# How Environmental Cost Accounting Can Transform Hospital Medical Waste Policies

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ABSTRACT

*This study examines the implementation of environmental cost management in hospital waste management using the Environmental Management Accounting (EMA) framework. In Indonesia, hospitals increasingly implement environmental management practices, yet the integration of environmental costs into formal accounting systems remains limited. This research aims to analyze how environmental costs related to medical waste management are identified, measured, and recorded in hospital accounting practices. The study adopts a qualitative single case study approach conducted at PKU Muhammadiyah Nanggulan Hospital. Data were collected through semi-structured interviews, document analysis, observations, and financial records from 2023 to 2024 and analyzed using thematic analysis. The findings indicate that the hospital has implemented several environmental management practices, including medical waste segregation, wastewater treatment through IPAL facilities, and cooperation with certified third-party waste management companies. However, environmental costs are still recorded as general operational expenses under the IPAL account, without a clear classification in line with EMA principles. Integrating EMA into hospital accounting systems could improve transparency into environmental costs, strengthen environmental accountability, and support corporate social responsibility in sustainable healthcare management.*

ABSTRAK

*Penelitian ini menelaah penerapan pengelolaan biaya lingkungan dalam konteks manajemen limbah rumah sakit dengan menggunakan kerangka Environmental Management Accounting (EMA). Meskipun praktik pengelolaan lingkungan di Rumah sakit Indonesia semakin berkembang, integrasi biaya lingkungan ke dalam system akuntansi formal masih relative terbatas. Tujuan utama penelitian ini adalah menganalisis bagaimana biaya lingkungan yang terkait dengan pengelolaan limbah medis diidentifikasi, diukur, serta dicatat dalam praktik akuntansi Rumah Sakit. Studi ini menggunakan pendekatan studi kasus kualitatif tunggal pada RS PKU Muhammadiyah Nanggulan, dengan pengumpulan data melalui wawancara semi-terstruktur, analisis dokumen, observasi, serta telaah catatan keuangan tahun 2023-2024. Analisis dilakukan menggunakan teknik tematik untuk memperoleh pemahaman mendalam. Hasil penelitian menunjukkan bahwa Rumah Sakit telah melaksanakan sejumlah praktik pengelolaan limbah cair melalui instalasi pengelolaan lumbah pihak ketiga yang tersertifikasi. Namun, biaya lingkungan masih dicatat sebagai bagian dari biaya operasional umum, khususnya dalam akun IPAL, tanpa klasifikasi yang sesuai dengan prinsip EMA. Integrasi EMA berpotensi meningkatkan transparansi, memperkuat akuntabilitas, dan mendukung penerapan tanggung jawab sosial perusahaan dalam layanan kesehatan berkelanjutan.*

## INTRODUCTION

Significant environmental impacts occur in the hospital industry, which can negatively affect the surrounding environment due to the high volume of medical waste generated by hospital activities. Poor management of hospital waste causes environmental pollution and contaminates residents' drinking water in the operational area (Akif Destek et al., 2024; Sharma et al., 2025;

Verlicchi et al., 2012). Medical waste disposal is a key challenge for both environmental oversight and hospital management (Nematollahi et al., 2025).

The hospital industry produces hazardous, toxic waste. This waste can be either physical or liquid, including IV equipment, used syringes, laboratory materials, and various infectious wastes that pose a potential threat to public health and environmental quality if mismanaged (Singh et al., 2022). As the need for health services in Indonesia increases, so does hospital waste (Saghita, Purna, 2017). The amount of waste from healthcare facilities continues to increase by around 2.11 percent annually, in line with the growth of hospital services (Kaposi et al., 2024). This challenges hospitals to implement operational controls and establish an accounting system capable of identifying, measuring, and reporting the environmental costs arising from these activities (Burritt & Schaltegger, 2010; Christ & Burritt, 2013; Qian et al., 2011; Sumiari et al., 2025).

Environmental Management Accounting (EMA) is an approach that integrates environmental aspects into the management accounting system (Burritt & Schaltegger, 2010; Christ & Burritt, 2013; Qian et al., 2011). This EMA approach enables hospitals to identify, classify, and evaluate environmental costs associated with operational activities, thereby improving the quality of managerial decision-making and supporting improvements in the organization's environmental performance. (Ferreira et al., 2010). The EMA approach was developed by Don R. Hansen and Maryanne M. Mowen and can be classified into environmental prevention costs, environmental detection costs, and environmental external failure costs (Adisty et al., 2024; Budianto et al., 2025).

Environmental responsibility is not only about accounting aspects but also about the concept of Corporate Social Responsibility (CSR) (Christ & Burritt, 2013).

Empirical research on the value of implementing Environmental Management Accounting in the hospital sector remains relatively limited. Previous studies have largely focused on manufacturing companies, while research in healthcare institutions is rare (Gunarathne & Lee, 2021; Mukwarami et al., 2023; Ningly & Rahmadani, 2025; Rahmawati & Hamzah, 2025). In fact, hospital operations are complex, involving strict health regulations, complex medical waste management, and responsibilities to various stakeholders (Cartier, 2013; Olukanni et al., 2022). This is a challenge for hospitals to implement environmental accounting.

In addition, several previous studies in Indonesia show that environmental management activities in hospitals have been implemented in practice but have not been formally integrated into an organized, structured accounting system (Rohim & Hardiningsih, 2022; Saribu et al., 2024; Sutrisna & Anna, 2019). Recording environmental costs remains separate from general operational costs, making it difficult for management to evaluate the effectiveness and efficiency of environmental management activities (Jasch, 2006; Sumiari et al., 2025). The disparity between environmental management practices and accounting reporting systems indicates the need for further research to understand how Environmental Management Accounting is implemented in health care institutions (Asiri et al., 2020; Gunarathne & Lee, 2021).

This study aims to analyze the application of Environmental Management Accounting as a material for Corporate Social Responsibility in hospital waste management practices. This study uses a case study at PKU Muhammadiyah Nanggulan Hospital to examine how the implementation of environmental costs for waste management, starting from identification, measurement, and disclosure, affects hospital accounting practices. The reason for selecting the research object is that hospitals generate various types of medical waste that require proper environmental management. This study is expected to contribute to the literature on environmental accounting in the healthcare sector and to offer a conceptual framework for integrated hospital accounting systems in environmental management practices. This study exposes a critical gap in environmental accounting practices within healthcare, an overlooked dimension that could redefine transparency, accountability, and sustainability in the sector.

