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Driving Sustainable Waste Management Through CSR and Green Accounting

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ABSTRACT

Despite the increasing volume of medical waste in Indonesia, there is still limited understanding of how organizational strategies influence environmental performance in the healthcare sector. This study examines the roles of green accounting (GA) and corporate social responsibility (CSR) in shaping sustainable waste management (SWM), while also exploring whether waste management awareness (WMA) acts as a mediating factor. A quantitative approach was applied in a general hospital in Manado, using data collected from 109 purposively selected employees. The data were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The results show that CSR has a significant positive effect on SWM ($t = 6.454$, $p < 0.001$), whereas GA does not have a significant effect ($t = 1.682$, $p = 0.093$). In addition, the indirect effects of GA ($t = 0.090$, $p = 0.928$) and CSR ($t = 0.671$, $p = 0.502$) through WMA are not significant, indicating that WMA does not function as a mediator. These findings suggest that sustainable waste management in hospitals is influenced more by institutional strategies than by individual awareness. From a practical standpoint, hospitals should prioritize the integration of CSR initiatives and strengthen the strategic use of GA to improve waste management performance.

Keywords: Corporate Social Responsibility; Green Accounting; Healthcare Sector; Sustainable Waste Management; Waste Management Awareness

INTRODUCTION

Waste management has become a major environmental problem worldwide, especially in developing countries such as Indonesia. When waste is not handled properly, it can harm ecosystems, affect public health, and undermine efforts to promote sustainable development. In Indonesia, the problem is worsened by poor infrastructure and low public awareness. As of mid-2024, more than 11 million tons of waste were reported as unmanaged (Pristiandaru, 2024). Even though the government has policies and rules in place to protect the environment, there are still gaps in their enforcement (Pristiandaru, 2024). Healthcare institutions are major contributors to this issue, as hospital-generated waste, particularly medical waste, poses distinct management challenges due to its hazardous characteristics (Alighardashi et al., 2024).

Extant literature has been done on general hospital waste management and following the rules, as well as the environmental effects of hazardous medical waste (Kumar et al., 2025). Nonetheless, few studies have examined the integration of green accounting (GA) and corporate social responsibility (CSR) frameworks into hospital waste management systems, particularly in the Indonesian public healthcare sector. Moreover, the function of public awareness as a mediating element in the promotion of sustainable waste management (SWM) practices in hospitals is still inadequately investigated (Faieq & Cek, 2024). This study seeks to fill this research gap by investigating the role of accounting-based sustainability strategies and CSR engagement in enhancing hospital waste governance.

GA, or environmental accounting, is the practice of including environmental costs in financial reporting and decision-making (Suryanawa et al., 2025). This method helps organizations figure out how their actions affect the environment and make smart investments (Pesak & Miran, 2024). In hospitals, GA can be used to keep track of and control the costs of medical waste on both the environment and the hospital's finances (Ramos, 2024). In addition, CSR shows that an organization has a moral duty to reduce harm to the environment and improve social welfare, which aligns healthcare services with larger sustainability goals (Suryawan & Lee, 2024).

Prof. Dr. R. D. Kandou Hospital in Manado is a great example because it is a major referral hospital in Eastern Indonesia and is always working to be more environmentally friendly and socially responsible (Kawatu & Kewo, 2021). The hospital's size, complexity, and variety of cases make it a good place to test integrated sustainability models. There are a lot of environmental programs in place, but there are still problems with waste management, especially when it comes to separating hazardous and non-hazardous waste and reporting on the costs of environmental damage (Sunaningsih, 2020).

Despite growing attention to hospital waste management, significant gaps remain in understanding how sustainability-oriented accounting and governance frameworks can support effective waste management practices in healthcare institutions. In particular, limited research has examined the integrated role of GA and CSR in improving SWM within the public healthcare sector. Furthermore, the potential role of public awareness as a mediating factor linking institutional sustainability practices and waste management outcomes remains underexplored in the existing literature. Addressing these gaps, this study aims to examine the influence of GA and CSR practices on SWM in Indonesian government hospitals and to investigate the mediating role of public awareness in strengthening these relationships. By doing so, this study contributes to the literature by providing empirical evidence on the integration of sustainability accounting and social responsibility frameworks in healthcare waste governance. The findings are expected to

offer practical insights for policymakers and hospital administrators in developing more effective, accountable, and environmentally responsible waste management systems.

