

A Relationship Assessment Between Environmental Practices, Corporate Value, and CSR in Sustainability Context

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Abstract

This study examines the influence of environmental performance disclosure within corporate social responsibility on company value. It assesses the impact of green intellectual capital (human, structural, and relational), green innovation (product and process), carbon emission disclosure, and eco-efficiency on Price Book Value (PBV). The sample includes 11 companies from the Sri Kehati Index 2018-2022, which apply Sustainable Responsible Investment (SRI) and ESG principles. Using multiple regression analysis, the findings reveal that green intellectual capital disclosure does not significantly affect company value. However, green innovation positively impacts PBV, suggesting its importance in enhancing corporate valuation. In contrast, carbon emission disclosure and eco-efficiency are found to negatively influence PBV. These results highlight the critical role of green innovation in driving company value while suggesting that certain environmental disclosures may lower valuations. The study provides valuable insights into how environmental practices affect corporate value within the framework of corporate social responsibility and sustainability.

Keywords: Green Intellectual Capital, Green Innovation, Carbon Emissions Disclosure, Eco-Efficiency, Company Value

Penilaian Hubungan Antara Praktik Lingkungan, Nilai Perusahaan, dan CSR dalam Konteks Keberlanjutan

Abstrak

Studi ini menguji pengaruh pengungkapan kinerja lingkungan dalam tanggung jawab sosial perusahaan terhadap nilai perusahaan. Studi ini menilai dampak modal intelektual hijau (manusia, struktural, dan relasional), inovasi hijau (produk dan proses), pengungkapan emisi karbon, dan efisiensi ekologi terhadap Nilai Buku Harga (PBV). Sampel mencakup 11 perusahaan dari Indeks Sri Kehati 2018-2022, yang menerapkan prinsip-prinsip Investasi Bertanggung Jawab Berkelanjutan (SRI) dan ESG. Dengan menggunakan analisis regresi berganda, temuan tersebut mengungkapkan bahwa pengungkapan modal intelektual hijau tidak memengaruhi nilai perusahaan secara signifikan. Namun, inovasi hijau berdampak positif pada PBV, yang menunjukkan pentingnya dalam meningkatkan valuasi perusahaan. Sebaliknya, pengungkapan emisi karbon dan efisiensi ekologi ditemukan memengaruhi PBV secara negatif. Hasil ini menyoroti peran penting inovasi hijau dalam mendorong nilai perusahaan sambil menunjukkan bahwa pengungkapan lingkungan tertentu dapat menurunkan valuasi. Studi ini memberikan wawasan berharga tentang bagaimana praktik lingkungan memengaruhi nilai perusahaan dalam kerangka tanggung jawab sosial perusahaan dan keberlanjutan.

Kata Kunci: Modal Intelektual Hijau, Inovasi Hijau, Pengungkapan Emisi Karbon, Efisiensi Ekologi, Nilai Perusahaan

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INTRODUCTION

Beginning with the Rio Earth Summit Declaration in 1992, followed by the Kyoto Protocol Conference in 1997, the World Summit on Sustainable Development in Johannesburg in 2002, the Paris Agreement in 2015, the G20 Summit in 2020, and the European Union's plan to restrict the use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) and Waste Electrical and Electronic Equipment (Electronics and Electrical Equipment-WEEE) to be adopted in 2008, international environmental regulations have rapidly evolved. Consumers' increased environmental awareness has had a substantial impact on the global industry (Y. Chen, 2008). Recent data from IQAir on May 31, 2023, indicates that Jakarta currently has the highest air pollution levels in the world with a score of 170, even at the national level, it ranks second after South Tangerang with a score of 177. The concentration of PM2.5 particulate matter in Jakarta is 20.4 times higher than the annual air quality guideline set by the WHO (2002).

The increasing production activities of the company impacting infrastructure development result in growth in production waste and air pollution levels in Jakarta, posing environmental challenges. This underscores the importance of green intellectual capital, green innovation, carbon emission disclosure management, and efficient environmental management, which can have a positive impact on the company's value. The accumulation of non-recycled production waste can lead to water and soil pollution, both within the company's environment and in the general community (Putri Fabiola & Khusnah, 2022). To sustain business operations; companies must consider environmental aspects by implementing environmentally friendly concepts. This is crucial to instill confidence in consumers that the products used are safe and meet consumer needs. To succeed in the global market competition, companies must continually enhance human resources with a focus on the green economy and innovation to achieve optimal results for competitive advantage.

In the current economic era, intangible assets have become the key to achieving competitive advantage. Intellectual capital plays an increasingly significant role compared to financial capital (Y. Chen, 2008). The gap between the market value and book value of a company continues to widen, and traditional accounting systems are no longer capable of accurately reflecting the real value of a company in its financial reports. Traditional accounting systems are falling short of accurately reflecting market value today. Global competition has driven significant changes in how companies conduct their business operations. Companies must face changes and challenges in the political, economic, social, and technological aspects that are continually evolving while considering environmental factors that create competitive challenges.

To maintain a lasting competitive advantage, companies need to effectively handle their intangible assets. Competitive advantage can be realized through green innovation, carbon emission disclosure, and eco-efficiency to enhance company performance while achieving maximum profit with environmental awareness and preservation for business sustainability.

