

The Impact of Green Intellectual Capital Disclosure and Environmental Performance on Financial Performance: The Moderating Role of Firm Size

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ABSTRACT

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Introduction: Companies operating in the Consumer Non- Cyclical sector are mainly engaged in manufacturing and shipping products. Having a continuous and high volume of consumption, their operational activities often cause great environmental pressure. Hence, the importance of environmental responsibility and the importance of intellectual resource management to improve financial performance in a sustainable business context.

Objectives: The study analyses how green intellectual capital (GIC) disclosure and environmental performance on financial performance. This study also analyses how firm size can moderate the connection between corporate environmental efforts and financial performance in Consumer Non-Cyclical sector companies.

Methods: A quantitative methodology is adopted in this research, using previously published financial and sustainability reports. Panel data regression was employed as the method of analysis and Moderated Regression Analysis (MRA) to assess interaction effects. EVIEWS 12 was used to perform statistical computations and hypothesis testing.

Results: Findings reveal that GIC disclosure does not significantly impact financial performance. In contrast, environmental performance and firm size has a significant positive effect on financial performance. Notably, the moderation analysis indicates that larger firms tend to weaken the positive association connecting sustainability performance to corporate earnings.

Conclusions: This finding shows, from a total sample of 41 Consumer Non-Cyclical firms on IDX (2021–2023), the results show that environmental performance and firm size positively influence financial performance, but GIC disclosure has no significant effect. Moreover, firm size weakens the connection involving environmental performance and financial performance. The study explains the strategic role of the environment and shows that the effectiveness of sustainability efforts varies by firm scale. The study addresses the importance of improving and standardizing the methods used to disclose GIC.

Keywords: Green Intellectual Capital, Environmental Performance, Firm Size, Financial Performance

INTRODUCTION

The rapid acceleration of globalization and market liberalization has underscored the critical importance of corporate financial performance in sustaining competitive advantage. In parallel, environmental responsibility has transitioned from a peripheral concern to a central pillar of strategic planning. As companies increasingly face pressure to operate sustainably, eco-oriented business models have become instrumental in strengthening customer loyalty, mitigating

regulatory risks, and fostering investor trust (Sari & Sutopo, 2023). Financial performance, therefore, not only reflects profitability but also signals how effectively a firm aligns business, sustainability, and community goals with its operations.

In Indonesia, firms IDX are obligated to present transparent disclosures, making financial reports vital for stakeholder decision-making (Wardoyo, 2022; Nahor et al., 2021). Return on Assets (ROA) is frequently adopted to measure profitability and management efficiency (Sari & Sumaryati, 2020; Kayakus et al., 2023), with higher ROA indicating more effective asset utilization (Haryanto, 2019).

Despite its importance, financial performance remains volatile in key sub-sectors of the Consumer Non-Cyclicals industry. For instance, ICBP recorded a substantial final profit margin surge of 1,274% in Q2 2023, reaching IDR 2.1 trillion, compared to IDR 155 billion in Q2 2022. This increase was driven by rising sales in instant noodles, dairy products, snacks, and nutrition segments, coupled with reduced financial expenses (Setiawati, 2023). Conversely, PT Garudafood Putra Putri Jaya Tbk posted a sharp 55% decline, attributed to falling packaged food and beverage sales. Similar inconsistencies appear across other firms such as CPIN, JPFA, and KEJU, while PT Unilever Indonesia Tbk (UNVR) experienced a 10.51% drop in net income due to geopolitical tensions that disrupted domestic sales (Tonce & Haffiyan, 2024).

These fluctuations highlight the need to explore underlying factors influencing financial outcomes. This study draws upon Stakeholder Theory and the Resource-Based View (RBV) (Borchert, 2008; Anser et al., 2024; Fitri et al., 2024), suggesting that firms not only cater to shareholders but must also balance ethical, social, and environmental responsibilities. RBV further emphasizes the strategic value involving non-tangible capital, such as eco-intellectual resources in generating sustainable competitive advantages (Zalfa & Novita, 2023).