This study contributes to the literature on Environmental Management Accounting (EMA) in several important ways. First, it offers a detailed mapping of hospital environmental expenditures, particularly those related to IPAL operations and medical waste management services, into the EMA classification framework (Hansen & Mowen, 2007). Second, it advances theoretical integration by employing both Institutional Theory and Stakeholder Theory to explain the observed gap between environmental practices and their representation in accounting systems within the healthcare sector. Third, it highlights the discrepancy between operational environmental management and formal accounting disclosure, with a specific focus on Indonesian hospitals, an area underexplored in existing scholarship.

Despite the increasing volume of medical

waste and the growing environmental risks in hospitals, environmental costs are still commonly embedded within general operational accounts. They are not explicitly identified, measured, or disclosed. Existing studies on Environmental Management Accounting (EMA) have predominantly focused on manufacturing sectors, while empirical evidence in hospital settings, particularly in Indonesia, remains limited. Consequently, there is insufficient understanding of how environmental costs related to medical waste management are translated into accounting information and how this affects environmental accountability and Corporate Social Responsibility (CSR).

## THEORETICAL FRAMEWORK AND HYPOTHESES

### Environmental Management Accounting (EMA) and the Implementation of EMA in the Healthcare Institution

Environmental management accounting (EMA) is a management accounting method that integrates environmental data into organizational decision-making by capturing and evaluating both physical and financial data relevant to environmental impacts (UNSD, 2026). Emissions, waste production, and resource utilization provide insights that help institutions improve operational efficiency and environmental performance (Huynh & Nguyen, 2024). From a practical perspective, EMA supports cleaner production and sustainability-oriented innovation by embedding comprehensive environmental information into management structures. However, EMA applications in developing countries face challenges such as limited resources, a lack of managerial knowledge of its advantages, and insufficient integration with conventional accounting practices and environmental management systems. For example, Indonesia generated 30.97 million tons of waste in 2023; of that total, approximately 34.76 percent was left unmanaged (Ahdiat, 2024).

During EMA deployment, it is important to identify hidden environmental costs that are often missed due to blanket operational costs generated by standard accounting methods (Purwanti et al., 2025; Yudha et al., 2025). Therefore, hospitals pose complex environmental challenges, particularly regarding medical waste generation. Previous studies indicate that EMA implementation helps drive hospital productivity and can facilitate effective medical waste management policies (Saribu et al., 2024; Zahrani et al., 2026).

However, EMA adoption among hospitals in Indonesia is low unless fully integrated into their accounting structures (Putri et al., 2024; Sary et al., 2022). Furthermore, research on EMA implementation at a regional hospital in Surabaya found that hospital waste management costs increased significantly, particularly after the COVID-19 pandemic, due to increased medical waste volumes and the hospital's reliance on third-party waste management services (Putri et al., 2024). Therefore, further evidence is required to determine how well EMA enables more environmentally sustainable practices in the hospital setting (Manehat et al., 2025).

### Environmental Management Accounting and Corporate Social Responsibility

Research in the journal Business Strategy and the Environment shows that implementing environmental accounting makes it easier for organizations to identify the environmental impacts of operational activities in a more structured manner, thus encouraging more accountable and transparent environmental management practices (Saizarbitoria et al., 2020). EMA also provides management with relevant information to evaluate an organization's environmental performance and develop strategies for more effective sustainability. Research in the Journal of Cleaner Production reveals that integrated information between accounting systems and environmental activities can improve organizational decision-making by providing accurate data on resource use, environmental costs, and emissions arising from operational activities (Hanif et al., 2023).

Corporate Social Responsibility (CSR) is an organization's obligation to consider the ethical impacts of its operational activities on the environment, society, and stakeholders (Aftab et al., 2025; Golob et al., 2013). CSR encompasses not only social and philanthropic activities but also the organization's ongoing activities. Previous research has shown that organizations with strong CSR responsibilities are more likely to have robust environmental management systems and higher levels of public disclosure of environmental information (Liu et al., 2024). In the modern business world, CSR is also seen as a strategy to enhance an organization’s legitimacy with the public and stakeholders. By transparently reporting on CSR, organizations demonstrate their responsibility for managing environmental impacts and for participating in the Sustainable Development Goals (SDGs), the global action plan for social and economic development (Larrinaga & Bebbington, 2021).

Environmental Management Accounting

(EMA) has a strong correlation with CSR implementation because it provides the environmental information organizations need to fulfill their social commitments effectively. Through EMA, the information generated makes it easier for organizations to identify environmental costs, improve resource efficiency, and monitor the environmental impact of operational activities, all of which are essential elements of CSR practices (Christ & Burritt, 2013).

Empirical research reveals that organizations that effectively implement EMA can disclose CSR regularly and systematically, supported by an environmental accounting system that provides data for social responsibility and sustainability reporting (Wang et al., 2022).

Furthermore, integrating a CSR policy with EMA can enhance organizational accountability, as the resulting environmental information can be used to evaluate environmental performance and demonstrate the organization's responsibility for environmental management. Therefore, the correlation between environmental accounting, EMA, and CSR demonstrates that accounting systems are not only useful for managing environmental costs but also for enhancing accountability, transparency, and the implementation of organizational social responsibility to support sustainable business practices.

Overall, previous studies have highlighted the importance of Environmental Management Accounting in improving environmental performance and resource efficiency. However, most studies have focused on manufacturing and industrial sectors, with limited attention to healthcare institutions. In addition, existing research rarely examines how specific environmental costs, such as wastewater treatment and third-party waste management, are identified and structured within accounting systems. This study addresses these gaps by providing empirical evidence on environmental cost identification, measurement, and disclosure in a hospital context in Indonesia.

**Theoretical Framework**

**Institutional theory** posits that organizations function not solely based on economic efficiency but are also shaped by regulations, societal norms, and expectations prevalent in their institutional contexts. This theory was initially presented by John W. Meyer and Brian Rowan in 1977 and subsequently expanded by Paul J. DiMaggio and Walter W. Powell in 1983, who introduced the idea of institutional isomorphism characterized by coercive, normative, and mimetic pressures (DiMaggio and Powell, 1983; Meyer & Rowan, 1977). Within the healthcare domain, hospitals are subject to stringent regulations on medical waste management and environmental protection, which impose institutional pressure to implement environmentally responsible practices. A common organizational response to these pressures is the adoption of Environmental Management Accounting (EMA), which integrates environmental data into accounting frameworks to identify and manage environmental expenditures.

Furthermore, **stakeholder theory,** as articulated by R. Edward Freeman, emphasizes that organizations must consider the interests of diverse stakeholders, including governments, communities, employees, and environmental advocates (Freeman et al., 2010). In hospital settings, effective management of medical waste is crucial for fostering stakeholder trust and ensuring environmental responsibility. By utilizing EMA, hospitals can produce information related to environmental costs that enhances transparency, refines waste management strategies, and bolsters Corporate Social Responsibility initiatives. Collectively, institutional theory and stakeholder theory offer a foundational framework for understanding how EMA facilitates environmental accountability and promotes sustainable practices within hospital management.

