management system :

$Pyx1\ X1 + Pyx_3\ X3 + Pyx_4\ X4 + Py\varepsilon$; R square

: $0{,}252X_1 + 0{,}553X_3 + 0{,}202X_4 + 0{,}335\ \varepsilon$; 0,665

In the overall test exposure, it can be seen that waste treatment explains a variance of 66.5% for each variable, this indicates that the process of sorting, transportation, and temporary storage accounts for 66.5 percent for each variable and a value of 33.5 percent is influenced by additional stages or factors.

Table 2. Exposure to SEM Method Analysis of the Effect of each Variable on Waste Treatment

Influence between variables	Effect
Sorting (X1) to Waste Treatment (Y)	Direct
Container (X2) to Waste Treatment (Y)	Indirect
Transportation (X3) to Treatment (Y)	Direct
Storage (X4) to Waste Treatment (Y)	Direct

It can be seen in Table 2 that only the Containment (X2) variable on Waste Processing (Y) has an indirect effect. Meanwhile, the variables Sorting (X1), Transportation (X3), and Storage (X4) have a direct effect on waste processing.

The findings of the study indicate that the average daily weight of medical waste is 0.68 kilograms, with a range of 0.5 to 0.8 kilograms. The majority of hospitals (73%) sort various types of medical waste. However, around 20% of hospitals still employ staff who are not qualified to sort medical waste, and 93.3 percent of hospitals only have temporary storage areas. Only 20% of hospitals have provided ongoing education and training for their staff, despite the fact that 93.3% of hospitals have provided training for medical waste staff and managers. The fact that the waste disposal system is constructed using high-cost incineration technology and that disposing of medical waste costs approximately US 580 per ton is burdensome for hospitals.

Results of research that were not taken into account in the SEM analysis, in the questionnaire regarding officers' understanding of medical waste processing, show that knowledge is still lacking, and 77% of study subjects thought medical waste processing was not an important factor in health services. Various service activities in hospitals make them a repository for all kinds of diseases that threaten society, and can even become a source of disease spread due to inpatient activities, use of services, and visits from outsiders who may be vulnerable and susceptible to the entry of disease-causing germs. In hospitals, direct transmission (cross infection) can occur through contaminated objects or insects, which can endanger the health of the wider community.

DISCUSSION

A statistical analysis model of the stages and factors that influence the processing of solid medical waste, which is analyzed using the SEM method, will be described in the findings of this study. This discussion is more focused on aspects of statistical analysis, but considering that statistics serve as a tool in research. The stages and factors that influence the processing of solid medical waste cannot be separated from this discussion. (Al-Khatib, Eleyan, and Garfield 2016; Aung, Luan, and Xu 2019; Bokhoree et al. 2014).

According to (Ali et al. 2017) "SEM plays a role in changing traditional ways of thinking into structured ones that initiate logical and fundamental thinking patterns. SEM has some advantages over traditional path analysis, such as establishing multiple linear regression, identifying variable indicators, determining accurate models, and explaining the magnitude of the influence of a variable on other variables.".

Sorting and Examining the Treatment of Medical Solid Waste

In the presentation of the test results from SEM analysis, it was found that sorting directly affected processing by 0.449. However, apart from directly influencing processing, sorting can also indirectly influence processing through the storage route with a total influence of 0.342 (34.2%), whereas sorting generally influences processing by 34.2%.

This is consistent with a research conducted (Maina 2018) which states that waste sorting is the cause of poor solid waste treatment. This is because waste from various activities is not put in the sorted waste bins. There should be instructions and guidelines in the form of SOPs that regulate the procedures for disposing of solid waste, a clear distinction between trash bins, and rules on how to dispose of waste .

