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THE IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT ACCOUNTING IN THE HOSPITAL DURING THE COVID-19 PANDEMIC (A CASE STUDY IN THE X TEACHING HOSPITAL)

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Abstract

Environmental concern has been the center of attention for various parties, including the hospitals. The Covid-19 outbreak that soon turned into a global health crisis at the beginning of 2020 has forced governments, including the government of Indonesia, to establish a policy as a response to the hasty spread of the virus. The increasing number of Covid-19 patients has significantly affected the amount of waste at the hospital, including medical waste. This study aimed to evaluate the environmental management at the hospital from the monetary and physical perspectives. This study took place at the X Teaching Hospital in Malang as a reference hospital for Covid-19 patients. The study employed a qualitative approach with a case study design. Data were collected through interviews with the hospital staff. Findings confirmed that the hospital had recorded environmental costs and conducted environmental management in handling waste. However, the hospital implemented neither environmental management accounting in the form of cost and benefit analysis nor environmental strategies nor innovations for sustainable environmental health.

Keywords: environmental management; environmental management accounting; environmental costs; Covid-19

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1. INTRODUCTION

Environmental concern has grown globally, especially in countries experiencing the industrial revolution like the UK, the USA, and Germany. The industrial revolution has accelerated economic development, yet it also comes with environmental issues that threaten human health (Jianping *et al.*, 2014). Health centers like hospitals have become one place that needs ongoing environmental concerns, primarily related to medical waste.

At the end of 2019, the first Covid-19 case was detected in Wuhan, Hubei Province, China. The virus soon spread to other countries worldwide (WHO, 2020). In its report released on December 31, 2020, Johns Hopkins University disclosed 19.74 new cases of Covid-19 with 1,342,312 deaths globally (University of Johns Hopkins, 2020). Indonesia confirmed 743,198 cases of Covid-19 per December 31, 2020 (covid19.go.id, 2020).

The increasing number of Covid-19 patients has also increased the amount of waste, especially medical waste. Dhaka produced an average of 206 tons of Covid-19 medical waste per day (Wardani *et al.*, 2020). The medical waste incurs additional costs of waste management. A report published by the United Nations Environment Program (UNEP) confirmed an increase in health care waste from health facilities treated Covid-19 patients—the average waste was 3.4 kg per person per day worldwide and around 2.4 kg per bed per day of medical waste by developing countries worldwide (Maalouf *et al.*, 2021). The cost of medical waste management for hospitals in Sukoharjo, a city in Central Java Province of Indonesia, swelled during the Covid-19 pandemic, from IDR 70 million in 2019 to IDR 100 million in 2020 (Jawa Pos Solo, 2020).

Waste management needs good planning both in the process and cost. Failure to include environmental concerns in management accounting practices means that organizations are unaware of the impact of environmentally-related activities on the income statement and balance sheet (Frost and Wilmhurst, 2000). The Ministry of Health (2020) states that there are at least 132 Covid-19 Referral Hospitals throughout Indonesia, one of which is X Teaching Hospital in Malang, East Java.

Data showed a rising amount of solid medical waste at the X Teaching Hospital in Malang from 153.90 kg in 2019 to 303.70 kg in 2020. The hospital's waste management costs increased during the Covid-19 pandemic, from IDR 132,907,500 in 2019 to IDR 246,468,325 in 2020. The increase in medical waste during the Covid-19 pandemic was not accompanied by good environmental management. In fact, good environmental management can become an added value for hospitals during the Covid-19 pandemic.

Based on the identified problems, the purpose of this study is to evaluate the implementation of environmental management accounting in hospitals during the Covid-19 pandemic. This research is expected to make a valuable contribution to knowing the importance of environmental management in hospitals during the Covid-19 pandemic therefore it can provide added value for management decision-making considerations.

The difference between the present study and previous research is in the study sites—there was a Previous studies did not conduct the PEMA and MEMA analysis in hospitals, while this study did. This case study in hospital with difference unique characteristic and the mechanisms used, which has not been the case study in previous research.

