


## Sustainable Growth as a Moderator of the Relationship Between Green Intellectual Capital and Environmental Performance with Financial Performance

Yussi Dwi Luthfiah<sup>1</sup>, Fitri Wulandari<sup>2</sup>, Silvi Rahmadi<sup>3</sup>, Sri Agustina<sup>4</sup>

Fakultas Ekonomi dan Bisnis, Universitas Pamulang,  
Jl. Raya Puspittek, Buaran, Kec. Pamulang, Kota Tangerang Selatan, Banten 15310

Article Info	ABSTRACT
<p><b>Keywords:</b> Financial Performance, Sustainable Growth, Green Intellectual Capital, Kinerja Lingkungan.</p>	<p>This study aims to analyze and provide empirical evidence that sustainable growth moderates the relationship between green intellectual capital and environmental performance with financial performance. This research employs a quantitative associative approach using secondary data obtained from the Indonesia Stock Exchange (IDX) website, specifically from the official websites of the listed companies. The population consists of agricultural sector companies listed on the Indonesia Stock Exchange from 2019 to 2023. The sample selection was conducted using a purposive sampling method, resulting in 95 company-year observations that met the specified criteria. The results show that green intellectual capital has a significant effect on financial performance, while environmental performance does not significantly affect financial performance. Regarding the moderation test, the findings indicate that sustainable growth is able to moderate the relationship between green intellectual capital and financial performance. However, sustainable growth does not moderate the relationship between environmental performance and financial performance.</p>
<p>This is an open access article under the <a href="https://creativecommons.org/licenses/by-nc/4.0/">CC BY-NC</a> license</p> 	<p><b>Corresponding Author:</b> Yussi Dwi Luthfiah Fakultas Ekonomi dan Bisnis, Universitas Pamulang Jl. Raya Puspittek, Buaran, Kec. Pamulang, Kota Tangerang Selatan, Banten 15310 <a href="mailto:16yussidll@gmail.com">16yussidll@gmail.com</a></p>

### INTRODUCTION

Financial performance refers to an analytical measure used to evaluate a company's performance, where improved performance adds value to the company and enhances investor confidence in purchasing its equity shares. In order to attract existing and potential investors, companies must consistently maintain and improve their financial performance. Financial performance represents a formal effort to assess the efficiency and effectiveness of a company in generating profits and managing cash positions (Utami & Mulyana, 2021). The better the financial performance, the more attractive the company becomes to investors, potentially increasing the overall return.

A pressing global issue today is environmental awareness, which has become a central topic among both the public and business communities. To ensure long-term business sustainability, companies must account for their resources and assets. Green intellectual

capital represents a field of knowledge and strategic orientation focused on environmental conservation as a competitive advantage (Tonay & Muwarningsari, 2019).

Green intellectual capital reflects a company's intangible assets, including knowledge, policies, experience, and innovations in environmental protection (Firmansyah, 2017). This compels companies to pay attention to their available resources and assets, both tangible and intangible, used to support business processes amid competitive pressures. According to Chandra & Augustine (2019), acknowledging the environment means the company is forward-looking and understands that business activities inevitably require environmental support. Prior research by Landion & Lastanti (2019) confirmed a significant relationship between intellectual capital and financial performance. Similarly, Renaldo & Augustine (2022) found that green intellectual capital has a positive effect on financial performance. In contrast, Maulana Sahid & Henny I (2023) reported no such effect, which is also supported by Winingsih & Suropto (2025).

Environmental performance refers to how effectively companies manage environmental impacts, as disclosed in annual reports. Higher environmental performance encourages investor interest, as investors tend to favor companies that transparently disclose environmental information. These disclosures act as signals to investors. Thus, corporate environmental responsibility may influence shareholder returns (Purwaningsih, 2017). One form of this responsibility is publishing environmental performance reports for stakeholders. Such reports have become vital components in integrated reporting alongside financial statements (Putri & Hikmah, 2021).

Several studies have examined the link between environmental performance and financial performance. Andreffe & Kurniawati (2024), Ramadhani et al. (2022), and Putri & Arsjah (2023) confirmed a positive relationship. However, research by Sianturi & Purwatiningsih (2024), Hutasoit & Sembiring (2020), and Angelina & Nursasi (2021) found no such effect.

Given these inconsistent findings, this study aims to re-examine the relationship using a different research object and period. Furthermore, this study extends the work of Febriani (2022) by introducing sustainable growth as a moderating variable. It investigates green intellectual capital and environmental performance as independent variables and financial performance as the dependent variable. Based on this background, the researcher is interested in conducting a study titled:

“Sustainable Growth as a Moderator of the Relationship between Green Intellectual Capital and Environmental Performance toward Financial Performance (An Empirical Study on Agricultural Sector Companies Listed on the Indonesia Stock Exchange for the Period 2019–2023)”

## METHODS

This study adopts an associative quantitative research design. According to Sugiyono (2017), the quantitative research method is based on positivist philosophy and is used to examine specific populations or samples. Data collection is conducted using research instruments, and data analysis is performed quantitatively or statistically with the aim of testing predetermined

hypotheses. The type of data used in this research is secondary data, which refers to data not obtained directly from the source, but through intermediaries such as other individuals or documents.

