



The Effect of Sustainability Performance, Growth Opportunity, and Free Cash Flow on Energy Sector Firm Value Moderated by Institutional Ownership

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Article Info:

Article history:

Received: July 30, 2026

Revised: September 01, 2026

Accepted: September 07, 2026

Available Online: September 22,
2026

Keywords:

Free Cash Flow; Growth
Opportunity; Institutional
Ownership; Sustainability
Performance



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Abstract

Background: Energy-sector firm value remains volatile amid sustainability demands, while prior evidence concerning ESG, Growth Opportunity, and cash flow factors remains inconsistent.

Objective: This study analyzes the effects of Sustainability Performance, as measured by Environmental Score, Social Score, and Governance Score, as well as Growth Opportunity and Free Cash Flow on firm value in the Indonesian energy sector. The study also examines the role of Institutional Ownership as a moderating variable.

Methods: The study employs a quantitative approach with an associative-causal design. Secondary data were obtained from audited financial reports, annual reports, sustainability reports, and the Indonesia Stock Exchange. The sample was selected through purposive sampling of 27 energy sector companies on the IDX Main Board during 2021–2024, yielding 108 firm-year observations. Analysis was conducted using panel data regression and moderated regression analysis with EViews 13.

Results: The results show that Social Score has a significant negative effect, Free Cash Flow has a significant positive effect, Environmental Score and Governance Score have positive but insignificant effects, while Growth Opportunity has an insignificant negative effect on firm value. Institutional Ownership has a positive but insignificant direct effect on firm value. In the moderation analysis, Institutional Ownership strengthens the effect of Free Cash Flow, weakens the effect of Social Score and Growth Opportunity, and does not moderate the effect of Environmental Score and Governance Score on firm value.

Conclusion: These findings indicate that financial and sustainability factors have varying effects on firm value, while Institutional Ownership can strengthen or weaken these relationships in energy sector companies.

To cite this article: Winarsih, & Kurniasih, A. (2026). The effect of sustainability performance, Growth Opportunity, and Free Cash Flow on energy sector firm value moderated by Institutional Ownership. *INKUBIS: Jurnal Ekonomi dan Bisnis*, 8(3), 2383-2397. <https://doi.org/10.59261/inkubis.v8i3.460>

INTRODUCTION

Firm value constitutes an indicator of management's success in resource management while also reflecting shareholder welfare. The higher the firm value, the greater the owners' prosperity and the stronger the investment attractiveness for investors. Firm value functions as both a performance indicator and a future projection, as it provides a view of how effectively management optimizes assets and generates profits (Whetyningtyas et al., 2025). Furthermore, firm value provides a basis for strategic decision-making, such as funding policies, investment, and capital structure, aimed at maximizing stock prices and increasing market confidence (Ani et al., 2024). According to signalling theory, an increase in firm value signals good prospects for the

company in future periods, potentially increasing investment interest and strengthening the company's position in the capital market (Burhanuddin, 2022). Research on firm value is important because it not only relates to shareholder welfare but also determines the company's ability to compete in the long term and maintain operational continuity amid international competitive pressures (Ani et al., 2024; Whetyningtyas et al., 2025).

The energy sector makes an essential contribution to sustainable development and the implementation of the SDGs in Indonesia. Energy is the foundation for sustainable economic, social, and environmental development. Directly, the energy sector relates to SDG 7 (Affordable and Clean Energy), as Indonesia is committed to ensuring affordable energy availability, increasing the contribution of clean energy, and optimizing energy use. Moreover, the energy sector holds a primary role in SDG 13 (Climate Action) as Indonesia is currently transitioning to new and renewable energy (NRE).

Besides being part of the sustainable agenda, the energy sector is also a principal pillar of Indonesia's economy. Its contribution to Gross Domestic Product (GDP) and state fiscal is very significant, especially through the contribution of Non-Tax State Revenue (PNBP) originating from oil, gas, and energy mining. The energy sector contributes 10.18% to GDP, making it one of the strategic sectors in national development (Central Bureau of Statistics, 2024).

The energy sector contributes substantially to fiscal revenue through PNBP. In 2024, the realization of PNBP from the energy and mineral resources sector reached IDR 269.5 trillion, exceeding the 2024 target of IDR 234.2 trillion (Ministry of Energy and Mineral Resources, 2024). This condition illustrates the energy sector's crucial role as a state revenue source, both from oil and gas and energy mining. Furthermore, the energy sector is also an investment driver with realized investment of USD 32.3 billion in 2024, an increase of USD 2.4 billion compared to 2023, and supports the sustainability of the national electricity system with an electrification ratio reaching 99.83% (Ministry of Energy and Mineral Resources, 2024). With such significant contributions to GDP, PNBP, and energy access, the energy sector's role is not merely as a fuel provider but also as a primary foundation for Indonesia's economic stability and social welfare.

Nevertheless, although the energy sector plays a crucial role in sustainable development and contributing substantially to the economy, firm value in the energy sector still faces challenges. Price to Book Value (PBV) and Price to Earnings Ratio (PER) data show fluctuating patterns during 2021 to June 2025 and still lag behind several other industrial sectors such as health, technology, infrastructure, and transportation & logistics.