LITERATURE REVIEW

The Normative Activation Theory (NAT)

NAT posits that pro-environmental behavior is primarily driven by personal norms, an individual's felt moral obligation to perform or refrain from specific actions (Faieq & Cek, 2024; Ling et al., 2025). NAT explains that when organizational or social norms are activated through awareness of consequences and ascription of responsibility, they translate into concrete actions such as SWM (Faieq & Cek, 2024; Muthukumari et al., 2024). In the context of healthcare, NAT suggests that when hospital management perceives waste as a threat to public health, this awareness activates a moral obligation to implement GA and CSR strategies to mitigate these risks (Faieq & Cek, 2024; Ling et al., 2025; Muthukumari et al., 2024).

Hypotheses Development

GA and SWM

GA extends traditional accounting by identifying, measuring, and disclosing environmental costs that are typically hidden in overheads (Faieq & Cek, 2024; Pesak & Miran, 2024). By quantifying the economic impact of waste, GA provides the transparency needed for strategic decision-making in SWM (Faieq & Cek, 2024; Febriyanti et al., 2024). Prior studies indicate that hospitals utilizing GA can better allocate resources for waste segregation and recycling technology, thereby improving environmental performance (Faieq & Cek, 2024). From a NAT perspective, GA serves as a cognitive pillar that informs the organization of the consequences of its waste (Faieq & Cek, 2024; Pesak & Miran, 2024). When the financial and ecological costs of waste are made visible, it reinforces the institutional norm of accountability (Faieq & Cek, 2024). Based on this synthesis:

H1: GA has a positive effect on SWM.

CSR and SWM

CSR reflects an organization's ethical commitment to stakeholder welfare and environmental preservation. In healthcare, CSR is not merely a philanthropic gesture but a strategic investment in institutional legitimacy and public trust. Studies by Darendeli et al. (2022) and Lestari et al. (2024) demonstrate that organizations with high CSR engagement are more likely to adopt circular-economy practices and waste-reduction strategies. Applying NAT, CSR serves as a normative pillar that activates the hospital's desire to act ethically, thereby promoting pro-environmental behavior. When the hospital commits to CSR, it internalizes the social expectation of doing no harm, leading to more rigorous SWM practices (Garanina & Kim, 2023). Therefore:

H2: CSR has a positive effect on SWM.

The Mediating Role of Waste Management Awareness (WMA)

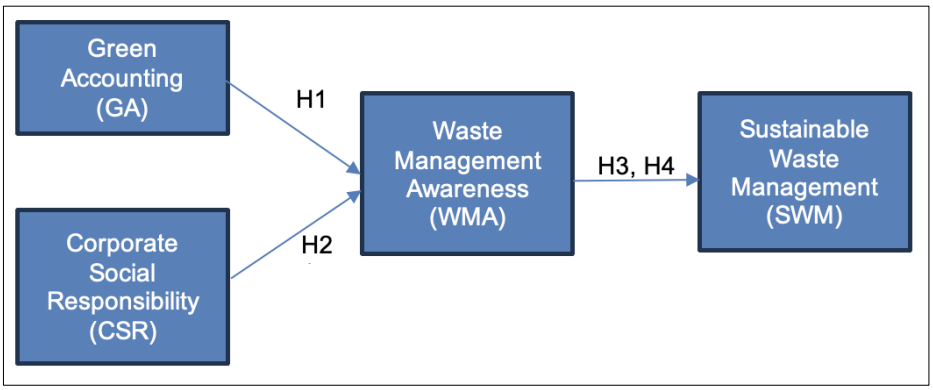
WMA is defined as the internal understanding of how specific behaviors and organizational processes impact the ecosystem, particularly concerning hazardous outputs (Nurmalasari et al., 2025). According to NAT, awareness of consequences is the primary catalyst for activating personal norms and moral obligations (Faieq & Cek, 2024). In the healthcare context, even sophisticated GA systems or robust CSR policies may remain ineffective paper tools if human actors, medical and administrative staff, lack a high degree of awareness of the environmental impacts of waste (Faieq & Cek, 2024).

