



Article

Comparison of Environmental Costs of Hospital X in 2023 and 2024 Based on Hansen and Mowen Theory

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Abstract: Every hospital is required to perform waste treatment and management processes. Measurement, assessment, disclosure, and reporting are procedures required to manage waste management costs generated from hospital operations. The purpose of this study is to analyze the environmental costs of Hospital X. This research is a descriptive quantitative type. This research was conducted in August - December 2024. Primary and secondary data were collected. Environmental prevention and detection costs are lower than internal failures in 2023 and 2024. The total costs incurred in 2023 were greater than those in 2024. The data also shows that there were no expenditures related to external environmental failure costs. The largest percentage is also shown in the internal failure cost expenditure which is 1.62% in 2023 and 1.15% in 2024.

Keywords: environmental cost, environmental management, hospital

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1. Introduction

Every healthcare facility, including hospitals, is required to manage waste generated from its activities. The waste can be in the form of medical waste as well as non-medical or domestic waste. Medical waste includes infectious, cytotoxic, genotoxic, pharmaceutical, waste, heavy metal, chemical, or other radioactive waste classified as hazardous waste. The management of solid medical waste from healthcare facilities is carried out through several stages, namely reduction, sorting, preservation, storage, transportation, and finally processing. Meanwhile, non-medical or domestic waste management is carried out through stages such as transportation, processing, sorting, collection, and/or final processing. [1].

Environmental management is a form of responsibility that must be carried out by all companies or organizations that produce goods or services from their operational activities. These activities can have a positive or negative impact on the surrounding environment, either directly or indirectly. To fulfill these responsibilities, an environmental accounting system is required for companies. This system acts as a control mechanism in waste management and covers the process of measuring, evaluating, disclosing, and reporting the costs associated with managing waste from operational activities. Environmental accounting is a branch of social accounting that has evolved to reflect corporate social responsibility and focuses on the process of identifying, recognizing, measuring, communicating, and disclosing information related to environmental aspects. [2].

The application of environmental accounting allows organizations or companies to be more disciplined in managing their waste and operational activities, so that waste can be treated first to reduce the content of hazardous materials before disposal. In addition,

companies that properly implement environmental accounting can avoid the environmental costs that arise from the disposal of waste without proper management, which has the potential to damage the environment. Environmental accounting also aims to improve a company's understanding of how its operations affect the environment [2].

Soekarno Sukoharjo Regency's Regional General Hospital is classified as a class B facility. The Sukoharjo district region has nine hospitals, according to data collected by researchers from the Sukoharjo Regency Health Office. The Ir Soekarno Regional General Hospital in Sukoharjo Regency is the only one of the nine hospitals in the region with larger waste deposits than the others. This, for Ir Soekarno Regional General Hospital in Sukoharjo Regency, came to 40,333.9 kg in 2020 [3].

Hospital X has implemented environmental management including waste management. Hospital X generates an average of 20-30 kg of waste per day with approximately 35 patients. Hospital X works with a third-party hazardous waste transporter and processor. The collection period of B3 waste by the third party is scheduled 2 times a week. Based on the April - June 2024 waste report, Hospital X generated 6.361 tons of waste. Therefore, a special calculation related to waste management costs is required, but Hospital X does not have a special report related to environmental costs. Based on this background, a study was conducted on "Comparison of Environmental Costs of Hospital X in 2023 and 2024 Based on Hansen and Mowen Theory".

2. Materials and Methods

This study is classified as quantitative research using a descriptive analysis methodology. The descriptive approach is used because this research aims to describe or explain the condition of the object that is the focus of the study. Based on the place of implementation, this research is field research conducted in the hospital. The data used in this research includes interview data and secondary data obtained from the hospital. This research was conducted from August to December 2024. This quantitative data is also descriptive and obtained through interviews, document analysis, or field notes. Primary data was collected through interviews with authorized resource persons from the hospital, namely the head of the General and Legality Subdivision. Hospital X profile and hospital waste data are secondary data in this study and their management, cooperation agreement documents related to waste management, and financial data related to hospital environmental management. The variables of this study are environment-related costs, including environmental prevention costs, environmental detection costs, internal failure costs, external failure costs, environmental costs, and total operating costs. The data and information collected were then compared to hospital operating costs and Hansen and Mowen's theory. The findings are summarized to explain the application of environmental accounting and related cost reporting.