Green innovation aims to create innovations in a company's products or processes not only to provide economic benefits and increase profits but also to create a competitive advantage with its competitors by reducing negative impacts on the environment. Carbon emission disclosure involves voluntary disclosure of risks and opportunities related to climate change, including the disclosure of greenhouse gas emissions and energy consumption as a form of social responsibility to the community. Eco-efficiency is an environmental management system concept used to address environmental risk impacts arising from industrial activities. Therefore, this study aims to examine the impact of green intellectual capital (human, structural, and relational), green innovation (product and process), carbon emission disclosure, and eco-efficiency on company value as measured by Price Book Value (PBV). The study contributes understanding of how various sustainability factors affect firm value. It emphasizes the significance of green innovation and reveals that some environmental practices might incur short-term financial costs, even though they offer long-term sustainability advantages.

Literature Review

The significance of intellectual capital has been increasing globally. Similarly, recent studies have focused on the importance of green intellectual capital in mitigating environmental degradation. However, only a few studies have analyzed green intellectual capital and its impacts, such as the study by Ali, et.al (2021) that investigated the effects of green intellectual capital on green innovation adoption in small and medium-sized enterprises in the four manufacturing sectors of Pakistan including textile, chemical, pharmaceutical and steel and analyzed using a multiple regression analysis approach. Waheed Ali (2021) found that the empirical results indicate that green human capital and green structural capital significantly increase green innovation adoption. However, it must be noted that green relational capital has a positive but insignificant impact on green innovation adoption in manufacturing SMEs in Pakistan.

By using 2,372 A-share listed companies in China from 2009 to 2020 as research samples, a study by Liu and Hou (2023) empirically examined the effect of corporate ESG performances on corporate value using a conditional process analysis model. The paper found that ESG has a significant positive effect on corporate value, and green innovation can partially mediate the path; corporate external pressure, mainly media attention and analysts' attention, can positively moderate the path of ESG on green innovation, and thus positively moderate the mediation effect played by green innovation. This study concludes that corporate ESG performance and green innovation activities help companies achieve their goals of economic value growth and sustainable development ultimately.

On the other place, the research by Khalil, M.A., Khalil, R., & Khalil, M.K. (2022) has investigated the impact of innovation on firms' environmental and financial value, with a particular focus on the environmental aspects of such investments. Drawing on the natural resource-based view and stakeholder theory, the study builds on the work of Khalil and Nimmanunta (2021) to analyze the link between innovation and firms' environmental and financial performance. The research employs time fixed-effects panel regression with data

from publicly traded companies in ten Asian economies. This research revealed that traditional innovation positively affects market valuation but has adverse environmental effects, contributing significantly to carbon emissions. In contrast, investments in environmental innovation demonstrate positive impacts on both financial performance and the environment. The study underscores the importance of considering various aspects of environmental sustainability beyond carbon emissions and corporate social responsibility, emphasizing the critical role of environmental innovation for firms seeking market benefits from sustainable practices and eco-friendly products and services.

In a study by Tonay & Murwaningsari (2022), the results indicate that green intellectual capital has a positive influence on firm value (proxied by Tobin's Q). However, in the research by Astuti et al (2022), it was found that green intellectual capital does not have a significant impact on firm value (proxied by PBV). Agustia et al's (2019) research shows that green innovation has a positive influence on firm value (proxied by Tobin's Q). On the other hand, research by Putri Fabiola & Khusnah (2022) and Damas et al. (2021) states that green innovation has a positive influence on firm value (proxied by Tobin's Q). However, Tonay & Murwaningsari's (2022) study suggests that green innovation has a negative impact on firm value (proxied by Tobin's Q).

Muhammad & Aryani (2021) state that carbon emission disclosure has a negative influence on firm values [proxied by market capitalization (MCAP)]. In contrast, research by Rahmanita (2020), Damas et al (2021), and Nisa (2022) indicates that carbon emission disclosure has a significant positive impact on firm value (proxied by Tobin's Q). In Damas et al's (2021) study, the results indicate that eco-efficiency has a negative influence on firm value (proxied by Tobin's Q). However, R. Dewi & Rahmianingsih's (2020) research found that eco-efficiency has a positive influence on firm value (proxied by Tobin's Q). The conclusion from various studies shows the existence of inconsistency (research gap) in the results of each variable's research.

Previous research has presented inconsistent findings regarding the impact of various environmental factors on firm value. Consequently, this study focuses on companies listed in the SRI KEHATI index, an equity index prioritizing Sustainable Responsible Investment (SRI) and Environmental, Social, and Governance (ESG) principles in the Indonesian Capital Market. Comprising shares from 25 publicly listed companies on the IDX, the SRI KEHATI index undergoes regular biannual reviews. The identified problems include companies encountering challenges in enhancing green intellectual capital and green innovation due to significant costs, lengthy research periods, and environmental risks associated with non-environmentally friendly production and unsustainable raw material usage. Additionally, companies demonstrate insufficient awareness in delivering sustainability reporting, and inconsistencies persist in previous research findings related to specific variables. Hence, the objectives of this research are:

- a. To examine the influence of green intellectual capital on firm value.
- b. To examine the influence of green innovation on firm value.
- c. To examine the influence of carbon emission disclosure on firm value.