Sorting plays a very important role in waste treatment, and proper sorting helps minimize risks to public health. The sorting factor is one of the influencing stages/ factors in solid waste treatment in hospitals (Chaerul, Tanaka, and Shekdar 2008). (WILUJENG, DAMANHURI, and CHAERUL 2019)stated that hospitals have not fully implemented waste processing in accordance with government regulations. For instance, Regulation No. 56 of 2015 of the Minister of the Environment and Forestry regarding the Procedures and Technical Requirements for the Management of Hazardous and Toxic Waste from Health Service Facilities requires that trained officers sort hazardous and toxic waste, but many types of waste are still sorted by third parties. However, it turns out that the implementing party has not fully implemented these regulations. This can be seen from the existing waste storage/retention areas that remain non-compliant with regulatory standards, as well as the land used to sort and accommodate solid waste, which also remains non-compliant .

Storage Analysis of Medical Solid Waste Treatment

Test results of the SEM method path analysis show that storage has a significant direct influence on waste processing with a large effect of: 0.202; however, storage also has an indirect effect on waste treatment through containerization and transportation with a total effect of 0.553 (55.3%).This is in line with research by Mmereki which found that waste treatment in hospitals did not comply with waste treatment regulations in Botswana. Botswana's 1998 Waste Treatment Act addresses waste from health services but also encourages sustainable processing and disposal (Mmereki et al. 2017).

Sadly, the storage area contains both infectious and non-infectious waste, as well as general waste while the waste is being stored. In conclusion, improper treatment of healthcare waste can put patients, or the public in general and the environment in danger. Health facilities have storage and collection services (Faskes), but neither of these services function effectively . In a number of health service facilities, the composition is nearly identical, with the following order of average value: general waste (48.84 percent), medical waste (39.39 percent), and sharp objects (13.13 percent) According to the findings of this study, the government must devise a healthcare waste processing system that is more environmentally friendly.

This is also consistent with the results of a study at Mulago Hospital, Uganda, according to (Osman et al. 2023)

"It was discovered that general waste accounts for as much as 72% of the facility's waste in a waste storage area, while clinical waste accounts for 28%. The wardroom, operating room, kitchen, public areas, laundry, and administration room accumulate the most waste, with an average of 111.4 kg per day. The Individual Rapid Assessment Tool (I-RAT) is another tool used to find the causes of poor storage. The average compliance with waste sorting in hospitals was only 37.4 percent, with compliance with the best SOP reaching 62.8 percent in the operating room, 51.7 percent in the administration room, 32 percent in the kitchen, 27.3 percent in the ward, 27.3 percent in the public area, and 25 percent in the laundry." In addition, to minimize the mixing and spilling of waste at waste generation points due to inappropriate waste bins, All hospital units should use waste containers with capacities of 0.024 m3 for clinical waste and 0.062 m3 for general waste, according to this study.

Also supported by a statement from (Fadaei 2023) who systematically searched the Embase, PubMed/MEDLINE, Scopus, PubMed Central, Google Scholar, and medRxiv databases and identified 38 articles that met the inclusion criteria to conduct a literature review. It was found that only around 17% of healthcare facilities studied used established waste storage standards for a variety of medical wastes. Waste collection, storage, transportation, and transfer activities all exhibit poor processing, as well as medical waste disposal in various countries. According to 25% of the articles, a number of nations simultaneously use autoclaving, incineration, and landfilling for the processing and disposal of medical waste, and 91% explained in the articles that medical waste processing uses the incineration method. This literature investigation highlights the importance of adhering to specific medical waste processing guidelines and regulations, use of technology, knowledge of waste processing, and financing, to improve medical waste processing worldwide. In a study (Anstey et al. 2023) found that in waste management in ICUs in Australian and New Zealand hospitals, there was a high use of general ICU consumables and was associated with low recycling rates. This was related to weak storage, so it was concluded that interventions to reduce resource use and increase recycling were needed to improve environmental improvement and preservation.

This is known from the SEM model found in this research, of the 4 independent variables that influence solid medical waste treatment, waste treatment is most heavily influenced by storage. The direct effect, which has a T-value of 2.343, demonstrates this. The magnitude of the direct influence is 0.202, while the indirect influence totals 0.553 (55.3%), indicating that the temporary storage stage accounts for 55.3% of the stages or factors that influence the success of the final treatment or processing of solid medical waste.