3. Results and Discussion

3.1. Identification of Environmental Cost

Environmental costs consist of internal and external environmental prevention, detection, and failure costs. Based on the results of interviews and secondary data obtained in environmental management are as follows:

Table 1. Environmental cost of hospital X for 2023 and 2024

Environmental costs	Expenditure in 2023 (in IDR)		Total cost in 2023	Expenditure in 2024 (in IDR)		Total cost in 2024
Environmental prevention cost						
Environmental research cost		-			-	
Cost of training sanitation staff	Rp	4.500.000		Rp	8.250.000	
Cost of products/tools to reduce or eliminate waste		-			-	
Cost of sanitizing tools	Rp	6.500.000		Rp	8.000.000	
Cost of sanitizing materials	Rp	4.000.000		Rp	6.500.000	
Cost of cleaning materials	Rp	21.000.000		Rp	24.000.000	
Cost of cleaning tools	Rp	15.500.000		Rp	10.250.000	
Environmental management costs	Rp	18.000.000		Rp	21.000.000	
Sanitation facility maintenance costs	Rp	54.000.000		Rp	90.000.000	
Environmental general and administrative costs	Rp	4.500.000		Rp	6.000.000	
Cost of separation, storage, transportation, destruction, treatment of solid and liquid waste, and disposal of solid waste	Rp	18.600.000		Rp	20.400.000	
Housekeeping costs	Rp	24.000.000	Rp 170.600.000	Rp	24.000.000	Rp 218.400.000
Environmental detection cost						
Environmental activity audit fee		-			-	
Pollution level measurement cost		-			-	
Environmental detection fee		-			-	
Hazardous waste self-monitoring reporting fee		-			-	
Emission, ambient, and noise inspection fee	Rp	16.500.000	Rp 16.500.000	Rp	21.000.000	Rp 21.000.000
Environmental internal failure cost						
Equipment operating costs		-			-	

Environmental costs	Expenditure in 2023 (in IDR)		Total cost in 2023	Expenditure in 2024 (in IDR)		Total cost in 2024
Toxic waste treatment and disposal costs	Rp	462.690.830		Rp	276.000.450	
Pollution equipment maintenance costs		-			-	
Office building maintenance costs	Rp	26.600.000		Rp	31.000.000	
Network installation maintenance fee	Rp	17.500.000		Rp	17.500.000	
Cleaning service fee	Rp	30.840.000		Rp	36.000.000	
Machinery maintenance fee	Rp	35.000.000		Rp	55.000.000	
Cost of treating solid waste with Incinerator		-			-	
Cost of treating liquid waste with Liquid Waste Treatment Plant	Rp	15.000.000		Rp	17.500.000	
Cost of analyzing wastewater and clean water	Rp	25.506.000	Rp 613.136.830	Rp	25.506.000	Rp 458.506.450
Environmental external failure cost						
Cost of cleaning up polluted land		-			-	
Cost of cleaning up polluted rivers and soil		-	Rp -		-	Rp -
Total environmental cost	Rp	800.236.830		Rp	697.906.450	

Table 1 shows that the costs incurred for environmental prevention and detection costs are lower than internal failures in both 2023 and 2024. The total costs incurred in 2023 were greater than those incurred in 2024. The data also shows that there were no expenditures related to external environmental failure costs. Environmental prevention costs at Hospital X consist of sanitation personnel training costs, sanitation equipment, sanitation materials, cleaning materials, cleaning tools, environmental management, sanitation maintenance, environmental general and administrative costs, solid and liquid waste management, and janitorial costs. Environmental Detection Costs at Hospital X consist of emissions, emissions, and noise inspection costs. Failure costs at Hospital X consist of third-party waste disposal costs, building maintenance costs, wastewater treatment plant maintenance costs, janitorial service costs, wastewater treatment plant machinery maintenance costs, wastewater treatment costs, and wastewater and clean water analysis costs. There are no external failure costs at Hospital X.