2. LITERATURE REVIEW

2.1. HOSPITAL WASTE MANAGEMENT

The Ministry of Health Regulation Number 7 of 2019 mentions that hospital waste management aims to prevent environmental degradation and improve the hospital environment. The regulation defines four waste management activities in hospitals:

1. Domestic solid waste management activities

The standard set several stages hospitals need to comply with to ensure the environment's health, comfort, and beauty to avoid environmental damage. Domestic waste shall go into containers, be transported, and disposed of at a temporary disposal site. The solid waste is then sorted and reduced. There are efforts to provide handling facilities for domestic solid waste and handle vectors and animals carrying diseases from domestic solid waste.

2. Hazardous and toxic waste

This kind of waste can disrupt health protection and pollute the environment. Considering the significantly negative impact of the waste, hazardous and toxic waste must be appropriately managed at all stages—from the collection in containers, transportation, temporary storage to processing. For solid hazardous and toxic waste related to Covid-19, such as used masks, personal protective equipment, gloves, used infusion sets, and others, careful handling is a must (Minister of Health and Germas, 2020). Covid-19 waste is infectious, therefore the containers must be labeled “Highly Infectious Waste – Specific Infections”.

3. Liquid waste

Liquid waste management consists of the distribution, processing, and inspection of liquid waste to reduce health and environmental problems caused by liquid waste. The Ministry of Health of the Republic of Indonesia (2020) describes Covid-19 liquid waste as wastewater originating from the handling of Covid-19 patients, including used gargling water and washing water for work equipment, eating and drinking utensils, and/or linen laundry. It also includes liquid used by patients in isolation. This waste treatment uses the Wastewater Treatment Plant (WWTP) process.

4. Gas waste

Gas waste management refers to the effort to handle gas waste which consists of selecting, maintaining, and repairing hospital utilities based on proper gas emissions and inspection to reduce the risk of health and environmental problems.

Apart from hospital waste, radiation waste management is also necessary because of its impact on environmental quality. Radiation is the emission and spread of energy through space (media) in the form of electromagnetic waves or particles or elementary particles with very high kinetic energy released from radiation materials or equipment used by installations in hospitals (Minister of Health of the Republic of Indonesia, 2019). Radiation safety refers to the effort to protect public health from the effects of radiation by promoting and preventing risks of radiation hazards through monitoring, investigating, and mitigating activities on sources, media, and exposed humans or devices containing radiation (Minister of Health of the Republic of Indonesia, 2019).

Regulated waste management activities are the basis for hospitals to determine the classification of environmental management activities. By using a classification

that complies with standards, management can control the activities and costs incurred for environmental management.

2.2. ENVIRONMENTAL MANAGEMENT ACCOUNTING

Environmental Management Accounting (EMA) has now been developed as a tool to assist managers in dealing with environmental management problems, especially in improving financial performance and environmental performance.

The International Federation of Accountants (IFAC) defines EMA as follows:

“The management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some companies, environmental management accounting typically involves life-cycle costing, full-cost accounting, benefits assessment, and strategic planning for environmental management”.
(IFAC, 2005).

EMA involves tracking, tracing, and handling costs, revenues, and savings in connection with the company’s activities related to the environment (Burrit, Hahn, and Schaltegger, 2002). Systematically, EMA integrates aspects of the corporate environment into management accounting and decision-making processes. EMA helps business people and managers to collect, analyze, and link environmental aspects with monetary and physical information.

Environmental costs means A past approach to the environment based on the disposal of past products in the environment (Yakhou & Dorweiler, 2004: 68). Environmental costs can also be defined as impacts, both monetary and non-monetary, caused by company activities that have an impact on environmental quality. There are environmental costs consisting of internal and external costs, as well as the overall costs incurred as a result of environmental damage and protection. Costs resulting from environmental control include costs for planning, controlling, controlling, controlling, and repairing damage that occurs in the company and can have an effect, both government and society (United Nations, 2001:11).

Relevant income from subsidies, second-hand or reusable waste (still useful in other organizations), income arising from insurance changes for the related environment, higher profit margins due to environmentally friendly product innovation sales, sales of management facilities waste with excess excess, etc (IFAC, 2005)

On the other hand, measurement is related to realization only when the currently defined system will turn into a way. For example, if there is an increase in efficiency that can reduce material use and waste generation, the reduction in monetary costs resulting from a reduced comparison with previously higher costs (IFAC, 2005).

2.3. ENVIRONMENTAL MANAGEMENT ACCOUNTING FRAMEWORK

Burrit et al. (2002) classify EMA into two categories: Monetary Environmental Management Accounting (MEMA) and Physical Environmental Management (PEMA). MEMA is an aspect of organizational activity in monetary units and provides general information for internal management use due to past, current, and future activities (Burrit et al., 2002). Using MEMA will help management make decisions based on the costs and revenues for the organization's environmental impact.

