





“Environmental, social and governance disclosure and firm value in the energy sector: The moderating role of profitability”

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ENVIRONMENTAL, SOCIAL AND GOVERNANCE DISCLOSURE AND FIRM VALUE IN THE ENERGY SECTOR: THE MODERATING ROLE OF PROFITABILITY

Abstract

Environmental, social, and governance (ESG) performance is critical in mitigating climate change. Energy companies must include ESG practices in their business plans because they can determine firm value. This study investigates the impact of ESG and firm size on firm value in Indonesian energy sector, which is moderated by profitability through return on assets. This study uses a sample of 19 energy companies listed on the Indonesia Stock Exchange from 2016 to 2022. A panel data regression model is applied to estimate the impact of ESG practices and firm size on firm value with the moderating role of return on assets. The study results found that ecological, social, and governance disclosure in the model with return on assets as a moderator independently positively impacts firm value but not vice versa. The interaction between return on assets and ESG practices has no impact on firm value, which means that the role of return on assets as a moderator cannot strengthen the influence of ESG and firm size on firm value. Return on assets positively impacts firm value if it acts as an independent variable without a moderator. Firm size independently has a negative impact on firm value but has no effect if it interacts with return on assets. The implications of the empirical findings provide recommendations for policymakers, corporate management, investors, and academics. Environmental, social, and governance disclosure practices are essential to pay attention to as they can improve sustainability performance and firm value in the energy sector of Indonesia.

Keywords

environmental, social, and governance disclosure, firm value, firm size, profitability, energy sector

JEL Classification

M14, F64, G32, Q56

INTRODUCTION

Environmental, social, and governance (ESG) disclosure has become increasingly popular among public companies in recent years as they seek to engage stakeholders, respond to investor desires, and build credibility and reputation (Olsen et al., 2021). Some companies use sustainability as a competitive advantage, while others consider it a routine practice, but sustainability adoption is dynamic and varies over time (Aydoğmuş et al., 2022). In recent years, companies worldwide have actively engaged in many ESG practices, indicating that they receive several economic benefits (Yoon et al., 2018). Investors and companies increasingly consider ESG in decision-making (Eccles & Youmans, 2016). ESG disclosure by energy companies is motivated by the same concerns as other sectors (Islam & Van Staden, 2018). ESG disclosure also reduces management information asymmetry with investors, decreasing agency costs. Energy companies are more concerned about ESG practices to provide helpful information to investors (Huang & Ge, 2024). ESG disclosure by energy companies covers many issues, including environment and sustainability, community



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involvement and development, worker health and safety, and government relations. Investors perceive that ESG disclosure impacts stock price movements in response to energy companies' caring commitments (Meng & Zhang, 2022). Corporate ESG performance can comprehensively improve financial performance and market value by reducing funding constraints. Xie et al. (2019) and Wu et al. (2022) empirically prove that higher ESG transparency can positively impact firm value.

The impact of ESG disclosure on firm value is a hot topic of discussion, focusing on the presentation of non-financial information. The requirement to demonstrate the presence of associations is based on including non-financial information combined with financial information in corporate reporting. Non-financial information presents the company's long-term prospects. Compared to financial, non-financial information focuses on the value-creation process and is limited to the short-term goal of maximizing profits. ESG disclosure is a representative aspect of non-financial information that is the focus of companies, markets, and investors. Investors do not only consider the financial aspect; they also look at the company's potential for value creation and sustainable performance.

1. LITERATURE REVIEW AND HYPOTHESES

Stakeholder and trade-off theories explain the relationship between ESG and firm value (Teng et al., 2022; Kumar et al., 2022). Stakeholder theory states a positive relationship between ESG and firm value. This suggests that resources allocated to ESG practices are not part of the cost; instead, investment in ESG practices can benefit the company, including innovation, competitive advantage, and corporate image (Behl et al., 2022). Therefore, companies should consider the impact of their operating results on all stakeholders and the creation of value for the company (Andrieş & Sprincean, 2023). In addition, ESG disclosure is essential for companies because it can help stakeholders obtain information related to ethical standards, strategies, organizational performance, and community engagement (Connelly & Limpaphayom, 2004). Stewardship theory supports stakeholder theory, stating the positive impact of sustainability disclosure on firm value.