Environmental costs at Hospital X include environmental prevention, environmental detection, internal failure, and external failure costs. Expenditures for internal failure costs were higher than those for environmental prevention and detection costs in both 2023 and 2024. The total cost incurred in 2023 was greater than that in 2024. The data also showed that there were no expenditures related to external environmental failure costs. Hospitals must pay to prevent environmental damage. Hospitals can reduce the likelihood of environmental failures by increasing investments in prevention and detection. By implementing an environmental management system, they can do so. To ensure that the system works properly and is sustainable, hospitals need to pay for it. If the system is implemented effectively, hospitals will reap greater benefits. [4]. Research conducted at the Regional General Hospital S.K. Lerik Kupang in 2021 shows that environmental accounting plays an important role in hospital management to protect the environment from the hazards of waste generated. As an institution engaged in the health sector, hospitals must ensure the safety of both patients and the surrounding environment from the potential hazards of waste generated. [5], [6].

Environmental Prevention Costs at Hospital X consist of sanitation personnel training costs, sanitation equipment, sanitation materials, cleaning materials, cleaning tools, environmental management, sanitation maintenance, general and environmental administrative costs, solid and liquid waste management, and housekeeping costs. Environmental detection costs at Hospital X consist of emissions, emissions, and noise inspection costs. Failure costs at Hospital X consist of third-party waste treatment costs, building maintenance costs, wastewater treatment plant maintenance costs, cleaning service costs, wastewater treatment plant machinery maintenance costs, wastewater treatment costs, and wastewater and clean water analysis costs. Meanwhile, there are no external failure costs at Hospital X.

This is also consistent with the study of the Kupang City Health Office for 2017-2020, which shows that environmental costs consist of the budget for third-party services related to the budget for medical waste incineration, medical waste management training, transportation, and official travel for supervision and transportation of medical waste. [7]. Regional General Hospital Massenrempulu Enrekang Regency and Haji Hospital Surabaya have also implemented accounting measures related to environmental management costs, which include liquid waste costs, solid waste, water costs, electricity, space and building arrangements, and maintenance costs for the Wastewater Treatment Plant (IPAL) [8]–[11].

Environmental accounting's use in Siloam Jember Hospital's waste management : (1) Identification of all costs used in waste management of Siloam Jember Hospital, resulting in costs generated as a result of operational activities, including the cost of carrying medical solid waste, the cost of purchasing a WWTP, the cost of testing liquid waste, the cost of keeping liquid waste, and the cost of transporting non-medical solid waste. (2) Siloam Jember Hospital's cost budget is measured by referring to historical costs, or the realization of costs incurred in the past, in order to determine the appropriate amount and value based on the actual demands of each period. (3) The presentation and reporting of the environmental protection costs incurred by Siloam Jember Hospital is done by including them in the operating costs of the hospital. (4) Siloam Jember Hospital has done waste management well in its operations. Siloam Jember Hospital has also incurred costs for the process of maintaining its environment. With the costs incurred, Siloam Jember Hospital has participated in preserving the environment [12].

The cost of waste management activities of the Mamajang Community Health Center is disclosed in the operational report. The disclosure is useful to know each transaction that occurs during the waste management activities of Puskesmas. Puskesmas Mamajang Makassar has identified, recognized, measured, presented, and disclosed environmental costs in the financial statements. Environmental accounting disclosure is

based on Government Accounting Standards Statement No. 1 of 2010, where environmental accounting disclosure is a type of voluntary disclosure. [13].

The impact of preserving the hospital environment provides benefits both to the surrounding community and to businesses, especially businesses that use and benefit from the environment, of course, by protecting the surrounding environment and managing both waste from hospital activities. The higher the hospital's environmental responsibility, the better the hospital's waste management will be. Conversely, the lower the hospital's responsibility to the environment, the worse the waste management process. [14]–[17].

Finding the percentage of environmental costs (detection, prevention, external failure, and internal failure costs) to total environmental costs is one way to measure environmental cost disclosure in research that employs ratio analysis to measure financial performance and environmental performance ranked by PROPER. The hypothesis is then tested using statistical methods. With a significance level of 0.047, the findings demonstrated that the only factor influencing the financial performance of mining and manufacturing enterprises is environmental cost disclosure. This indicates that Indonesian mining and manufacturing companies' disclosure of environmental costs for the years 2014–2018 affects the company's financial performance and concerns, including the costs of detection, prevention, external failure, and internal failure. The danger of environmental contamination makes this clear. [18].