**Conceptual Framework**

In the literature, the study defines Environmental Management Accounting (EMA) as the primary way hospitals allocate environmental costs for medical waste by identifying and managing them. EMA provides critical information on these environmental costs, helping to organize more effective processes for managing medical waste and related environmental issues.




**Figure 1: Conceptual Framework**

In this light, Institutional Theory and Stakeholder Theory can provide the theoretical lens through which to understand hospitals' motivations for adopting environmental accounting. Pressures from environmental regulations and health care standards, as well as from stakeholders' calls for responsible environmental behavior, motivate hospitals to add environmental data to their accounting systems. This integration enhances EMA's environmental accountability and solidifies.
Corporate Social Responsibility in the hospital waste management processes.

**Informant Profile**

**Table 1. Informant Profile**

| Infomant Code | Position | Unit/Department | Role in Env. Management | Relevance to Study |
|---|---|---|---|---|
| INF-01 | Financial Staff | Finance Department | Responsible for recording operational and IPAL-related costs | Provides data on environmental cost recording and accounting practices |
| INF-02 | Sanitarian (Head of Infrastructure Installation) | Sanitation Unit | Responsible for waste management, segregation, and coordination with third-party waste handlers | Provides data on environmental management practices and operational waste handling |

Source: Author's field data

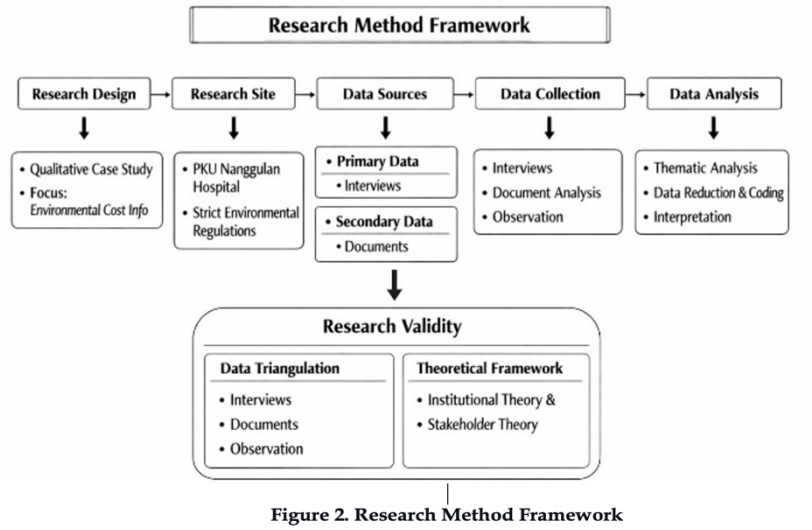



**Figure 2. Research Method Framework**

This study offers several contributions compared to previous EMA research. First, it provides a detailed mapping of hospital environmental costs, particularly IPAL-related costs and medical waste management services, into the EMA classification framework (Hansen & Mowen, 2007). Second, it integrates institutional theory and stakeholder theory to explain the gap between environmental practices and accounting systems in the healthcare sector. Third, it highlights the discrepancy between operational environmental management and formal accounting representation, particularly in Indonesian hospitals, a gap that remains underexplored in the existing literature.

## RESEARCH METHOD

### Research Design

Using a qualitative single-case study approach, this study examines how environmental cost information is identified and used in hospital waste management practices. Case study research enables an in-depth examination of organizational practices in real-world contexts. According to previous research, case studies are particularly appropriate for studying contemporary organizational processes in which contextual conditions are significant (Yin, 2018). A common approach in management accounting research is to analyze how accounting practices develop within organizations.

### Research Site

The study took place at PKU Muhammadiyah Nanggulan Hospital. Hospitals provide a significant context for research due to the diverse types of medical waste they generate and their adherence to stringent environmental regulations. This environment provides an opportunity to investigate the application of Environmental Management Accounting (EMA) to medical waste management practices.

### Research Period

The study was carried out in 2025, using financial information sourced from hospital records covering the years 2023 to 2024.

### Data Sources

The research employs various forms of evidence to bolster its credibility.

**Primary Data**: Conducted semi-structured interviews with hospital personnel engaged in operational and waste management tasks.

**Secondary Data**: Utilized organizational documents, including reports on waste management, records related to environmental management, and pertinent regulatory guidelines**.**

**Data Collection Techniques**

Data were gathered using three primary methods:

**Semi-structured interviews** to gain insights into participants' views regarding environmental cost management.

**Document analysis** to ascertain the formal recording of environmental information within organizational frameworks.

**Observation** to examine the waste management processes and environmental practices adopted by the hospital.

**Data Analysis**

The gathered data were analyzed using qualitative thematic analysis, following the methodology established by Matthew B. Miles, A. Michael Huberman, and Johnny Saldaña. This analytical process consisted of three phases: data reduction, coding and categorization, and interpretation of the results (Miles et al., 2018)

**Research Validity**

To bolster its credibility, the research uses data triangulation, analyzing information from interviews, documents, and observations. The results are examined through the perspectives of Institutional Theory and Stakeholder Theory, which serve as guiding frameworks.

## DATA ANALYSIS AND DISCUSSION

**Hospital Waste Management Practice**

Healthcare institutions unavoidably generate a variety of waste streams from their operational activities, including hazardous medical waste and non-medical waste. Consequently, establishing a comprehensive waste management system is critical to mitigating environmental risks and safeguarding surrounding ecosystems.

At RS PKU Muhammadiyah Nanggulan, waste is systematically categorized into three primary groups: medical waste, non-medical waste, and wastewater. This classification has been substantiated through triangulated evidence, including interviews, direct field observations, and document analysis. Data from the sanitation unit indicate that medical waste includes infusion sets, syringes, used cotton swabs, oxygen tubing, and pharmaceutical packaging—materials that require specialized handling due to their hazardous and potentially infectious properties. As noted by the hospital's sanitation officer:

Field observations further validated these accounts, revealing that the hospital has implemented physical segregation practices. Medical waste was placed in designated containers separate from non-medical waste, with temporary storage areas clearly differentiated by waste type.

Additionally, wastewater generated from medical activities was processed through an on-site wastewater treatment facility (IPAL), demonstrating that environmental management practices are embedded in daily hospital operations.

