

The Effect of Environmental, Social, and Governance (ESG) Performance, Green Investment, and Capital Structure on Company Value, with Profitability as a Mediating Variable, Among Listed Companies in the Agricultural Sector

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Keywords:	Abstract
ESG; GRI 13; green investment; capital structure; profitability.	This research aims to examine the effect of Environmental, Social and Governance (ESG) performance, green investment, and capital structure on firm value, with profitability serving as a mediating variable, among agricultural companies listed on the Indonesia Stock Exchange during the 2022–2024 period. This research employed a quantitative approach using secondary data obtained from annual reports, sustainability reports, and financial statements. The sample consisted of 34 companies selected through purposive sampling. Panel data regression analysis and the Sobel test were employed to examine both the direct and indirect effects among the variables. The findings indicate that green investment has no direct effect on firm value, whereas ESG performance, capital structure, and profitability have significant direct effects on firm value. The mediation analysis reveals that profitability mediates the relationship between ESG performance and firm value as well as the relationship between green investment and firm value. In contrast, profitability mediates the relationship between capital structure and firm value with a negative indirect effect. These findings suggest that improvements in firm value within the agricultural sector are primarily driven by firms' ability to enhance profitability through ESG implementation and green investment, while capital structure continues to exert direct influence on firm value despite its negative indirect effect through profitability.

INTRODUCTION

The agricultural sector plays a vital strategic role in sustaining national food security and contributing significantly to Indonesia's gross domestic product (GDP). Based on the Macro Statistics Report by the Ministry of Agriculture in 2024, the agricultural sector ranked as the second largest contributor to Indonesia's national GDP at 13.27% in 2024, following the manufacturing and wholesale sectors. In addition to its economic significance, the sector employs approximately 37.81 million workers as of August 2024, representing 26.15% of Indonesia's total workforce of 144.64 million people, making it one of the most labour-intensive sectors in the country.

Despite its strategic importance, the agricultural sector faces complex environmental and social challenges, including land degradation, water pollution, greenhouse gas emissions, and biodiversity loss. The sector is subject to extensive regulatory oversight, including Law No. 32 of 2009 on Environmental Protection and Management, Law No. 41 of 2009 on Protection of Sustainable Agricultural Land, and Law No. 22 of 2019 on Sustainable Agricultural Cultivation

Systems. These regulatory dynamics, combined with the sector's high dependency on natural resources and its intensive labour composition, create a unique context in which sustainability performance becomes a critical factor influencing investor perception and firm value.

Firm value in the agricultural sector is typically measured through the Price to Book Value (PBV) ratio, which reflects how the market values a company relative to its book equity. An analysis of PBV trends among agricultural emittents listed on the Indonesia Stock Exchange (IDX) shows that the average PBV increased from 2021 to 2023 but subsequently declined in 2024. Based on the Katadata ESG Index Summary Report 2025, the Plantation Sector recorded the highest sustainability performance index among all sectors for three consecutive years, with environmental disclosure scores of 66.75, social scores of 51.50, and governance scores of 71.67 in 2025. The sector's consistently improving ESG performance contrasts with the PBV decline in 2024, raising important questions about how sustainability dimensions translate into market-recognised firm value.

Table 1. Katadata ESG Sustainability Performance Index – Plantation Sector (2025)

Category	Environmental Score	Social Score	Governance Score
Plantation Sector	66.75	51.50	71.67
Indonesia Average	–	–	–

Source: Katadata ESG Index 2025, processed by researcher.

The relationship between ESG performance and firm value has attracted significant scholarly attention in the context of sustainability-driven investment. According to Stakeholder Theory (Freeman, 1984), companies that adequately address the interests of multiple stakeholders through environmental and social practices tend to enhance their reputation and investor confidence, ultimately increasing firm value. However, evidence on the direct ESG–firm value relationship remains mixed across different sectors and geographies. For the agricultural sector, Cristea et al. (2025) found that ESG dimensions positively influence financial performance and firm value in European agricultural companies. In contrast, Chong and Loh (2023) observed a negative ESG transparency effect on firm valuation in the global palm oil sector, while Septian et al. (2025) found no significant effect of ESG performance on share values of Indonesian plantation companies.