Voluntary disclosure theory explains that companies consciously disclose information without regulatory obligations. The company's voluntary disclosure aims to reduce the lack of information with stakeholders, which impacts low agency costs. In addition, the company also shows its credibility and best reputation to stakeholders (Meeprom et al., 2024). Agency theory reveals the relationship between shareholders as principals and management acting as agents in a company. This can cause conflict where managers prioritize their interests

over the interests of shareholders, which leads to agency costs. Shareholders take the initiative to reduce disputes and agency costs by asking management to make disclosures that allow monitoring of managerial actions (Dey, 2008).

Studies on the relationship between ESG performance and firm value have increased recently. Positive relationships between ESG and firm value dominate the reported empirical findings, although some reveal adverse effects. Fatemi et al. (2018) proved that ESG disclosure increases firm value in the US. Yoon et al. (2018) showed that ESG practices increase firm market value in Korea, but the effects may vary by firm characteristics. Zhao et al. (2018) found that good ESG practices can positively impact the financial performance of listed energy companies in China. Friske et al. (2023) confirmed that sustainability reporting decreases firm value, but the relationship becomes positive over time. When associated with signaling theory, sustainability reporting is initially considered costly but eventually can increase firm value. As a result, firms continue to improve sustainability performance and communicate with stakeholders and investors. Fuadah et al. (2022), Tahmid et al. (2022), and Temiz (2021) proved that better ESG disclosure initiatives can increase firm value. Behl et al. (2022) proved that ESG had a negative impact on firm value in the energy sector in India in the short run and a positive relationship in the long run. Constantinescu et al. (2021) proved a significant relationship between ESG and firm value for energy companies. Li et al. (2018) found that ESG can increase firm value in the long run.

Profitability is the leading indicator used by shareholders to assess the performance of company management in increasing firm value. Firm value can maximize welfare according to objectives achieved if the company can generate high and sustainable profits. Therefore, the company must optimize its resources efficiently to generate maximum profits. Profitability uses return on assets (ROA) as an appropriate indicator of financial performance. Signal theory states that achieving a company's financial performance shows investors the prospects for firm value sustainability. Purbawangsa et al. (2020) revealed that in three countries, namely Indonesia, China, and India, ROA positively impacts firm value. Hutauruk (2024) and Iswajuni et al. (2018) proved that ROA positively impacts firm value. Keter et al. (2024) found that financial performance (ROA) positively impacts firm value.

The objective of maximizing future firm value depends on the total assets available. Total assets measure firm size, which continues to increase and impact the increase in firm value. Hutauruk (2024) and Iswajuni et al. (2018) proved that firm size positively impacts firm value. Increasing firm size provides many opportunities for companies to invest in assets, increasing firm value. Companies with significant total assets can achieve economies of scale in production activities to become more efficient. The optimal level of efficiency achieved makes the company more competitive in facing high market competition, reducing the company's risk and uncertainty in the future while instilling confidence in investors. Ali et al. (2023) confirmed that firm size positively affects firm value in the oil and gas industry.

Companies with high profitability can disclose better ESG performance, which impacts increasing firm value. Taha et al. (2023) found a positive impact of sustainability performance on ROA moderated by stock price and liquidity in the Jordanian industrial sector. S. Chouaibi and J. Chouaibi (2021) proved that green innovation as a moderator variable can encourage ethical and social forces to increase firm value. Meeprom et al. (2024) demonstrated that ESG performance does not affect market-based firm performance. However, its effect significantly affects firm performance when ESG is moderated by CEO duality and board size.