Documentary evidence corroborates these findings. Internal records show that the hospital collaborates with an external, licensed waste management company to treat medical waste. The sanitation unit confirmed periodic collection:

"*PT Artama Sentosa Indonesia collects medical waste once a week, approximately 50–60 kg.*"
(Interview with the Sanitarian, Head of the Hospital Infrastructure Installation Section)

This statement aligns with operational records documenting regular collection schedules and third-party service utilization. Financial documentation also highlights recurring expenditures associated with waste management and wastewater treatment. The finance unit reported:

"*During 2023, the cost of wastewater treatment plants (IPAL) for water sample testing and medical and domestic waste transportation was approximately 4-5 million per month.*"
(Interview with the Financial Staff of PKU Muhammadiyah Nanggulan Hospital)

Accounting records further confirm that environmental-related expenditures are recorded under operational accounts linked to IPAL activities. These recurring costs indicate that environmental management is not only operationalized but also financially embedded within the hospital system.

From an EMA perspective, practices such as waste segregation, wastewater treatment, and third-party disposal represent the initial stage of recognizing environmental activities that generate environmental costs. However, while

environmental management has been implemented operationally and financially, integration into the hospital's accounting system remains limited. Environmental costs are still subsumed within general operational accounts rather than being explicitly identified as environmental costs information. This suggests that RS PKU Muhammadiyah Nanggulan has achieved operational environmental management but has yet to advance toward full integration of environmental information into accounting, a critical requirement for the effective application of EMA.

**Table 2. Hospital Waste Classification and Management Practices**

| Waste Type | Source of Waste | Treatment Method |
|---|---|---|
| Medical waste | Healthcare services | Collected by third-party company |
| Non-medical waste | Kitchen, office, garden | Collected by local government |
| Wastewater | Medical activities | Processed through IPAL |

Source: Author's analysis based on interview data and hospital financial documents.

**Environmental Cost Identification in Hospital Waste Management**

Environmental Management Accounting (EMA) underscores the need to systematically identify environmental costs arising from organizational activities, particularly those associated with waste generation, environmental monitoring, and wastewater treatment. Within the hospital context, recognizing these costs is critical because environmental management encompasses not only technical aspects of waste handling but also produces quantifiable financial implications for the institution. The results of this study demonstrate that RS PKU Muhammadiyah Nanggulan has already incurred environmental costs through its operational practices, particularly in wastewater treatment, medical waste disposal, waste transportation, and environmental monitoring. This conclusion is substantiated by multiple sources of evidence, including interviews, document analysis, and direct observation. Interviews with the hospital's finance staff revealed that environmental expenditures are currently consolidated under a single operational account linked to IPAL (wastewater treatment plant) activities:

"*The expenses incurred consist solely of IPAL-related costs*".

(Interview with the Financial Staff of PKU Muhammadiyah Nanggulan Hospital)

Financial document analysis corroborated this statement. Examination of the hospital's accounting records revealed that the IPAL account consistently contains recurring transactions associated with wastewater sample testing, laboratory services, medical waste transportation, waste destruction, and domestic waste collection.

This evidence demonstrates that environmental expenditures are already being incurred and acknowledged in practice. However, these costs remain embedded within a general operational account rather than being distinctly identified and reported as separate environmental cost categories.

Field observations further substantiated these findings by documenting waste management practices within the hospital. The researcher noted that environmental management activities—such as wastewater treatment via the IPAL facility, temporary storage of waste, and the handling of medical waste—are not incidental measures but rather routine operational processes that demand continuous allocation of resources, labor, and external services. These observations reinforce the interpretation that the hospital's environmental practices carry significant economic implications and should therefore be explicitly recognized as environmental costs within the accounting framework.

The sanitation unit further confirmed that hospital waste management generates regular expenditures:

"*During 2024, the cost of wastewater treatment plant (IPAL) activities, including wastewater sampling and*

*medical waste transportation, was approximately 4–5 million rupiah per month."*
(Interview with the Sanitarian, Head of the Hospital Infrastructure Installation Section)

The consistency between interview evidence and the hospital's financial documentation is evident, as the records display recurring entries linked to dimensions of the hospital's environmental management practices.

The identification process in this study shows that the hospital has already incurred environmental expenditures. Still, these expenditures have not yet been formally recognized within a structured Environmental Management Accounting framework. In other words, environmental costs exist substantively and administratively, yet they remain unclassified as distinct environmental cost information for managerial use. To extend the analysis, the identified cost components were subsequently reclassified using Hansen and Mowen's Environmental Management Accounting (EMA) cost framework (Hansen & Mowen, 2007). Drawing on the hospital's financial records, environmental expenditures were organized into three categories: **prevention costs, detection costs, and internal failure costs**. This reclassification provides a more systematic perspective, clarifying how environmental spending is distributed across different dimensions of hospital waste management activities and offering a structured basis for evaluating the economic implications of environmental practices. Table 4 illustrates the distribution of environmental cost based on the EMA framework.

The identification of environmental cost components in this study was validated through triangulation, combining interview data, financial records related to IPAL, and direct observation of routine waste management practices within the hospital. This multi-source approach strengthens the reliability of the findings by demonstrating consistency across administrative documentation, staff testimony, and operational evidence

**Table 3. Environmental Cost Components Identified in Hospital Operations**

| Environmental Activity | Description | Accounting representation |
|---|---|---|
| Waste destruction | Medical waste treatment by third-party company | Waste treatment cost |
| Laboratory testing | Wastewater and environmental sample testing | Environmental monitoring cost |
| Waste transportation | Transportation of medical waste | Waste handling cost |
| Waste collection | Domestic waste collection | Environmental service cost |

Source : Author's analysis based on interview data and hospital financial documents.

**Table 4. Environmental Cost Distribution Based on Environmental Management Accounting**

| EMA Cost Category | Environmental Activity | Example Transaction | Total Cost (IDR) | Percentage |
|---|---|---|---|---|
| Prevention Cost | Waste management preparation and sanitation materials | Plastic waste bags, disinfectant, sanitation equipment | 1,360,500 | 4.5% |
| Detection Cost | Environmental monitoring and testing | Wastewater sample testing, laboratory testing services | 10,000,700 | 33.1% |
| Internal Failure Cost | Waste treatment and waste handling | Medical waste destruction (LB3), waste transportation, waste collection services | 18,845,114 | 62.4% |
| Total Environmental Cost | | | 30,206,314 | 100% |

Source: Financial records of RS PKU Muhammadiyah Nanggulan (IPAL account), processed by the author

The distribution outlined in Table 4 indicates that **internal failure costs** account for the largest share of environmental expenditures, totaling IDR 18,845,114, or 62.4% of the overall environmental cost. These expenditures primarily cover medical waste destruction, waste transportation, and waste collection services. In contrast, **detection costs** amount to IDR 10,000,700 or 33.1%, largely attributable to wastewater sample testing and laboratory services. Finally, **prevention costs** account for the smallest proportion, totaling only IDR 1,360,500 (4.5%), which includes sanitation materials such as plastic waste bags, disinfectants, and supporting sanitation equipment.