The first focus of this research is GIC, which integrates environmental concerns into intellectual capital frameworks (Chandra & Augustine, 2019). While studies by Putri & Murtanto (2023) and Suzan & Putri (2023) confirm its positive influence on profitability, Sahid & Henny (2023) find no significant relationship, citing the limitations of GIC in asset optimization. The second construct, Environmental Performance, reflects the firm's ecological accountability, as measured by Indonesia's PROPER index (PERMENLHK No. 1/2021). Empirical findings remain mixed: while Sari & Sutopo (2023) and Ezhilarasi (2023) reveal positive associations with economical final outcomes.

Finally, Firm Size is incorporated serving as an interaction factor. According to Putri et al. (2024) and Youssef et al. (2023), larger firms often exhibit superior financial outcomes due to greater resources. In contrast, Mujiyati & Linuha (2023) suggest firm size may not always significantly influence performance. Firm size is determined by the total assets, equity, and revenue it possesses, which ultimately reflects the scale of the company (Kristanti et al., 2024). Lubis & Henny (2022) posit that larger firms can leverage economies of scale in environmental initiatives, potentially enhancing market reputation and investor appeal. Considering these empirical inconsistencies and observed industry phenomena, this research seeks to examine the connection involving GIC, Environmental Performance, and Financial Performance, with Firm Size as a moderating variable focusing on companies in the staple consumption sector recorded on the IDX.

OBJECTIVES

This research endeavors to examine how the articulation of GIC and the implementation of environmentally conscious practices contribute to shaping the financial trajectory of firms within the basic consumer segment included in the IDX listings. In addition, it aims to explore the extent to which organizational scale expressed through Firm Size acts as a modifying force in the dynamic involving Environmental Performance and Financial Performance. By employing theoretical lenses from both stakeholder-based framework and internal resource theory, this study aspires to offer a nuanced interpretation of how eco-intellectual strategies and organizational capabilities interact to influence firm profitability and sustainability in a rapidly evolving corporate ecosystem.

Stakeholder Theory

Stakeholder theory was originally introduced by Freeman in 1984. According to Freeman and McVea (2015), stakeholders encompass any individuals or groups who contribute to influencing or are influenced by an organization's operations outcomes or overall success. The stakeholder theory underscores that a company's operations should not solely serve internal interests, but must also generate value for all its stakeholders (Saraswati et al., 2024).

Resource Based View (RBV) Theory

According to Borchert (2008), the resource-based perspective offers a conceptual basis for strategic decision-making that emphasizes leveraging an organization's critical assets both tangible and intangible to establish and sustain a distinctive competitive edge. This theory emphasizes the critical role of resources, both tangible and intangible. According to Gallegos et al. (2021), competitive advantage arises when a firm possesses heterogeneous, valuable, rare, and hard-to-imitate resources.

Financial Report

Financial statements provide structured insights into a company's performance and financial standing, essential for evaluating its present and future condition (Suzan & Putri, 2023). These reports help users assess company health, serving functions such as screening, understanding, forecasting, diagnosis, and evaluation (Hidayat, 2018).

Financial Performance

Financial the level of performance illustrates the firm's robustness and goal achievement. According to Oktavianus et al. (2022), it reflects how well management fulfills its responsibilities, particularly in utilizing assets efficiently during operations. This success is often measured by the net profit reported in financial statements (Suzan & Heryustitriaspatri, 2019). The Return on Assets (ROA) formula, as stated by Wardoyo (2024), is:

$$\text{ROA} = (\text{Earnings Before Tax} / \text{Total Assets}) \times 100\%$$

Green Intellectual Capital

According to Suharman et al. (2023), GIC reflects the corporation's focus on stakeholder relationships by protecting their interests and reputation. This study assesses it through five key disclosure aspects. Knowledge-based assets refers to intangible assets in the form of knowledge and information resources that contribute to enhancing a firm's competitiveness and performance (Kurniawan & Muharam, 2021).

Environmental Performance

Environmental performance plays a vital role in preserving ecological sustainability and addressing the adverse impacts of business operations. It reflects how far a company's activities affect the environment (Dianty & Nurrahim, 2022) and represents the outcome of efforts made to manage and mitigate those environmental impacts (Bednárová et al., 2019).