Purbawangsa et al. (2020) revealed that ROA indirectly affects firm value by mediating corporate social responsibility (CSR) disclosure. Bagh et al. (2024) revealed that the ESG and firm value relationship nonlinearly, indicating that ESG changes the firm value trajectory from positive to negative, with the moderating role of the growth-option value variable negatively moderating the relationship between ESG practices and firm value. Wu et al. (2022) revealed that ESG performance positively impacts firm value; furthermore, institutional ownership and executive ownership moderate the relationship between ESG performance and firm value, while the moderating role of equity balance and ownership concentration is insignificant. Fuadah et al. (2022) revealed that the audit committee does not moderate the effect of ESG on firm value. Mappanyukki et al. (2024) proved that financial reporting disclosure, a moderator variable, cannot explain audit fees through litigation risk and corporate governance.

D'Amato and Falivena (2020) found that the positive impact of CSR on firm value was moderated by firm size, which had a negative effect when small companies were considered. This finding suggests that CSR practices are less effective in small companies due to financial, experience, and reputation limitations. Larger companies have the potential to generate high profits and impact increasing firm value. Sudiyatno et al. (2020) revealed that profitability is an intervening variable that mediates the relationship between firm size and firm value. Fathony et al. (2022) proved that ROA strengthens the influence of CSR on firm value. This is because increased profits encourage companies to practice better CSR.

Understanding of how ESG disclosure can affect firm value is still limited. Not only is it unclear, but inconsistent findings can also be misleading (Wang, 2016). Rowley and Berman (2000) stated that in investigating the direct relationship between social and financial dimensions, various firm characteristics have the potential to moderate this relationship, and it is essential to explore this topic. Therefore, this study examines the impact of ESG disclosure and firm size on Indonesia's energy sector's firm value moderated by profitability (ROA). Based on empirical studies, the research hypotheses tested are:

- H1: *ESG disclosure has a positive impact on firm value.*
- H2: *Profitability has a positive effect on firm value.*
- H3: *Firm size has a positive effect on firm value.*
- H4: *Profitability positively moderates the relationship between ESG and firm value.*
- H5: *Profitability positively moderates the relationship between firm size and firm value.*

2. METHOD

ESG disclosure score data and financial performance of the final sample of 19 energy companies listed on the Indonesia Stock Exchange (IDX) from 2016 to 2022. The high and severe risk levels include the selection of energy sector companies as research samples based on the ESG assessment of IDX's collaboration with Morningstar Sustainalytics. In addition, the energy sector faces increasing demands from internal and external stakeholders to focus more on ESG aspects of their business. This is due to efforts to prepare for the ESG reporting regulations proposed by the Securities and Exchange Commission. Given their strategic position in the business ecosystem, these regulations significantly impact energy companies. The research data were collected from the company's annual financial reports and IDX. IDX remains committed to improving ESG practices and encouraging long-term sustainable investment in the Indonesian capital market through collaboration with assessment institutions to conduct ESG assessments on companies listed on the IDX. IDX is currently working with Morningstar Sustainalytics to conduct ESG assessments. The ten categories measured across all pillars are resource utilization, emission reduction, innovation, human rights, community, product responsibility, management, shareholder score, and CSR strategy.

Firm value measurement in empirical research literature uses various proxies. This study uses a market-based indicator, namely the price-to-book value ratio. ESG is guided by three central elements that assess the impact of sustainability in

investment decision-making. The third element is ESG. ESG assessment is an integral part of a company's ESG practices. Firm size reflects the capacity that can be evaluated based on total assets, total revenue, and average sales level. Companies with significant total assets can reach maturity with positive cash flow, good managerial ability, and favorable long-term prospects to maximize firm value. Various approaches can measure firm size, including total assets, stock market value, and total sales. In addition to being an independent variable that directly determines firm value, it also acts as a moderator variable for ESG and firm size. ROA is also often used to indicate financial performance, measured as the company's net operating profit divided by total assets. A firm with a high ROA can increase its investment and take the initiative to disclose more excellent sustainability activities. In addition, ROA also reflects the efficiency of the company's resource allocation to achieve maximum firm value.

