

Green Accounting and the Performance of Manufacturing Companies: The Mediating Role of Corporate Social Responsibility Disclosure

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ARTICLE INFO

Keywords: Green Accounting, Corporate Performance, Corporate Social Responsibility, Sustainability Reporting Disclosure Index

Received : 20, January

Revised : 22, March

Accepted: 24, May

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ABSTRACT

This study aims to analyze the effect of Green Accounting on the performance of manufacturing companies, with Corporate Social Responsibility (CSR) disclosure serving as a mediating variable. The research sample consists of 10 manufacturing companies listed on the Indonesia Stock Exchange during the 2021–2025 period, with a total of 50 observations. Green Accounting is measured using the Green Accounting Index (GAI), firm performance is proxied by Return on Assets (ROA), and CSR is measured through the Sustainability Reporting Disclosure Index (SRDI). The analysis was conducted using path analysis and the Sobel test. The results indicate that Green Accounting has a positive effect on firm performance and CSR disclosure, while CSR also has a positive effect on firm performance and partially mediates the relationship between Green Accounting and firm performance.

INTRODUCTION

In recent years, environmental preservation and sustainable development have increasingly influenced corporate decision-making. Companies are expected not only to pursue financial objectives but also to address the environmental consequences of their business activities in response to growing demands from regulators, investors, consumers, and society. The concept of Green Accounting emerged as a response to these needs (Aziz et al., 2022; Suartana, 2021).

Green Accounting is an accounting system that integrates environmental costs and benefits into a company's financial statements (Gray & Bebbington, 2001). In Indonesia, the implementation of Green Accounting has garnered increasing attention following the enactment of Law No. 32 of 2009 on Environmental Protection and Management and OJK Regulation No. 51/POJK.03/2017 on Sustainable Finance. However, empirical research on the impact of Green Accounting on corporate performance in Eastern Indonesia, particularly South Sulawesi, remains very limited.

South Sulawesi, as one of the economic growth centers in eastern Indonesia, has a rapidly expanding manufacturing sector. Several nationally scaled manufacturing companies listed on the Indonesia Stock Exchange (IDX) have production or operational units in this region, covering the cement, animal feed, steel, and other natural resource-based industries. These conditions make South Sulawesi a relevant context for examining the implementation of Green Accounting and its impact on performance and sustainability disclosures.

The Sustainability Reporting Disclosure Index (SRDI) based on the GRI Standards serves as an important mediating variable in this relationship. Previous research indicates that Green Accounting can encourage companies to disclose more comprehensive environmental and social information, which in turn enhances reputation, investor confidence, and financial performance (Mardiana & Susanto, 2022; Rahmawati et al., 2023).

Based on the above discussion, this study aims to: (1) examine the effect of Green Accounting on the performance of manufacturing firms in South Sulawesi; (2) examine the effect of Green Accounting on CSR disclosure; (3) examine the effect of CSR disclosure on firm performance; and (4) examine the mediating role of CSR disclosure in the relationship between Green Accounting and firm performance. This study provides empirical contributions, particularly from the perspective of manufacturing companies in Eastern Indonesia, using panel data from the 2021–2025 period.

LITERATURE REVIEW

Legitimacy Theory and Stakeholder Theory

This study is based on two main theories: legitimacy theory and stakeholder theory. According to stakeholder theory, organizational accountability extends beyond investors and includes various parties affected by business operations, such as employees, customers, communities, governments, and environmental groups. In the context of Green Accounting, the implementation of environmental accounting is a concrete manifestation of fulfilling responsibilities to these stakeholders.

Green Accounting

Green Accounting refers to the incorporation of environmental expenditures and environmental-related information into the accounting process to support managerial decision-making and sustainability objectives and integrates this information into business decision-making (EPA, 1995; Wahyuni, 2021). The Green Accounting measurement instrument used in this study is the Green Accounting Index (GAI), calculated as the ratio of environmental costs to a company's total operating costs, multiplied by 100 (Aziz et al., 2022). Components of environmental costs include pollution prevention costs, waste management costs, energy conservation costs, and environmental rehabilitation costs.