Theoretical Foundation

This study underscores the interconnectedness of various theoretical bases, highlighting their collective relevance in understanding how companies strategically disclose green-related information and manage their intellectual capital to enhance performance and sustainability.

In the context of Sri Kehati Stock Index Companies, this study explores the connections between eco-efficiency, green innovation, carbon emission disclosure, and green intellectual capital and how these links affect corporate value. Utilizing diverse theoretical frameworks such as Agency, Signaling, and Stakeholder theories (Josephine et al., 2020, Agustia et al., 2019), the study investigates how—strategic disclosures in sustainability reports can augment a firm's standing, and edge over competitors, and appeal to investors.

In order to emphasize the significance of sustainability reports in gaining societal legitimacy, maximizing internal resources, and creating a sustainable competitive advantage—particularly in the field of green intellectual capital—the study also employs the Legitimacy Theory (Alhaj, 2012) and the Resources-Based View Theory as follow:

- 1) The legitimacy theory primarily explains the relationship between carbon emission disclosure and firm value. Companies disclose their carbon emissions to gain social acceptance and legitimacy. By voluntarily reporting their environmental impact, firms demonstrate their commitment to sustainability, potentially improving their public image and stakeholder relationships. This improved perception can translate to higher firm value as investors and consumers may view the company more favorably. In this study, this theory is used to explain why firms would engage in carbon emission disclosures as a strategy to gain societal approval and mitigate risks associated with poor environmental practices. Over time, this can positively influence the company's value as it builds stronger relationships with stakeholders and enhances its reputation. For companies, particularly in environmentally sensitive industries, disclosing environmental practices like carbon emission reporting is a strategy to gain legitimacy from stakeholders such as investors, regulators, consumers, and the broader public.
- 2) Resource-based view (RBV) Theory explains the possible relationship between green intellectual capital and firm value. This theory posits that a firm's unique resources and capabilities can lead to sustainable competitive advantage. Green intellectual capital - comprising green human capital, structural capital, and relational capital - represents valuable, rare, inimitable, and non-substitutable resources that can enhance a firm's performance and value. Elaboration: For instance, a company with strong green human capital (employees with environmental expertise) and green structural capital (eco-friendly processes) may be better positioned to innovate and adapt to environmental regulations, potentially leading to cost savings and new market opportunities. By aligning RBV Theory, companies that effectively manage their green intellectual capital can leverage these internal resources to build a sustainable competitive advantage. This leads to differentiation in the marketplace, efficiency in operations, compliance with

environmental regulations, and ultimately higher firm value through better financial performance and reputation.

This combined approach ensures that the company not only meets external expectations but also strengthens its internal capabilities for long-term success in sustainability-driven markets.

The study also takes into account the implications for firm value [(Agustia et al., (2019), Pratami et al., (2023)], highlighting how shareholders assess organizations in light of the information that is given. The analysis supports management's overarching objective of boosting business value as represented by stock prices. Examining green intellectual capital adds another level of complexity by highlighting the role that environmental protection-related knowledge, abilities, and innovation play in producing revenue [(Y. Chen, (2008), Huang & Kung, (2011), Josephine et al., (2020), Wang, (2019)]. In keeping with the changing accounting requirements on intangible assets, this also takes into account the commitment of workers (green human capital) to environmental conservation as well as green structural and relational intellectual capital (David H. Luthy, 1998). The study's goal is to offer insightful knowledge on how Sri Kehati Stock Index Companies strategically handle and communicate green-related information to improve their overall corporate value. [(P. C. Chen & Hung, (2014), Dewi and Rahmianingsih, (2020)]

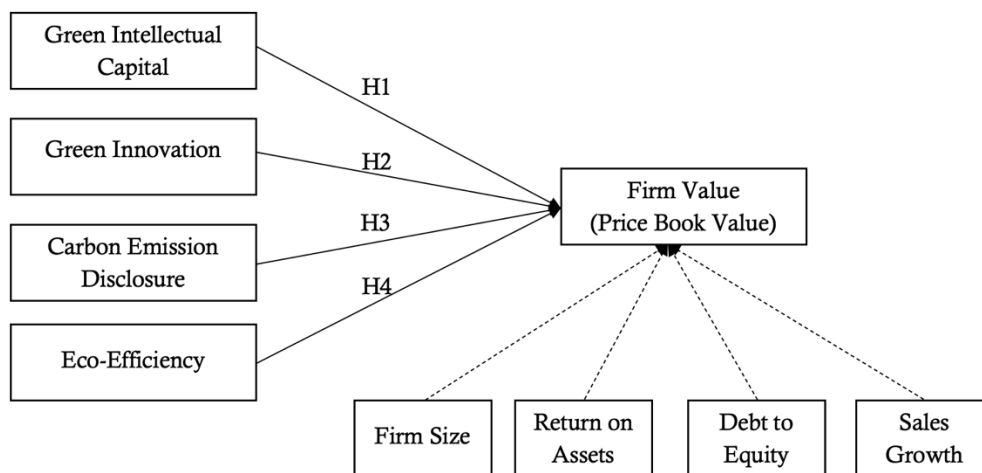


Figure 1. Conceptual Framework

Hypothesis Testing

The impact of green intellectual capital on firm value is substantial. Firms that effectively manage and prioritize intangible assets associated with environmental issues—such as green human, structural, and relational capital—are likely to experience a positive effect on their corporate value. This is based on the premise that emphasizing environmentally responsible intellectual capital enhances long-term sustainability and competitiveness, thereby giving these companies an advantageous position in the market. Therefore, H1 posits that green intellectual capital has a positive effect on firm value.