The study tests the relationship between ESG, firm size, and firm value moderated by ROA formulated in two estimation equations of panel data regression models. The dependent variable is firm value, and the explanatory variables consist of ESG, firm size, and ROA while also acting as moderating variables. Therefore, the study considers two models: without and with moderation. Model 1 tests the effect of ESG, firm size, and ROA on firm value.

$$FV_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Firm\ Size_{it} + \beta_3 ROA_{it} + \varepsilon_{it} \quad (1)$$

Model 2 tests the influence of ESG and firm size independently and moderated by ROA on firm value.

$$FV_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Firm\ Size_{it} + \beta_3 ESG_{it} \cdot ROA_{it} + \beta_4 Firm\ Size_{it} \cdot ROA_{it} + \varepsilon_{it} \quad (2)$$

The firm value uses the price-to-book value ratio, calculated by dividing the stock market price by the firm's book value. ESG is a sustainability disclosure score that divides the ESG value disclosed by the total ESG disclosure. Firm size is calculated as the natural logarithm of the firm's total assets. ROA is a proxy for profitability calculated by

dividing after-tax profit by the firm's total assets. ESG \times ROA and firm size \times ROA links moderate the effect of ESG and firm size on firm value.

Estimation of two research models used panel data regression methods, including pooled ordinary least squares (Pooled OLS), random effect model (REM), and fixed effect model (FEM). Panel data are one of the most popular forms of longitudinal data in finance that investigate corporate behavior and reactions. Diagnostic testing is carried out to determine the most appropriate model to investigate the effects of ESG, firm size, and ROA in models 1 and 2 on firm value. On this basis, three tests are carried out. First, the Breusch–Pagan multiplier test (LM test) is carried out to choose between pooled OLS and REM estimation. Second, if there is a panel effect, the Hausman test is selected between the FEM and REM models. This test determines whether there is a correlation between specific unobserved random effects and regression. Third, the Chow test determines whether the model used is OLS or FEM.

3. RESULTS

The study selected 19 energy sector companies listed on the IDX as research samples (Appendix A); these companies are issuers that provide complete ESG assessment reports. ESG assessment is an important part of assessing the implementation of ESG practices in a company. Therefore, the IDX continues to encourage long-term sustainable investment and improve ESG practices in the Indonesian capital market by collaborating with ESG assessment institutions and conducting ESG assessments of listed companies on the IDX. ESG practices can positively impact the value of energy sector companies in Indonesia. The implementation of ESG can help companies reduce negative impacts on the environment and public health, improve the company's financial performance, increase the company's competitive level, minimize

business risks, and maintain the company's reputation and sustainability.

Table 1 summarizes the statistics of the variables analyzed to determine the impact of ESG and firm size on the Indonesian energy sector's firm value in 2016–2022, moderated by the ROA variable. The firm value measured by price book value shows an average value of 0.552 times, a maximum value of 1.235, and a minimum of 0.020. ROA has an average value of 0.033, a maximum value of 0.379, and a minimum of -0.401 . The ROA range (-0.401 to 0.367) indicates that some companies are unprofitable and others are very profitable. Sustainability performance using ESG has an average score of 0.329, with a range of values of 0.116 to 0.558. The ESG score results show that energy companies' sustainability practices and performance in Indonesia are still relatively low, and the ESG risk is relatively moderate.

Firm size using million Rupiah units shows an average value of $2.05E+10$, a maximum value of $1.70E+11$, and a minimum of $5,286,058$. The significant difference in minimum and maximum values of the total assets of energy sector companies in Indonesia indicates a high firm size inequality. This indication is also shown by the highest standard deviation figure of firm size, which implies that the companies in the research sample have different sizes. ROA has the most diminutive standard deviation figure, which means its volatility is relatively low. The slope results show a positive slope for firm value, ESG, and firm size, indicating that upward movements occur more often than downward movements. Conversely, ROA shows a negative slope coefficient, implying that downward movements occur more often than upward movements. Kurtosis statistics show that ROA and firm size display a leptokurtic distribution with a value greater than three, a standard data distribution. At the same time, PBV and ESG have flat data distributions (platykurtic) with values less than 3.