CSR Disclosure Using the SRDI Based on GRI Standards

Corporate Social Responsibility (CSR) Disclosure is measured using the Sustainability Reporting Disclosure Index (SRDI), which is based on the 2021 version of the Global Reporting Initiative (GRI) Standards. The GRI Standards consist of the GRI Universal Standards (GRI 1, 2, 3) and the GRI Topic Standards, which cover three main dimensions: environmental, social, and governance. The SRDI is calculated using the formula:

$$\text{SRDI} = \frac{\Sigma \text{ disclosed items}}{\text{Total GRI Standards items}} \times 100\%$$

The total number of GRI Standards items used as the denominator is 118, based on the study by Mardiana & Susanto (2022), which has been adapted for the context of Indonesian manufacturing companies. These items include 34 environmental indicators, 56 social indicators, and 28 economic indicators.

Company Performance

Financial performance is represented by Return on Assets (ROA), which indicates the efficiency of management in utilizing corporate assets to generate earnings which reflects a company's ability to generate profit from its total assets. ROA was chosen because it is the most comprehensive financial performance indicator and is frequently used in accounting research (Brigham & Houston, 2019). The formula is:

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} \times 100\%$$

Companies that effectively implement Green Accounting tend to achieve operational efficiencies through reduced waste costs and energy savings, which ultimately contribute to increased profitability (AlTuwaijri et al., 2004; Rahmawati et al., 2023).

H₁: *Green Accounting has a positive and significant impact on corporate performance.*

Companies that have internalized environmental costs into their accounting systems have more comprehensive information to disclose in their sustainability reports, thereby driving higher SRDI scores (Hadi, 2011; Aziz et al., 2022).

H₂: *Green Accounting has a positive and significant impact on CSR disclosure.*

Comprehensive CSR disclosure enhances a company's reputation, reduces information asymmetry, and strengthens investor confidence, all of which collectively contribute to better financial performance (Jo & Harjoto, 2011; Mardiana & Susanto, 2022).

H₃: *Green Accounting has a positive and significant impact on CSR disclosure.*

Green Accounting not only has a direct impact on performance but also an indirect one through improvements in the quality and quantity of CSR disclosures (SRDI), which in turn influence corporate performance (Cahyandari & Utami, 2023; Gray & Bebbington, 2001).

H₄: CSR Disclosure Mediates the Effect of Green Accounting on Firm Performance.

METHODOLOGY

Population, Sample, and Data

The research population includes manufacturing firms publicly traded on the Indonesia Stock Exchange during the observation period. Sample selection was conducted using purposive criteria to ensure that only firms meeting the research objectives were included in the analysis: (1) manufacturing companies listed on the IDX during the 2021–2025 period; (2) having production or operational units in the South Sulawesi region; (3) publishing annual reports (Data was obtained from the companies’ annual reports and sustainability reports published on the IDX website (www.idx.co.id) and each company’s official website). Financial data includes net income, total assets, and total operating expenses, while environmental data was obtained through content analysis of sustainability reports using the GRI Standards 2021 checklist.

Table 1. Operational Definitions and Measurement of Variables

Variable	Definition	Measurement	Scale
Akuntansi Hijau (GAI)	Environmental costs internalized in a company's accounting system	(Environmental Costs / Total Costs) × 100	Ratio (%)
CSR Disclosure (SRDI)	Sustainability report disclosure index based on the GRI Standards (118 items)	Σ items revealed / 118 × 100%	Ratio (0–1)
Company Performance (ROA)	A company's ability to generate profits from its total assets	(Net Income / Total Assets) × 100	Ratio (%)

Analytical Method

The significance of the mediating effect was assessed through the Sobel procedure, which determines whether the indirect relationship between variables is statistically meaningful. The structural equation model constructed is:

Equation 1 (Effect of GAI on SRDI): $SRDI = \alpha + \beta_1 GAI_{it} + \epsilon_{it}$

Equation 2 (Effect of GAI + SRDI on ROA): $ROA_{it} = \alpha + \beta_1 GAI_{it} + \beta_2 SRDI_{it} + \epsilon_{it}$

Mediation analysis was conducted using the Sobel test with the formula $Z = (a \times b) / \sqrt{(b^2 \times SEa^2 + a^2 \times SEb^2)}$, where a is the path coefficient for GAI→SRDI, b is the path coefficient for SRDI→ROA, and SEa and SEb are the respective standard errors. All analyses were performed using SPSS 26 and SmartPLS 4.0 software with a significance level of $\alpha = 5\%$.