PEMA is also a tool for internal management decision-making. PEMA focuses on natural environmental impacts from past, current, and future activities and is expressed in physical units such as kilograms (Burrit et al., 2002). PEMA as an accounting approach can provide analytical tools to detect ecological strengths and weaknesses, make decisions to improve environmental quality, and can be used as an accountability tool to provide unbiased and transparent information to external parties (Burrit et al., 2002).

MEMA and PEMA are beneficial for internal and external interests. MEMA and PEMA can assist management (the internal party) in decision making, assessing investments, conducting environmental budgeting, measuring performance, and benchmarking. Sustainability reporting is an example of MEMA and PEMA benefits for external parties. In this case, it can be seen in the table 1. as follows:

Table 1. EMA (United Nations, 2001:116)

EMA (Environmental Management Accounting)			
Monetary EMA (MEMA)		Physical EMA (PEMA)	
As a tool for past-oriented information	As a tool for future-oriented information	As a tool for past-oriented information	As a tool for future-oriented information
Annual environmental charges or fees are tracked from record-keeping and cost accounting	Budgeting and assessing monetary environment investment	Amount of material, energy, water flow	Budgeting and assessing physical environment investment
	Calculation of costs, savings, and benefits of the project	Environmental performance evaluation and indicators, benchmarking	Determining performance targets quantitatively
External disclosure of environmental costs, investments, and liabilities		Environmental reports for external interests Other reports for authorities and agencies	Designing and implementing environmental management systems, cleaner production, pollution prevention, environmental design, supply chain management, etc.

Based on Table 1, Buritt et al., (2002) also divides EMA implementation into two: as a tool for past-oriented information and future-oriented information. The use of EMA is also divided into two: internal and external interests. MEMA deals with cost calculation and recording from bookkeeping to cost accounting for internal interests related to past-oriented information. In contrast, MEMA for future-oriented information focuses on budgeting and assessing environmental investment and calculating the benefits and costs of an environmental project.

Burrit et al. (2002) explains that PEMA for internal interests related to past-oriented information deals with the number of past expenditures such as materials, energy, and water flow, and environmental performance evaluation based on predetermined indicators and benchmarks. Future orientation for PEMA focuses on calculating the budget for the physical environment and evaluating its investment and performance targets in quantity. For the interests of external parties, PEMA deals with reports on past environmental activities

and determines the design and implementation of a better environmental management system for the future.

MEMA and PEMA have benefits for internal and external interests. According to Winayanti (2014) the benefits that can be provided for internal parties such as to assist management in making decisions, assessing investments, conducting environmental budgeting, measuring performance, benchmarking and for external parties such as sustainability reporting.

Burhany (2013) researched the understanding of management related to the benefits of implementing environmental management accounting and measuring the effectiveness of environmental management accounting in companies to improve environmental performance. The approach uses two dimensions: monetary and physical information, completed with indicators in each of these dimensions (Table 2). The indicators can be the basis for separating environmental management activities at hospitals.

Table 2. PEMA and MEMA Indicators (Burhany, 2013)

Dimension	Indicators
Physical	<ol style="list-style-type: none"> 1. Calculating and recording the amount or percentage of materials derived from recycled materials 2. Calculating and recording the amount of energy consumed 3. Calculating and recording the amount of energy saved 4. Calculating and recording the amount of water taken from nature 5. Calculating and recording the amount of water recycled for reuse 6. Calculating and recording the amount of water discharged/wasted 7. Calculating and recording the amount of gas emission produced 8. Calculating and recording the amount of waste generated 9. Calculating and recording the amount of waste recycled 10. Calculating and recording the amount of waste disposed
Monetary	<ol style="list-style-type: none"> 1. Calculating and recording the cost of purchasing waste management equipment 2. Calculating and recording the evaluation or depreciation cost of waste management equipment 3. Calculating and recording the cost of development or process design or environmentally friendly products 4. Calculating and recording the cost of employee training on environmental issues 5. Calculating and recording the cost of developing an environmental management system 6. Calculating and recording the cost of environmental audit 7. Calculating and recording the inspection cost of the production process 8. Calculating and recording the cost of emission tests 9. Calculating and recording the cost of inspecting hazardous waste content 10. Calculating and recording the cost of hazardous waste processing