This is because, at this temporary storage stage, it has been used through various stages by the SOP contained in Minister of Health Regulation Number 7 of 2019 concerning Hospital Environmental Health (Indonesian Ministry of Health 2019). These include requirements that the TPS be built with walls and floors made from from materials , watertight, and easy to clean materials with a cleaning frequency at least 1 x 24 hours; and that the TPS be equipped with the following facilities; a solid medical waste TPS nameplate, a water tap with sufficient pressure for cleaning the TPS area, a sink with running water equipped with hand soap and/or -rub as well as hand/tissue drying materials, fire protection facilities such as fire extinguishers and fire alarms, symbols or instructions for the prohibition of burning, smoking and unauthorized entry, a safety fence of at least 2 meters in heigh , and a first aid kit PPE case.

This is also supported by several previous studies. The first one conducted by (Askar Ilyas, Anwar Daud 2015) entitled Regional-Based According to the Medical Waste Treatment Model in the Province of South Sulawesi, each hospital was unable to manage its own medical waste, which led to the accumulation of B3 solid medical waste in Temporary Storage Places (TPS). (Omar et al. 2012) in his research explaining the management of clinical waste in regional hospitals in several Malaysian states. It was discovered that the improper handling of medical waste and its worsening were in the temporary storage and sorting of medical waste. (Peng et al. 2020) presented the results of their research on solutions and recommendations for logistics problems in Nanjing, China in collecting medical waste. Information was obtained that there was non-compliance in handling medical waste, namely lack of discipline when carrying out sorting, temporary storage, and disorganized regulations and facilities for sorting medical waste. According to (Nugraha 2020) research, "Review of Infectious Medical Waste Treatment Policy for Handling COVID-19," the regulation of medical waste produced is one important aspect in controlling the spread of the COVID-19 outbreak, which requires the participation of patients and medical personnel (Ikeda 2019).

Policies for the management of infectious medical waste have been developed by the Indonesian Government and the Regional Government of West Java Province for health service facilities, emergency hospitals, and self-quarantine/isolation homes. Based on a review of the stages of medical waste processing, 5 (five) policies were produced by the Indonesian government, and 2 (two) policies from the West Java Provincial Government must be considered by health service facilities. All of these policies contain stages for managing infectious medical waste that are quite clearly defined and can be used as a reference, even though these policies are not issued in an integrated manner. These policies are very important during the COVID-19 emergency period for implementing medical waste processing so that the spread of viruses through medical waste media can be avoided (Nugraha 2020).

From the four references above, the researcher assumes that temporary storage affects the processing of solid medical waste, as proper and well-equipped temporary storage facilities improve the effectiveness of final waste treatment, while inadequate facilities negatively affect subsequent processing and treatment . There are limitations to this research, particularly because the data used covers the period from 2021 to 2022, where the discussion of COVID-19 was less relevant to this research due to the pandemic starting in early 2020 – 2021. However, we feel that in 2022 the impact of the Covid 19 pandemic remain impactful on waste accumulation.

CONCLUSION

In the overall results, it can be seen that the processing process explains 66.5% of the variance for each variable, meaning that the sorting, transportation, and temporary storage processes has a variance of each variable of 66.5%. Meanwhile, the remaining 33.5% indicates the presence of other stages or factors that influence the process . After examining the results, it shows that the storage factor is the most influential in poor solid waste treatment. Based on in-depth interviews and supporting theory, additional stages or factors thought to influence storage include insufficient waste treatment training for cleaning service personnel, lack of knowledge, and low level of education of cleaning service personnel.

Suggestions for Hospital Directors and local Health Services are as follows: First, it is necessary to have special policies and guidelines regarding the treatment of solid medical waste, especially in regards to storage.

Second, hold training for cleaning service officers in processing hospital waste. Third, always follow up-to-date information in the world regarding the management of hospital medicine that can help treat solid medical waste more effectively, efficiently, and safely.

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