Recent studies suggest that WMA serves as a critical bridge (intervenor) that translates formal organizational instruments into actual behavioral outcomes (Harris & McCabe, 2024). High awareness ensures that GA data is not merely reported for compliance but also used to drive meaningful operational change (Pratiwi et al., 2025). Similarly, CSR initiatives are more likely to be internalized as daily sustainable practices when staff members possess that GA (Hastuti et al., 2025). CSR indirectly influences SWM by first elevating internal awareness among the organization's members (Pratiwi et al., 2025).

H3: WMA significantly mediates the relationship between GA and SWM.
H4: WMA significantly mediates the relationship between CSR and SWM.

To further illustrate the conceptual relationships underlying this study, the proposed research framework is presented in Figure 1.

Figure 1. Framework Research



RESEARCH METHOD

Research Design

This study adopts a quantitative, explanatory research design to empirically investigate the hypothesized causal relationships between organizational strategies and environmental performance. The primary objective is to examine the impact of GA and CSR on SWM, with a specific focus on the mediating role of WMA. This methodological framework enables exploration of how formal institutional mechanisms (GA and CSR) indirectly influence waste governance by enhancing hospital personnel's internal cognitive and moral awareness.

Sampling and Data Collection

The research was conducted at Prof. Dr. R. D Kandou General Hospital (RSUP) in Manado, a premier state-owned referral center in Eastern Indonesia. This site was deliberately selected for its comprehensive integration of environmental management systems and established CSR reporting protocols. Data were collected using structured questionnaires distributed to 109 respondents selected through purposive sampling. Inclusion criteria required participants to be active employees with at least 2 years of tenure and to possess specialized knowledge in accounting, public relations, or environmental health. This sample size fulfills the requirements for Partial Least Squares Structural Equation Modelling (PLS-SEM), as it adheres to the ten-times rule regarding the number of indicators for the most complex construct in the model (Hair et al., 2025).

Sample Size Justification

Table 1, entitled Sub-Sample Test, explains the sampling methodology and the calculation of the minimum sample size for structural model-based research (PLS-SEM) (Hair et al., 2025). This study uses purposive sampling, which involves selecting respondents based on specific criteria, specifically, hospital staff involved in sustainability and waste management issues. The primary dependent variable in this model is SWM, which is influenced by direct and indirect paths. There are two direct causal paths to SWM: CSR and GA. There are also two indirect causal paths mediated by the WMA (Awareness Management) variable: CSR → WMA → SWM and GA → WMA → SWM. This means four structural paths influence SWM.

Table 1. Sub-Sample Test

Sampling Method Criteria	Value	Explanation
Sampling method used	Purposive sampling	Based on specific inclusion criteria (e.g., hospital staff involved in sustainability and waste issues)
Dependent variable	SWM	Outcome variable influenced through direct and indirect effects
Number of direct causal paths to the dependent variable (SWM)	2 paths	CSR → SWM, GA → SWM
Number of indirect causal paths (through mediator)	2 paths	CSR → WMA → SWM, GA → WMA → SWM
Total structural paths leading to SWM (direct + indirect)	4 paths	Used to calculate minimum sample size (PLS-SEM rule of thumb)
Minimum sample size (10 × number of causal paths)	10 × 4 = 40	Minimum sample based on model structure (Hair Jr et al., 2021)
Construct with the highest number of indicators	10 indicators	Example: CSR or WMA construct
Minimum sample size (10 × number of indicators)	10 × 10 = 100	Recommended sample size based on measurement model complexity
Actual number of valid respondents	109	All questionnaires were completed and met the inclusion criteria

In PLS-SEM, the minimum sample size is determined by multiplying the number of causal paths by 10 (Hair Jr et al., 2021). With four structural paths, the minimum sample size is 40. However, the sample size is also calculated based on the complexity of the measurement model, which is done by multiplying the maximum number of indicators in a construct, in this case, the CSR or WMA construct with 10 indicators, by 10, yielding a minimum sample size of 100. Finally, 109 valid respondents participated in this study (Hair et al., 2025). All respondents completed the questionnaire and met the predetermined inclusion criteria.