Table 1. Description statistics

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis
Firm value	0.5522	0.5224	1.235	0.0203	0.2993	0.3381	2.2609
ROA	0.0325	0.0326	0.3785	-0.4011	0.0984	-0.0762	7.2987
ESG	0.3290	0.3256	0.5581	0.1163	0.1046	0.1698	2.4565
Firm size	$2.05E+10$	$5.06E+09$	$1.70E+11$	5286058	$3.49E+10$	2.0668	6.2364

Table 2 shows the relationship between variables in pairs. Based on the correlation analysis of six pairs of variables, it shows a weak relationship. The highest and negative correlation between ESG and firm size is 0.3333, while the lowest and positive correlation between ROA and firm size is 0.1272. The correlation results also reveal that ESG disclosure has a negative relationship with the other three variables: firm value, ROA, and firm size.

Table 2. Correlation matrix

Variable	PBV	ROA	ESG	SIZE
Firm value	1			
ROA	0.2028	1		
ESG	-0.2263	-0.2251	1	
Firm size	0.1646	0.1272	-0.3331	1

Panel data regression estimation on firm value is conducted on two research models: model one without moderation and model two with moderation. The panel data regression model uses three methods, namely pooled OLS, FEM, and REM. Table 3 shows the diagnostic results of model selection based on the LM test, F-test, and Hausman, which conclude that FEM is the most appropriate method. Thus, the interpretation and analysis of the study are based on the results of the FEM estimation. Table 4 presents the estimation of the panel model for the pooled OLS, FEM, and REM methods with different results. The proper FEM

Table 3. Diagnostic test results without moderation

Effects test	Statistics	Prob	Results
LM test	104.2302	0.0000	Random > Pooled
F test	9.8283	0.0000	Fixed > Pooled
Houseman	9.2146	0.0266	Fixed > Random

Table 4. Comparison of three OLS panel models, FEM, and REM, without moderation

Variable	OLS	FEM	REM
ESG	-0.4610 (-1.7670)*	-0.0474 (-0.1298)	-0.5499 (-1.1263)
ROA	0.4708* (1.7869)	0.4935 *** (3.2370)	0.4318* (1.8917)
Firm Size	0.0127 (1.0191)	-0.1578 * ** (-4.2785)	-0.0112 (-0.4340)
Constant	0.4051 (1.2779)	4.0654*** (4.9531)	0.9693 (1.5173)
Observations	133	133	133
R-squared	0.0829	0.8454	0.0348
Adjusted R-squared	0.0616	0.8161	0.0123
F-test	3.8873**	28.8949 ***	1.5501

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

method chosen for analysis proves that the ROA estimation coefficient has a positive effect on firm value, which means that firm value increases if ROA increases. The firm size estimation coefficient has a negative impact on firm value, which indicates that an increase in the number of assets decreases the company's value. The ESG disclosure estimation coefficient does not affect firm value, meaning ESG performance is independent of firm value.

Tables 5 and 6 present the results of the estimated impact of ESG and firm size on firm value by making ROA a moderator variable. The results of the diagnostic test of the selection of the panel model show that FEM is the proper method. The test results show that the estimated coefficient of ROA does not moderate the effect of ESG and firm size on firm value. However, an interesting finding, although not significantly influential, is that the direction of the moderator role of ROA is different. Namely, the interaction with ESG is negative, while the interaction with firm size is positive. However, directly and independently, the estimated ESG coefficient positively affects firm value, indicating that if the level of ESG disclosure is high, firm value will increase. There is an inconsistency in the negative direction compared to the model without moderation, even though the effect is insignificant. The estimated coefficient for firm

Table 5. Diagnostic test results with moderation effects

Effects test	Statistics	Prob	Results
LM test	96.6218	0.0000	Random > Pooled
F test	9.5638	0.0000	Fixed > Pooled
Houseman	10.6786	0.0304	Fixed > Random