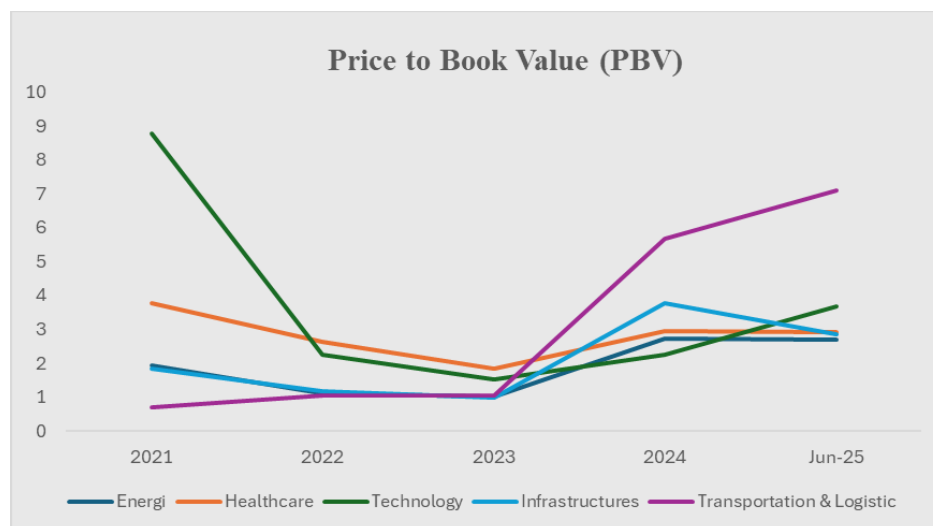


Figure 1. Average Price to Book Value 2021 – June 2025

Source: Indonesia Stock Exchange (IDX, 2025)

Figure 1 demonstrates that the average PBV of energy sector companies shows a fluctuating pattern with a sharp decline in 2022–2023, then experiencing a significant increase in 2024 and declining again in June 2025. The energy sector's PBV still lags behind other sectors such as health, technology, infrastructure, and transportation & logistic (Indonesia Stock Exchange, 2025). The PBV of the energy sector suggest that the energy sector has not been able

to optimally increase investment attractiveness, especially amid sustainability demands and changes in the global energy structure compared to other sectors

Sustainability performance measured through Environmental Score, Social Score, and Governance Score describes the company's commitment to environmental, social, and governance aspects. ESG Score has been reported to have a significant positive effect on firm value, while other studies have found a significant negative effect (Jeanice & Kim, 2023). Other studies have reported no significant effect (Handajani et al., 2022; Ibad & Oktaviani, 2024).

Furthermore, Growth Opportunity represents the company's investment and expansion opportunities that may enhance future profits. However, its effect on firm value remains inconsistent: research has found a significant positive effect (Priyanto & Aryati, 2023), while other research has found a significant negative effect due to increased investor risk and uncertainty (Burhanuddin, 2022); other studies state no effect (Zalukhu & Pratiwi, 2024). Firm value is also influenced by Free Cash Flow, which reflects resource utilization efficiency, profit sustainability, liquidity, and investor attractiveness. Several studies have found a significant positive effect (Wijayanto et al., 2024), while other studies have found a significant negative effect (Permata & Heriansyah, 2022) and some state no effect (Delima & Linawati, 2023). In the energy sector, which is capital-intensive, high-risk, and faces sustainability demands, Institutional Ownership is significant as a monitoring mechanism to mitigate agency conflicts and promote efficient and transparent managerial practices. Consequently, Institutional Ownership may moderate the effect of Growth Opportunity, Free Cash Flow, and ESG score on firm value.

Previous research has shown inconsistent results regarding financial and sustainability factors affecting firm value. ESG has been reported to have a positive effect on firm value (Aydoğmuş et al., 2022; Chen, 2024; Rahelliamelinda & Handoko, 2024) while other studies reported no statistically significant effect (Jeanice & Kim, 2023). Separately, the effects of environmental, social, and governance dimensions also vary depending on company and country characteristics (Kong et al., 2023). Growth Opportunity has been reported to have a positive effect (Veda & Panji, 2021), while other studies have found a negative effect (Bangun et al., 2024; Kevin & Petronila, 2021) or no significant effect (Zalukhu & Pratiwi, 2024). Inconsistency is also seen in Free Cash Flow: a positive effect was found in some studies (Hiya & Syafi'i, 2021; Simamora & Hasyim, 2025) while a negative effect was found in other studies (Permata & Heriansyah, 2022), and other studies reported no statistically significant effect on firm value.

Institutional Ownership was reported to exert a positive effect on firm value (Suhandi et al., 2021 and Rahman et al., 2022) but the results can be positive, negative, or insignificant depending on the effectiveness of institutional investor monitoring (Bagus et al., 2024). Furthermore, Institutional Ownership reinforces the effect of ESG, but fails to moderate the effect of Growth Opportunity. The divergence among these findings underscores the need for further testing on energy sector companies in Indonesia.