Measurement

Measurement instruments were developed using a five-point Likert scale, with indicators adapted from validated scholarly sources to ensure content validity. GA was assessed using five indicators focused on environmental impact valuation and cost efficiency

(Faieq & Cek, 2024; Febriyanti et al., 2024), while CSR was evaluated using six items on stakeholder engagement and sustainable resource commitment (Faieq & Cek, 2024). The mediating variable, WMA, was operationalized using four indicators that reflect understanding of health risks and environmental stewardship (Boermans et al., 2024). Finally, SWM was measured using nine indicators that encompass sustainability mission compliance and raw material optimization (Faieq & Cek, 2024).

Data Analysis

The data is analyzed in several phases. In the initial stage, model validation is carried out to assess the framework's validity and reliability. Convergent validity is measured using the Average Variance Extracted (AVE) value, which must be at least 0.5. The reliability of composites is evaluated using Cronbach's Alpha and Relative Reliability, both of which must be at least 0.7. Metrics that do not meet these criteria are eliminated. The second phase is testing the model. This phase includes assessing the path coefficient and evaluating R-squared to measure the model's predictive capability (Hair et al., 2025).

RESULTS

Respondents' Data

The study involved 109 employees at Prof. Dr. R. D. Kandou General Hospital in Manado. The demographic distribution is summarized in Table 2.

Table 2. Demographic Profile of Respondents

Category		Frequency (N)	Percentage (%)
Gender	Woman	68	62.39
	Man	41	37.61
Final Education	S1	93	85.32
	S2	11	10.09
	High School/Vocational School	5	4.59
Age	17-25 Years	4	3.67
	26-35 Years	94	86.24
	36-45 Years	11	10.09

The data in Table 2 indicate that the majority of respondents are female, accounting for 68 individuals (62.39%), while male respondents comprise 41 individuals (37.61%). This distribution suggests that female participants are more prominently represented in the sample, which may influence the overall perspectives captured in the study. In terms of educational attainment, most respondents hold a bachelor's degree (S1), totaling 93 individuals (85.32%), followed by those with a master's degree (S2) at 11 individuals (10.09%), and a small proportion with only a high school or vocational background at 5 individuals (4.59%). This indicates that the sample is largely composed of well-educated individuals, suggesting that participants possess adequate cognitive and academic capacity to understand and evaluate the technical aspects of GA and CSR.

Regarding age distribution, the respondents are predominantly within the 26–35 years age group, comprising 94 individuals (86.24%), while smaller proportions fall within the 36–45 years group (10.09%) and the 17–25 years group (3.67%). This pattern shows that the sample is largely made up of relatively young professionals, likely in their early to mid-career stages. Such a demographic profile may reflect a group that is both academically equipped and actively engaged in contemporary professional practices, thereby providing relevant and informed insights into the implementation of GA and CSR.

Outer Model Review

During the initial assessment, several indicators exhibited factor loadings below the required threshold of 0.70 and were therefore removed following a stepwise refinement procedure. As a result, each construct (GA, CSR, WMA, and SWM) was represented by two retained indicators with the strongest statistical performance. While this reduction improves measurement reliability and validity, it also requires careful conceptual consideration. The retained indicators were selected because they capture the core functional aspects of each construct: for GA, the emphasis is on environmental target setting and reporting transparency; for CSR, on stakeholder collaboration and socio-economic evaluation; for WMA, on environmental sensitivity and behavioral awareness; and for SWM, on operational efficiency and resource optimization. These elements represent the most actionable and observable dimensions within the hospital context.

Although broader conceptualizations of these constructs may include additional dimensions, the retained indicators adequately reflect their essential operational meaning in this study setting. In PLS-SEM, the use of two-item constructs is acceptable when indicators are theoretically coherent and demonstrate strong internal consistency (Sarstedt et al., 2022). Therefore, the final measurement model balances statistical robustness with conceptual representativeness, ensuring that each construct remains meaningful despite the reduction in indicators.