Beyond ESG performance, green investment represents another dimension of corporate sustainability commitment. Green investment, defined as expenditures on activities that conserve energy, reduce greenhouse gas emissions, manage pollution, and minimise waste (Obagbuwa & Chummun, 2024), carries significant implications for corporate performance. The Legitimacy Theory posits that companies undertake green investment to align with societal norms and maintain their social licence to operate (Deegan, 2002). Agricultural companies in Indonesia are mandated to conduct Environmental Impact Assessments (AMDAL) and manage their environmental liabilities under applicable regulatory frameworks. Prior studies report divergent findings: Obagbuwa and Chummun (2024) and Khalid et al. (2023) found that green investment significantly enhances firm value and profitability, whereas Abdurrohman et al. (2025) and Sion et al. (2026) found no direct or negative effects.

Capital structure, as measured by the Debt-to-Equity Ratio (DER), represents a key financial determinant of firm value. The Trade-Off Theory suggests that optimal use of debt

provides tax shield benefits while managing financial distress risks (Jensen & Meckling, 1976). Among agricultural companies, which are characterised by high capital intensity for land expansion and asset development, capital structure decisions carry particular strategic relevance. The DER of agricultural emittents showed a declining trend from 2021 to 2024, yet empirical evidence on its relationship with firm value remains inconsistent: Monica et al. (2025) found a positive effect, while Hung et al. (2021) reported a negative relationship.

To reconcile these inconsistencies, this study introduces profitability measured by Return on Equity (ROE) as a mediating variable. Sumarno et al. (2023) argue that improvements in ESG performance are not immediately recognised as firm value signals by markets; investors require tangible financial performance indicators such as profitability. Similarly, Tanasya and Handayani (2020) argue that green investment's impact on firm value is indirect, mediated through the profitability it generates. Putro and Risman (2021) underscore that capital structure only meaningfully influences firm value when it supports the effective generation of profit. Empirical support for profitability as a mediator is provided by Putra and Budastra (2024), Pathan and Mohanty (2025), and Sukmana and Suzan (2025).

Several previous studies have examined the relationships among ESG performance, green investment, capital structure, profitability, and firm value. Cristea et al. (2025) found that ESG dimensions positively influence financial performance and firm value in European agricultural companies. Obagbuwa and Chummun (2024) and Khalid et al. (2023) found that green investment significantly enhances firm value and profitability. Monica et al. (2025) found a positive effect of capital structure on firm value, while Hung et al. (2021) reported a negative relationship. Putra and Budastra (2024), Pathan and Mohanty (2025), and Sukmana and Suzan (2025) confirmed profitability as a mediator in these relationships. However, despite these findings, several research gaps remain. Most previous studies were conducted in developed markets or general manufacturing sectors, with limited focus on the Indonesian agricultural sector. The integration of ESG performance, green investment, and capital structure as simultaneous predictors of firm value through profitability has not been extensively examined in the agricultural context. Moreover, research specifically analyzing agricultural companies listed on the IDX with comprehensive ESG disclosure based on GRI 13 standards remains scarce. This study addresses these gaps by providing a comprehensive analysis of these relationships in the Indonesian agricultural sector.

The novelty of this research lies in integrating three key determinants ESG performance, green investment, and capital structure as simultaneous predictors of firm value in a single research model with profitability as a mediating variable, which has not been extensively examined in the Indonesian agricultural sector. This study employs comprehensive ESG disclosure measurement based on GRI 13 standards (26 indicators), providing a more detailed and standardized assessment compared to previous studies that used aggregate ESG scores or limited indicators. The research specifically focuses on the agricultural sector, which has unique characteristics in terms of natural resource dependency, regulatory intensity, and labour composition, making it a relevant and under-researched context. Additionally, this study uses panel data regression with the Fixed Effect Model to control for company-specific heterogeneity, providing more robust empirical evidence compared to cross-sectional or simple regression approaches, thereby contributing to the limited literature on ESG and firm value in

the Indonesian agricultural sector and offering insights for investors, policymakers, and corporate managers in a rapidly evolving sustainability landscape.