In response to these issues, this study examines the effects of Environmental Score, Social Score, Governance Score, Growth Opportunity, Free Cash Flow, and Institutional Ownership on the firm value of energy sector companies listed on the Indonesia Stock Exchange.

Furthermore, this study aims to examine the role of Institutional Ownership in moderating the effects of each ESG dimension, Growth Opportunity, and Free Cash Flow on firm value, particularly whether it strengthens or weakens these relationships.

From a theoretical perspective, this study enriches the literature by integrating financial and sustainability factors as well as Institutional Ownership as a moderating variable in a single research model. From a practical perspective, the research results are expected to help management optimize growth strategies, cash flow management, ESG implementation, and institutional monitoring; serve as investor considerations in assessing company prospects; and support the government and regulators in strengthening ESG transparency, governance, firm value, and the competitiveness of Indonesia's energy sector.

On this basis, the following hypotheses are formulated:

- H.1 : Environmental Score has a positive effect on Firm Value.
- H.2 : Social Score has a positive effect on Firm Value.
- H.3 : Governance Score has a positive effect on Firm Value.
- H.4 : Growth Opportunity has a positive effect on Firm Value.

H.5 : Free Cash Flow has a positive effect on Firm Value.

H.6 : Institutional Ownership has a positive effect on Firm Value.

H.7 : Institutional Ownership moderates the effect of Environmental Score on Firm Value.

H.8 : Institutional Ownership moderates the effect of Social Score on Firm Value.

H.9 : Institutional Ownership moderates the effect of Governance Score on Firm Value.

H.10 : Institutional Ownership moderates the effect of Growth Opportunity on Firm Value.

H.11 : Institutional Ownership moderates the effect of Free Cash Flow on Firm Value.

Drawing on the hypotheses presented above, the conceptual framework of the research can be seen in Figure 2 below.

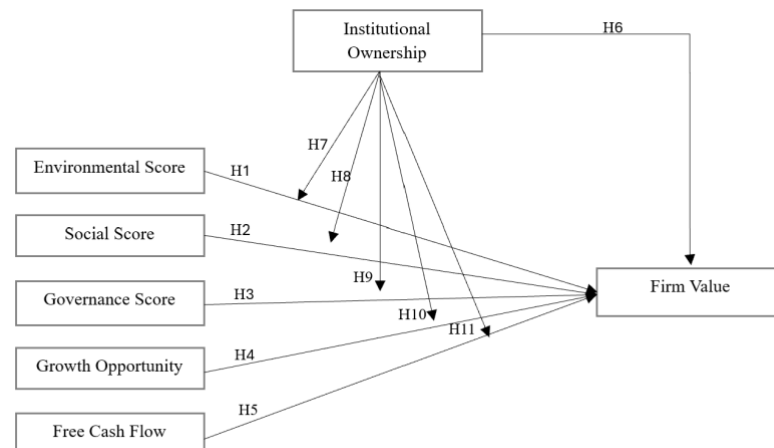


Figure 2. Conceptual Framework

METHOD

This research employed a quantitative approach with an associative-causal design to examine the effects of Environmental Score, Social Score, Governance Score, Growth Opportunity, and Free Cash Flow on firm value with Institutional Ownership as a moderating variable. The data were numerical and were sourced from audited financial reports, annual reports, sustainability reports, and the Indonesia Stock Exchange (IDX).

Table 1

Variable Operationalization

Variable	Brief Definition	Measurement	Source
Firm Value	Market value reflecting shareholder welfare (Brigham & Houston, 2004).	PBV = Market price per share / Book value per share; Book value per share = Total equity / Outstanding shares	Audited financial reports; IDX
Environmental Score	Disclosure of energy management, emissions, waste, and natural resources.	ES = Environmental items disclosed / Total environmental items	Sustainability report
Social Score	Disclosure of human rights, OHS, diversity, inclusion, and community engagement.	SS = Social items disclosed / Total social items	Sustainability report
Governance Score	Disclosure of transparency, accountability, anti-corruption, and compliance.	GS = Governance items disclosed / Total governance items	Sustainability report
Growth Opportunity	Company's investment Opportunity to grow in the future.	GO = (Total assets _t - Total assets _{t-1}) / Total assets _{t-1}	Audited financial reports
Free Cash Flow	Cash that can be withdrawn	FCF = Operating cash flow -	Audited

	without disrupting operations or future cash flows (Brigham & Houston, 2004).	Capital expenditure (Capex)	financial reports
Institutional Ownership	Proportion of shares owned by banks, insurance companies, pension funds, mutual funds, and similar institutions.	$IO = \frac{\text{Institutional shares}}{\text{Total outstanding shares}}$	Annual report; IDX

The research population comprised 91 energy sector companies listed on the IDX in 2025. The sample was selected using purposive sampling based on Main Board status, continuity of sustainability report publication, and data completeness for the 2021–2024 period. The selection process yielded 27 companies, resulting in 108 firm-year observations.