Table 3. Construction, Loading Factor, and Reliability

Construct	Indicator	Loading Factor	CA	CR
Green Accounting (GA)	GA. 4 Our agencies use GA indicators to determine the right waste-related targets and objectives.	0.778	0.791	0.792
	GA 5. Our agencies provide regular updates to stakeholders on waste management performance and GA methods.	0.798		
Corporate Social Responsibility (CSR)	CSR 5. Our agencies actively seek partnerships and collaborations with other organizations to improve SWM as part of CSR.	0.892	0.917	0.971
	CSR 6. Our agency considers the social and economic benefits of waste management practices in the assessment of CSR.	0.735		
Waste Management Awareness (WMA)	WMA 1. Promoting environmental awareness helps in controlling wasteful disposal	0.826	0.804	0.810
	WMA 4. Adequate environmental sensitivity prompted me to dispose of hospital waste at a designated landfill	0.755		
Sustainable Waste Management (SWM)	SWM 3. Agencies consider waste management practices as part of employee satisfaction and well-being	0.800	0.838	0.839
	SWM 5.	0.800		

Construct	Indicator	Loading Factor	CA	CR
	The agency optimizes the use of raw materials to minimize waste generation.			

Based on the data in Table 3, all remaining indicators achieved loadings more than 0.70, and all constructs met the internal consistency requirements with Cronbach's Alpha and CR values exceeding 0.70. Furthermore, discriminant validity was assessed using the Fornell-Larcker criterion, as shown in Table 4.

Table 4. Fornell-Larcker Matrix

Construct	WMA	CSR	GA	SWM
WMA	0.791			
CSR	0.228	0.817		
GA	0.041	0.270	0.788	
SWM	0.045	0.540	0.307	0.800

According to Table 4, the square root of the AVE for each construct is higher than its highest correlation with any other construct, confirming that each variable represents a unique conceptual entity.

Table 5. Coefficient of Determination

	R-square	R-square adjusted
WMA	0.052	0.034
SWM	0.325	0.306

Based on Table 5, the model shows the difference in explainability between WMA and SWM. For WMA, an R-squared value of 0.052 indicates that exogenous variables can only explain 5.2% of WMA variations. After adjusting for adjusted R-squared (0.034), the proportion decreases, indicating the model's limitations relative to WMA's predictive power. In contrast, SWM has an R-squared of 0.325, suggesting that the independent constructs in the model explain 32.5% of the variation in SWM. An adjusted R-squared value of 0.306 indicates that the explanation should be corroborated or added to improve the accuracy of the prediction against independent constructs. These results show that the model has a much greater variance in cruising power on SWM than on WMA. However, the relatively low R-squared number in WMA does not detract from the relevance of this study. This is because in the social sciences, complex external variables often produce moderate to low explanatory values without diminishing the theoretical and practical contribution of the study (Jr. et al., 2017). Therefore, research remains feasible, especially if unmeasured variables are incorporated into model development to improve its predictive performance.

Robustness Test

We added a quadratic (non-linear) part to the model for this robustness test to see how stable the relationships between the variables were. The objective is to ascertain whether the independent variables exert any non-linear effects on the dependent variables, WMA and SWM.

Table 6. Robustness Test

Quadratic	Original Sample	P Value
QE (WMA) -> SWM	-0.133	0.674
QE (CSR) -> WMA	0.147	0.064
QE (CSR) -> SWM	0.046	0.506

QE (GA) -> WMA	0.070	0.335
QE (GA) -> SWM	0.006	0.937

Based on Table 6, the quadratic effect of WMA on SWM produced a coefficient of -0.133 and a p-value of 0.674. This means the result is not significant, indicating no meaningful quadratic relationship between WMA and SWM. The correlation between CSR and WMA has a quadratic coefficient of 0.147 and a p-value of 0.064. This result is marginally significant ($p < 0.1$), indicating a possible weak non-linear relationship between CSR and WMA, although it remains at the threshold of statistical significance.

The quadratic effect of CSR on SWM, on the other hand, has a coefficient of 0.046 and a p-value of 0.506, which means that there is no significant non-linear effect. The quadratic effect of GA on WMA is also not significant, with a coefficient of 0.070 and a p-value of 0.335. Finally, the effect of GA on SWM has a coefficient of 0.006 and a p-value of 0.937, which is very high, indicating no quadratic effect. The robustness test results show that most of the model's relationships are not affected by quadratic or non-linear effects. There is only a slight sign of a non-linear relationship between CSR and WMA. So, it can be said that the original model is strong and stable enough, even when tested in a non-linear way.