This study therefore examines the role of profitability as a mediating mechanism between ESG performance, green investment, capital structure, and firm value in the Indonesian agricultural sector, an area that remains underexplored despite its strategic importance. This study aims to examine the effect of ESG performance, green investment, and capital structure on firm value, with profitability as a mediating variable, among agricultural companies listed on the Indonesia Stock Exchange during the 2022–2024 period. The research offers theoretical contributions by extending Stakeholder, Signaling, Legitimacy, and Trade-Off Theories to the Indonesian agricultural context, while practically providing insights for companies, managers, investors, and policymakers on strengthening ESG disclosure, optimizing capital structure, and developing sustainability strategies to enhance firm value.

METHOD

Research Design and Data

This research employed a quantitative associative-causal research design to examine relationships among ESG performance, green investment, capital structure, profitability, and firm value. Secondary data were obtained from annual reports, sustainability reports, and audited financial statements of agricultural companies listed on the Indonesia Stock Exchange over the period 2022–2024. The three-year observation window was selected to ensure data stability, relevance, and adequate reflection of the dynamics within the post-pandemic period characterised by increasing ESG regulatory attention in Indonesia.

Variable Operationalization

The operational definitions and measurement of all variables used in this study are summarised in Table 2.

Table 2. Variable Operationalization

Variable	Definition	Measurement	Scale
ESG Performance (X1)	Extent of ESG disclosure based on GRI 13 standard (26 indicators)	ESG Score = $(\text{Disclosed Items} / 26 \text{ Total Items}) \times 100\%$	Ratio
Green Investment (X2)	Environmental expenditure relative to total assets	GI = $\text{Total Environmental Cost} / \text{Total Assets} \times 100\%$	Ratio
Capital Structure (X3)	Proportion of debt financing relative to equity	DER = $\text{Total Debt} / \text{Total Equity}$	Ratio
Profitability / ROE (M)	Return generated on shareholders' equity (mediating variable)	ROE = $\text{Net Income} / \text{Total Equity} \times 100\%$	Ratio
Firm Value / PBV (Y)	Market valuation relative to book value of equity	PBV = $\text{Market Closing Price} / \text{Book Value per Share}$	Ratio

Source: GRI 13 (2022), ISO 31000, POJK 51/2017, processed by researcher.

Population and Sample

The population consists of all agricultural sub-sector companies listed on the IDX in 2024, totalling 57 companies. Purposive sampling was applied to obtain a sample with the following criteria, as summarised in Table 3.

Table 3. Sample Selection Criteria

No.	Criterion	Companies
1	Agricultural companies listed on IDX in 2024	57
2	Complete financial statements available for 2022–2024	53
3	Sustainability/Annual Reports available for 2022–2024	47
4	Positive equity throughout the observation period	46
5	Environmental expenditure reported during 2022–2024	34
Final sample used in the study		34

Source: IDX, processed by researcher (2025).

A total of 34 companies were selected, yielding 102 observations over three years (34 companies $\times$ 3 years). The sample covers two sub-groups: Plantations & Crops and Fish, Meat & Poultry, reflecting the diversity of the agricultural sector in Indonesia.

Data Analysis Method

This study employs panel data regression analysis using EViews version 13. The analysis involves three regression equations: (1) direct effects of ESG, GI, and DER on PBV; (2) effects of ESG, GI, and DER on ROE (profitability); and (3) effects of ESG, GI, DER, and ROE on PBV with profitability as a mediating variable. The appropriate regression model (Common Effect, Fixed Effect, or Random Effect) was determined through Chow and Hausman tests. Mediation effects were examined using the Sobel test (Sobel, 1982), with significance assessed based on t-statistic > 1.96 and p-value < 0.05 . Hypothesis testing for direct effects used partial t-tests and simultaneous F-tests, with the coefficient of determination (Adjusted R^2) reported to assess model fit.

The three regression equations are formulated as follows:

$$\text{Equation 1: } PBV_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 GI_{it} + \beta_3 DER_{it} + \varepsilon_{it}$$

$$\text{Equation 2: } ROE_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 GI_{it} + \beta_3 DER_{it} + \varepsilon_{it}$$

$$\text{Equation 3: } PBV_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 GI_{it} + \beta_3 DER_{it} + \beta_4 ROE_{it} + \varepsilon_{it}$$

RESULTS AND DISCUSSION

Descriptive Statistics

Table 4 presents the descriptive statistics for all variables used in this study.