	11.	Calculating and recording the costs of maintaining waste treatment equipment
	12.	Calculating and recording the cost of recycling waste materials for reuse
	13.	Calculating and recording the cost of recycling water for reuse
	14.	Calculating and recording the cost of repair/conservation of damaged land

The PEMA and MEMA indicators in Table 2 show the information needed by management related to environmental activities in the organization (Burhany, 2013). Burhany (2013) shows that monetary and physical calculating, recording, and reporting on the flow of inputs (costs, energy, and materials) and outputs (waste, emissions) can improve environmental performance.

Our reference is the study by Ibrahim and Souleiman (2018) related to environmental costs in Tartous City. The study explored the practice of Environmental Cost Accounting (ECA) in a Syrian hospital (Al Basel Hospital) in Tartous City to explain the environmental costs incurred by the hospital and how the hospital was responsible for these costs.

The next research reference is a thesis written by Danastri (2018), related to environmental management systems in steel companies. The study aims to analyze the company's environmental management system as a form of awareness on environmental issues and evaluate the implementation of environmental management accounting.

The difference between the present study and previous research is in the study sites—there was a unique characteristic of the hospital and the mechanisms used. The characteristics of a hospital which is a work unit of an educational institution which in terms of financial management and strategy does not independently regulate itself and is under the supervision of the parent of the educational institution. Previous studies did not conduct the PEMA and MEMA analysis in hospitals, while this study did. The other difference was in the time of the study since the present study took place during the Covid-19 pandemic.

3. RESEARCH METHOD

The study employed a qualitative approach with a case study method focusing on one example of the phenomenon; it offered detailed and in-depth descriptions

and insights about the event to be studied (Johannesson, 2014). We collected data through documentation and interviews.

We evaluated records such as financial reports from 2019 before the pandemic and 2020 when the pandemic occurred. We also examined 2021 budget reports as a form of future planning. We interviewed two main people, namely The Vice Director of the General and Finance Department, and The Vice Director of the Support for Facilities and Infrastructure Department, as well as two staff in the Finance Department is Head of Finance and Accounting and the Non-Medical Supporting Department is Environmental Sanitation Installation Coordinator because they could provide answers to the problems investigated in this study.

Interviews were conducted on 29 October 2021 with The Vice Director of the General and Finance Department and 3 November 2021 with The Vice Director of the Support for Facilities and Infrastructure Department. Meanwhile, during the research process, we also conducted interviews and confirmations with staff in the Finance Department and Non-Medical Supporting Departments. Interviews were conducted in a semi-structured manner with reference to a series of open-ended questions to be able to dig deeper into the respondent's answers. We directly wrote down their answers during the interviews. The answers were then analyzed using qualitative content analysis. The questions asked during the interviews were related to:

1. whether the X Teaching Hospital implemented environmental management and the form of the environmental management applied; and
2. whether the implemented environmental management of the X Teaching Hospital conformed with literature and standards on environmental management, especially MEMA and PEMA.

4. ORGANIZATION PROFILE

Teaching Hospital X is a class C teaching hospital from Education X Malang. Teaching Hospital X has managed to get a PARIPURNA Accreditation rating on May 3, 2018 from the Hospital Accreditation Commission (KARS). hospital in environmental management under the Department of Non-Medical Supporting Sie. In the Non-Medical Supporting Department, there is an IPL

(Environmental Sanitation Installation) division which functions to manage both medical and non-medical waste.

Related to financial management, as the responsibility of the Vice Director of the General and Finance Department who oversees the general department of personnel and finance. In this department all financial activities are recorded, budgeted and managed as well as coordinating with other departments related to the needs and for hospital operational activities.

5. RESULT AND DISCUSSION

5.1. Implementation of EMA in Hospital - Environmental Accounting Records

One objective of the present study was to examine how the hospital implemented environmental management during the Covid-19 pandemic compared to the one implemented before the pandemic employing the environmental management accounting. Our findings confirmed that the hospital followed the standards set in Regulation of the Minister of Finance of the Republic of Indonesia as conveyed by the Head of Financial and Accounting Affairs:

“As a government institution, our record and accounting system surely follow the standard of the Ministry of Finance. We never develop any rules or systems of our own.”