This cost structure indicates that the hospital's environmental spending is primarily focused on handling waste after it is generated, rather than on preventive environmental management. From an EMA perspective, this suggests that the hospital's environmental management approach remains largely reactive. The dominance of internal failure costs implies that the institution allocates more resources to treatment and handling than to early prevention and environmental risk reduction.

These results suggest that the implementation of environmental management practices within the hospital is primarily influenced by operational demands and regulatory obligations, rather than by a formalized environmental accounting framework. This finding is consistent with previous studies indicating that environmental costs are often embedded within operational accounts and are not systematically identified in organizational accounting systems (Huynh & Nguyen, 2024; Saribu et al., 2024; Sary et al., 2022)

**Environmental Cost Recording and Reporting**

The findings further reveal that although environmental costs are already acknowledged in hospital operations, their accounting treatment remains relatively basic and primarily administrative. This conclusion is supported not only by interview evidence but also by the examination of financial documents and direct observation of how environmental expenditures are recorded and reported in the hospital's accounting system.

Analysis of hospital financial documentation reveals that expenditures related to wastewater treatment, laboratory testing, waste transportation, and medical waste destruction are consistently recorded in the accounting system. However, these costs are not maintained as distinct environmental accounts. Instead, they are consolidated under a general operational account identified as the IPAL cost account. This evidence confirms that environmental expenditures are already captured in monetary terms, yet they have not been structured or classified as separate environmental accounting information for managerial purposes.

Interview evidence from the finance unit supports this condition :

*"The costs incurred are only in the form of IPAL costs."*
(Interview with the Financial Staff of PKU Muhammadiyah Nanggulan Hospital)

The consistency between interview evidence and financial documentation highlights that IPAL-related transactions, such as wastewater analysis, waste transportation, and medical waste treatment, are already recognized through actual payments and recorded as operating expenses in the hospital's income statement. From a measurement standpoint, this indicates that the hospital has applied monetary quantification of environmental costs; however, such measurement remains **transaction-based** rather than integrated into a **systematic Environmental Management Accounting (EMA) framework**.

Field observations further reinforce this conclusion. Activities such as wastewater treatment via IPAL, temporary waste storage, and coordination with licensed third-party waste handlers demand continuous operational inputs, including labor, materials, and external services. Yet, these resource Consumptions are not explicitly translated into structured environmental cost information within the accounting system. This demonstrates that while environmental practices are clearly visible at the operational level, their representation in accounting terms remains limited and lacks formal integration into EMA.

The sanitation unit also confirmed that environmental costs are not yet detailed or systematically recorded:

*"Environmental costs have not been detailed; they are still included in IPAL costs."*
(Interview with the Sanitarian, Head of the Hospital Infrastructure Installation Section)

Documentary evidence demonstrates that the hospital's chart of accounts does not provide separate classifications for environmental expenditures. As a result, such costs are recorded administratively but lack analytical differentiation. This accounting treatment constrains the hospital's capacity to distinguish among critical categories of environmental costs, namely prevention, detection, and failure costs, which constitute essential

dimensions within the Environmental Management Accounting (EMA) framework.

From a reporting standpoint, the hospital's financial system remains confined to conventional statements, namely the income statement and balance sheet. In these reports, environmental expenditures are included under general operating expenses and directly affect the hospital's financial surplus. However, document analysis reveals that such costs are not disclosed separately in financial statements, accompanying notes, or sustainability reports. This condition demonstrates that environmental cost disclosure has not yet been incorporated into the hospital's accounting practices as a distinct reporting element. To evaluate the application of Environmental Management Accounting (EMA) at the hospital, an analysis was conducted comparing current accounting practices with the EMA framework's essential elements.

To assess the level of EMA implementation, this study conducted a comparative analysis between the hospital's existing accounting practices and the standard components outlined in the Environmental Management Accounting (EMA) framework. The outcomes of this comparison are summarized in Table 6.

**Table 6. Comparison Between EMA Standard Practice and Current Hospital Practices**

| EMA Component | EMA Standard Practice | Current Practice in the Hospital | Evaluation |
|---|---|---|---|
| Environmental cost identification | Environmental costs are identified separately from operational costs | Environmental costs are grouped into a single IPAL account | Not fully implemented |
| Environmental cost classification | Costs are classified into prevention, detection, and failure costs | No formal environmental cost classification applied | Not implemented |
| Environmental cost recording | Environmental costs are recorded in specific environmental accounts | Environmental costs recorded as general operational expenses | Partially implemented |
| Environmental cost reporting | Environmental costs are disclosed in financial statements or sustainability reports | Environmental costs are not disclosed separately in financial reports | Not implemented |

Source: Author's analysis based on interview data and hospital financial documents.

The comparative analysis underscores that environmental cost identification within the hospital is only partially realized, cost classification is absent, recording practices are incomplete, and environmental cost disclosure has not been implemented. These conclusions are corroborated through triangulated evidence drawn from interviews, financial documentation, and direct observation of accounting practices.

Overall, the findings suggest that while environmental costs are acknowledged and measured at the operational level, they are not systematically recorded or disclosed as distinct information within the accounting framework. This indicates that environmental management remains primarily reactive, driven by operational needs and regulatory compliance rather than embedded within a formal Environmental Management Accounting (EMA) system.

From a managerial standpoint, this condition carries significant implications. Because environmental expenditures are aggregated under general operational accounts, the hospital lacks the detailed cost information necessary to evaluate the efficiency of environmental management activities, assess environmental performance, and support sustainability-oriented decision-making. Consequently, environmental accounting functions remain administrative in nature, rather than serving as a strategic tool for advancing hospital sustainability.

Consistent evidence has emerged from earlier studies, revealing that environmental expenditures in healthcare organizations are commonly incorporated into operational accounting systems (Sary et al., 2022; Sumiari et al., 2025)

## Discussion

This research explores the impact of incorporating environmental costs into hospital waste management on accounting practices, specifically the identification, measurement, and reporting of these costs. The analysis contextualizes the results within a conceptual framework that connects institutional pressures, stakeholder expectations, Environmental Management Accounting (EMA), practices related to medical waste management, and accountability for environmental performance.

### Institutional and Stakeholder Drivers of Environmental Management

Hospitals operate within a highly regulated institutional environment that requires compliance with both health and environmental standards. In Indonesia, healthcare facilities are obligated to manage hazardous medical waste in accordance

with strict regulatory frameworks, which create coercive pressures to adopt environmental management practices.