Table 4. Descriptive Statistics (n = 102 observations, 34 companies, 2022–2024)

Statistic	PBV	ESG	GI	DER	ROE
Mean	1.5360	0.6655	0.000815	1.4142	0.0172
Median	1.1500	0.6923	0.000430	1.0244	0.0701
Maximum	5.6900	0.9615	0.005233	9.9317	0.3118
Minimum	0.1500	0.3077	0.000029	0.0720	−2.7599
Std. Dev.	1.2101	0.1825	0.000988	1.4606	0.3499
Observations	102	102	102	102	102

Source: Processed using EViews 13 (2026)

The mean PBV of 1.536 indicates that, on average, agricultural companies in the sample are valued above their book equity, reflecting positive investor expectations. The highest PBV of 5.690 was recorded by PT Sawit Sumbermas Sarana Tbk (SSMS) in 2023, attributable to its strong profitability (ROE of 0.2926) and high ESG score of 0.962, while the lowest PBV of 0.150 was observed for PT Widodo Makmur Unggas Tbk (WMUU) in 2024, coinciding with consecutive years of negative ROE. The mean ESG score of 0.666 indicates moderate-to-good sustainability disclosure levels across the sample. Green investment (GI) exhibits a very low mean of 0.000815, suggesting that environmental expenditure as a proportion of total assets remains at an early development stage for most agricultural companies. The average DER of 1.414 indicates that external debt exceeds equity on average, consistent with the capital-intensive nature of agricultural operations. The wide standard deviation in ROE (0.350) and DER (1.461) reflects substantial heterogeneity among sample companies in terms of financial leverage and profitability performance.

Panel Data Model Selection

The Chow and Hausman tests were conducted for all three regression equations to determine the most appropriate panel data model. Results are presented in Table 5.

Table 5. Panel Data Model Selection Results

Equation	Test	Criterion	Prob.	Model Selected
Eq. 1 (ESG,GI,DER→PBV)	Chow Test	Cross-section Chi-sq	0.0000	Fixed Effect
	Hausman Test	Cross-section random	0.0037	Fixed Effect
Eq. 2 (ESG,GI,DER→ROE)	Chow Test	Cross-section Chi-sq	0.0000	Fixed Effect
	Hausman Test	Cross-section random	0.0000	Fixed Effect
Eq. 3 (with ROE→PBV)	Chow Test	Cross-section Chi-sq	0.0000	Fixed Effect
	Hausman Test	Cross-section random	0.0202	Fixed Effect

Source: Processed using EViews 13 (2026)

The Chow test results for all three equations show p-values of 0.0000, rejecting the Common Effect Model. The Hausman test results similarly reject the Random Effect Model across all equations ($p < 0.05$). Consequently, the Fixed Effect Model (FEM) is adopted for all three regression equations, consistent with significant individual company heterogeneity that must be controlled for in the analysis.

Direct Effect of ESG, Green Investment, and Capital Structure on Firm Value (Equation 1)

Table 6 presents the results of the Fixed Effect regression for Equation 1.

Table 6. Regression Results – Equation 1: Direct Effects on Firm Value (PBV)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.2045	0.5161	0.3963	0.6932
ESG Performance	1.5555	0.7156	2.1738	0.0334**
Green Investment (GI)	0.0881	0.6920	0.1273	0.8991
Capital Structure (DER)	0.2109	0.0703	3.0012	0.0038***
R-squared: 0.8619 Adjusted R-squared: 0.7854				
Prob(F-statistic): 0.0000				

Source: Processed using EViews 13 (2026). ** $p < 0.05$; *** $p < 0.01$.