Table 2

Sample Selection Results Based on Purposive Sampling Criteria

Selection Criteria	Number
Energy sector companies listed on the IDX in 2025	91
Listed on the IDX Main Board	40
Published sustainability reports consecutively 2021–2024	28
Have complete data for all variables	27

Secondary data were collected through documentation of the audited financial reports, annual reports, and sustainability reports of the sampled companies (Sugiyono, 2023). Data analysis was performed using EViews 13 through panel data regression, which combines cross-sectional and time-series data (Savitri et al., 2021). Descriptive analysis was conducted to present the mean, minimum, maximum, and standard deviation values before inferential testing.

Panel Data Regression and Moderation Models

Model 1 (baseline): $PBV_{it} = \alpha + \beta_1 ES_{it} + \beta_2 SS_{it} + \beta_3 GS_{it} + \beta_4 GO_{it} + \beta_5 FCF_{it} + \varepsilon_1$

Model 2 (direct effect of IO): $PBV_{it} = \alpha + \beta_1 ES_{it} + \beta_2 SS_{it} + \beta_3 GS_{it} + \beta_4 GO_{it} + \beta_5 FCF_{it} + \beta_6 IO_{it} + \varepsilon_2$

Model 3 (MRA): $PBV_{it} = \alpha + \beta_1 ES_{it} + \beta_2 SS_{it} + \beta_3 GS_{it} + \beta_4 GO_{it} + \beta_5 FCF_{it} + \beta_6 IO_{it} + \beta_7 (ES \times IO)_{it} + \beta_8 (SS \times IO)_{it} + \beta_9 (GS \times IO)_{it} + \beta_{10} (GO \times IO)_{it} + \beta_{11} (FCF \times IO)_{it} + \varepsilon_3$

Note: i = company; t = year; α = intercept; β_1 – β_{11} = regression coefficients; ε = error. Moderation effects are determined primarily from the significance of interaction coefficients in Model 3.

Estimation, Fit, and Model Selection

The estimations were compared using the Common Effect Model (CEM/OLS), Fixed Effect Model (FEM/LSDV or within estimator), and Random Effect Model (REM/GLS). Model fit was assessed using the F-test, where a Prob. F value < 0.05 indicated that the model was statistically significant. The coefficient of determination (R^2) was also examined, with values ranging from 0 to 1; values closer to 1 indicated greater explanatory power.

Table 3

Criteria for Panel Data Regression Model Selection

Test	Comparison	H_0	Decision ($\alpha = 5\%$)
Chow	CEM vs FEM	CEM	Prob. F < 0.05 → FEM
Hausman	REM vs FEM	REM	Prob. Chi-square < 0.05 → FEM; otherwise REM
Lagrange Multiplier	CEM vs REM	CEM	Prob. Breusch–Pagan < 0.05 → REM

Table 4

Classification of Institutional Ownership Role

Category	Direct Effect of IO	Interaction IO×X
Quasi moderator	Significant	Significant
Homologizer	Significant	Not significant
Pure moderator	Not significant	Significant
Potential moderator	Not significant	Not significant

Note: A significant interaction coefficient indicates that IO strengthens or weakens the relationship between the independent variable and PBV. The direction of moderation is determined by the sign of the interaction coefficient.

RESULTS AND DISCUSSION

Results

Overview of Energy Sector Companies in Indonesia

The research covers energy sector companies listed on the Indonesia Stock Exchange (IDX). The development of this sector is rooted in the strategic role of PT Pertamina (Persero), established on December 10, 1957, which evolved from an oil and gas business into an integrated energy entity from upstream to downstream, including new and renewable energy (PT Pertamina Persero, 2024). In the capital market, PT Bumi Resources Tbk (BUMI), listed since July 30, 1990, illustrates energy corporate transformation: the company shifted from the tourism sector to oil, gas, and mining through an Extraordinary GMS on August 31, 1998 (PT Bumi Resources Tbk, 2024).

The number of energy issuers increased from approximately 66 companies in 2020 to 91 companies in 2025, an increase of 25 companies with an average growth of 6.57% per year (IDX, 2025). Based on IDX-IC, this sector includes oil and gas, coal, oil/gas/coal support, alternative energy equipment, and alternative fuels. The sample consists of 27 companies and is dominated by the coal subsector.

Table 5

Distribution of Population and Sample by Energy Subsector

Subsector	Population	Population (%)	Sample	Sample (%)
Coal	48	52.75	17	62.96
Oil & Gas	18	19.78	5	18.52
Oil, Gas, & Coal Support	23	25.27	5	18.52
Alternative Energy Equipment	2	2.20	0	0
Total	91	100	27	100

Source: Processed research data

The dominance of coal in the population (52.75%) and sample (62.96%) confirms that fossil energy still dominates Indonesia's energy market. The energy sector contributes 10.18% to GDP (Central Bureau of Statistics, 2024), while PNPB from energy and mineral resources in 2024 reached IDR 269.5 trillion, exceeding the target of IDR 234.2 trillion. Investment in this sector reached USD 32.3 billion and the electrification ratio was 99.83% (Ministry of Energy and Mineral Resources, 2024).