In a similar vein, green innovation—encompassing environmentally friendly product and process developments—can enhance a firm's value by establishing a competitive edge. Companies that engage in environmentally conscious innovation, such as creating green products or implementing more sustainable processes, can lower costs, distinguish themselves from their competitors, and appeal to a market of environmentally aware consumers. Consequently, Hypothesis 2 asserts that green innovation positively influences firm value.

The disclosure of carbon emissions is also crucial in influencing a company's value. Firms that openly report their carbon emissions and environmental initiatives can enhance their reputation among stakeholders. This transparency reflects a dedication to sustainability, which can boost the confidence of both investors and consumers, ultimately leading to an increase in the company's value. Therefore, H3 posits that the disclosure of carbon emissions has a positive impact on firm value.

Ultimately, eco-efficiency is an important element that can enhance a company's long-term value. By implementing eco-efficiency strategies—such as minimizing waste, optimizing resource use, and reducing environmental impacts—businesses can boost their operational efficiency while also promoting sustainability. This strategy aligns with wider environmental performance goals and can lead to favorable outcomes for firm value over time. Consequently, H4 posits that eco-efficiency positively influences firm value.

METHOD

Research Category

This research is a quantitative study with an associative approach. Quantitative research methods address research questions related to numerical data and statistical analysis. The data utilized are time series, collected at relatively consistent intervals, using the same instruments and objects.

Operational Variable

Dependent Variable (Y)

In this research, the dependent variable is the company's value measured using the price book value (PBV). PBV is a ratio that depicts the relationship between a company's market value and the book value per share. Hence, the higher the PBV the higher the perceived values of the company in the eyes of investors.

Independent Variable (X)

Variable independent in this study are green intellectual capital, green innovation, carbon emission disclosure, eco-efficiency.

Variable control

Variable controls in this study are debt-to-equity ratio, firm size, return on asset, and sales growth.

Table 1. *Operational Variable*

Variable	Variable measurement Indicator	Scale
<i>Green Intellectual Capital (X1)</i>	$GIC = \frac{\text{Number of items disclosed by the company}}{\text{The total number of criteria to be disclosed}}$	Nominal
<i>Green Innovation(X2)</i>	$GI = \frac{\text{Number of items disclosed by the company}}{\text{The total number of criteria to be disclosed}}$	Nominal
<i>Carbon Emission Disclosure(X3)</i>	$CED = \frac{\text{Number of items disclosed by the company}}{\text{The total number of criteria to be disclosed}}$	Nominal
<i>Eco-Efficiency (X4)</i>	1 = The company has been certified by ISO 14001 0 = The company is not certified by ISO 14001	Nominal
<i>Debt To Equity Ratio (DER)</i>	$DER = \frac{\text{Total Debt}}{\text{Total Equity}} \times 100\%$	Ratio
<i>Firm Size</i>	$\text{Firm Size} = \text{Log of Total Asset}$	Ratio
<i>Return On Asset (ROA)</i>	$ROA = \frac{\text{Net Income}}{\text{Total Asset}}$	Ratio
<i>Sales Growth</i>	$SG = \frac{\text{Total Sales (t)} - \text{Total Sales (t - 1)}}{\text{Total Sales (t - 1)}}$	Ratio

The guidelines or standards used for measuring research variables, as seen in the table above, are Green Intellectual Capital (GIC) that can be measured using the Global Reporting Initiative (GRI) Standards, specifically GRI 103: Management Approach and GRI 400: Social Topics. The GRI Standards are widely recognized globally for sustainability reporting, offering a comprehensive framework for disclosing intellectual capital related to environmental issues. These standards ensure comparability across companies and industries by providing a robust, standardized approach to measuring and reporting sustainability-related information, including aspects of green intellectual capital. Adopting GRI Standards allows companies to align their reporting with internationally accepted sustainability benchmarks.

Green Innovation (GI) can be evaluated using the Oslo Manual guidelines, which focus on collecting and interpreting innovation data with an emphasis on environmental benefits. Developed by the OECD and Eurostat, the Oslo Manual offers a standardized method for measuring innovation, particularly innovations that result in environmental improvements. It is widely accepted as an international standard for innovation measurement, allowing consistent reporting and comparability of green innovation efforts across companies and sectors.

For Carbon Emission Disclosure (CED), companies can use the Carbon Disclosure Project (CDP) questionnaire or the Greenhouse Gas (GHG) Protocol. The CDP provides a structured framework for disclosing carbon emissions and climate change strategies, while the GHG Protocol offers guidelines for measuring and managing greenhouse gas emissions.

Both standards are well-regarded and widely used, ensuring consistency and comparability in carbon emission reporting across organizations.