As a government institution using the accounting system set by the government, hospitals also have to follow the Regulation of the Minister of Health of the Republic of Indonesia Number 7 of 2019 concerning Environmental Health. Thus, hospitals must have a waste management installation. The interview results with the Vice Director of the General and Finance Department revealed the following related to cost and waste management:

“... The fund for waste management is included in the hospital fund. There is additional funding during the pandemic, especially for medical waste management. This addition was made considering that, although the number of patients is decreasing, there are activities such as vaccinations that increase the cost of waste management.”

The Vice Director of the General and Finance Department confirmed that the fund for waste management of the X Teaching Hospital was included in the fund

for hospital activities. Therefore, there was no special fund for waste management. Findings also showed a surge in costs for waste management and the establishment of a separate budget for waste management activities during the Covid-19 pandemic. A third party carried out the medical waste management at the X Teaching Hospital. A special installation was established within the hospital area for liquid waste management. Thus, the budget was allocated for waste management operational activities and maintaining the liquid waste treatment machine. The hospital only managed its own waste—it did not accept waste from other hospitals, as stated by Head of Finance and Accounting:

“We do not want to call it an investment because we do not aim for profit, as it does with investment. We name it funding for waste management. Waste management needs certain equipment, and we have to buy the tools. There are also regular maintenance, operational costs, and others set by the Ministry of Finance....”

The hospital could not maximize the operation of the waste management facility, and the waste processing could not generate additional revenue for the hospital. Based on the analysis results, the waste management at the X Teaching Hospital had followed the standards set in the Regulation of the Minister of Health Number 7 of 2019. The management had SOPs on waste management for domestic solid waste, hazardous and toxic waste, liquid waste, and gas waste. If the hospital referred to the waste management regulation, it conformed with the existing standards. Previous studies by Ardiansyah (2018), Ibrahim, Emad, and Siuleiman (2018), Dewinta Danastri (2018), Indrawati and Rini (2018) confirmed that the hospitals they studied also implemented environmental management following the applicable standards and regulations.

The hospital, however, needs to note that waste management must be seen as an investment. The management still considered waste handling as an expense. In fact, proper and responsible waste management is a future investment if it adheres to the Environmental Management Accounting Framework (2002), such as the past-oriented and future-oriented aspects that will help management analyze environmental strengths and weaknesses to provide information for the external parties. Findings also confirmed no changes in waste management activities before and during the Covid-19 pandemic at the X Teaching Hospital.

5.2. Waste Management and Budgeting

In addition to examining if changes happened to the waste management budget as a representation of environmental management accounting, it was also necessary to examine the long-term financial planning and whether there was a particular work unit handling the waste management process. The Vice Director of the Support for Facilities and Infrastructure Department revealed that:

“We do not have a formal strategic plan of waste management, but the process refers to the waste management standards to guarantee environmental safety and health. Well, the

strategic plan applied is the general strategic plan of the parent educational institution and the hospital.”

Planning on waste management referred to the strategic plan of the X Teaching Hospital and the university. As such, information on the long-term waste management plan was not available because long-term plans for funding had to follow the parent educational institution’s strategic plan. Related to the waste management unit, the Vice Director of the Support for Facilities and Infrastructure Department stated that:

“We have a waste management team, as you can see in our organizational structure. The job description of the team members, well, I think it is just the same with other similar waste management teams.”

The waste management team was included in the IPL (*Instalasi Penyehatan Lingkungan* – Environmental Sanitation Unit). The unit had Standard Operating Procedures (SOPs) to carry out waste management such as the SOP for Handling Infectious and Non-Infectious Solid Waste, the SOP for Handling Medical and Non-Medical Waste, the SOP for Separating Medical and Non-Medical Waste, the SOP for Domestic Waste Collection, the SOP for Monitoring Flow of Wastewater Treatment Plants, and so on.

The second objective of this research was to find out the process of recording costs and using costs of environmental activities. The information is presented in Table 3.