The hypothesis testing analysis in this study aims to examine the influence of green intellectual capital (GIC) and environmental performance on financial performance, with sustainable growth serving as a moderating variable. The data analysis methods employed include descriptive statistical analysis, panel data regression analysis, and Moderated Regression Analysis (MRA), along with the coefficient of determination ( $R^2$ ), simultaneous test (F-test), and partial test (t-test). Data were processed using EViews version 12.

The structural regression equations are formulated as follows:

$$\text{Equation 1: } Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

$$\text{Equation 2: } Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 M + \beta_4 (X_1 M) + \beta_5 (X_2 M) + \varepsilon$$

Where:

Y: Financial Performance

$\alpha$ : Constant (intercept)

$X_1$ : Green Intellectual Capital (GIC)

$X_2$ : Environmental Performance

M: Sustainable Growth

$X_1 * M$ : Interaction between Green Intellectual Capital and Sustainable Growth

$X_2 * M$ : Interaction between Environmental Performance and Sustainable Growth

$\beta_1 - \beta_5$ : Regression Coefficients

$\varepsilon$ : Error term, representing the estimation error in the model

The population in this study consists of agricultural sector companies listed on the Indonesia Stock Exchange (IDX) during the period 2019–2023, totaling 95 observations. The sampling technique used is purposive sampling, resulting in a final sample of 19 companies, with a total of 95 data points included in the analysis.

**Table 1.** Measurement of Variables

Variable Code	Variable Name	Measurement	Sources
Y	Financial Performance (PBV)	PBV = Market Price per Share / Book Value per Share	Agustina et al., 2024
X1	Green Intellectual Capital	GICI = $n / k$ (Number of items disclosed divided by total disclosure items)	Chandra & Augustine, 2019
X2	Environmental Performance	Disclosure Index = Total Items Disclosed / Maximum Disclosure Items	Daromes & Kaliwarang, 2020
M	Sustainable Growth	SGR = $b(NP/S)(1+D/E)b(NP/S)(1 + D/E) / A/S$	Florensia et al., 2022

## RESULTS AND DISCUSSION

To determine the most appropriate model among the three types, common effect model, fixed effect model, and random effect model, a series of tests were conducted, namely the Chow

test, Hausman test, and Lagrange Multiplier test. The results of the estimations for Equation 1 and Equation 2 can be seen in Table 1, Table 2, Table 3, Table 4, and Table 5.

**Table 2.** Chow Test equation 1

Redundant Fixed Effects Tests  
 Equation: Untitled  
 Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.468518	(18,74)	0.0000
Cross-section Chi-square	69.891250	18	0.0000

**Table 3.** Chow Test equation 2

Redundant Fixed Effects Tests  
 Equation: Untitled  
 Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.498068	(18,71)	0.0001
Cross-section Chi-square	60.315541	18	0.0000

**Table 4.** Hausman test equation 1

Correlated Random Effects - Hausman Test  
 Equation: Untitled  
 Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.780701	2	0.0075

**Table 5.** Hausman test equation 2

Correlated Random Effects - Hausman Test  
 Equation: Untitled  
 Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	18.971909	5	0.0019

**Tabel 6.** Results of the Best Panel Data Regression Model

No	Method	Testing	Result
1	<i>Chow-Test</i>	<i>Common Effect Model vs Fixed Effect Model</i>	<i>Fixed Effect Model</i>
2	<i>Hausman Test</i>	<i>Fixed Effect vs Random Effect</i>	<i>Fixed Effect Model</i>

Source: Processed by Eviews 12 (2024)

This study has successfully passed the classical assumption tests. Therefore, the next step is to perform hypothesis testing to evaluate the proposed research hypotheses. The results of the hypothesis testing are presented as follows:

**Tabel 7** uji f

R-squared	0.538698	Mean dependent var	0.999842
Adjusted R-squared	0.414022	S.D. dependent var	0.764114
S.E. of regression	0.584923	Akaike info criterion	1.957621
Sum squared resid	25.31801	Schwarz criterion	2.522163
Log likelihood	-71.98702	Hannan-Quinn criter.	2.185738
F-statistic	4.320774	Durbin-Watson stat	1.177000
Prob(F-statistic)	0.000002		

**Tabel 8** uji t

Dependent Variable: FF  
 Method: Panel Least Squares  
 Date: 05/25/25 Time: 15:50  
 Sample: 2019 2023  
 Periods included: 5  
 Cross-sections included: 19  
 Total panel (balanced) observations: 95

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.201634	0.543428	-0.371041	0.7117
GIC	2.596830	0.997588	2.603109	0.0112
KL	-0.571246	0.495773	-1.152233	0.2529

Subsequently, the results of the Moderated Regression Analysis (MRA) are presented to address Hypotheses 3 and 4. The MRA test results are as follows:

