The Effect of Green Accounting Implementation, Carbon Emission Disclosure and Environmental Performance on Company Value in Basic and Chemical Industry - Cement Sub-Sector Companies Listed on The IDX In The 2021-2024 Period

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Abstract

This research explores the impact of green accounting, carbon emission disclosure, and environmental performance on the firm value of Basic and Chemical Industry—Cement sub-sector companies listed on the Indonesia Stock Exchange during the 2021–2024 period. A quantitative methodology was applied, relying on secondary data collected from financial statements, sustainability reports, IDX publications, and PROPER ratings. Six companies were selected purposively, with variables measured as follows: Green Accounting (environmental cost/net income), Carbon Emission Disclosure (checklist score), Environmental Performance (PROPER index), and Firm Value (price-to-book value). Data analysis utilized descriptive statistics, classical assumption testing, and multiple linear regression processed through SPSS. The results show that green accounting significantly and positively influences firm value, while both carbon emission disclosure and environmental performance do not exhibit significant individual effects. However, when considered simultaneously, the three variables contribute significantly to explaining firm value. The findings suggest that embedding environmental costs into accounting systems has a greater impact on market valuation than relying solely on disclosure or environmental ratings. The study therefore recommends that companies strengthen the application of green accounting supported by standardized approaches to carbon disclosure.

Keywords : *green accounting, carbon emission disclosure, environmental performance, firm value*.
JEL Codes : M41, Q56

INTRODUCTION

Environmental pollution has emerged as a pressing global concern that endangers ecological stability and human well-being. Accelerated industrial growth, excessive energy consumption, and unsustainable production methods have intensified environmental challenges, particularly the rising concentration of greenhouse gases. Among these, carbon dioxide (CO_2) emissions are the most significant, as they contribute substantially to global warming and climate change. This situation underlines the urgency for industries to implement sustainable practices to minimize their environmental impact. The cement industry is one of the sectors most strongly linked to environmental degradation. Cement manufacturing is highly resource- and energy-intensive, leading to significant CO_2 emissions along with other adverse impacts such as dust, noise, and industrial waste. On a global scale, this industry is estimated to account for approximately 7–8% of total CO_2 emissions, making it one of the most environmentally critical sectors. In Indonesia, the cement subsector plays a vital role in supporting infrastructure development; however, it simultaneously faces mounting pressure to align financial performance with environmental accountability.

To address these issues, Indonesian regulators and stakeholders have established various initiatives to promote corporate sustainability. The Ministry of Environment and Forestry introduced the PROPER program (Company Performance Rating in Environmental Management) to evaluate firms' environmental performance. At the same time, the Indonesia Stock Exchange (IDX) encourages publicly listed companies to disclose their environmental, social, and governance (ESG) practices in sustainability reports. These policies demonstrate the growing expectation that businesses must not only deliver financial returns but also act responsibly toward the environment and society. Within this context, three aspects become central to this study. Green accounting integrates environmental costs into financial

reporting, providing a clearer view of how business activities affect the environment. Carbon emission disclosure reflects the degree of corporate transparency in reporting greenhouse gas emissions and mitigation measures, reducing information asymmetry and building stakeholder trust. Environmental performance, as measured by PROPER ratings, offers an external evaluation of companies' compliance with regulations and their environmental management efforts.

Prior research on these variables has yielded inconclusive findings. Some studies reveal that adopting environmental initiatives can enhance firm value by improving legitimacy and reputation, whereas others show little or no effect on market valuation. This inconsistency suggests a research gap that requires further examination, particularly within environmentally sensitive industries such as cement.

LITERATURE REVIEW

Triple Bottom Line Theory

John Elkington (1997) introduced the Triple Bottom Line (TBL) as a framework that broadens the traditional measure of business success beyond financial profit. It emphasizes that sustainable performance must incorporate three pillars: People (social responsibility), Planet (environmental protection), and Profit (economic gain)**.** For industries with substantial ecological impacts, such as the cement sector, the TBL underscores the necessity of embedding environmental performance into corporate strategy as a critical dimension of long-term sustainability alongside profitability.