Table 3. Medical Solid Waste in 2019 and 2020

No	Month	Medical Solid Waste (kg/month) 2019	Medical Solid Waste (kg/month) 2020
1	January	12.7	20.0
2	February	11.8	21.8
3	March	14.8	22.6
4	April	14.6	14.7
5	May	11.4	14.9
6	June	9.8	21.8
7	July	9.9	40.3
8	August	10.6	26.0
9	September	15.9	32.3
10	October	14.2	26.0
11	November	15.4	30.6
12	December	12.8	32.7

(source: Internal Data of Teaching Hospital X processed, 2021)

Medical solid waste fluctuated in 2020 and ranged around 9 to 25 kilograms per day. Based on that amount, the cost for waste management recorded by the X Teaching Hospital was increase

97%, from IDR132,907,500 in 2019 to IDR 246,468,325 in 2020. Based on the cost in 2020, the budget for waste management prepared by the X Teaching Hospital in 2021 is as follows.

Table 4. The X Teaching Hospital Waste Management Budget of 2021

No	Type of Expenditure	Amount
1	Sanitation waste management	IDR342,123,996
2	PCR test waste management	IDR6,446,000
3	Regular cost of air quality inspection	IDR14,351,000
4	Cost of wastewater and clean water analysis	IDR11,457,000
5	Procurement of IPL units supply	IDR62,106,000
Total budget of waste management		IDR436,483,996
Total budget		IDR17,000,000,000
Total cost of waste management in 2020		IDR295,946,425

(source: Internal Data of Teaching Hospital X processed, 2021)

Table 4 confirms that hospital management has budgeted more about 47% for waste management costs in 2021, because as in the interview with the vice director of general and finance that there are costs for vaccine activities that can also be in line with the increase in waste management costs. This table shows that there is great attention from hospital management in waste management due to Covid-19. This table also share some information about that the contribution of waste management cost is 2.75%. It means waste management does not have a major influence on the hospital's total cost.

Based on table 4, the hospital management does not allocate specific funds for WWTP (Wastewater Management Installation) maintenance and has not allocated a special budget for environmental management activities or included in the entire hospital budget. There was a lack of existing implementation of environmental management accounting at the hospital because not all indicators of the monetary and physical dimension were met. As stated before, all the monetary and physical indicators must be fulfilled to achieve the best EMA performance. It requires corporate resources that include management commitment, a planning process able to integrate corporate strategies with environmental issues, and environmental management accounting.

Proper implementation of EMA will help organizations to improve performance. However, a contrasting finding was found in the X Teaching Hospital, where the two dimensions of EMA were not met. The budget allocated for waste management did not include the amount for WWTP maintenance. Improvement in environmental performance can affect the hospital's reputation since it represents the ability to manage resources.

The concern of management on environmental issues leads to the birth of organizational capability to create proactive environmental strategies. Hansen and Mowen (2011) classify environmental cost as the reference to assess the performance of environmental management accounting—we used the reference in this study. Our identification revealed that the management of the X Teaching Hospital had paid expenses for environmental activities. Still, the costs had not been classified explicitly because the management considered the cost of the environmental activities as a part of operational costs that need special attention, like for evaluation and improvement in the future. Table 5 depicts the comparison

of the classified costs of environmental activities in the X Teaching Hospital, referring to the classification by Hansen and Mowen (2011).

Table 5. Classified Costs of Environmental Activities in the X Teaching Hospital

No.	Cost Classification	Environmental Costs	2019	2020	Presentation
1	Preventive Cost	-	-	-	-
2	Environmental Detection Cost	Cost of WWTP quality periodic tests	IDR5,428,500	IDR8,042,100	48%
		Cost of air tests	IDR4,500,000	IDR27,398,800	509%
		Cost of WTP clean water tests	IDR8,371,000	IDR2,356,200	-72%
3	Environmental Internal Failure Cost	Cost of medical waste transportation	IDR132,907,500	IDR246,468,325	85%
		Cost of domestic waste transportation	IDR8,000,000	IDR8,000,000	0%
4	Environmental External Failure Cost	-	-	-	-

(source: Internal Data of Teaching Hospital X processed, 2021)

Table 5 shows that the X Teaching Hospital did not completely include the preventive cost and external environmental failure. Environmental prevention costs are costs for activities carried out to prevent the production of waste and/or waste that can damage the environment (Hansen, Mowen., 2011). However, the management of X Teaching Hospital has not taken any precautions to prevent the production of waste, both in terms of process design and employee training (Table 6).

In terms of costs, that the costs for the internal failure of the environment have a large contribution compared to the costs of prevention which even have no costs, it means that there are no activities carried out by the hospital and the costs for detecting the environment. Without proper activities on environmental prevention and detection, it will have an impact on increasing internal and external failure costs.

