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The Influence of Environmental Cost, Leverage, Environmental Performance, Profitability (ROA) on Company Value

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A B S T R A C T

This study aims to examine the influence of environmental costs, leverage, environmental performance, and profitability on firm value in energy sector companies listed on the Indonesia Stock Exchange during the 2021–2024 period. The study applies a quantitative approach with descriptive methods and utilizes secondary data sourced from annual reports and corporate sustainability reports. The sample was determined using a purposive sampling technique, resulting in 41 companies meeting the research criteria with a total of 164 observation units. Firm value was measured using the Tobin's Q ratio, while leverage was proxied by the Debt to Asset Ratio (DAR), profitability was measured using Return on Assets (ROA), and environmental performance was assessed using the PROPER rating. Meanwhile, environmental costs were measured by the proportion of environmental costs to net profit after tax. Data analysis was conducted using statistical analysis techniques to test the influence of each independent variable on firm value. The results of this study are expected to provide empirical evidence regarding the determinants of firm value in the energy sector in Indonesia, as well as serve as a reference for academics, investors, and management in supporting decision-making oriented towards increasing firm value.

INTRODUCTION

Corporate activities have become one of the primary contributors to environmental degradation in Indonesia. Based on records issued by the Jakarta Environmental Agency, the average concentration of fine particulate matter (PM_{2.5}) reached 40.3 µg/m³ in 2023. This figure surpassed the maximum air quality standard established under Government Regulation Number 22 of 2021 (Greenpeace Indonesia, 2024). This situation indicates that industrial activities continue to contribute Substantially to environmental degradation. Furthermore, several firms have received administrative sanctions, including the suspension of operations, due to discrepancies between environmental management documents and implementation in the field (Tempo, 2023). However, the implementation of environmental law still faces various obstacles. This is reflected in the case of PT Soedali Sejahtera, which was fined Rp48 billion for environmental pollution (Mangobay, 2024).

Indonesia has demonstrated its dedication to strengthening corporate accountability for environmental sustainability through the enactment of Law Number 32 of 2009 on Environmental Protection and Management, as well as Law Number 40 of 2007 regulating Limited Liability Firms. These regulations emphasize that firms are not only obligated to maintain environmental sustainability but are also expected to integrate sustainability aspects into their business strategies. Implementing good environmental management practices is believed to strengthen competitiveness and increase company value (Farooq et al., 2024; Zaid et al., 2024). Furthermore, transparently disclosing environmental information can increase stakeholder trust, improve financial performance, and drive a company's market value (Putri & Arsajah, 2023). Therefore, environmental performance, Indicated through an environmental score, is

an important indicator for evaluating a company's effectiveness in controlling the environmental impacts of its operational activities (Adeneye et al., 2023).

Efforts to improve environmental performance require environmental expenditures, including investments in environmentally friendly technologies, waste management, and compliance along with various applicable regulatory requirements (Kheireddine et al., 2023). Although environmental expenditures are frequently perceived as increasing a company's short-term financial obligations, numerous studies indicate that such investments provide substantial long-term advantages. These benefits include improving operational performance, strengthening corporate reputation, and enhancing overall firm value (Al-Mari & Mardini, 2024). Furthermore, adequate allocation of environmental costs reflects a company's commitment to implementing sustainability principles. By consistently fulfilling environmental responsibilities, firms can safeguard the continuity of their business operations while simultaneously fostering greater confidence among stakeholders, ultimately contributing to sustained growth in corporate value.

Investors often assess a firm's future potential and overall performance through its market value, making company value an important measure of corporate success. This value is shaped by numerous internal and external determinants. Among the internal factors, leverage plays a Substantial role, representing the proportion of debt employed to finance the company's assets and business activities. The use of borrowed funds enables firms to obtain additional financial resources that can be allocated to finance daily operations as well as facilitate business growth and expansion. However, if the debt ratio is not managed optimally, the company could potentially face increased financial burdens, which could ultimately reduce the company's value (Muttaqin & Widiyanto, 2024). Therefore, firms need to implement effective capital structure management through cost control, efficient cash flow management, and debt restructuring to meet financial obligations along without hindering operational continuity (Brigham et al., 2022). Moreover, firms that rely heavily on debt financing are typically expected to disclose information more comprehensively. Greater transparency helps minimize information gaps between the company and external parties, strengthens the confidence of investors and creditors, and supports the preservation of corporate value in the capital market (Nur'Afiah & Munandar, 2024).