Based on the data of X Hospital, it can also be seen that increasing the prevention and environmental detection costs from 2023 to 2024 can reduce the internal failure cost. Because of the hospital's partnership thirty-party, internal failure costs have decreased and external failure costs have been eliminated. Medical waste can be managed by standards by working with third parties. Environmental management that complies with the standards will reduce the cost of environmental failure. Research at PT Aneka Tambang in 2020, shows that the more efficient environmental costs are to sales, the greater the profit that can be generated because environmental costs also describe the reduction of material, energy, and waste costs to control overall production costs which have an impact on increasing profits. On the other hand, if it is linked back to the effectiveness of control as seen from the environmental performance achieved, then a smaller environmental cost ratio will result in lower environmental performance. Conversely, a larger environmental cost ratio will result in higher environmental performance [19].

3.2. Comparison of environmental costs with operating costs

A comparison of the environmental costs incurred by Hospital X with the total operating costs in the years 2023 and 2024 can be seen in Table 2.

Table 2. Comparison of environmental costs with operating costs of Hospital X in 2023 and 2024

Environmental costs	Expenditure in 2023 (in IDR)	percentage of operating cost	Expenditure in 2024 (in IDR)	percentage of operating cost
Environmental prevention cost	Rp 170.600.000	0,45%	Rp 218.400.000	0,55%
Environmental detection cost	Rp 16.500.000	0,04%	Rp 21.000.000	0,05%
Environmental internal failure cost	Rp 613.136.830	1,62%	Rp 458.506.450	1,15%
Environmental external failure cost	Rp -	0%	Rp -	0%
Total environmental cost	Rp 1.600.473.660	2,11%	Rp 1.395.812.900	1,76%
Total operating cost	Rp 37.938.052.676		Rp 39.750.150.425	

Table 2 shows that in 2023, environmental costs will account for 2.11% of overall operating costs, while it is 1.76% in 2024. This shows that the expenditure on environmental costs is higher in 2023 than in 2024. The largest percentage is also shown in the expenditure of internal failure costs, which was 1.62% in 2023 and 1.15% in 2024.

The percentage of the environmental cost to the total operating cost of X Hospital in 2023 is 2.11%, while in 2024 it is 1.76%. This shows that the environmental cost expenditure is higher in 2023 than in 2024. The largest percentage was also shown in the internal failure cost expenditure, which was 1.62% in 2023 and 1.15% in 2024. This shows that the increase in environmental costs is directly proportional to the increase in hospital operating costs. In addition, the percentage of internal failure costs is directly proportional to the increase in total environmental and operating costs.

The study of environmental costs at Ibn Sina Bukittinggi Islamic Hospital, which was compared with the total operating costs in 2016, showed that the environmental prevention costs reached Rp 1.344.694.042, - or 28% of the total environmental and operational costs. [20]. Research at Siti Hawa Hospital in 2023 shows that any increase in the application of environmental management accounting and operational strategies will have an impact on the increase in management costs at the hospital. [5]–[7], [10], [21], [22].

Research at Haji Hospital Surabaya states that every company or agency must conduct environmental accounting because it has an impact on the public perception of the company and its reputation. [10]. If there is environmental pollution in the community due to hospital activities, it will have an impact on increasing environmental costs and hospital operations.

The environmental expenses of PKU Muhammadiyah Gamping Hospital rise annually. Each environmental cost is divided by the totality of the environmental costs to get the percentage statistics. The two ecological cost reports that were created in 2018 and 2019 were Rp 5.741.603.921 and Rp 6.961.518.825, respectively. External failure costs are absent from both environmental cost assessments. Information about the proportion of environmental expenses to overall expenses in 2018 and 2019 [23].

4. Conclusions

The largest environmental cost incurred by Hospital X in 2023 and 2024 is the cost of internal failure. The total operating costs of Hospital X are higher in 2024 than in 2023. In 2023 and 2024, Hospital X's environmental costs accounted for 2.11% and 1.76% of its overall operating costs, respectively.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the respondents to publish this paper.

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