Typically, a study would develop a checklist based on key disclosure items from these standards, with the number of items disclosed by a company divided by the total number of items on the checklist to create a disclosure index. In this study, the researcher selected companies as the research object, specifically companies listed in the SRI KEHATI index. The SRI KEHATI index is a stock index that applies selection standards based on the principles of Sustainable Responsible Investment (SRI) and Environmental, Social, and Governance (ESG). The SRI KEHATI index consists of shares from 25 publicly listed companies on the Indonesia Stock Exchange (IDX) and is revised twice within a single period.

Table 2. *Sample Determination process (via Purposive Sampling)*

No	Description	Total
1	Companies with SRI KEHATI index listed on IDX during 2018-2022	25
2	Companies in and out of the SRI KEHATI Index from 2018-2022	(10)
3	Companies that do not report sustainability reporting consistently in 2018-2022	(3)
4	Companies that do not use Rupiah currency in their financial statements from 2018-2022	(1)
	Sample of companies with SRI KEHATI index that publish complete financial statements for 2018-2022 without interruption	11
	Number of observation year 2018-2022	5
	Number of company samples during the period 2018-2022	55
	Number of outlier data	0
	Number of company samples used during the period 2018-2022	55

This study measures these variables using standardized disclosure indices based on internationally recognized guidelines:

- Green Intellectual Capital: Likely based on GRI Standards
- Green Innovation: Possibly using Oslo Manual guidelines
- Carbon Emission Disclosure: Potentially using CDP or GHG Protocol

Eco-efficiency is measured through ISO 14001 certification, while financial controls include *debt-to-equity ratio*, *firm size*, *return on assets*, and *sales growth*.

The sources used in this research are derived from annual reports accessible through the official website of the Indonesia Stock Exchange (www.idx.co.id), Finance.yahoo.com, and sustainability reporting accessed through the official company website. The study primarily used the audited annual financial reports of companies listed on the Indonesia Stock Exchange. These reports were accessed through the official IDX website (www.idx.co.id). This study focused on the financial statements, management discussion and analysis, and corporate governance sections of these reports. Not all company reports were used; the data selected companies based on [specific criteria, e.g., market capitalization, sector representation, etc.].

Data were collected for the period from 2018 to 2022. By choosing this specific timeframe, the researchers aim to provide a current, relevant, and comprehensive analysis of how green practices impact firm value in the context of Sri Kehati Stock Index Companies. This period likely offers the best balance of data recency, availability, and representativeness for the study's objectives. In the sampling process, the researcher utilized purposive sampling with predetermined criteria, resulting in a sample of 11 companies. The observations were conducted over 5 years, from 2018 to 2022. The total number of data used was 55, and there were no outliers in this study.

FINDING AND DISCUSSION

Descriptive Statistic test

Table 3. *Descriptive Statistic*

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
GIC	55	0.67	0.94	0.86	0.07	0.01
GI	55	0.25	1.00	0.78	0.18	0.03
CED	55	0.17	0.83	0.53	0.19	0.04
EF	55	0.00	1.00	0.62	0.49	0.24
PBV	55	0.55	9.11	2.89	2.05	4.21
DER	55	0.03	6.90	3.38	2.15	4.64
SIZE	55	30.09	35.23	32.92	1.60	2.57
ROA	55	0.02	4.32	0.59	1.07	1.15
SG	55	-47.98	56.00	5.06	17.79	316.60
Valid N (listwise)	55					

The descriptive statistics for the period from 2018 to 2022 indicate considerable variability in the Sales Growth (SG) and Return on Assets (ROA) variables, as evidenced by their standard deviations surpassing their respective means. This pronounced variability in SG suggests a broad dispersion of sales growth rates among the examined firms, indicating that while certain companies experienced significant growth, others encountered substantial declines. For example, Company A may have achieved a sales growth rate of 45%, whereas Company B might have faced a decrease of 30%. Likewise, the elevated standard deviation concerning the mean for ROA signifies notable fluctuations in profitability and asset utilization efficiency across the sample. For instance, the highest ROA recorded could be 22%, in contrast to a low of -15%.

This extensive range in both metrics may be attributed to a variety of factors, including diverse industry sectors, differing company sizes, unique business models, and the uneven effects of external economic conditions, such as the COVID-19 pandemic. The significant variability in these metrics carries several implications: it indicates a heterogeneous set of companies in terms of growth and profitability, potentially signifies increased investment risk, reflects the disparate impact of economic conditions across various sectors, and calls

for meticulous consideration in subsequent analyses. This variability highlights the necessity of accounting for company-specific and industry-specific factors when interpreting financial performance, emphasizing the importance of a nuanced approach in interpreting overarching market trends based on these metrics.

Classic Assumption Testing

Table 4 below provides a concise summary of the classic assumption testing results, confirming the reliability of the regression model used in the study.

Table 4. *Summary of Classic Assumption Testing*

Test	Method	Result	Conclusion
Normality	Kolmogorov-Smirnov Test	p-value = 0.079 (> 0.05)	Residuals are normally distributed
Multicollinearity	Variance Inflation Factor (VIF)	VIF < 10, Tolerance > 0.1	No multicollinearity present
Heteroscedasticity	Chi-Square Test	Chi-square value < Critical value	No heteroscedasticity detected
Autocorrelation	Runs Test	Z-value = -0.134, p-value = 0.894 (> 0.05)	No autocorrelation present

The classic assumption tests were conducted to ensure the validity of the regression model. The Kolmogorov-Smirnov test for normality yielded a p-value of 0.079, indicating that the residuals are approximately normally distributed at the 0.05 significance level.