Table 6. Comparison of three OLS panel models, FEM, and REM with moderation effect

Variable	OLS	FEM	REM
ESG	-0.3773 (-1.4298)	2.3590*** (4.1165)	-0.5421 (-1.1027)
Firm Size	0.0076 (0.5934)	-0.2641 * ** (-5.3786)	-0.0135 (-0.5169)
ESG*ROA	-3.9654 (-1.4194)	-0.6114 (-0.2126)	-0.4649 (-0.1866)
Firm Size*ROA	0.0826 (1.9261)	0.0243 (0.4475)	0.0286 (0.7601)
Constant	0.4793 (1.5133)	5.6428*** (5.3818)	1.0133 (1.5836)
Observations	133	133	133
R-squared	0.1034	0.6912	0.0413
Adjusted R-squared	0.0754	0.6081	0.0113
F-test	3.6899***	8.3148 ***	1.3776

Note***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

size is independently and directly the same as the model without moderation, indicating a negative impact on firm value.

4. DISCUSSION

ESG, with the moderating role of ROA, independently has a positive effect on firm value. However, the interaction between ESG and ROA does not impact firm value. ESG with a model without moderation hurts firm value but the effect is not significant. High ESG disclosure indicates an increase in firm value. This finding is supported by legitimacy and stakeholder theories. Both theories highlight the awareness and demand among stakeholders for increased ESG scores, and stakeholders integrate ESG with other investment information. Therefore, meeting stakeholder requirements can result in higher sustainability performance and firm value. Furthermore, ESG disclosure allows companies to gain consumer support and competitive advantage. In addition, ESG disclosure can increase the intangible assets of firm value (Konar & Cohen, 2001).

Investors consider the improvement of ESG to mean that financial performance can improve through revenue growth and increased efficiency. Therefore, investors are willing to pay more for the company's

shares, increasing the firm value (Melnyk et al., 2003). The findings align with Ammer et al. (2020), Yoon et al. (2018), and Zhou et al. (2022). Ammer et al. (2020) revealed that reporting environmental sustainability practices increases firm value. Zhou et al. (2022) found that improving ESG can increase the firm value. Yoon et al. (2018) used ESG scores to evaluate CSR, proving that CSR practices positively affect firm value. Qureshi et al. (2020) revealed that ESG disclosures are more relevant to firm value than governance scores. Aydoğmuş et al. (2022) found that ESG positively affects firm value. Ali et al. (2023) revealed that ESG has a negative impact on firm value in the oil and gas sector. However, vertical integration moderates the relationship between ESG and firm value.

The finding from the model without the moderating role of ROA reveals that ESG has a negative but insignificant impact on firm value. This finding suggests that companies' efforts to build a public image and green initiatives by disclosing more elements in the ESG score can lower the market-to-book ratio and the likelihood of experiencing financial distress (Velte, 2017; Fathony et al., 2020). Endri (2019) also proved a statistically insignificant relationship between ESG practices and firm value. Prabawati and Rahmawati (2022) reported that high ESG scores indicate low firm

value in sampled companies in ASEAN countries. Using the mediating variable ROA, Suhartini et al. (2024) found that sustainability reporting does not directly affect firm value, and ROA does not mediate this relationship. Rastogi et al. (2024) revealed an insignificant linear relationship between ESG and firm value but a positive impact if the relationship is nonlinear (U-shaped). Transparency and disclosure did not moderate the connectivity of corporate ESG with firm value.

ROA, which acts as a moderator variable, cannot moderate the influence of ESG and firm size on firm value. However, if ROA plays an independent role without moderating other variables, it will positively impact firm value. Luthfiah and Suherman (2018) proved that financial performance (ROA) positively impacts firm value. Achieving a high ROA in a company can increase stock prices and ultimately increase firm value. Sudiyatno et al. (2020) revealed the role of ROA in mediating the influence of firm size on firm value.

Different findings were revealed by Westerman et al. (2020), who proved that ROA had a negative impact on firm value. Razak et al. (2020) revealed that ROA does not impact firm value.