Stakeholder Theory

Proposed by R. Edward Freeman in 1984, Stakeholder Theory argues that companies must create value not only for shareholders but also for a wide range of stakeholders including employees, customers, suppliers, regulators, and surrounding communities. By adopting practices like green accounting and openly disclosing environmental performance, firms demonstrate accountability and responsiveness to these groups. Such actions can foster trust, strengthen relationships, and enhance a company's reputation, which ultimately contributes to greater firm value.

Signaling Theory

Developed by Michael Spence, Signalling Theory addresses the problem of information asymmetry between internal management and external investors. According to this view, firms with superior performance can convey credible signals to the market to distinguish themselves and gain investor confidence. Within this study, green accounting, carbon emission disclosure, and environmental performance are interpreted as key signals that communicate a firm's environmental responsibility and risk management practices. Transparent reporting and commitment to sustainability can therefore serve as strong signals that influence investor perceptions and increase firm value.

The Effect of Green Accounting on Firm Value (H_1)

Green Accounting serves as a strategic instrument that captures and reports the financial implications of a firm's environmental activities. By incorporating environmental costs into financial statements, companies provide a credible signal to stakeholders regarding their long-term sustainability and risk management. Such practices can be interpreted as proactive steps to reduce future environmental liabilities. Empirical studies have reported mixed outcomes: for instance, Daffa et al. (2024) found a positive and significant effect of Green Accounting on firm value, whereas Hayatul et al. (2023) reported otherwise.

H_1: Green Accounting significantly influences the firm value of cement sub-sector companies listed on the BEI during 2021–2024.

The Effect of Carbon Emission Disclosure on Firm Value (H_2)

Voluntary disclosure of carbon emissions demonstrates a company's commitment to addressing climate change, which can enhance its image among environmentally conscious stakeholders. However, because such disclosure is voluntary, variations in quality and reliability may exist, and some investors may be cautious about information not directly verified by financial outcomes. Prior research also reflects these inconsistencies: Kafi & Arie (2024) observed a significant positive impact of disclosure on firm value, whereas Siera & Christina (2024) found no meaningful relationship.

H_2: Carbon Emission Disclosure significantly influences the firm value of cement sub-sector companies listed on the BEI during 2021–2024.

The Effect of Environmental Performance on Firm Value (H_3)

Environmental performance, as assessed through the PROPER program, reflects government-certified compliance with environmental management standards. Higher ratings, such as Gold or Green, often strengthen a company's legitimacy and public image. Nevertheless, some investors may view environmental compliance merely as a baseline requirement, particularly if it entails high costs without producing immediate financial returns. Previous studies, such as those by Hayatul et al. (2023) and Miranti & Efi (2023), also revealed mixed results.

H_3: Environmental Performance significantly influences the firm value of cement sub-sector companies listed on the BEI during 2021–2024.

The Joint Effect of All Variables on Firm Value (H_4)

Although each factor may have varying individual effects, the integration of Green Accounting, Carbon Emission Disclosure, and Environmental Performance is expected to create a stronger signal to the market. Together, they reflect financial commitment, transparency, and verified compliance, which may build investor confidence, reduce perceived risks, and attract socially responsible investors. This combined impact has been supported by Daffa et al. (2024), who found that sustainability practices jointly contribute to firm value.

H_4: Green Accounting, Carbon Emission Disclosure, and Environmental Performance simultaneously and

RESEARCH METHOD

Research Design and Data

This study employs a quantitative research design based on secondary data. The data were obtained from the annual reports and sustainability reports of cement sub-sector companies listed on the Indonesia Stock Exchange (IDX). The reports were collected through the official IDX website and the companies' official websites for the period 2021–2024.