The findings indicate that RS PKU Muhammadiyah Nanggulan has implemented operational waste management procedures, including waste segregation, wastewater treatment through IPAL facilities, and collaboration with licensed third-party waste management companies. These practices reflect the hospital's response to institutional pressures and regulatory compliance requirements.

These initiatives exemplify the hospital's commitment to environmental regulations and healthcare quality standards. When it comes to stakeholders, patients, local communities, and environmental authorities expect hospitals to handle medical waste safely and responsibly. From a stakeholder standpoint, patients, local communities, and environmental authorities expect hospitals to manage waste responsibly and mitigate environmental risks. This expectation is consistent with Institutional Theory, which posits that organizations adopt structured practices to secure legitimacy within their institutional environment (DiMaggio and Powell, 1983; Meyer & Rowan, 1977).

Environmental management practices in the hospital are therefore not only a matter of technical necessity but also socially constructed as responses to legitimacy pressures. In this sense, the hospital's actions reflect an effort to align with institutional expectations and reinforce organizational legitimacy within its regulatory and social environment.

**Environmental Management Accounting and Environmental Cost Identification**

In the conceptual framework, Environmental Management Accounting serves to translate environmental management activities into financial information (Burritt & Schaltegger, 2010; Christ & Burritt, 2013). The findings demonstrate that hospital environmental management activities incur identifiable costs, particularly for waste destruction, wastewater testing, waste transportation, and environmental monitoring.

Nevertheless, these expenditures are not formally recognized as environmental costs within the accounting framework. Instead, they remain embedded in general operational accounts, most notably under the IPAL account. This condition highlights that while environmental costs are present and measurable, they are not yet structured or classified as distinct accounting information within an Environmental Management Accounting (EMA) system.

From an Environmental Management Accounting (EMA) standpoint, the findings indicate that environmental cost identification within the hospital remains incomplete. Although expenditures can be traced through operational activities, they are not systematically categorized into prevention, detection, or failure costs. As a result, the hospital lacks structured cost information that could support managerial evaluation and performance assessment.

This condition suggests that while environmental management has been implemented operationally, its financial implications have not been fully reflected in accounting information. Consequently, environmental cost identification remains implicit rather than explicit, thereby limiting its utility for strategic decision-making and sustainability-oriented management.

**Environmental Cost Recording and Medical Waste Management Practices**

A central contribution of this study is to demonstrate that environmental costs within the hospital are already quantified in monetary terms, yet not integrated into a structured Environmental Management Accounting (EMA) framework. The hospital records expenditures based on actual payments, such as fees for wastewater testing, waste transportation, and medical waste destruction, indicating that measurement occurs at the transactional level. From an EMA perspective, however, measurement should extend beyond monetary quantification to provide structured information that supports managerial analysis. In this case, environmental costs are measured but remain fragmented and unstructured, as they are consolidated within a single operational account.

Consequently, management cannot differentiate between preventive, monitoring, and waste-handling costs. This limitation carries significant implications. Without a structured system for measuring environmental costs, the hospital is unable to evaluate the efficiency of its environmental spending or assess whether resources are allocated effectively. The predominance of internal failure costs, as highlighted in the results, shows that spending is largely reactive, emphasizing waste treatment rather than preventive measures. Thus, the absence of a structured measurement framework constrains the hospital's capacity to transition toward proactive, sustainability-oriented environmental management.

**Environmental Accountability and Corporate Social Responsibility**

The final element of the conceptual framework relates to environmental accountability

and Corporate Social Responsibility. Hospitals have an ethical and social responsibility to ensure that their operational activities do not harm the surrounding environment or public health (Golob et al., 2013; Larrinaga & Bebbington, 2021).

The findings reveal notable limitations in the disclosure of environmental costs. Although such expenditures are recorded as part of operational expenses, they are not presented separately in financial statements or supporting reports. This indicates that environmental information is acknowledged internally but remains invisible externally.

From an accountability perspective, the absence of disclosure reduces transparency and constrains the hospital's ability to demonstrate environmental responsibility. Within the framework of Corporate Social Responsibility (CSR), organizations are expected not only to manage environmental impacts but also to communicate their environmental performance to stakeholders. In this case, environmental responsibility is evident in operational practices but not reflected in accounting disclosure.

This situation creates a disconnect between environmental action and accountability. While the hospital has implemented waste management procedures, the lack of structured environmental reporting prevents stakeholders from fully evaluating its environmental performance. The adoption of Environmental Management Accounting (EMA) could help bridge this gap by establishing a systematic basis for environmental cost disclosure, thereby enhancing transparency and reinforcing CSR-related accountability.

## CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

**Conclusion:** This study explores the impact of integrating environmental costs associated with medical waste management into hospital accounting practices from an Environmental Management Accounting (EMA) perspective.

The results indicate that PKU Muhammadiyah Nanggulan Hospital has adopted various environmental management initiatives. These include the segregation of medical waste, wastewater treatment via IPAL facilities, and partnerships with certified third-party companies for hazardous waste disposal. Such initiatives reflect the hospital's operational measures to mitigate environmental impacts associated with healthcare operations.

Consequently, information on these costs is not fully leveraged within a holistic Environmental Management Accounting system.

In summary, the findings show that environmental management efforts at the hospital incur costs that affect accounting practices, particularly in recognizing and documenting these expenses. However, the integration of Environmental Management Accounting within the hospital's financial system remains insufficient. Implementing a more organized environmental accounting structure could enhance transparency, facilitate better identification of environmental costs, and promote accountability in managing hospital waste.

**Implication:** The results of this research offer significant practical and theoretical insights**.** **Practical Implications:** This study underscores the need to incorporate Environmental Management Accounting (EMA) into hospitals' accounting frameworks. By adopting EMA, hospital administrators can systematically identify and categorize environmental costs, which facilitates improved assessment of waste management effectiveness and overall environmental performance. A systematic environmental accounting framework advances transparency and supports evidence-based managerial choices. **Theoretical Contributions:** On a theoretical level, this research enriches the existing body of knowledge in environmental accounting by broadening the application of EMA within the healthcare domain. While prior studies have primarily focused on manufacturing sectors, this investigation reveals that environmental accounting is significant for healthcare organizations facing complex environmental challenges arising from medical waste management. Moreover, the findings align with institutional theory and stakeholder theory, suggesting that external regulatory influences and stakeholder demands are crucial in motivating hospitals to adopt environmentally responsible practices. Nonetheless, incorporating environmental accounting into established accounting systems remains an evolving process.

**Limitations**

This research has several limitations that warrant consideration.

**First**, it is important to note that the findings are derived from a single case study conducted at PKU Muhammadiyah Nanggulan Hospital. As a result, these outcomes may not adequately reflect the environmental accounting practices of other hospitals or healthcare organizations operating under different organizational frameworks and regulatory conditions.