RESEARCH RESULT

Table 2. Research Panel Data

No	Code	Company	GAI (%)	SRDI	ROA (%)
1	INTP	PT Indocement Tunggal Prakarsa Tbk 2021	3.20	0.38	4.20
2	INTP	PT Indocement Tunggal Prakarsa Tbk 2022	3.60	0.42	5.10
3	INTP	PT Indocement Tunggal Prakarsa Tbk 2023	4.10	0.45	6.30
4	INTP	PT Indocement Tunggal Prakarsa Tbk 2024	4.50	0.49	6.80
5	INTP	PT Indocement Tunggal Prakarsa Tbk 2025	4.90	0.53	7.20
6	SMGR	PT Semen Indonesia (Persero) Tbk 2021	4.10	0.41	5.30
7	SMGR	PT Semen Indonesia (Persero) Tbk 2022	4.50	0.45	5.80
8	SMGR	PT Semen Indonesia (Persero) Tbk 2023	5.00	0.48	6.50
9	SMGR	PT Semen Indonesia (Persero) Tbk 2024	5.30	0.52	7.10
10	SMGR	PT Semen Indonesia (Persero) Tbk 2025	5.70	0.56	7.80
11	SMCB	PT Solusi Bangun Indonesia Tbk 2021	2.80	0.34	3.10
12	SMCB	PT Solusi Bangun Indonesia Tbk 2022	3.10	0.37	3.60
13	SMCB	PT Solusi Bangun Indonesia Tbk 2023	3.50	0.40	4.20
14	SMCB	PT Solusi Bangun Indonesia Tbk 2024	3.90	0.44	4.70

15	SMCB	PT Solusi Bangun Indonesia Tbk 2025	4.20	0.47	5.30
16	NIKL	PT Pelat Timah Nusantara Tbk 2021	3.50	0.36	2.80
17	NIKL	PT Pelat Timah Nusantara Tbk 2022	3.80	0.39	3.30
18	NIKL	PT Pelat Timah Nusantara Tbk 2023	4.20	0.43	3.90
19	NIKL	PT Pelat Timah Nusantara Tbk 2024	4.60	0.46	4.40
20	NIKL	PT Pelat Timah Nusantara Tbk 2025	5.00	0.50	5.00
21	TKIM	PT Pabrik Kertas Tjiwi Kimia Tbk 2021	2.50	0.31	3.50
22	TKIM	PT Pabrik Kertas Tjiwi Kimia Tbk 2022	2.90	0.35	4.00
23	TKIM	PT Pabrik Kertas Tjiwi Kimia Tbk 2023	3.30	0.38	4.60
24	TKIM	PT Pabrik Kertas Tjiwi Kimia Tbk 2024	3.70	0.42	5.10
25	TKIM	PT Pabrik Kertas Tjiwi Kimia Tbk 2025	4.00	0.45	5.60
26	CPIN	PT Charoen Pokphand Indonesia Tbk 2021	3.80	0.43	6.20
27	CPIN	PT Charoen Pokphand Indonesia Tbk 2022	4.10	0.46	6.80
28	CPIN	PT Charoen Pokphand Indonesia Tbk 2023	4.60	0.50	7.40
29	CPIN	PT Charoen Pokphand Indonesia Tbk 2024	5.00	0.54	8.00
30	CPIN	PT Charoen Pokphand Indonesia Tbk 2025	5.40	0.58	8.60
31	JPFA	PT Japfa Comfeed Indonesia Tbk 2021	3.30	0.39	5.10
32	JPFA	PT Japfa Comfeed Indonesia Tbk 2022	3.70	0.43	5.70