Hypothesis Testing

In PLS-SEM, the inner model depicts the causal relationships among latent constructs. Exogenous variables function as predictors, and endogenous variables function as criteria. To assess the strength and significance of relationships among variables, this model emphasizes structural path testing. In addition, it estimates the path coefficient, also known as the road coefficient, the t-statistics, and their significance. Therefore, the inner model serves as the basis for hypothesis analysis. It shows how much each construct contributes to the variance of the other constructs within the proposed theoretical framework.

Table 7. Inner Model Test

Hypothesis	T Count	Sig. Value	Results
GA>SWM	1.682	0.093	Rejected
CSR>SWM	6.454	0.000	Accepted
GA>WMA>SWM	0.090	0.928	Rejected
CSR>WMA>SWM	0.671	0.502	Rejected

According to the hypothesis analysis in Table 7, there is statistically significant evidence of CSR's contribution to SWM, with a t-value of 6.454 and a p-value of 0.001. This shows that the increase in CSR activities directly encourages waste management practices. Conversely, because the influence of GA on SWM was insignificant, the hypothesis of a direct role of GA in influencing SWM was rejected at the 5% confidence level.

The statistical analysis of the indirect effects confirms that WMA is not a significant mediator in this study. The two hypothesized pathways, specifically the influence of GA on SWM through WMA and the influence of CSR on SWM through WMA, failed to reach the threshold of statistical significance. The results indicate that WMA does not serve as a psychological or operational bridge to channel the impact of formal accounting systems or social responsibility initiatives into sustainable waste practice. Consequently, the findings demonstrate that only CSR engagement exerts a direct and significant impact on the quality of hospital waste management. Other interventions, such as formal GA frameworks or indirect behavioral pathways mediated by awareness, require further

strategic refinement and future research to enhance their effectiveness in the healthcare sector.

DISCUSSION

The Influence of GA on SWM

The study results indicate that the influence of GA on SWM is not significant. This indicates that applying GA to the organizations or companies in this study does not directly affect SWM practices. Most of the participants gave a high score, namely 4 or 5, for the GA construct. This indicates that the company or organization being studied has a strong understanding of GA practices. A high score indicates that respondents recognize the importance of recording, reporting, and incorporating environmental elements into the company's accounting system. However, it is not enough to change organizational habits about SWM. In other words, GA is still considered a government effort rather than a tool to change operational policies.

It is expected that GA will improve environmental performance, but studies have shown that its effects on waste management are not always significant. Legitimacy theory and institutional theory may explain this phenomenon because companies' adoption of GA is more symbolic of meeting external requirements, such as regulations and stakeholder expectations, than of driving substantial changes in waste management practices. As a result, although GA has been widely accepted administratively, the practice tends to remain limited to reporting. Research by Sapulette and Limba (2021) notes that although GA is expected to contribute positively, the analysis shows that the factor does not affect company value, whereas environmental performance has a significant influence.

In addition, institutional theory holds that companies often adopt environmental reporting standards under pressure from external parties, such as governments, regulators, or stakeholders. Thus, GA, when administratively implemented and formally reported, does not always have a significant impact on hospital SWM. However, this only happens symbolically in most cases, especially when it comes to SWM (Liem & Hien, 2024).

Several previous studies support these findings. Sardila and Prasetio (2025) investigated the manufacturing industry in Indonesia and found that GA only has a significant impact on the transparency and accountability of environmental reporting. However, they did not find a direct relationship between the effectiveness of industrial waste management and the level of transparency of environmental reporting. Additional research by Hotnauli and Murwaningsari (2024) found that GA cannot improve a company's environmental performance, including waste management, unless management commitments, environmentally oriented corporate strategies, and policy integration across the organization support it. These results align with previous research findings: most respondents support GA, yet they struggle to implement meaningful change in SWM.

The Influence of CSR on SWM

In PLS-SEM, structural results showed that the path from CSR to SWM had a coefficient of 0.511 (t-statistic = 6.454; $p < 0.001$), indicating that CSR significantly influences SWM efficiency. By expanding CSR programs, such as providing resource-sorting facilities, funding recycling technologies, and holding staff education programs, hospital personnel can more effectively reduce, sort, and recycle waste. Therefore, the CSR function is more than just a symbol that helps to disseminate resources and knowledge essential to creating sustainable hospital SWM practices.