Meanwhile, the environmental external failure cost is used to handle problems occurring after contaminants and waste enter the environment. Even though the handling of medical and domestic waste treatment has been managed by outsourcing companies, hospital management should still ensure that there is no adverse impact on the environment for the hospital waste that has been released. Therefore, both preventif cost and external failure costs will affect the reputation of the X Teaching Hospital in environmental management. However, based on interviews with Environmental Sanitation Installation Coordinator that as follow in Table 5, WWTP maintenance cost that should be classified as an environmental detection cost but was not paid or incurred regularly— there was no cost allocated for the current year.

A proactive strategy will help companies increase their environmental performance (Rodrigue et al., 2013) that can be seen on the environmental performance indicators. EMA can help companies fulfill their environmental responsibilities and identify economic benefits from improving environmental and economic performance (Burritt et al., 2002). EMA is also an approach to disclosing information that helps companies achieve better environmental and financial performance (Zhou et al., 2017). Lisi (2015) shows that environmental performance indicators are closely related to the company's environmental strategy. Thus, EMA management planning will affect the commitment of the X Teaching Hospital management. Perez et al. (2007) mention three main intangible assets in sustainable environmental improvement: (1) top management commitment to environmental issues, (2) environmental strategy planning, and (3) the application of EMA. Top management committed to environmental preservation tends to adopt a system that can provide information related to the environment (such as the flow of materials in accounting management).

The analysis of EMA generates can assist managers in developing indicators for measuring environmental performance (Lisi, 2015). When top management understands the potential benefits from specific environmental initiatives (such as improved performance), they will be motivated to commit to environmental sustainability. To sum up, the environmental management applied by the X Teaching Hospital was weak because it was not able to apply environmental-based accounting to its business processes.

5.4 PEMA AND MEMA ANALYSIS

PEMA and MEMA analysis (Burhany, 2013) were used to analyze the implementation of environmental management accounting and the management understanding of environmental management accounting. The dimension in the analysis included the physical and monetary dimension with indicators to assess the implementation of PEMA and MEMA. Table 6 illustrates the results of the PEMA and MEMA analysis in the management of the X Teaching Hospital.

Table 6. PEMA and MEMA Indicators in the Management of the X Teaching Hospital

Dimension	Indicators	Understanding
Physical	1. Calculating and recording the amount or percentage of materials derived from recycled materials	-
	2. Calculating and recording the amount of energy consumed	-
	3. Calculating and recording the amount of energy saved	-
	4. Calculating and recording the amount of water taken from nature	√
	5. Calculating and recording the amount of water recycled for reuse	-
	6. Calculating and recording the amount of water discharged/wasted	√
	7. Calculating and recording the amount of gas emission produced	√
	8. Calculating and recording the amount of waste generated	√
	9. Calculating and recording the amount of waste recycled	-
	10. Calculating and recording the amount of waste disposed	√
Monetary	1. Calculating and recording the cost of purchasing waste management equipment	-
	2. Calculating and recording the evaluation or depreciation cost of waste management equipment	√
	3. Calculating and recording the cost of development or process design or environmentally friendly products	-
	4. Calculating and recording the cost of employee training on environmental issues	-
	5. Calculating and recording the cost of developing an environmental management system	-
	6. Calculating and recording the environmental audit fees	-
	7. Calculating and recording the inspection costs of the production process	-
	8. Calculating and recording the cost of emission tests	√
	9. Calculating and recording the cost of inspecting hazardous waste content	√
	10. Calculating and recording the cost of hazardous waste processing	√
	11. Calculating and recording the costs of maintaining waste treatment equipment	-
	12. Calculating and recording the cost of recycling waste materials for reuse	-
	13. Calculating and recording the cost of recycling water for reuse	-
	14. Calculating and recording the cost of repair/conservation of damaged land	-

Based on table 6, the assessment of management understanding, the hospital management did not understand many indicators of the physical and monetary dimension, especially the ones related to environmental management accounting, such as the amount of energy saved, the amount of water taken from nature, the amount of water recycled for reuse, and the amount of water discharged/wasted.

Based on the results of the assessment related to management's understanding, it can be seen that from the 10 physical and 14 monetary indicators, the management still does not understand many things, especially those related to environmental management accounting, such as the amount of energy saved, the amount of water recycled for reuse, and the amount of waste recycled in PEMA activities. This happened because the hospital management did not carry out production activities, so no energy was expended, and a third party carried out waste management.