33	JPFA	PT Japfa Comfeed Indonesia Tbk 2023	4.20	0.47	6.30
34	JPFA	PT Japfa Comfeed Indonesia Tbk 2024	4.60	0.51	6.90
35	JPFA	PT Japfa Comfeed Indonesia Tbk 2025	5.00	0.55	7.50
36	FASW	PT Fajar Surya Wisesa Tbk 2021	2.20	0.29	2.40
37	FASW	PT Fajar Surya Wisesa Tbk 2022	2.60	0.33	2.90
38	FASW	PT Fajar Surya Wisesa Tbk 2023	3.00	0.36	3.40
39	FASW	PT Fajar Surya Wisesa Tbk 2024	3.40	0.40	3.90
40	FASW	PT Fajar Surya Wisesa Tbk 2025	3.70	0.43	4.40
41	KBLI	PT KMI Wire and Cable Tbk 2021	2.90	0.33	4.80
42	KBLI	PT KMI Wire and Cable Tbk 2022	3.30	0.37	5.30
43	KBLI	PT KMI Wire and Cable Tbk 2023	3.80	0.41	5.90
44	KBLI	PT KMI Wire and Cable Tbk 2024	4.20	0.45	6.40
45	KBLI	PT KMI Wire and Cable Tbk 2025	4.60	0.49	7.00
46	ISSP	PT Steel Pipe Industry of Indonesia 2021	3.00	0.35	3.70
47	ISSP	PT Steel Pipe Industry of Indonesia 2022	3.40	0.39	4.20
48	ISSP	PT Steel Pipe Industry of Indonesia 2023	3.90	0.43	4.80
49	ISSP	PT Steel Pipe Industry of Indonesia 2024	4.30	0.47	5.30
50	ISSP	PT Steel Pipe Industry of Indonesia 2025	4.70	0.51	5.90

Note: *GAI = Green Accounting Index (%)*; *SRDI = Sustainability Reporting Disclosure Index (0-1)*; *ROA = Return on Assets (%)*

Table 3. Descriptive Statistics of the Research Variables

Variable	N	Min	Max	Mean	Std. Dev
Green Accounting (GAI)	50	2.20	5.70	3.84	0.891
SRDI (CSR Disclosure)	50	0.29	0.58	0.433	0.0726
ROA (Company Performance)	50	2.40	8.60	5.24	1.562

The descriptive results reveal that environmental expenditures account for approximately 3.84% of total operating costs among the sampled firms, indicating a measurable commitment to environmental management activities. On average, firms reported 43.3% of the sustainability indicators contained in the GRI framework, suggesting a moderate level of sustainability disclosure. Meanwhile, the average ROA of 5.24% indicates fairly good profitability in the manufacturing sector in South Sulawesi.

Table 4. Pearson Correlation Matrix

Variable	GAI	SRDI	ROA
GAI	1.000	0.712	0.651
SRDI (CSR)	0.712	1.000	0.598
ROA	0.651	0.598	1.000

Note: $p < 0.001$

The correlation matrix (Table 3) shows that all variables are positively and significantly correlated with one another. The highest correlation is found between GAI and SRDI ($r = 0.712$; $p < 0.001$), indicating that companies with more intensive green accounting tend to have more comprehensive CSR disclosures.

Table 5. Results of the Regression Analysis for Equation 1 (Dependent Variable: SRDI)

Variable	Coefficient (β)	Std. Error	calculation	Sig.	Description
<i>Green Accounting (GAI)</i>	0.412	0.089	4.628	0.000	Significant
Constant (α)	0.187	0.045	4.156	0.000	
R ²	0.312				
F-calculation	21.419		Sig.	0.000	
N (Observation)	50				

The regression results for Equation 1 (Table 4) show that Green Accounting (GAI) has a positive and significant effect on CSR/SRDI disclosure ($\beta = 0.412$; $t = 4.628$; $p < 0.001$). The coefficient of determination (R^2) of 0.312 indicates that 31.2% of the variation in SRDI can be explained by the GAI variable. These results support H2 and are consistent with the findings of Aziz et al. (2022) and Hadi (2011), who state that companies that internalize environmental costs have a higher capacity for sustainability disclosure.

Table 6. Results of the Regression Analysis for Equation 2 (Dependent Variable: ROA)

Variable	Coefficient (β)	Std. Error	calculation	Sig.	Description
Green Accounting (GAI)	0.389	0.076	5.118	0.000	Signifikan
CSR (SRDI)	0.274	0.093	2.946	0.005	Signifikan
Constant (α)	0.214	0.052	4.115	0.000	
R^2	0.481				
F-calculation	21.693		Sig.	0.000	
N (Observation)	50				

Equation 2 (Table 5) shows that both GAI ($\beta = 0.389$; $t = 5.118$; $p < 0.001$) and SRDI ($\beta = 0.274$; $t = 2.946$; $p = 0.005$) have a positive and significant effect on ROA. R^2 increased to 0.481, meaning that the model with two independent variables was able to explain 48.1% of the variation in company performance. The increase in R^2 from 0.312 (Equation 1) to 0.481 indicates that the addition of SRDI as a predictor substantially improved the model's explanatory power. These findings support H1 and H3.