Firm Size

Firm size is a measure utilized for grouping businesses based on their scale (Purba & Candradewi, 2019). According to Rossa et al. (2023), it reflects whether a company is large or small, typically assessed through the value of total assets.

METHODS

This research employs a quantitative method, where numerical data is statistically analyzed to address the research objectives (Sugiyono, 2017). The variables include GIC comprising GHC, GSC, and GRC measured using a disclosure index. Firm size is measured using the use of total assets' LN to minimize data variance (Kurniawan & Muharam, 2021). The population consists of 130 Consumer Non-Cyclicals companies on IDX from 2021 to 2023. Purposive sampling was employed to select firms meet the following criteria: consistent publication of financial and sustainability reports, active participation in the PROPER program, and status as parent companies. Figure 1 details the criteria for selecting samples applied in this research,

Figure 1 Sampling Criteria

Determination of Sample Criteria	Number
Consumer Non-Cyclicals Sector Companies listed on the Indonesia Stock Exchange in the 2021-2023 period.	130
Consumer Non-Cyclicals Sector Companies that do not consistently publish financial reports listed on the IDX in the 2021-2023 period.	(31)
Consumer Non-Cyclicals Sector Companies that do not publish sustainability reports in the 2021-2023 period.	(4)
Consumer Non-Cyclicals Sector Companies that do not consistently follow PROPER listed on the IDX in the 2021-2023 period.	(53)
The company is not a parent company	(1)
Total Sample	41
Number of Observations (41 x 3 Years)	123

Classical assumption tests were conducted, including multicollinearity (threshold: correlation < 0.8) and heteroskedasticity using probability values (> 0.05 indicates homoskedasticity). Panel data regression was applied with three estimation techniques including Common Effect, Fixed Effect, and Random Effect models. Model selection relied on Chow, Hausman, and Lagrange Multiplier tests. Moderated Regression Analysis (MRA) was employed to examine the moderating role of Firm Size association between sustainability performance and financial outcomes. The regression equation includes interaction terms. Hypothesis testing was performed through R² (coefficient of determination), F-test (simultaneous influence), and t-test (individual influence). Significance was determined at a 5% threshold.

RESULTS

Multicollinearity Test

Table 1 Multicollinearity Test

	X1	X2	M
X1	1.000000	0.235362	-0.178722
X2	0.235362	1.000000	-0.123572
M	-0.178722	-0.123572	1.000000

The multicollinearity test as shown in table 1, results show that no variable correlations exceed 0.8, indicating no multicollinearity in this study.

Heteroscedasticity test

Table 2 Heteroscedasticity test

Variables	Coeff	Std.E	t-Stat	Prob.
C	0.466635	0.923546	0.505264	0.6148
X1	-0.021979	0.079763	-0.275552	0.7836
X2	0.004391	0.297946	0.014738	0.9883
M	-1.12E-05	2.91E-05	-0.382954	0.7028
MX2	-8.53E-07	9.38E-06	0.090964	0.9278

The heteroscedasticity test in table 2 above outcomes, as reflected in the table above, reveal probability values exceeding 0.05. indicating that the regression model does not suffer from heteroscedasticity.

Chow test

Table 3 Chow Test

Effects Test	Statistic	d.f	Prob.
Cross-S F	2.391832	(40,78)	0.0005
Cross-S Chi-Square	98.457435	40	0.0000

Table 3 show the cross-section F value of $0.0005 < 0.05$ indicates H_0 is rejected, so the Fixed Effect Model (FEM) is the appropriate choice.

Hausman test

Table 4 Hausman Test

Test Summary	Chi-Sq. S	Chi-Sq. d.f	Prob.
Cross-S R	10.423014	4	0.0339

Table above 4 reveals a cross-section random probability of 0.0339, below the 0.05 threshold, indicating rejection of H_0 and acceptance of H_a . Hence, the Hausman test confirms the FEM as the preferred estimator.