In monetary activities, the cost of developing/designing processes/environmentally friendly products was not incurred because the X Teaching Hospital did carry out 3R (Reduce, Reuse, and Recycle) activities or did not do any production activities. The hospital also skipped training on environmental issues for employees from 2019 to 2020. The training activities were still at the planning stage of the Human Resource Development. The hospital also did not develop an environmental management system because the system development must be done using a government-based system (website)—as a result, there were no manufacturing costs incurred.

The hospital also did not incur costs of checking the production process and recycling waste and water for reuse because the hospital did not carry out production activities and 3R (Reduce, Reuse, and Recycle). All waste management, except water management, was carried out by a third party or outsourcing company. The hospital did not have to pay for the costs of cleaning the polluted environment and repairing/conserving damaged land from 2019 to 2020 because there were no environmental pollution problems during its operation.

The interview with the Vice Director of the General and Finance Department regarding future innovation plans revealed that

“Currently, there is no strategic plan because there is still a third party. There are standards or criteria in choosing a waste management partner—

it must follow the rules set by the Environmental Service (Dinas Lingkungan Hidup – DLH). We cannot figure it out because the costs are quite high, not to exclude the need for space, tools, and labor.”

Therefore, the management of the X Teaching Hospital did not yet develop future-oriented PEMA activities. It also had no future strategic plans in the future. There has been no comparative analysis between establishing its own waste management and continuing to use third parties. Although the hospital is new, it still has responsibilities to the parent educational institution. The hospital establishment is challenging as it requires high costs compared to using a third party. Burrit et al., (2002) states that one of the monetary tools is budgeting and assessment on environmental monetary investment. The X Teaching Hospital, to date, only implements budgeting for waste management in the following year based on the information on the current year's budget. It means that the X Teaching Hospital has not taken environmental considerations in its decision making, and it focuses more on past-oriented information for future decision making. In other words, it does not consider future savings.

6. CONCLUSION

Environmental management is often used as an environmental strategy in initiatives to reduce environmental impact. Environmental management can be done through company products, processes, and policies such as reducing energy consumption, reducing waste, using sustainable green resources, and implementing environmental management systems. This study aimed to explain the environmental costs incurred by the X Teaching Hospital in Malang and how the management was responsible for these environmental costs. This study further explored the motives and barriers to environmental cost accounting at the X Teaching Hospital. Therefore, this study used a qualitative case study approach with observation and interviews with the management of the X Teaching Hospital.

Our findings confirmed that the X Teaching Hospital in carrying out waste management have followed regulations determined by the government such as those from the Ministry of Health, Ministry of Environment and Forestry, and the

Ministry of Finance both in conditions before the pandemic and during the pandemic. However, related to the conditions in the study during the pandemic, there was no significant difference in treatment for waste management compared to the conditions before the pandemic.

In terms of EMA Framework, X Teaching Hospital failed to meet some indicators within the monetary and physical EMA dimensions. The waste management at the X Teaching Hospital has not taken PEMA and MEMA into account by considering future savings. It makes future decision-making only based on past-oriented information for monetary purposes.

The hospital also still not yet to classify environmental costs as suggested by Hansen and Mowen (2011) because it did not have the prevention cost and external failure costs into the consideration for the evaluation of environmental management's performance. This would affect the reputation of the hospital related to environmental management. To sum up, the environmental management applied by the X Teaching Hospital was weak because it was not able to apply environmental-based accounting to its business processes.

It is recommended for X Teaching Hospital's management to consider environmental management based on environmental management accounting both physically and monetary which can provide performance evaluation and strategic decision making in the future.

The scope of this research is focused on the condition of the Education Hospital X Malang regarding the evaluation of the implementation of hospital environmental management in the Covid-19 pandemic conditions. This evaluation uses an environmental management accounting system from a monetary point of view that includes environmental costs in hospital accounting calculations by dividing them into environmental cost classifications. Then the evaluation uses environmental management accounting based on a physical aspect that includes information on physical activity activities from management and their impact on the hospital environment. Based on the hospital environment management process, evaluation is limited to activities carried out in the hospital and does not evaluate management outside the hospital environment such as by third parties.

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DISCLOSURE

There is no conflict of interest in this study.

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