Economic Role, ESG, and Data Characteristics

In 2024, oil and gas exports were valued at USD 15.88 billion, down 0.28% from 2023; Singapore, China, and Japan accounted for 56.91% of total oil and gas exports. Coal exports were valued at USD 30.49 billion, down 11.86%, but volume increased 6.87% to 405.8 million tons. This condition demonstrates that the decline in value was mainly influenced by global prices, not a decrease in demand (Central Bureau of Statistics, 2025).

The characteristics of a capital-intensive and high-risk sector make ESG disclosure important for controlling environmental impacts, social protection, preventing conflicts of interest, and reinforcing investor confidence. POJK No. 51/POJK.03/2017 encourages financial service institutions, issuers, and public companies to implement sustainable finance and prepare sustainability reports. Consequently, ESG is both a regulatory requirement and an instrument of competitiveness and business sustainability.

Descriptive Analysis

Descriptive analysis serves to portray tendencies, distributions, and possible extreme values before panel regression. The research variables include firm value (PBV), Environmental Score (ES), Social Score (SS), Governance Score (GS), Growth Opportunity (GO), Free Cash Flow (FCF), and Institutional Ownership (IO) as a moderator.

Table 6

Descriptive Statistics

Description	PBV	ES	SS	GS	GO	FCF	IO
Mean	1.2849	0.6099	0.6317	0.6786	0.1792	226.7047	0.8553
Minimum	0.2420	0.1563	0.0278	0.0909	0.0033	12.1243	0.6284
Maximum	10.3606	1.0000	1.0000	1.0000	0.7970	952.4400	0.9996
Std. Deviation	1.4604	0.2604	0.2575	0.2802	0.1721	253.1131	0.0977
Observations	108	108	108	108	108	108	108

Source: Data processed with EViews 13

The average PBV of 1.2849 indicates that the market value of equity is approximately 1.28 times its book value. The lowest PBV was RMKE in 2021 (0.2420) in the early post-IPO phase, while the highest was GEMS in 2021 (10.3606), in line with a 211.76% stock price increase from IDR 2,550 to IDR 7,950. The high PBV dispersion (SD 1.4604) shows heterogeneity in market valuation. PBV is relevant as a proxy for firm value because it captures market perceptions of net assets and issuer prospects.

Interpretation of Descriptive Statistics

The average ES of 0.6099 (60.99%) is higher than the average ESG disclosure of ISSI and ASEAN at 38.571% (Gati et al., 2026). The lowest value of 0.1563 was found at TPMA and PSSI in 2023 and TEBE in 2024; the highest value of 1.0000 was achieved, among others, by GEMS (2022–2024), INDY (2021), ITMG (2021 and 2024), PGAS (2021), PTBA (2021), and TOBA (2021–2024). This difference reflects variations in the completeness of disclosure on energy, water, waste, emissions, biodiversity, and environmental compliance according to GRI.

The average SS of 0.6317 (63.17%) is above the ASEAN average of 52.082%. TPMA in 2022 had the lowest value of 0.0278, while a score of 1.0000 was achieved, among others, by INDY (2021), ITMG (2023–2024), PTBA (2021–2024), ABMN (2021), PGAS (2021), and PSSI (2021). Social aspects include occupational safety, employee welfare, community relations, human rights, and CSR; their disclosure contributes to reputation and investor confidence (Velte, 2022).

The average GS of 0.6786 (67.86%) is higher than the ASEAN average of 45.9388 (Gati et al., 2026). The lowest score was MBSS 2024 (0.0909), while a score of 1.0000 was achieved by HRUM (2021), PGAS (2021 and 2024), TOBA (2021), SHIP (2021), PSSI (2024), and TEBE (2022–2024).

The average GO of 0.1792 indicates average asset growth of 17.92% per year. The lowest value occurred at MBSS in 2024 (0.0033), in line with an 84.4% decrease in capital expenditure, while the highest was at TPMA in 2023 (0.7970) with a 359.36% increase in capital expenditure. The SD value of 0.1721 demonstrates that growth prospects among companies are quite heterogeneous.

The average FCF reached USD 226.7047 million and shows the company's ability to provide cash after operational needs and capital expenditure. The lowest FCF was obtained by AKRA in 2024 (USD 12.1243 million) after capital expenditure increased 83.09% from IDR 648.52 billion (USD 42.07 million) to IDR 1,187.39 billion (USD 73.07 million). The highest FCF was obtained by DSSA in 2022 (USD 952.4400 million), supported by a 160.85% increase in operating cash receipts from USD 436.96 million to USD 1,139.8 million and a 175.12% revenue increase. The FCF SD of 253.1131 indicates high variation in cash generation ability.

The average IO was 0.8553; the lowest value was BUMI 2021 (0.6284) and the highest was DSSA 2023 (0.9996). The IO SD of 0.0977 demonstrates that Institutional Ownership is relatively high and homogeneous, thus potentially strengthening management oversight.

Inferential Analysis

Panel data regression combines time series and cross-entity data. The selection of approach was carried out through the Chow, Hausman, and Lagrange Multiplier tests, then estimation using robust standard errors to increase result resilience against heteroskedasticity and autocorrelation. The F-test assessed simultaneous significance, while R^2 showed the proportion of PBV variation explained by the model.