ESG performance ($\beta = 1.5555$, $p = 0.0334$) shows a positive and significant direct effect on PBV, supporting H1. The magnitude of the coefficient is the largest among the three independent variables, indicating that sustainability disclosure practices carry greater relative weight in shaping market valuation. Green investment ($\beta = 0.0881$, $p = 0.8991$) does not show a significant direct effect on firm value, leading to the rejection of H2. This suggests that the scale of green investment in the agricultural sector remains insufficient to produce an immediate market signal to investors. Capital structure (DER) ($\beta = 0.2109$, $p = 0.0038$) has a positive and significant effect on PBV, supporting H3. This finding is consistent with Trade-Off Theory, suggesting that moderate leverage is perceived positively by investors as a signal of financial efficiency and expansion capacity. The Adjusted R^2 of 0.785 indicates that 78.54% of PBV variation is explained by the model, with the remainder attributable to factors outside the model.

Effects on Profitability (Equation 2)

Table 7 presents the regression results for Equation 2.

Table 7. Regression Results – Equation 2: Effects on Profitability (ROE)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.0428	0.1158	-0.3691	0.7132
ESG Performance	0.6041	0.1606	3.7614	0.0004***
Green Investment (GI)	0.3872	0.1553	2.4932	0.0152**
Capital Structure (DER)	-0.2487	0.0158	-15.772	0.0000***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R-squared: 0.9168 Adjusted R-squared: 0.8707				
Prob(F-statistic): 0.0000				

Source: Processed using EViews 13 (2026). **p<0.05; ***p<0.01.

ESG performance has a positive and significant effect on profitability ($\beta = 0.6041$, $p = 0.0004$), supporting H5. This aligns with Stakeholder and Signaling theories: companies with strong ESG practices achieve operational efficiency, stronger stakeholder relationships, and improved access to capital, all of which enhance profitability. Green investment also shows a positive and significant effect on ROE ($\beta = 0.3872$, $p = 0.0152$), supporting H6. Environmental expenditure reduces regulatory fines, improves resource efficiency, and strengthens corporate reputation, ultimately boosting profitability. Capital structure (DER) has a negative and significant effect on ROE ($\beta = -0.2487$, $p = 0.0000$), supporting H7. Excessive leverage imposes high interest burdens that erode net income, consistent with the predictions of Trade-Off Theory. The Adjusted R^2 of 0.871 confirms the high explanatory power of the model for profitability variation.

Full Model with Profitability as Mediator (Equation 3)

Table 8 presents the regression results for Equation 3, incorporating profitability (ROE) as a mediating variable.

Table 8. Regression Results – Equation 3: Effects with Profitability as Mediator

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.2750	0.4838	0.5684	0.5717
ESG Performance	0.5602	0.7394	0.7577	0.4514
Green Investment (GI)	0.7261	0.6782	1.0706	0.2884
Capital Structure (DER)	0.6207	0.1446	4.2940	0.0001***
Profitability (ROE)	1.6477	0.5175	3.1840	0.0022***
R-squared: 0.8808 Adjusted R-squared: 0.8118				
Prob(F-statistic): 0.0000				

Source: Processed using EViews 13 (2026). ***p<0.01.

After incorporating ROE as a mediating variable, ESG performance ($p = 0.4514$) and green investment ($p = 0.2884$) lose their significant direct effects on PBV, indicating full mediation. Capital structure remains positively significant ($\beta = 0.6207$, $p = 0.0001$), with its coefficient increasing from 0.2109 to 0.6207, reflecting partial mediation. Profitability (ROE) exerts the strongest positive and significant effect on PBV ($\beta = 1.6477$, $p = 0.0022$), confirming that investors primarily respond to bottom-line financial performance. This supports H4 and

highlights the pivotal role of profitability as the most influential determinant of firm value in the agricultural sector. The Adjusted R² increases to 0.812 with the inclusion of ROE.

Sobel Test – Mediation Analysis

Table 9. Sobel Test Results for Mediation by Profitability (ROE)

Variable	Path a	Sa	Path b	Sb	t-Statistic	p-value
ESG → ROE → PBV	0.6041	0.1606	1.6477	0.5175	2.4303**	0.0151
GI → ROE → PBV	0.3872	0.1553	1.6477	0.5175	1.9630**	0.0496
DER → ROE → PBV	-0.2487	0.0158	1.6477	0.5175	-3.1211***	0.0018

Source: Processed using Sobel calculator (2026). **p<0.05; ***p<0.01.