From the tolerance value analysis for the four independent variables and four control variables, it was found that the tolerance values for each variable are greater than 0.10, and the VIF analysis values also indicate that they are less than 10. Thus, it can be concluded that there is no indication of multicollinearity in the independent variables.

In the chi-square test, the calculated chi-square value is 26.785 ($55 * 0.487$), while the tabulated chi-square value taken from the distribution with a significance level of 0.05 is 73.312. Since the calculated chi-square value is lower than the tabulated chi-square value, it can be concluded that there is no heteroscedasticity in the residuals. The run test results indicate a test statistic of 0.21 with a probability value of 0.89, which is greater than the significance level of 0.05. Therefore, it can be concluded that there is no autocorrelation in the regression equation.

Multiple Regression Test

Table 5. *Multiple Regression Test*

Variable	Coefficient	t-statistic	p-value
Constant	48.115	5.060	0.000
GIC	-1.701	-0.507	0.615
GI	4.744	3.708	0.001
CED	-3.095	-2.557	0.014
EF	-3.320	-2.870	0.006
DER	0.294	1.819	0.075
Size	-1.354	-5.309	0.000
ROA	-0.374	-1.941	0.058
SG	0.005	0.475	0.637

$$Firm\ Value = 48.115 - 1.701GIC + 4.744GI - 3.095CED - 3.32EF + 0.294DER - 1.354SIZE - 0.374ROA + 0.005SG + e$$

The constant value of 48.115 indicates that when all independent variables (green intellectual capital, green innovation, carbon emission disclosure, eco-efficiency, debt to equity ratio, firm size, return on asset, and sales growth) have a value of zero (0), the company's value will increase by 48.115.

Coefficient of Determination Test (R-squared Test)

Table 6. *R Squared test*

Model	R	R Square	Adjusted R Square	Std. Error
1	0.768	0.59	0.518	1.425

The coefficient of determination, represented by the adjusted R-squared of 0.518, indicates that approximately 51.8% of the variation in the company's value measured using price book value can be explained by the variables in the model, namely green intellectual capital, green innovation, carbon emission disclosure, eco-efficiency, debt to equity ratio, firm size, return on asset, and sales growth. The remaining approximately 49.2% is influenced by other factors not included in this research regression model.

Significant Individual Test (t-Test)

This table summarizes the individual significance of each variable on firm value (PBV). Variables with p-values less than 0.05 (Green Innovation, Carbon Emission Disclosure, Eco-Efficiency, Firm Size) are considered significant, while others (GIC, DER, ROA, SG) are not.

Based on the t-test results, green innovation has a positive effect on firm value (PBV). The t-test produced a coefficient of 3.708 with a significant value of 0.001, which is less than

0.05, indicating that green innovation significantly enhances the company's value. In contrast, carbon emission disclosure negatively affects firm value. The t-test result showed a coefficient of -2.557 with a significant value of 0.014, indicating that disclosing carbon emissions detracts from the company's value (PBV).

Table 7. *t-Test*

Variable	Coefficient (B)	t-Statistic	p-Value	Conclusion
Constant	48.115	5.060	0.000	Significant
Green Intellectual Capital (GIC)	-1.701	-0.507	0.615	Not significant
Green Innovation (GI)	4.744	3.708	0.001	Significant
Carbon Emission Disclosure (CED)	-3.095	-2.557	0.014	Significant
Eco-Efficiency (EF)	-3.320	-2.870	0.006	Significant
Debt-to-Equity Ratio (DER)	0.294	1.819	0.075	Not significant
Firm Size (SIZE)	-1.354	-5.309	0.000	Significant
Return on Assets (ROA)	-0.374	-1.941	0.058	Not significant
Sales Growth (SG)	0.005	0.475	0.637	Not significant

Similarly, eco-efficiency was found to have a negative influence on firm value. The t-test showed a coefficient of -2.870 and a significant value of 0.006, indicating that implementing eco-efficiency measures also reduces the company's value in the short term. The debt-to-equity ratio, however, does not significantly affect firm value. The t-test yielded a coefficient of 1.819 with a p-value of 0.075, which is greater than 0.05, indicating no significant impact on the firm's value.

When testing firm size, the results indicated a significant negative effect on firm value. The t-test produced a coefficient of -5.309 with a significance value below 0.05, showing that larger firms tend to have a lower firm value (PBV). The t-test for return on assets (ROA) showed a coefficient of -1.941 with a p-value of 0.058, which is greater than 0.05, indicating that ROA does not have a significant impact on firm value.

Lastly, sales growth also does not significantly influence firm value. The t-test results showed a coefficient of 0.475 and a significant value of 0.637, indicating that sales growth does not play a major role in determining firm value (PBV).