Table 7

Model Selection Tests

Model	Chow Test	Hausman Test	LM Test	Selected Model
Model 1	0.0000 (FEM)	0.47451 (REM)	0.0000 (REM)	REM
Model 2	0.0000 (FEM)	0.5192 (REM)	0.0000 (REM)	REM
Model 3	0.0001 (FEM)	0.1378 (REM)	0.0025 (REM)	REM

Source: Data processed with EViews 13

Model 1, Model 2 and Model 3 use the Random Effect Model (REM). All three are simultaneously significant with Prob(F-statistic) of <10%. R² increased from 0.0976 in Model 1 to 0.1218 in Model 2 and 0.2365 in Model 3; thus, the addition of IO and interaction moderation increases the model's explanatory power for PBV.

Panel Data Regression Model 1 and Panel Data Regression Model 2

Table 8*Panel Data Regression Model 1 Results (REM)*

Variable	Coeff.	Prob.	Note
C	0.2963	0.6889	
ES	0.8214	0.2603	
SS	-1.9817	0.0083	***
GS	0.8998	0.1091	
GO	-0.3821	0.6001	
FCF	0.2532	0.0858	*
R Square	0.0976		
Prob. (R-squared stat)		0.0594	

Note: *** p < 1%; ** p < 5%; * p < 10%. Source: Data processed with EViews 13

Model 1 equation: $PBV = 0.2963 + 0.8214 ES - 1.9817 SS + 0.8998 GS - 0.3821 GO + 0.2532 FCF$. FCF has a significant positive effect on PBV, while SS has a significant negative effect. ES, GS and GO are not significant. The model explains 9.76% of PBV variation; the remaining 90.24% is explained by other factors.

Table 9*Panel Data Regression Model 2 Results (REM)*

Variable	Coeff.	Prob.	Note
C	-1.9122	0.8560	
ES	0.6300	0.3945	
SS	-1.6727	0.0294	**
GS	0.7550	0.1788	
GO	-0.2786	0.7014	
FCF	0.2511	0.0802	*
IO	2.5949	0.1162	
R Square	0.1218		
Prob. (R-squared stat)		0.0375	

Note: *** p < 1%; ** p < 5%; * p < 10%. Source: Data processed with EViews 13

Model 2 equation: $PBV = -1.9122 + 0.6300 ES - 1.6727 SS + 0.7550 GS - 0.2786 GO + 0.2511 FCF + 2.5949 IO$. After Institutional Ownership was added, Free Cash Flow remained positive and significant, Social Score remained negative and significant, Environmental Score, Governance Score, and Growth Opportunity remained insignificant. Institutional Ownership has an insignificant positive effect on PBV. The model explains 12.18% of PBV variation, an increase of 2.42 percentage points compared to Model 1.

Panel Data Regression Model 3: Moderation Testing

Table 10

Panel Data Regression Model 3 Results (REM)

Variable	Coeff.	Prob.	Note
C	6.4080	0.2661	
ES	0.8177	0.8738	
SS	10.4915	0.0966	*
GS	-5.9212	0.1575	
GO	11.5040	0.0368	**
FCF	-2.9939	0.0222	**
IO	-7.2093	0.2731	
ES×IO	0.1069	0.9857	
SS×IO	-13.6023	0.0588	*
GS×IO	7.5769	0.1188	
GO×IO	-13.9922	0.0327	**
FCF×IO	3.7048	0.0133	**
R Square	0.2365		
Prob. (R-squared stat)		0.0045	

Note: *** p < 1%; ** p < 5%; * p < 10%. Source: Data processed with EViews 13

Model 3 equation: $PBV = 6.4080 + 0.8177 ES + 10.4915 SS - 5.9212 GS + 11.5040 GO - 2.9939 FCF - 7.2093 IO + 0.1069 ES \times IO - 13.6023 SS \times IO + 7.5769 GS \times IO - 13.9922 GO \times IO + 3.7048 FCF \times IO$. In Model 3, Social Score and Growth Opportunity have positive and significant effects on firm value, while Free Cash Flow has a negative and significant effect. Environmental Score and Governance Score have insignificant effects, while Institutional Ownership has a negative but insignificant effect. The differences in the direction and significance of the coefficients in Model 3 may occur due to the inclusion of Institutional Ownership and interaction terms in the model. The presence of interaction terms may affect the estimated direct effects of each independent variable on firm value.

Synthesis of Results and Moderation Implications

The ES×IO interaction is positive but insignificant ($\beta = 0.1069$; $p = 0.9857$). Accordingly, Institutional Ownership does not significantly moderate the relationship between Environmental Score and firm value. SS×IO interaction is negative and significant at the 10% level ($\beta = -13.6023$; $p = 0.0588$), indicating that Institutional Ownership weakens the effect of Social Score on PBV. The GS×IO interaction is positive but insignificant ($\beta = 7.5769$; $p = 0.1188$), indicating that Institutional Ownership does not significantly moderate the effect of Governance Score on firm value.