**Second,** the investigation predominantly relies on

qualitative data sourced from interviews, observations, and document reviews. Although this method offers valuable insights into hospital operations, the scarcity of environmental accounting data limits a more thorough analysis of environmental cost structures.

**Third**, within the hospital's accounting framework, environmental costs are still integrated into operational accounts. This integration complicates efforts to assess the financial implications of environmental management activities in greater detail**.**

**Suggestion For Future Research**

Future research could broaden this study's focus by assessing the implementation of Environmental Management Accounting across hospitals to gain a more comprehensive understanding of environmental accounting practices within the healthcare industry. Comparative analyses of distinct types of healthcare facilities, such as public and private hospitals, might yield important insights into differences in environmental accounting practices across organizational settings. Moreover, subsequent research could use quantitative methods to analyze the financial implications of environmental costs for hospital performance and sustainability outcomes. Additionally, future studies might examine the relationship between environmental accounting and sustainability reporting frameworks or green hospital initiatives to enhance understanding of how healthcare organizations can improve their environmental accountability while promoting sustainable management in healthcare.

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**Conflict of Interest**

I declare that I have no conflicts of interest linked to this research, encompassing any financial, professional, or personal connections, affiliations with relevant organizations, ties to related entities, or personal beliefs concerning the topic of this study.

**Use of Artificial Intelligence Technology**

The study was developed with the assistance of artificial intelligence tools. Microsoft Copilot helped create visual figures that align with the conceptual framework. The author thoroughly reviewed and refined all generated materials to guarantee their precision and relevance to the research topic.

Furthermore, Grammarly was used for language and grammar corrections, while Mendeley was used for reference management, helping organize and format citations. The author assumes complete responsibility for the manuscript's content.

**REFERENCES**

Adisty, L., Espa, V., & Damayanti, F. (2024). Analysis Implementation of Green Accounting in Medical Waste Management at RSUD Dr. Agoesdjam Ketapang. *Jurnal Pendidikan Akuntansi Dan Keuangan*, *12*(July), 179–188.

Aftab, J., Wei, F., Abid, N., Kiran, A., & Aftab, F. (2025). From CSR to environmental gains: examining the roles of AI change readiness, green entrepreneurial orientation, intellectual capital, and value co-creation. *Journal of Intellectual Capital*, (March), 1–36. https://doi.org/10.1108/JIC-07-2025-0310

Ahdiat, A. (2024). Millions of Tons of Unmanaged Waste in Indonesia. In *Kementerian Lingkungan Hidup dan Kehutanan* (No. 6, pp. 2022–2023). https://databoks.katadata.co.id/en/environment/statistics/669784b69baf4/millions-of-tons-of-unmanaged-waste-in-indonesia

Akif Destek, M., Hossain, M. R., & Khan, Z. (2024). Premature deindustrialization and environmental degradation. *Gondwana Research*, *127*, 199–210. https://doi.org/10.1016/j.gr.2023.06.006

Asiri, N., Khan, T., & Kend, M. (2020). Environmental management accounting in the Middle East and North Africa region: Significance of resource slack and coercive isomorphism. *Journal of Cleaner Production*, *267*. https://doi.org/10.1016/j.jclepro.2020.121870

Budianto, A. A., Herawati, N., & Seputro, H. Y. (2025). Exploring Environmental Costs in Environmental Pollution Prevention Efforts: A Case Study of the Shalempang Batik MSME. *Jati: Jurnal Akuntansi Terapan Indonesia*, *08*(02), 192–207.

https://doi.org/10.18196/jati.v8i2.27995
Burritt, R. L., & Schaltegger, S. (2010). Sustainability accounting and reporting: Fad or trend? *Accounting, Auditing & Accountability Journal*, *23*(7), 829–846. https://doi.org/10.1108/09513571011080144
Cartier, Y. (2013). *Cartier Safe Management of Waste*. World Health Organization.
Christ, K. L., & Burritt, R. L. (2013). Environmental management accounting: The significance of contingent variables for adoption. *Journal of Cleaner Production*, *41*, 163–173. https://doi.org/10.1016/j.jclepro.2012.10.007
DiMaggio and Powell. (1983). The Iron Cage Revisited : Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, *48*(2), 147–160.
Freeman, R. E., Harrison, J. S., Wicks, A. C., Parmar, B. L., & de Colle, S. (2010). *Stakeholder Theory: The State of the Art*. Cambridge University Press. https://doi.org/DOI: 10.1017/CBO9780511815768
Golob, U., Podnar, K., Elving, W. J., Ellerup Nielsen, A., Thomsen, C., & Schultz, F. (2013). CSR communication: Quo vadis? *Corporate Communications: An International Journal*, *18*(2), 176–192. https://doi.org/10.1108/13563281311319472
Gunarathne, N., & Lee, K. H. (2021). Corporate cleaner production strategy development and environmental management accounting: A contingency theory perspective. *Journal of Cleaner Production*, *308*(May). https://doi.org/10.1016/j.jclepro.2021.127402
Hanif, S., Ahmed, A., & Younas, N. (2023). Examining the impact of Environmental Management Accounting practices and green transformational leadership on corporate environmental performance, the mediating role of green process innovation. *Journal of Cleaner Production*, *414*(May). https://doi.org/10.1016/j.jclepro.2023.137584
Hansen, D. R., & Mowen, M. M. (2007). *Managerial Accounting* (8th ed.). South-Western Cengage Learning.
Huynh, Q. L., & Nguyen, V. K. (2024). The Role of Environmental Management Accounting in Sustainability. *Sustainability (Switzerland)*, *16*(17), 1–21. https://doi.org/10.3390/su16177440
Jasch, C. (2006). Environmental management accounting (EMA) is the next step in the evolution of management accounting. *Journal of Cleaner Production*, *14*(14), 1190–1193. https://doi.org/10.1016/j.jclepro.2005.08.006
Kaposi, A., Nagy, A., Gomori, G., & Kocsis, D. (2024). Analysis of healthcare waste and factors affecting the amount of hazardous healthcare waste in a university hospital. *Journal of Material Cycles and Waste Management*, *26*(2), 1169–1180. https://doi.org/10.1007/s10163-024-01890-1
Larrinaga, C., & Bebbington, J. (2021). The pre-history of sustainability reporting: a constructivist reading. *Accounting, Auditing and Accountability Journal*, *34*(9), 131–150. https://doi.org/10.1108/AAAJ-03-2017-2872
Liu, X., Liu, S., Wang, J., & Chen, H. (2024). Does internal control affect corporate environmental responsibility? Evidence from China. *International Journal of Emerging Markets*, *20*(9), 3760–3781. https://doi.org/10.1108/IJOEM-06-2023-0955
Meyer, J. W., & Rowan, B. (1977). Institutionalized Organizations : Formal Structure as Myth and Ceremony. *American Journal of Sociology*, *83*(2), 340–363. https://www.jstor.org/stable/2778293
Miles, M. B., Huberman, A. M., & Saldaña, J. (2018). *Qualitative Data Analysis: A Methods Sourcebook* (4th ed.). SAGE Publications.
Mukwarami, S., Nkwaira, C., & van der Poll, H. M. (2023). Environmental Management Accounting Implementation Challenges and Supply Chain Management in Emerging Economies' Manufacturing Sector. *Sustainability (Switzerland)*, *15*(2). https://doi.org/10.3390/su15021061
Nematollahi, H., Tuysserkani, M., & Nematollahi, A. (2025). Medical waste management in the modern healthcare era: A comprehensive review of technologies, environmental impact, and sustainable practices. *Results in Engineering*, *28*(August). https://doi.org/10.1016/j.rineng.2025.107210
Ningly, E., & Rahmadani, S. (2025). Enhancing Corporate Environmental Performance Through Green Process Innovation: A