Tabel 9 uji MRA

Dependent Variable: FF  
 Method: Panel Least Squares  
 Date: 05/25/25 Time: 15:49  
 Sample: 2019 2023  
 Periods included: 5  
 Cross-sections included: 19  
 Total panel (balanced) observations: 95

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.075165	0.716419	1.500750	0.1379
GIC	-0.908625	1.212612	-0.749312	0.4561
KL	-0.138844	0.497151	-0.279279	0.7808
SGR	-0.426989	0.478670	-0.892032	0.3754
M1	1.684523	0.687144	2.451485	0.0167
M2	-0.537001	0.318297	-1.687110	0.0960

Effects Specification

Cross-section fixed (dummy variables)			
R-squared	0.703232	Mean dependent var	0.999842
Adjusted R-squared	0.607096	S.D. dependent var	0.764114
S.E. of regression	0.478962	Akaike info criterion	1.579675
Sum squared resid	16.28773	Schwarz criterion	2.224865
Log likelihood	-51.03458	Hannan-Quinn criter.	1.840380
F-statistic	7.314977	Durbin-Watson stat	1.418274
Prob(F-statistic)	0.000000		

## Discussion

### The Effect of GIC on Financial Performance

Based on the results of data analysis, the green intellectual capital (GIC) variable has a significant effect on financial performance. The t-test shows a probability (significance) value of  $0.0112 < 0.05$ , indicating that GIC influences financial performance. Therefore, Hypothesis H1 is accepted, confirming the first hypothesis.

These findings differ from those of Maulana Sahid & Henny I (2023) and Winingsih & Suropto (2025), who stated that GIC has no influence on financial performance. Although GIC reflects a company's concern for the environment, in practice, not all companies are able to convert this environmental concern into tangible financial gains. This aligns with the view that the disclosure of GIC is often more oriented toward fulfilling social legitimacy rather than serving as a strategy for improving economic efficiency. Consequently, the GIC approach does not always reflect a company's economic effectiveness.

### The Effect of Environmental Performance on Financial Performance

The results of the data analysis indicate that environmental performance does not significantly affect financial performance. The t-test yields a probability (significance) value of  $0.2529 > 0.05$ , suggesting that environmental performance has no influence on financial performance. Thus, Hypothesis H2 is rejected, meaning the second hypothesis is not supported.

This result contrasts with prior studies by Subakhtiar et al. (2022) and Dita & Ervina (2021), which found that environmental performance positively affects financial performance. Companies with strong environmental performance tend to also demonstrate strong financial

performance. This can be explained through the lens of legitimacy theory and signaling theory, in which companies actively engaged in environmental management receive more positive public perceptions. Such positive perceptions can enhance trust in the company, thereby improving its financial performance.

### **Sustainable Growth Moderates the Relationship Between GIC and Financial Performance**

The test results show that sustainable growth significantly moderates the relationship between GIC and financial performance. The MRA test reveals a probability (significance) value of  $0.0167 < 0.05$ , indicating that sustainable growth serves as a moderating variable in this relationship. Therefore, Hypothesis H3 is accepted, confirming the third hypothesis.

Companies that are able to manage environmentally oriented intellectual capital effectively send a positive signal to the market. This signal indicates that the company is not only focused on short-term profits but also on long-term sustainability. When this signal is combined with the company's ability to maintain a strong Sustainable Growth Rate (SGR), it enhances public trust. This, in turn, has a positive impact on the company's financial performance. Firms that successfully optimize their GIC with support from SGR can better utilize internal resources to drive eco-innovation.

### **Sustainable Growth Moderates the Relationship Between Environmental Performance and Financial Performance**

The results show that sustainable growth does not moderate the relationship between environmental performance and financial performance. The MRA test yields a probability (significance) value of  $0.0960 > 0.05$ , meaning sustainable growth does not function as a moderator in this relationship. Thus, Hypothesis H4 is rejected, indicating the fourth hypothesis is not supported.

A company with good environmental performance does not necessarily exhibit sustainable financial growth. Environmental performance reflects long-term strategic efforts, while the Sustainable Growth Rate (SGR) represents internal financial dynamics over the short to medium term. Many companies still fail to transparently report their environmental performance, making it difficult for such achievements to be reflected in financial indicators. This suggests that environmental commitment has not yet been fully integrated into corporate growth strategies.

## **CONCLUSION**

Based on the analysis, it can be concluded that green intellectual capital (GIC) has a significant positive impact on financial performance, and this relationship is further strengthened when moderated by sustainable growth. This suggests that companies effectively managing GIC and maintaining strong sustainable growth are more likely to enhance their financial outcomes. However, environmental performance does not directly affect financial performance, nor is its relationship with financial performance moderated by sustainable growth. These findings imply that while environmental awareness through GIC can translate into financial benefits, especially when coupled with growth strategies, general environmental performance alone may not sufficiently influence financial outcomes without greater transparency and integration into the company's strategic objectives.

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