The GO×IO interaction is negative and significant ($\beta = -13.9922$; $p = 0.0327$), so Institutional Ownership weakens the effect of Growth Opportunity on firm value. This finding suggests that the monitoring and analytical capacity of institutional investors may influence how the market evaluates the company's Growth Opportunity. Conversely, FCF×IO is positive and significant ($\beta = 3.7048$; $p = 0.0133$), indicating that Institutional Ownership moderates the effect of Free Cash Flow on PBV.

Overall, the results indicate that Institutional Ownership does not have a direct effect on firm value but plays a moderating role in certain relationships. Institutional Ownership strengthens the effect of Free Cash Flow, while weakening the effects of Social Score and Growth Opportunity on firm value. Meanwhile, Institutional Ownership does not significantly moderate the effects of Environmental Score or Governance Score. These findings indicate that the monitoring function of institutional investors may be more effective in decisions related to the management of internal company resources, such as Free Cash Flow and investment, than in environmental sustainability and governance aspects.

The increase in R^2 from 9.76% in Model 1 to 12.18% in Model 2 and 23.65% in Model 3 indicates an improvement in the model's explanatory power following the inclusion of Institutional Ownership and interaction terms. However, Model 3 explains only 23.65% of the variation in PBV, while the remaining 76.35% is attributable to factors outside the research model. Therefore, the findings should be interpreted by considering firm-specific characteristics, industry conditions, and other external factors.

Discussion

Environmental Score and Firm Value

Environmental Score has a positive but insignificant effect on firm value. This finding indicates that investors in energy sector companies have not yet considered environmental performance as a primary consideration in their investment decisions. This condition does not support Signaling Theory (Spence, 1973), as environmental disclosure has not yet been perceived as a signal capable of increasing firm value. In the energy sector, environmental investments are still perceived as costs whose benefits are realized only in the long term, and therefore have not received a positive response from the market. This finding is consistent with Nur'aeni & Sari (2023) and Rosa & Noveria (2025), who found that Environmental Score or environmental performance does not have a significant effect on firm value.

Social Score and Firm Value

Social Score has a negative and significant effect on firm value. This finding indicates that investors still perceive social activities as cost burdens whose economic benefits may not be realized in the short term. This finding does not support Stakeholder Theory (Freeman, 1984) or Signaling Theory (Spence, 1973), as social activities have not yet been perceived as signals that create added value for the company. This result is consistent with Istikomah et al. (2023), who found that the social aspect has a negative and significant effect on firm value among 70 companies listed on the Indonesia Stock Exchange, based on data from 2021.

Governance Score and Firm Value

Governance Score has a positive but insignificant effect on firm value. This finding indicates that the quality of corporate governance has not yet become a primary factor considered by investors when evaluating energy sector companies. This finding does not support Agency Theory (Jensen & Meckling, 1976) or Signaling Theory (Spence, 1973), as good governance practices have not yet been able to significantly increase investor confidence. This condition suggests that investors still prioritize financial performance over the quality of corporate governance. This finding is consistent with Nur'aeni & Sari (2023) and Rosa & Noveria (2025), who found that Governance Score does not have a significant effect on firm value.

Growth Opportunity and Firm Value

Growth Opportunity has a negative but insignificant effect on firm value. This finding indicates that the company's growth prospects have not yet been able to increase investor confidence, as they are still perceived as involving high investment risks and requiring a long period to generate economic benefits. This finding does not support Signaling Theory or Agency Theory, as Growth Opportunity has not provided a sufficiently strong signal of an increase in firm value. This result suggests that investors remain cautious in assessing the growth prospects of energy sector companies. This finding is also consistent with Setiadi (2023), Tampubolon (2022), and Zalukhu & Pratiwi (2024), who found that Growth Opportunity does not have a significant effect on firm value.

Free Cash Flow and Firm Value

Free Cash Flow has a positive and significant effect on firm value. This finding indicates that the company's ability to generate internal funds after meeting its investment needs is perceived as an indicator of financial flexibility that can increase firm value. This finding supports Agency Theory (Jensen & Meckling, 1976; Jensen, 1986), which states that Free Cash Flow can increase firm value when it is managed efficiently for the benefit of shareholders. This finding is consistent with the studies by Hiya & Syafi'i (2021) and Simamora & Hasyim (2025), which found that Free Cash Flow has a positive and significant effect on firm value.

Institutional Ownership and Firm Value

Institutional Ownership has a positive but insignificant effect on firm value. This finding indicates that the proportion of Institutional Ownership is not sufficient to directly increase firm value. The presence of institutional investors is not fully perceived by investors as a factor that increases firm value when it is not accompanied by improvements in company performance. This finding does not support Agency Theory (Jensen & Meckling, 1976), as the monitoring function of

institutional investors has not been able to directly increase firm value. This finding is consistent with [Handajani et al. \(2022\)](#) and [Irfani & Sanjaya \(2024\)](#), who found that Institutional Ownership does not have a significant effect on firm value.