Discussion

In the t-test, the variable green intellectual capital shows a regression coefficient of -0.507 with a significance value of $0.615 > 0.05$, indicating that green intellectual capital does not significantly influence the firm value (PBV). This finding aligns with previous research by Arsyad (2021) and Astuti et al. (2022), which also demonstrated that green intellectual capital does not have a significant effect on firm value (PBV).

Companies in the SRI Kehati Index gain a competitive advantage through green human capital, green structural capital, and green relational capital as part of their sustainability strategy. They apply basic theories such as RBV theory, signaling theory, stakeholder theory, agency theory, and legitimacy theory. Despite the implementation of green intellectual capital, the company's value is not significantly affected. External factors such as political issues, exchange rates, inflation, and interest rates play a crucial role in determining the market value of the company's stocks. Companies adopting GIC also contribute to achieving sustainability development goals (SDGs) with a focus on environmental, economic, and social objectives. This includes job creation, resource efficiency, and corporate social responsibility. Thus, even though GIC does not directly impact the company's value, it actively contributes to sustainable development through SDGs.

The Impact of Green Innovation on Firm Value (PBV) Testing

The t-test results indicate that green innovation has a significant positive influence on firm value (PBV) with a coefficient value of 3.708 and a significance of $0.001 < 0.05$. This finding is consistent with previous research by Agustia et al (2019), Damas et al (2021), Rizki & Hartanti (2021), Cahyaningtyas et al (2022), and Putri Fabiola & Khusnah (2022), which also demonstrate that green innovation positively affects firm value. Companies implementing environmentally friendly innovative products and processes tend to be more competitive and have higher value in the eyes of investors.

Companies in the SRI Kehati Index demonstrate the ability to reduce resource and energy consumption through green process innovation and produce recyclable products through green product innovation. The companies apply basic theories such as RBV theory, signaling theory, agency theory, and stakeholder theory to support green innovation activities. Companies implementing green innovation also contribute to achieving sustainable development goals (SDGs) with a focus on the environmental, economic, and social objectives of the company. Thus, green innovation not only has a positive impact on firm value but also supports the goals of sustainable development, including environmental, economic, and social objectives.

Carbon Emission Disclosure on Firm Value (PBV) testing

The t-test results reveal that the carbon emission disclosure variable has a significant negative impact on firm value (PBV) with a coefficient value of -2.557 and a significance of $0.014 < 0.05$. This finding aligns with Muhammad & Aryani (2021), indicating that companies disclosing carbon emissions tend to reduce firm value in the short term. However, in the long run, carbon emission disclosure supports corporate sustainability and meets social and environmental responsibility demands. Companies disclosing carbon emissions are considered a form of management transparency (agency theory) and capability in environmental management using environmentally friendly raw materials (RBV theory). However, stakeholders acknowledge that carbon emission disclosure requires significant investment costs and is perceived as bad news (signaling theory). This is related to concerns that the costs of preventing global warming or climate change may exceed the benefits, and companies disclosing carbon emissions are likely contributors to significant emissions, not meeting the expectations of stakeholders concerned about the environment (stakeholder theory). Nevertheless, carbon emission disclosure can also be seen as a form of accountability and an effort for the company to be accepted in its surrounding environment (legitimacy theory). Hence, despite the decrease in PBV caused by carbon emission disclosure, companies still fulfill several sustainable development goals, including economic and social development, in line with the Sustainable Development Goals (SDGs).

Eco-efficiency on Firm Value (PBV) Testing

The t-test results indicate that the eco-efficiency variable has a significant negative impact on firm value (PBV), with a coefficient value of -2.870 and a significance of $0.006 < 0.05$. This finding is consistent with the research by Damas et al (2021) and Rahmianingsih & Malau (2021), which also show that eco-efficiency has a negative effect on firm value. This result suggests that the initial implementation of eco-efficiency may require significant investment and can reduce earnings per share (EPS) in the short term. However, in the long run, eco-efficiency will support corporate sustainability and resource usage efficiency.

The company supports several theories, including agency theory, stakeholder theory, legitimacy theory, signaling theory, and the resource-based view. Despite the company disclosing eco-efficiency, its negative impact is due to significant costs incurred, around Rp 80 million. This reduces net income and earnings per share (EPS), causing eco-efficiency to have a negative impact on firm value (PBV). The ISO 14001 certificate on environmental management is considered to reduce profitability and returns for investors due to increased costs from implementing environmental management without direct perceived benefits.

Nevertheless, the company still fulfills several sustainable development goals, including economic and social development in line with Sustainable Development Goals (SDGs). This includes job creation, responsible implementation of eco-efficiency for environmental sustainability, and resource usage efficiency.

Debt to Equity Ratio on Firm Value (PBV) Testing

The t-test results indicate that the debt-to-equity ratio variable has a coefficient value of 1.819 with a significance level of $0.075 > 0.05$. This suggests that the debt-to-equity ratio does not have a significant influence on firm value (PBV). It indicates that the capital structure with the use of debt does not affect the company's value. External factors such as political conditions, the exchange rate of the rupiah against the dollar, inflation, Bank Indonesia interest rates, Federal Reserve interest rates, and public demand for shares are more dominant in determining the company's market price. This finding is consistent with the research by Komarudin & Affandi (2019) and Sondakh et al (2019). In conclusion, the debt-to-equity ratio does not influence the company's value, and it needs to be acknowledged that external factors play a larger role in determining the market value of the company.