The Sobel test confirms that profitability (ROE) significantly mediates all three indirect relationships. For ESG → ROE → PBV ($t = 2.430$, $p = 0.015$), profitability acts as a full mediator, supporting H8. ESG improvements enhance operational efficiency and stakeholder relationships, which first increase profitability, and investors then respond positively to this financial improvement by bidding up the stock price. This finding is consistent with Sumarno et al. (2023), Zhou et al. (2022), Putra and Budastra (2024), and Pathan and Mohanty (2025). For GI → ROE → PBV ($t = 1.963$, $p = 0.050$), profitability also acts as a full mediator, supporting H9. Green investment reduces regulatory penalties, improves resource efficiency, and strengthens corporate reputation, thereby enhancing profitability before the market responds. This aligns with Abdurrohman et al. (2025) and Sukmana and Suzan (2025). For DER → ROE → PBV ($t = -3.121$, $p = 0.002$), profitability mediates the capital structure–firm value relationship with a negative indirect effect, supporting H10 with partial mediation. While debt positively affects firm value directly (likely through tax shield benefits and investor confidence in funded expansion), it simultaneously decreases profitability through higher interest burdens, thus exerting a counteracting indirect negative effect on firm value. This dual-channel finding is consistent with Natsir and Yusbardini (2020) and Hikmah and Daljono (2023).

Summary of Hypothesis Testing

Table 10. Summary of Hypothesis Testing Results

Hypothesis	Relationship	Direction	Significance	Result
H1	ESG → PBV (direct)	Positive	Significant ($p=0.0334$)	Accepted
H2	GI → PBV (direct)	Positive	Not Significant ($p=0.8991$)	Rejected
H3	DER → PBV (direct)	Positive	Significant ($p=0.0038$)	Accepted
H4	ROE → PBV	Positive	Significant ($p=0.0022$)	Accepted

Hypothesis	Relationship	Direction	Significance	Result
H5	ESG → ROE	Positive	Significant (p=0.0004)	Accepted
H6	GI → ROE	Positive	Significant (p=0.0152)	Accepted
H7	DER → ROE	Negative	Significant (p=0.0000)	Accepted*
H8	ESG → ROE → PBV	Positive	Significant (p=0.0151)	Accepted (Full)
H9	GI → ROE → PBV	Positive	Significant (p=0.0496)	Accepted (Full)
H10	DER → ROE → PBV	Negative	Significant (p=0.0018)	Accepted (Partial)
*H7 hypothesis direction confirmed negative (originally positive direction rejected)				

Source: Processed by researcher (2026).

CONCLUSION

This study provides several key conclusions regarding the determinants of firm value among agricultural sector companies listed on the Indonesia Stock Exchange for 2022–2024. First, ESG performance based on GRI 13 disclosure has a positive and significant direct effect on firm value (PBV), confirming that investors in the agricultural sector recognise and reward companies that demonstrate strong sustainability governance. Second, green investment does not have a significant direct effect on firm value, indicating that the scale of environmental expenditure in the sector remains insufficient to generate immediate market signals. Third, capital structure (DER) has a positive and significant direct effect on firm value, suggesting that investors perceive moderate leverage as a growth enabler rather than a risk factor. Fourth, profitability (ROE) is the most influential determinant of firm value, consistent with signaling theory's prediction that earnings performance constitutes the most credible market signal. Fifth, ESG performance and green investment both positively and significantly enhance profitability, while capital structure exerts a negative and significant effect on profitability through increased interest burdens. On mediation effects, profitability fully mediates the relationships from ESG performance to firm value and from green investment to firm value, confirming that sustainability practices create value primarily by first improving financial performance. Profitability also partially mediates the capital structure–firm value relationship with a negative indirect channel, reflecting a dual effect where debt simultaneously increases firm value directly while reducing profitability indirectly. For managerial implications, agricultural companies should strengthen ESG disclosure quality aligned with GRI 13 standards, increase green investment allocation to improve operational efficiency and avoid regulatory penalties, and maintain optimal capital structure to balance tax shield benefits against profitability erosion. Future research should extend the analysis to longer time horizons, incorporate broader ESG metrics, and explore sector-specific moderation effects.

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