Moderation on Environmental Score

Institutional Ownership is unable to moderate the effect of Environmental Score on firm value. This finding indicates that the presence of institutional investors is neither able to strengthen nor weaken the effect of environmental performance on firm value. This finding is consistent with the direct effect of Environmental Score, which is also insignificant, indicating that the monitoring function of institutional investors has not been able to increase market responsiveness to environmental information. This finding is consistent with [Liangdri et al. \(2025\)](#) and [Alfriansyach et al. \(2026\)](#), who found that Institutional Ownership does not strengthen the relationship between ESG Score and firm value. In this relationship, Institutional Ownership is categorized as a potential moderator.

Moderation on Social Score

Institutional Ownership weakens the effect of Social Score on firm value. Institutional investors tend to prioritize financial efficiency and short-term performance, resulting in less appreciation of the long-term benefits of social activities in investment decisions. This finding extends the existing literature, as previous studies have more often positioned Institutional Ownership as a mechanism that strengthens the effects of ESG, such as [Wu et al. \(2022\)](#) and [Sadjiarto et al. \(2024\)](#). This result highlights that the role of institutional investors does not always strengthen all ESG dimensions but depends on investor orientation and market context. In this relationship, Institutional Ownership is categorized as a pure moderator.

Moderation on Governance Score

Institutional Ownership is unable to moderate the effect of Governance Score on firm value. This finding indicates that the presence of institutional investors has not been able to increase the relevance of governance information in the formation of firm value. This finding is consistent with the direct effect of Governance Score, which is also insignificant, and therefore does not support Agency Theory. This finding is consistent with the results of [Liangdri et al. \(2025\)](#) and [Alfriansyach et al. \(2026\)](#), who found that Institutional Ownership does not strengthen the relationship between ESG Score and firm value. In this relationship, Institutional Ownership is categorized as a potential moderator.

Moderation on Growth Opportunity

Institutional Ownership moderates the effect of Growth Opportunity by weakening its effect on firm value. This finding indicates that institutional investors exercise stricter monitoring over investment decisions, causing Growth Opportunity to be evaluated more selectively based on the effectiveness of its realization. As Institutional Ownership increases, the effect of Growth Opportunity on firm value becomes weaker. This finding supports Agency Theory, as the monitoring function of institutional investors can reduce agency conflicts in investment decisions, although it weakens the relationship between Growth Opportunity and firm value. This finding is consistent with [Vanenza et al. \(2026\)](#), who found that Institutional Ownership negatively moderates firm value among Consumer Non-Cyclical sector companies in Indonesia during the 2021–2024 period. In this relationship, Institutional Ownership is categorized as a pure moderator.

Moderation on Free Cash Flow

Institutional Ownership moderates the effect of Free Cash Flow by strengthening its effect on firm value. This finding indicates that the presence of institutional investors enhances the effectiveness of monitoring over the use of Free Cash Flow, ensuring that corporate funds are directed toward activities that create value for the company. This finding supports Agency Theory ([Jensen, 1986](#)), which states that institutional investor monitoring can reduce agency conflicts in the use of Free Cash Flow, thereby strengthening the contribution of Free Cash Flow to increasing firm value.

Discussion Implications

The findings of this study indicate that financial and sustainability factors have varying effects on firm value. This suggests that improved corporate performance does not necessarily lead to higher firm value, as market responses may differ across various aspects of corporate performance. Institutional Ownership, meanwhile, plays a moderating role through the monitoring function of institutional investors in overseeing investment decisions and the allocation of corporate resources, thereby strengthening or weakening certain effects on firm value.

CONCLUSION

The findings of this research demonstrate that Free Cash Flow has a positive and significant effect on firm value, while Social Score has a negative and significant effect. Meanwhile, Environmental Score, Governance Score, Growth Opportunity, and Institutional Ownership have either positive or negative effects on firm value, but these effects are not significant. In the moderation analysis, Institutional Ownership does not significantly moderate the effects of Environmental Score and Governance Score on firm value, but weakens the effects of Social Score and Growth Opportunity and strengthens the effect of Free Cash Flow on firm value.

For investors, Free Cash Flow can be considered an important indicator in investment decision-making, while Growth Opportunity should be evaluated together with the effectiveness of institutional investor monitoring. Environmental Score, Social Score, and Governance Score should be considered as indicators of long-term sustainability rather than as primary factors in short-term valuation. For companies, the management of Free Cash Flow, as well as the implementation and disclosure of ESG practices, should be improved to generate greater value for investors. Future research is encouraged to expand the sector and research period, use sustainability performance measures that better reflect actual implementation, and include other variables that may affect firm value. These improvements are important because this study is limited to energy sector companies during the 2021–2024 period, while sustainability performance is measured based on information disclosed in Sustainability Reports

ACKNOWLEDGEMENT

The authors gratefully acknowledge Universitas Mercu Buana for the academic support and research environment that facilitated this study. The authors further acknowledge all parties who contributed assistance during the data collection and completion of this research.

AUTHOR CONTRIBUTION STATEMENT

Winarsih conceptualization, methodology, data curation, formal analysis, data processing, interpretation of findings, and writing the original draft. Augustina Kurniasih: supervision, validation, interpretation of findings, and review and editing of the manuscript. Both authors approved the final version of the manuscript.

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