Sustainable Business Approach.pdf. *Jurnal Akuntansi UNTAR*, *29*(2), 377–399.

Olukanni, D. O., Lazarus, J. D., & Fagbenle, E. (2022). Healthcare Waste Management Practices in Nigeria: A Review. *Health Care Waste Management and COVID-19 Pandemic: Policy, Implementation Status and Vaccine Management*, 197–218. https://doi.org/10.1007/978-981-16-9336-6_9

Purwanti, A., Dewantara, B., Nurcahaya, C., Gunadarma, U., & Sriwijaya, P. N. (2025). The integration of environmental costs into financial reporting: a green accounting perspective. Penerapan biaya lingkungan dalam laporan keuangan: perspektif akuntansi hijau. *Journal of Economic, Business and Accounting*, *8*(5), 582–587.

Putri, S. Y., Widajantie, T. D., & Wilasittha, A. A. (2024). A Comparative Analysis Before and After the Pandemic on Environmental Accounting in Public Hospitals. *International Journal of Financial, Accounting, and Management (IJFAM)*, *6*(1), 1–17.

Qian, W., Burritt, R., & Monroe, G. (2011). Environmental management accounting in local government: A case of waste management. *Accounting, Auditing and Accountability Journal*, *24*(1), 93–128. https://doi.org/10.1108/09513571111098072

Rahmawati, T., & Hamzah, A. (2025). Green Accounting Enhances Sustainability Report Integrity : Does Governance Support Voluntary Disclosure Perspectives_. *Jurnal Akuntansi UNTAR*, *29*(3), 448–468.

Rohim, A. S. M., & Hardiningsih, P. (2022). Green Accounting Rumah Sakit Umum Daerah R.A. Kartini Jepara. *AKSES*, *17*(1), 45–53.

Saghita, Purna, a E. (2017). Pengelolaan Limbah Padat Medis Di Rumah Sakit. *Iptekin*, *3*(1), 89–94.

Saizarbitoria, I. H., Boiral, O., Allur, E., & Garcia, M. (2020). Communicating Environmental Management Certification : Signaling without signals? *Business Strategy and the Environment*, *29*(2), 422–431.

Saribu, A. D., Muda, I., Bukit, R. B., & Nasution, A. A. (2024). The Role of Environmental Management Accounting (EMA) in Hospital Performance Moderating the Effect of Green Innovation. *Journal of Hunan University Natural Sciences*, *51*(6). https://doi.org/10.55463/issn.1674-2974.51.6.28

Sary, I. G., Utami, H., & Andayani, E. S. (2022). Analysis of Environmental Management Accounting Implementation in RSUD Dr. Saiful Anwar Malang. *International Journal of Accounting Finance in Asia Pacific*, *5*(2), 27–39. https://doi.org/10.32535/ijafap.v5i2.1591

Sharma, C., Gupta, S., Kumar, V., & Kumar, V. (2025). Hospital-associated effluents: the masked environmental threat that needs urgent attention and action. *Discover Applied Sciences*, *7*(1). https://doi.org/10.1007/s42452-024-06456-2

Singh, N., Ogunseitan, O. A., & Tang, Y. (2022). Medical waste: Current challenges and future opportunities for sustainable management. *Critical Reviews in Environmental Science and Technology*, *52*(11), 2000–2022. https://doi.org/10.1080/10643389.2021.1885325

Sumiari, K. N., Pramitari, I. G. A. A., Wirayana, I. M. A., Parnata, I. K., & Setyastrini, N. L. P. (2025). Green Accounting in Healthcare: Strategic Framework for Sustainable Hospital Management. *Jurnal Ilmiah Akuntansi Kesatuan*, *13*(5), 1421–1434. https://doi.org/10.37641/jiakes.v13i5.3729

Sutrisna, S., & Anna, S. (2019). Penerapan Akuntansi Lingkungan dalam Pengelolaan Limbah Bahan Berbahaya Beracun (B3) di RSUP DR. Wahyudin Sudirohusono Makassar. *Jurnal Riset Terapan Akuntansi*, *3*, 89–105.

Verlicchi, P., Al Aukidy, M., Galletti, A., Petrovic, M., & Barceló, D. (2012). Hospital effluent: Investigation of the concentrations and distribution of pharmaceuticals and environmental risk assessment. *Science of the Total Environment*, *430*, 109–118. https://doi.org/10.1016/j.scitotenv.2012.04.055

Wang, T., Ismail, K., & Abas Azmi, K. S. (2022). The Rise of MCS and EMA in the Sustainable Field: A Systematic Literature Analysis. *Sustainability (Switzerland)*, *14*(24). https://doi.org/10.3390/su142416532

Yin, D. R. K. (2018). *Case Study Research and Applications: Design and Methods* (Sixth edition). SAGE Publications, Inc. https://uk.sagepub.com/en-gb/eur/case-study-research-and-applications/book250150

Yudha, M., Idris, A., Mansur, F., & Hernando, R. (2025). Pertumbuhan Profitabilitas. *Jurnal Akuntansi Dan Keuangan Universitas Jambi*, *10*(01), 102–114.

https://doi.org/10.22437/jaku.v10i01.45654

Zahrani, O. P., Yusrianti, H., & Kartasari, S. F. (2026). Systematic Literature Review (SLR): The Influence of Intellectual Capital On Financial Performance in Developed and Developing Countries. *Al Kharaj : Journal of Islamic Economics and Business*, *8*(1), 453–463.