Fixed Effect Model Test

Table 5 FEM test

Variables	Coeff	Std.E	t-Stat	Prob.
C	-4.850371	2.688535	-1.804094	0.0751
X1	-0.082189	0.232197	-0.353963	0.7243
X2	1.868444	0.867350	2.154197	0.0343
M	0.000174	8.48E-05	2.054100	0.0433
MX2	-6.48E-05	2.73E-05	-2.372752	0.0201

Effect Specification

Cross-S F (dummy var)			
R-Sq	0.570228	Mean Dep Var	0.094935
Adjusted R-Sq	0.327792	S.D. Dep Var	0.114012
S.E. of Regr	0.093476	Akaike inf cn	-1.625989
Sum Sq Resid	0.681548	Schwarz cn	-0.597141
Log Ld	144.9983	Hannan-Q cr	-1.208073
F-Stat	2.352080	Durbin-W Stat	2.338497
Prob (F-Stat)	0.000482		

As shown in table 5 above Using Fixed Effect Model panel regression on IDX on Consumer Non-Cyclicals firms (2021–2023), the relationship among Green Intellectual Capital (X1), Environmental Performance (X2), Financial Performance (Y), and Firm Size (M) as a moderator is expressed as:

$$Y = -4.850 - 0.082(X1) + 1.868(X2) + 0.0001(M) + \varepsilon$$

Key insights:

1. Intercept (-4.850): Baseline financial performance when all predictors are zero.
2. X1 (-0.082): Less GIC disclosure slightly lowers financial outcomes.
3. X2 (1.868): Better environmental performance boosts financial results.
4. M (0.0001): Larger firms show marginal financial improvement.

The moderation regression model yields the following insights:

1. The constant (-4.850) implies that when the dependent variable, firm financial performance, is zero, the baseline value is -4.850%.
2. The interaction term coefficient for Firm Size × Environmental Performance (-6.48) indicates that a one-unit decrease in this interaction leads to a 6.48% decline in financial performance, assuming other variables remain unchanged.

The adjusted R-squared value of 0.327792 indicates that the independent variables Green Intellectual Capital disclosure, Environmental Performance, and Firm Size (as a moderator) collectively explain approximately 32.7% of the variance in firm financial performance. The remaining 67.3% is attributed to factors beyond the scope of this study.

The F-test result shows a Prob(F-stat) of 0.000482, which is below the 0.05 threshold. This means H_a is accepted and H_o is rejected, confirming that the findings support the proposed hypothesis. It indicates that Green Intellectual Capital disclosure and Environmental Performance, moderated by Firm Size, have a joint significant effect on the company's financial performance.

Partial Test and Moderation Effect Test

Table 6 P-Test ME-Test

Variables	Coeff	Std.E	t-Stat	Prob.
C	-4.850371	2.688535	-1.804094	0.0751
X1	-0.082189	0.232197	-0.353963	0.7243
X2	1.868444	0.867350	2.154197	0.0343
M	0.000174	8.48E-05	2.054100	0.0433
MX2	-6.48E-05	2.73E-05	-2.372752	0.0201

Based on the t-test results in Table 6, the individual influence of each independent variable on financial performance can be interpreted as follows:

1. The regression coefficient for Green Intellectual Capital disclosure is -0.082189, with a p-value of 0.7243 (> 0.05). This suggests that X_1 does not exert a statistically significant effect on firm financial performance.
2. The Environmental Performance variable (X_2) has a coefficient of 1.868444 and a p-value of 0.0343 (< 0.05), indicating a positive and statistically relevant correlation with financial outcomes.
3. The moderating variable, Firm Size (M), shows a coefficient of 0.000174 and a p-value of 0.0433 (< 0.05), meaning that it also has a significant effect on financial performance.

Referring to Table 6, the interaction term between Firm Size (M) and Environmental Performance (X_2) produces a p-value of 0.0201 (< 0.05) and a negative coefficient of -6.48. This indicates that Firm Size significantly moderates the link between Environmental Performance and Financial Performance, though in a dampening direction suggesting that as Firm Size increases, the supportive positive effect of Environmental Performance tends to weaken.