For the CSR5 and CSR6 indicators, questionnaire data showed that most participants gave high scores, 4 and 5, respectively, on the Likert scale. The data indicate that CSR programs in the studied organizations have been successful, with internal stakeholders embracing them. Empirically, high scores on CSR5 and CSR6 indicate that most respondents feel that their agencies are actively seeking partnerships and collaborations with other organizations to improve SWM as part of CSR. It further suggests that their Agencies consider the social and economic benefits of waste management practices when assessing CSR.

CSR has proven to have a tangible impact on SWM practices because CSR activities often take the form of concrete programs directly related to the healthcare environment, such as staff waste management education, reducing plastic use, investing in environmentally friendly technologies, and collaborating with related institutional partners on organization-based waste management. This commitment enhances the agency's image and generates social and environmental value.

NAT may help explain CSR's influence on SWM (Faieq & Cek, 2024). This theory states that the activation of strong personal and social norms leads to pro-environmental behavior and to the emergence of organizations' social responsibility. The internalization of values and awareness of how a person's or group's actions impact the environment and society enable this activation. Businesses with high ethical standards and social sensitivity tend to encourage their employees to actively engage in environmental activities, such as SWM. CSR serves as an important tool to enable these social standards at the organizational level. The company creates an organizational culture that emphasizes environmental responsibility through internal communication, training, and empowerment programs. According to Faieq and Cek (2024), activated norms serve as the basis for actual behavior, especially when individuals and organizations recognize the moral consequences of their actions. In terms of CSR and SWM, companies with a consistent CSR program establish standards where each member feels responsible for protecting the environment, including waste management.

Previous research in Indonesia and around the world supports these findings. CSR encourages companies to increase transparency, invest in better waste management practices, and attract investors who care about sustainability (Ramadhani & Wiguna, 2024). Through the implementation of eco-friendly practices and stakeholder participation, CSR commitments improve relationships with local communities and demonstrate that a proactive approach to waste management is in line with business sustainability (Sanfo et al., 2022). Fitriani et al. (2024) conducted research that showed that CSR programs that focus on environmental issues significantly improve the company's waste management performance. The study found that CSR programs can encourage innovation in cleaner production processes, more environmentally friendly use of raw materials, and more efficient waste management.

WMA Mediates the Influence of GA and CSR on SWM

According to the mediation statistical test, there was no significant mediation effect on SWM, either between GA and WMA or between CSR and WMA. These results were obtained from an analysis of questionnaire data that asked respondents to assess their perceptions of GA, CSR, and SWM, as well as their level of awareness of waste management in the company environment. There was no statistically significant mediation effect, as the interaction effect between these variables was well above the 0.05 threshold. In other words, the influence of GA and CSR on SWM has not changed, regardless of the company's level of WMA. These results contradict some initial

hypotheses that highly conscious businesses can optimize the impact of GA and CSR on SWM.

WMA essentially refers to the knowledge, understanding, and concern a person or group has about waste problems and their environmental impact. Awareness, a cognitive and affective component in environmental psychology, has the potential to lead to positive attitudes towards environmentally friendly behaviors (Shaviratri & Pramadi, 2023). However, many studies have shown that there is a significant difference between knowledge and a positive outlook, and between knowledge and actions on the ground. Individuals and groups that are acutely aware of environmental issues often fail to take significant action, primarily if structural incentives, internal policies, or intense external pressures do not support them.

One of the primary explanations for why awareness cannot moderate the influence of GA and CSR on SWM is that the implementation of these programs is more structural and driven by formal organizational policies than by individual awareness levels. For example, GA is based on systems and policies integrated into a company's financial management and reporting. As a result, its implementation is highly dependent on regulations, governance, and institutional influence. In the same way, CSR usually starts with strategic decisions at the top management level and is organizational rather than just responding to employee awareness or opinions. Both companies with high and low levels of awareness will see the impact of GA and CSR on waste management through policy mechanisms and formal work systems. Therefore, the role of awareness as a moderator becomes statistically insignificant because decisions and impacts are influenced more by institutional factors than individual factors.