Population and Sample

The research population consists of all cement sub-sector firms listed on the IDX during 2021–2024. A purposive sampling technique was applied, with criteria including the availability of complete annual and sustainability reports as well as the absence of extraordinary conditions that could distort financial data. Based on these criteria, a total of six companies were selected as the research sample, namely:

- PT Semen Indonesia (Persero) Tbk (SMGR)
- PT Indocement Tunggal Prakarsa Tbk (INTP)
- PT Semen Baturaja Tbk (SMBR)
- PT Solusi Bangun Indonesia Tbk (SMCB)
- PT Wijaya Karya Beton Tbk (WTON)
- PT Cemindo Gemilang Tbk (CMNT)

Variable Operationalization

The operational definitions and measurements of variables are as follows:

Green Accounting (X_1): Measured as the ratio of environmental costs to net income. Environmental costs were derived from CSR expenditures specifically allocated for environmental activities as reported in annual reports.

$$GA = \frac{\text{CSR Total Cost}}{\text{Net Income}}$$

Carbon Emission Disclosure (X_2): Assessed using 18 disclosure indicators adapted from the Carbon Disclosure Project (CDP)**.** Each disclosed item was assigned a score of 1, and undisclosed items scored 0. The disclosure index was then calculated as the ratio of disclosed items to the maximum possible score (18).

$$CED = \frac{\text{Total Items Disclosed}}{\text{Total Items Overall}} \text{ x } 100\%$$

Environmental Performance (X_3): Measured using the PROPER rating issued by the Ministry of Environment and Forestry. The categorical scores were converted into numerical values: Gold = 5, Green = 4, Blue = 3, Red = 2, and Black = 1.

Firm Value (Y): Represented by the Price to Book Value (PBV) ratio, which compares a company's market price per share with its book value per share, thereby capturing the market's assessment of firm value.

$$\text{PBV} = \frac{\text{Price Per Share}}{\text{Book Value Per Share}}$$

RESULTS AND DISCUSSION

Descriptive Analysis

Based on 24 observations from six cement companies during the period 2021-2024, descriptive analysis shows the following key statistics. Based on Tabel 1 descriptive analysis results.

Table 1. Descriptive Analysis Results

	N	Minimum	Maximum	Mean	Std, Deviation
GA	24	0.000109	0.352215	0.0621	0.07759
CED	24	0.388889	0.88889	0.6981	0.16365
KL	24	3	5	3.9167	0.77553
NP	24	0.19621	36.6363	2.9936	7.28336
Valid N	24				

1. Green Accounting (GA): Average of 0.0621 with high standard deviation (0.07759), indicating significant variation in environmental cost allocation. The lowest value is 0.0001 and the highest is 0.3522.
2. Carbon Emissions Disclosure (CED): The average disclosure rate is 0.6981, with a moderate standard deviation (0.16366). The lowest value is 0.3889 and the highest is 0.8889, indicating differences in reporting practices among companies.
3. Environmental Performance (EP): The average PROPER score is 3.9167, approaching the green rating. The low standard deviation (0.77550) indicates that the data is relatively homogeneous.
4. Company Value (Y): The average PBV is 2.9936, but with a very high standard deviation (7.28336), indicating extreme heterogeneity. PBV values range from 0.1962 to 36.6364.

Classical Assumption Test

Normality Test

The Kolmogorov-Smirnov test yielded a significant value of 0.175, which is greater than the 0.05 threshold, indicating that the residuals are normally distributed (Table 2).

Table 2. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
N	24
Asymp Sig. (2 – Failed)	0.175

Multicollinearity Test

The Variance Inflation Factor (VIF) for all variables was less than 10, and the Tolerance values were greater than 0.10, indicating no significant multicollinearity between the independent variables (Table 3).