DISCUSSION

The results of this study indicate that GIC disclosure does not have a significant effect on corporate financial performance, as reflected by the coefficient value ($\beta = -0.082189$) and probability ($p = 0.7243$). This finding is in line with the study by Marilis et al. (2024), which also found no significant association between GIC disclosure and firm profitability. Similarly, Majidah and Aryanty (2023) concluded that GIC disclosure does not influence financial performance in Indonesian listed companies. Sukirman and Dianawati (2023) also observed that intellectual capital disclosure in general, including GIC, had no significant effect on profitability measures. These consistent findings suggest that current GIC disclosures in Indonesia may not yet be recognized as valuable by investors.

In contrast, the study by Mensah and Tang (2021) argued that intellectual capital should serve as a competitive asset, but empirical support remains limited in the Indonesian context. This divergence from the Resource-Based View (RBV) theory implies that while GIC is conceptually valuable, its real-world financial impact may depend on how well it is integrated into strategic management. Environmental performance, measured using the PROPER rating, showed a notable and favorable impact on financial outcomes ($\beta = 1.868444$, $p = 0.0343$). This supports the findings of Azwani et al. (2025), who stated that companies participating actively in PROPER tend to gain better stakeholder trust and market value. Ezhilarasi (2023) also confirmed that firms with strong environmental compliance report higher financial gains. In a similar vein, Lubis and Henny (2022) found that environmentally responsible firms attract investor confidence, which translates into enhanced financial metrics. Additionally, Sari and Sumaryati (2020) reported a positive association between environmental performance and long-term profitability, particularly in regulated industries.

This research supports stakeholder theory, which emphasizes that companies benefit financially when they maintain strong relationships with stakeholders through responsible environmental behavior. As demonstrated by the consistent PROPER performance of PT Austindo Nusantara Jaya Tbk (ANJT), high environmental ratings signal accountability, which may not immediately raise ROA but supports long-term financial stability. Firm size also significantly affects financial performance ($\beta = 0.000174$, $p = 0.0433$), confirming the hypothesis that larger firms enjoy more stable profits. Fazria et al. (2025) emphasized that big companies benefit from broader access to capital and resources, enabling greater operational efficiency. Afriani et al. (2021) likewise found that firm size positively influences financial outcomes due to better economies of scale and investor confidence.

Lastly, firm size was found to moderate the association between environmental effectiveness and financial outcomes in a negative direction ($\beta = -6.84E-05$, $p = 0.0201$). This suggests revealing that the greater the scale of the company, the less significant the role of environmental performance on profitability. This result is consistent with Siswanto and Soewarno (2018), who argued that smaller firms may gain more financially from good environmental practices due to their agility and faster decision-making processes. However, this finding contradicts Lubis and Henny (2022), who found that larger firms, with more substantial environmental investments, can leverage their sustainability initiatives for stronger financial outcomes, especially in the eyes of stakeholders and regulators.

CONCLUSION

This research explored the influence of green intellectual capital disclosure and environmental performance on the financial outcomes of firms, with firm size acting as a moderating dimension. The analysis focused on 41 firms operating in the Non-Cyclical Consumer sector on IDX from 2021 to 2023, producing 123 firm-year data points. The empirical investigation employed panel data regression alongside Moderated Regression Analysis (MRA) using EViews 12. The results from the joint significance test demonstrate that green intellectual capital disclosure, environmental performance, and firm size collectively contribute to shaping financial performance. However, further individual (partial) testing revealed divergent effects. Disclosure of GIC exhibited no measurable impact on financial performance, whereas environmental performance and firm size independently showed a significant and positive association with financial outcomes.

Interestingly, the moderating test revealed that firm size dampens the strength of the linkage between environmental performance and financial outcomes, suggesting that the scale of a company can influence how effectively environmental initiatives translate into financial returns. These findings emphasize that environmental responsibility remains a key strategic asset in driving corporate value, particularly within sustainability-conscious sectors. Meanwhile, the limited impact of green intellectual capital disclosure may indicate a gap between disclosure practices and their perceived value by investors or markets. Future studies may benefit from further examining the quality, depth, and standardization of such disclosures across industries and regions.

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