Firm size independently in both moderated and unmoderated models has a negative impact on firm value. However, the interaction between firm size and ROA does not impact firm value. Sudiyatno et al. (2020) revealed that the impact of firm size on firm value is indirect but through ROA. Kodongo et al. (2015) showed that companies with small asset sizes are better able to drive their value than large companies. Luthfiah and Suherman (2018) and Danso et al. (2024) also proved that firm size has a negative effect on firm value. Salim and Yadav (2012) revealed that firm size has a negative impact on firm value in the property sector. Iswajuni et al. (2018) proved that firm size has a significant positive effect on firm value. Zamroni et al. (2024), and Uyar et al. (2023) revealed different results: firm size had no impact on firm value.

CONCLUSION

The study investigates the impact of ESG and firm size and the moderating role of ROA on the Indonesian energy sector's firm value. The research findings reveal that ROA, which acts as a moderator variable, cannot moderate the impact of ESG and firm size on firm value. ROA positively impacts firm value if it acts as an independent variable without moderation. ESG in the model without moderation does not affect firm value, but in the moderation model, ESG positively impacts firm value. However, the interaction between ROA and ESG does not affect firm value. The results of the study prove that better ESG can increase the firm value of the energy sector in Indonesia. This finding also aligns with the legitimacy theory, which shows that ESG disclosure can help companies gain legitimacy from stakeholders with a high commitment from company management to CSR and environmental sustainability. Firm size independently negatively impacts firm value, but it has no effect if it interacts with ROA.

The practical implications recommend that regulators, company management, and investors improve sustainability practices and performance. The level of ESG disclosure of energy sector companies in Indonesia is still relatively low. Thus, capital market authorities need to encourage energy sector companies in Indonesia to improve the performance of ESG elements in their reporting. For company management, paying attention to ESG disclosure is the right thing to do to achieve long-term sustainability performance that increases firm value. Therefore, company management can allocate resources for ESG activities by adopting a more efficient and robust approach.

The analysis conducted is not free from limitations and becomes a suggestion for future work agendas. First, this study only involved energy companies in Indonesia. Therefore, further research can use a larger sample size by covering companies from various sectors. Second, this study uses company data in Indonesia, so the empirical findings cannot be generalized to the capital markets of other countries. Therefore, further research is also recommended to involve energy sector companies from various countries, especially those classified as developing countries.

AUTHOR CONTRIBUTIONS

Conceptualization: Priskila Dorothy, Endri Endri.

Data curation: Priskila Dorothy.

Formal analysis: Priskila Dorothy, Endri Endri.

Funding acquisition: Endri Endri.

Investigation: Endri Endri.

Methodology: Priskila Dorothy, Endri Endri.

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Validation: Priskila Dorothy, Endri Endri.

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APPENDIX A

Table A1. List of energy sector companies listed on the Indonesia Stock Exchange

No.	Code	Company Name
1	BIPI	Astrindo Nusantara Infrastruktur Tbk
2	MEDC	Medco Energi Internasional Tbk
3	AKRA	AKR Corporindo Tbk
4	LEAD	Logindo Samudramakmur Tbk.
5	PGAS	Perusahaan Gas Negara Tbk
6	SOCI	Soechi Lines Tbk
7	ADRO	Adaro Energy Tbk.
8	ARII	Atlas Resources Tbk
9	GTBO	Garda Tujuh Buana Tbk
10	ITMG	Indo Tambangraya Megah Tbk
11	KKGI	Resource Alam Indonesia Tbk.
12	SMMT	Golden Eagle Energy Tbk
13	BBRM	Pelayaran Nasional Bina Buana Raya Tbk
14	MBSS	Mitrabahtera Segara Sejati Tbk
15	ELSA	Elnusa Tbk.
16	DEWA	Darma Henwa Tbk
17	ITMA	Sumber Energi Andalan Tbk
18	PTRO	Petrosea Tbk.
19	WINS	Wintermar Offshore Marine Tbk