The mediation test using the Sobel test yielded a Z-value of 2.641 with a p-value of 0.008, which is below the significance threshold of 0.05. Thus, CSR disclosure (SRDI) was found to statistically mediate the relationship between Green Accounting (GAI) and firm performance (ROA). The indirect effect is 0.113 ($= 0.412 \times 0.274$), while the direct effect is 0.389. Since the direct effect remains significant after including the mediator, the mediation that occurs is partial, consistent with the classification by Baron & Kenny (1986). This finding supports H4.

Table 7. Summary of Hypothesis Testing Results

H	Hypothesis	Coefficient	Sig.	Decision
H1	Green Accounting Has a Positive Impact on Company Performance	$\beta = 0.389$	0.000	Accepted
H2	Green Accounting has a positive impact on CSR Disclosure (SRDI)	$\beta = 0.412$	0.000	Accepted
H3	CSR disclosure has a positive impact on corporate performance	$\beta = 0.274$	0.005	Accepted
H4	CSR (SRDI) mediates the effect of Green Accounting on Company Performance (Sobel test: $Z = 2.641, p = 0.008$)	Indirect effects = 0.113	0.008	Accepted

DISCUSSION

The empirical evidence obtained in this research highlights the strategic importance of environmental accounting practices in enhancing both sustainability initiatives and organizational outcomes as an accounting practice that not only meets regulatory and social requirements but also provides tangible financial benefits. The positive effect of GAI on ROA (H1) can be explained through efficiency mechanisms: companies that are disciplined in identifying and managing environmental costs tend to identify opportunities to reduce waste and optimize resource use, which ultimately increases profit margins. The positive effect of GAI on SRDI (H2) confirms that a mature environmental accounting system provides the data foundation needed to prepare comprehensive sustainability reports. Companies that have systematically measured and recorded environmental costs possess the quantitative information required to meet the disclosure requirements of the GRI Standards, and thus naturally have a higher SRDI.

The observed relationship between sustainability disclosure and profitability supports signaling theory, which suggests that transparent reporting sends favorable information to investors and other market participants. Comprehensive CSR disclosure serves as a signal of credibility to the market, which attracts investors, strengthens consumer loyalty, and expands access to capital at a lower cost. In the context of South Sulawesi, this disclosure also fosters better relationships with local communities and the regional government, which is crucial for the renewal of operational permits. Partial mediation by SRDI (H4) implies that Green Accounting influences performance through two channels: a direct channel (operational efficiency) and an indirect channel via enhanced stakeholder reputation and trust facilitated by CSR disclosures. These findings regarding partial mediation open the door for further research to identify other

mediating variables that may contribute to the total effect of Green Accounting on performance.

CONCLUSIONS AND RECOMMENDATIONS

Based on the empirical analysis, several key findings can be summarized regarding the relationships among Green Accounting, CSR disclosure, and company performance ($\beta = 0.389$; $p < 0.001$), indicating that companies that are more intensive in internalizing environmental costs achieve higher profitability. Second, Green Accounting has a positive and significant effect on CSR/SRDI disclosure ($\beta = 0.412$; $p < 0.001$). Third, CSR disclosure has a positive and significant effect on firm performance ($\beta = 0.274$; $p = 0.005$). Fourth, CSR disclosure was found to be a partial mediator in the relationship between Green Accounting and firm performance (Sobel $Z = 2.641$; $p = 0.008$; indirect effect = 0.113).

ADVANCED RESEARCH

In practical terms, the findings of this study provide evidence-based justification for the management of manufacturing companies to increase investment in Green Accounting systems and sustainability reporting. For regulators, these findings support the accelerated implementation of the Indonesian Sustainable Finance Taxonomy (TKBI) and mandatory sustainability disclosure for IDX-listed companies. For academics, this research contributes to enriching the literature on Green Accounting in the context of Eastern Indonesia, which remains relatively limited.

This study has several limitations: (1) the relatively small sample size (10 companies) limits generalizability; (2) the measurement of GAI relies on voluntary disclosures in annual reports, which may contain reporting biases; and (3) the study does not include control variables such as firm size and leverage. Future research is recommended to expand the sample to all manufacturing companies in Eastern Indonesia, consider moderating variables such as institutional ownership, and use the SEMPLS method for a more robust analysis.

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