Table 3. Multicollinearity Test Results

Coeffecient

Model		Unstandardized B	Coefficients Std.Error	Standardized Coefficients Beta	t	Sig	Collinearity Tolerance	Statistics VIF
1	*(Constant)*	15.669	5.140		3.049	0.006		
	GA	17.363	2.562	-0.792	6.776	0.001	0.996	1.004

CED	-11.093	5.311	-0.251	-2.089	0.050	0.946	1.057
KL	-0.974	1.129	-0.104	-0.863	0.398	0.942	1.061

Autocorrelation Test

The Durbin-Watson statistic was 1.948, which falls within the acceptance range of dU<d<4−dU (1.6565 < 1.948 < 2.3435), confirming that the model is free from autocorrelation (Table 4)

Table 4. Autocorrelation Test Results

Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimae*	*Durbin Watson*
1	0.461	0.213	0.095	6.92982	1.948

Heteroscedasticity Test

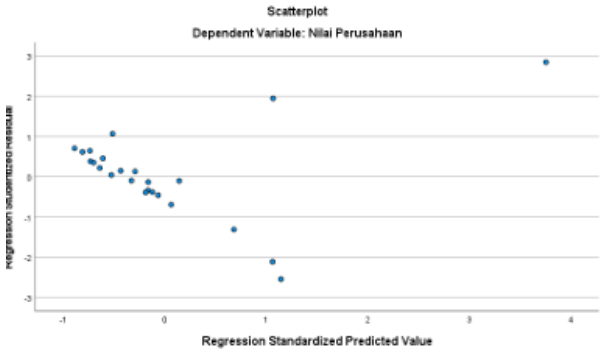

Figure 1. Heteroscedasticity Test Results

The scatterplot of the residuals showed no discernible pattern, indicating no heteroskedasticity

Multiple Linear Analysis

Table 5. Multiple Linear Analysis Results

Coeffecient

Model		*Unstandardized B*	*Coefficients Std.Error*	*Standardized Coefficients Beta*	*T*	*Sig*
1	*(Constant)*	15.669	5.140		3.049	0.006
	GA	17.363	2.562	-0.792	6.776	0.001
	CED	-11.093	5.311	-0.251	-2.089	0.050
	KL	-0.974	1.129	-0.104	-0.863	0.398

Based on the study's findings, the multiple linear regression analysis produced the following equation:

$$PBV = 15.669+17.363GA–11.093CED–0.974KL+\epsilon$$

1. Green Accounting (GA): The positive coefficient indicates a direct, significant relationship, meaning that an increase in a company's Green Accounting efforts leads to a notable increase in its Firm Value.
2. Carbon Emission Disclosure (CED) & Environmental Performance (KL): Both variables show negative coefficients, suggesting an inverse relationship with Firm Value. However, their individual effects were not found to be statistically significant.

3. Collective Impact**:** When all three variables Green Accounting, Carbon Emission Disclosure, and Environmental Performance are considered together, they have a significant collective impact on a company's value.

Hypothesis Testing
Partial T-Test

Table 6. Partial T-Test Results

Model		*Unstandardized B*	*Coefficients Std.Error*	*Standardized Coefficients Beta*	*T*	*Sig*
1	*(Constant)*	15.669	5.140		3.049	0.006
	GA	17.363	2.562	-0.792	6.776	0.001
	CED	-11.093	5.311	-0.251	-2.089	0.050
	KL	-0.974	1.129	-0.104	-0.863	0.398

1. Green Accounting (GA): The results show a significant positive effect, with a significant value of 0.001 (less than 0.05), proving that an increase in Green Accounting significantly increases Company Value.
2. Carbon Emissions Disclosure (CED): With a significance value of 0.050, this variable is at the threshold of significance. Therefore, it is concluded that Carbon Emissions Disclosure individually does not have a significant effect on Company Value.
3. Environmental Performance (EP): This variable also does not show a significant effect, with a significance level of 0.398 (greater than 0.05). This indicates no statistically significant relationship between Environmental Performance and Firm Value in this model.