Firm Size on Firm Value (PBV) testing

The t-test results show that the firm size variable has a coefficient value of -5.309 with a significance level of $0.00 < 0.05$. This indicates that firm size has a negative effect on firm value (PBV). A large company size sends a negative signal, in line with signaling theory, to investors or potential investors. Large company size can reduce supervision efficiency and affect earnings per share, ultimately influencing the company's value. This may lead investors to believe that companies with large total assets tend to retain more profits rather than distributing them as dividends to shareholders. This finding is consistent with the research by Ramdhonah et al (2019) and Octavus & Adiputra (2020), which also show that firm size has a negative effect on firm value. In conclusion, a large company size can be a factor that reduces firm value, especially if investors perceive it as a negative signal regarding profit policies and management efficiency.

Return on Asset on Firm Value (PBV) testing

The t-test results indicate that the return on asset variable has a coefficient value of -1.941 with a significance level of $0.058 > 0.05$. This suggests that return on asset does not have a significant influence on firm value (PBV). It indicates that a high ROA does not always reflect a good company value in the eyes of investors. This study supports the view that there are many other factors influencing investor decisions, including external factors such as political issues, currency exchange rates, inflation, Bank Indonesia interest rates, Federal Reserve interest rates, and public demand for shares. Thus, these results align with findings in previous research, as conducted by Sondakh et al. (2019). In conclusion, a high return on asset value cannot be a single indicator to assess the goodness or badness of a company in the eyes of investors because many external factors also play a crucial role in investment decision-making.

Testing Sales Growth on Firm Value (PBV)

The t-test results show that the sales growth variable has a coefficient value of 0.475 with a significance level of $0.637 > 0.05$. This indicates that sales growth does not have a significant

influence on firm value (PBV). This finding suggests that sales growth is not the main factor influencing investor decisions to invest, at least over the past five years. This result aligns with previous research by Rakasiwi et al. (2017) and Herninta (2019). In conclusion, sales growth in the observed time period does not have a significant impact on investor assessments of the company's value. Thus, it can be concluded that, based on the t-test results, sales growth is not a driving factor for investors to invest, and other factors may be more dominant in investment decision-making.

CONCLUSION

The study's findings reveal diverse impacts of various factors on firm value (PBV) among companies in the Sri Kehati index. Green Innovation, particularly in products and processes, positively influences firm value, suggesting that environmentally friendly innovations can create added value and competitive advantages. However, Green Intellectual Capital, encompassing human, structural, and relational aspects, shows no significant impact on firm value, indicating that these factors may not substantially influence investors' assessments. Interestingly, both Carbon Emission Disclosure and Eco-Efficiency implementation have significant negative impacts on firm value in the short term, likely due to associated costs. Nevertheless, these practices are expected to yield long-term benefits and reflect the companies' environmental responsibility. Regarding financial indicators, the study found that company size negatively impacts firm value, possibly due to perceptions of inefficiency in larger firms. Conversely, the Debt-to-Equity Ratio, Return on Asset, and Sales Growth do not significantly influence firm value, suggesting that investors may not prioritize these factors in their valuation of companies in the Sri Kehati index. These findings provide valuable insights into the complex relationship between sustainability practices, financial performance, and firm value in the context of environmentally conscious companies.

Suggestion

Based on our findings, we propose several recommendations for various stakeholders. For companies, given the positive impact of Green Innovation on firm value, it is crucial to implement regular sustainability reporting as a responsibility to stakeholders. This practice not only enhances transparency but also allows companies to showcase their environmental initiatives effectively. Furthermore, although Green Intellectual Capital did not show a significant direct impact on firm value in our study, we suggest that companies develop a comprehensive environmental roadmap. This roadmap should encompass the application of environmental management in company operations, supported by green intellectual capital resources. The long-term benefits of such practices, as indicated by our findings on Carbon Emission Disclosure and Eco-Efficiency, justify this approach despite short-term costs.

For investors, our results highlight the importance of considering a company's disclosure related to Sustainability Development Goals (SDGs) when making investment decisions. The significant impact of environmental factors on firm value underscores the

need for investors to choose investments that support the realization of sustainable companies. This approach demonstrates a commitment not only to financial gains but also to environmental responsibility, aligning with the growing importance of sustainability in corporate valuation.

In the academic sphere, our study's emphasis on environmental factors suggests a need for integrating these concepts into educational frameworks. We recommend implementing environmental management systems, including ISO 14001 standards, in academic environments. Despite the non-significant impact of Green Intellectual Capital on firm value in our study, we believe it's crucial to integrate green intellectual capital and green innovation into academic curricula, accounting seminars, and lecture materials. This integration can provide students with additional insights and prepare them for a business world increasingly focused on sustainability.

Moreover, introducing the concepts of carbon emission disclosure and efficiency practices in an academic context can help shape students into environmentally conscious resources. This approach aligns with our findings on the long-term importance of these practices, even if their short-term impact on firm value appears negative. By implementing these suggestions, stakeholders can contribute to a more sustainable business environment, reflecting the complex relationships between environmental practices and firm value revealed in our study.

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