GA and CSR are usually part of formal corporate policies, and their implementation is influenced more by external pressures, such as government regulations, market demand, or stakeholder expectations, than individual awareness. When GA and CSR become part of the company's strategy and governance, their influence on SWM will run according to procedures (Febriyanti et al., 2024). In many cases, organizational culture and leadership commitment are critical to determining how effective GA and CSR are to SWM. If the company's leadership does not prioritize waste management, employee awareness will decline (Liem & Hien, 2024).

Institutional Theory, proposed by Balzano et al. (2025), supports these findings. This theory posits that organizations are more likely to change their policies and practices in response to regulations, industry standards, and external expectations than to internal desires or awareness. The need to meet external standards or gain social and economic legitimacy affects the implementation of GA and CSR in many companies. These institutional factors increase SWM's influence. Even if the organization's members care deeply about its environment, the results will remain limited without a system of support, leadership, and incentives that drive change.

In addition, according to the Theory of Planned Behavior (TPB) (Sardila & Prasetio, 2025). Intention influences actual behavior, which comprises three main components: attitudes toward the behavior, subjective norms, and perceived behavioral control. Mindfulness attitudes are only part of attitudes, whereas the other two components, subjective norms, such as social pressures and behavioral controls, such as situational factors such as incentives, rules, and facilities often determine more about whether a person or organization changes its behavior if there are no incentives, policy support, or adequate oversight systems to change the behavior and performance of the company's environment even though the level of awareness in the organization is very high.

The results of this study are empirically supported by previous research. According to a study conducted by Boermans et al. (2024), high awareness and knowledge of environmental issues are not enough to drive real action. There needs to be a strong incentive system, institutional support, and social norms. In addition, Priantari and Setyowati (2024) found that employee awareness and knowledge of medical waste do not necessarily improve waste management quality without effective training, supervision, and reporting systems. In another study conducted by Fitriani et al. (2024), it was found that management, regulatory, and policy pressures have a much greater influence on encouraging SWM than personal awareness.

WMA is typically measured at the individual or small-group level, whereas GA and CSR are strategic and operational policies implemented at the organizational level. The insynchronization at this level leads to weak mediation relationships. Organizational culture, leadership, and management commitment are essential to developing effective environmental policies. Therefore, efforts at mediation through awareness raising alone are not enough without supporting greater structural and cultural change (Boermans et al., 2024).

CONCLUSION

This study explores how GA and CSR influence SWM in a hospital setting, while also examining whether WMA plays a mediating role. The results show that CSR has a significant positive effect on SWM, supporting H2. In contrast, GA does not show a significant direct effect, leading to the rejection of H1. In addition, WMA does not significantly mediate the relationship between GA and SWM (H3) or between CSR and SWM (H4).

These findings indicate that improvements in hospital waste management are driven more by institutional and strategic efforts, especially CSR, than by formal accounting practices or individual awareness alone. Although GA is already implemented at an administrative level, its impact appears limited when it is not supported by strong managerial commitment and effective integration into daily operations. Similarly, while awareness remains important in theory, it does not act as a key mechanism connecting organizational strategies to actual waste management outcomes in this context.

From a theoretical standpoint, this study shows that pro-environmental outcomes in healthcare organizations are shaped more by institutional norms and strategic actions than by individual cognitive factors. In this way, it extends NAT by emphasizing the stronger role of organizational drivers compared to personal awareness in influencing environmental practices.

From a practical perspective, hospitals should focus on developing CSR initiatives that directly contribute to waste reduction, resource efficiency, and stakeholder engagement. At the same time, GA should be used not only for reporting purposes but also as a strategic tool to support decision-making and environmentally responsible investments. Strengthening leadership commitment, building a supportive organizational culture, and ensuring alignment with regulations are also essential to ensure that sustainability initiatives lead to real operational improvements.

In conclusion, SWM in hospitals is shaped less by awareness or administrative systems alone, and more by how well institutional policies, leadership commitment, and socially responsible practices are aligned.

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DECLARATION OF CONFLICTING INTERESTS

The authors declare that no financial or non-financial conflicts of interest might have affected how this research was carried out, interpreted, or reported.

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