F Test (Simultaneous)

Table 7. F Test (Simultaneous) Results

Anova

Model		*Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig*
1	*Regresion*	887.960	3	295.987	17.824	0.001
	Residual	332.124	20	16.606		
	Total	1220.084	23			

The F-test is used to measure the collective influence of all independent variables on Company Value. With a significance value of 0.001 (less than 0.05), the results show that, taken together, Green Accounting, Carbon Disclosure, and Environmental Performance have a significant influence on Company Value.

R Test (Coefficient of Determination)

Table 8. R Test Results

Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimae*
1	0.461	0.213	0.095	6.92982

The Adjusted R^2 value of 0.095 indicates that only 9.5% of the variation in firm value can be explained by the variables included in this model. The remaining 90.5% of the variation is influenced by other factors not examined in this study, suggesting the model has a limited ability to predict firm value.

This hypothesis discussion provides the rationale behind the statistical test results :

1. Acceptance of H1: The significant and positive effect of Green Accounting aligns with Signaling Theory. A company's financial commitment to environmental causes is perceived as a credible signal by investors, who view it as a proactive step in managing long-term risks and boosting market confidence.

2. Rejection of H2 and H3: The insignificant partial effects of Carbon Emission Disclosure and Environmental Performance suggest that investors may be skeptical of voluntary disclosures and view compliance ratings (PROPER) as a minimum requirement rather than a strategic value-adding factor.

Acceptance of H4: The most crucial finding is the significant combined influence of all three variables. This underscores that the market places the highest value on an integrated sustainability strategy. When a company holistically merges its financial commitment (Green Accounting), transparency (Carbon Emission Disclosure), and verified performance (Environmental Performance), this powerful, unified signal successfully builds investor trust and increases firm value, in line with the principles of Triple Bottom Line and Stakeholder Theory.

CONCLUSION AND SUGGESTION

Conclusion

Based on the results of data evaluation and research discussions on the impact of Green Accounting, Carbon Emissions Disclosure, and Environmental Performance on Company Value in the cement sector listed on the IDX for the period 2021-2024, the following is a summary of the conclusions:

1. Green Accounting practices have been proven to have a significant positive impact on company value.
2. Individual carbon emissions disclosure does not have a significant impact on company value.
3. Environmental Performance also does not show a significant impact on company value.
4. Simultaneously: The key finding of this study is that when these three variables (Green Accounting, Carbon Emissions Disclosure, and Environmental Performance) are analysed together, they have a significant combined impact on company value.

Implications

1. Policy Implications
   The findings indicate that green accounting has a significant positive effect on firm value, while carbon emission disclosure and environmental performance (PROPER) do not exhibit meaningful individual impacts. This highlights the need for regulators, particularly the Indonesia Stock Exchange (IDX) and the Financial Services Authority (OJK), to strengthen sustainability reporting standards. Developing a standardized and comparable Environmental, Social, and Governance (ESG) disclosure framework—aligned with PROPER ratings—would reduce information asymmetry, enhance the credibility of sustainability reports, and improve investor confidence in listed companies.

2. Managerial Implications
   For cement companies, the results emphasize the strategic importance of embedding green accounting into corporate cost structures. Recognizing and allocating environmental costs within the accounting system not only improves legitimacy and reputation but also directly contributes to higher market valuation. Managers should therefore integrate environmental costs into their decision-making processes and treat carbon disclosure and PROPER compliance not merely as administrative obligations, but as complementary strategies to create long-term value for both firms and stakeholders.

3. Academic Contribution
   This study contributes to the academic literature by clarifying the ESG–firm value relationship in emerging markets characterized by state-led compliance mechanisms such as PROPER. The evidence that green accounting is valued more highly by investors than voluntary carbon disclosure or compliance ratings suggests that in Indonesia, capital markets respond more strongly to tangible financial commitments than to administrative compliance signals. Thus, the study enriches the discourse on ESG and firm value by highlighting the institutional specificity of emerging markets, offering new insights into how sustainability practices are perceived in developing economies.

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