Apart from leverage, the quality of a company's environmental performance is another important determinant that may affect its overall value. Environmental performance represents how effectively a firm controls and minimizes the environmental consequences of its business operations. Organizations that successfully implement responsible environmental practices are more likely to build a favorable corporate image, enhance their competitive position, and earn stronger trust from investors regarding their long-term business prospects (Ramadhani et al., 2022). The more effective a company is in minimizing negative environmental impacts, the higher the quality of its environmental performance, potentially contributing to increased company value. Corporate environmental performance in Indonesia is assessed through the PROPER program, which applies a five-tier color classification consisting of black, red, blue, green, and gold. This rating system is designed to measure the extent to which firms comply along with environmental regulations and demonstrate effective environmental management practices.

Profitability is another key determinant that Substantially influences a company's value, as it represents the firm's capacity to earn profits by efficiently utilizing its available resources. A strong level of profitability indicates that management has effectively managed corporate assets and successfully achieved the financial objectives established by the company (Nur'aisyah & Dara, 2022). Strong profitability sends a favorable signal to investors, as it reflects sound corporate performance and indicates promising future growth opportunities. As investor confidence increases, demand for the company's shares is likely to rise, contributing to higher firm value. Nevertheless, profitability should not be viewed as the sole determinant of corporate value because its effect may interact along with other important factors, including environmental costs, leverage, and environmental performance. For this reason, the impact of profitability should be examined together along with these variables to provide a more comprehensive explanation of the factors influencing firm value, particularly among energy sector firms listed on the Indonesia Stock Exchange.

According to Signaling Theory, firms communicate relevant information to the market as a means of signaling their future prospects, financial condition, and overall performance. By disclosing this information, firms aim to minimize information asymmetry between management and investors, enabling external stakeholders to make more informed, objective, and reliable investment decisions (Ross, 1977). From the perspective of this study, environmental costs, leverage, environmental performance, and profitability represent important signals that may affect how investors evaluate corporate value. The allocation of funds for environmental initiatives demonstrates a firm's dedication to sustainable environmental practices, whereas strong profitability reflects its effectiveness in generating earnings from available resources. In contrast, a greater reliance on debt financing may be perceived as a sign of higher financial risk. Consequently, information related to these four factors can shape investor judgments and influence their overall assessment of a company's value.

Previous study has yielded mixed Impacts regarding the factors influencing firm value. Ramadhani and Wicaksono (2023) found that environmental costs positively impact firm value. Conversely, study by Maryamah and Mahardika (2021) revealed that leverage negatively impacts firm value. Meanwhile, Sapulette and Limba (2021) demonstrated that environmental performance positively impacts firm value. Similar findings were also presented by Adeneye et al. (2023), who stated that profitability positively contributes to increasing firm value. The inconsistent findings reported in previous studies suggest that the effects of these variables on firm value have not yet been conclusively established. Therefore, additional empirical investigation is necessary by considering different study settings and Differences in company characteristics to obtain a more comprehensive understanding of these relationships.

This study introduces a new perspective by expanding the study conducted by Firza Octavia A. (2025), which analyzed the effects of green accounting, leverage, and environmental performance on firm value along within the Consumer Non-Cyclicals subsector and energy sector over the 2020–2023 period. The primary distinction of the present study is the substitution of the green accounting variable along with environmental costs, providing a different approach to examining the determinants of firm value. This replacement is based on the consideration that environmental costs better represent the amount of actual company expenditure allocated

to environmental management and preservation activities, so that its impact on firm value can be measured more specifically (Dewi & Sutanto, 2024). Furthermore, this study incorporates profitability as an additional explanatory variable, measured by Return on Assets (ROA), to represent a company's effectiveness in generating earnings from its asset base. Another distinguishing feature of this study is its study scope, which is limited to energy sector firms listed on the Indonesia Stock Exchange, along with the analysis covering the 2021–2024 observation period. The selection of this period is expected to provide a more actual picture of environmental conditions, company financial performance, and market dynamics that have the potential to influence firm value.

This research is conducted to examine the factors that may influence company value in the energy sector. Specifically, it investigates the roles of environmental costs, leverage, environmental performance, and profitability. Based on these variables, the study addresses four research questions related to whether each factor has an impact on company value. To answer these questions, four hypotheses are developed. It is expected that environmental costs, environmental performance, and profitability will have a positive influence on company value, while leverage is expected to have a negative influence. The findings of this study are expected to provide empirical evidence regarding the relationship between these variables and company value using data from energy sector companies listed on the Indonesia Stock Exchange (IDX) over the 2021–2024 period.

METHODS

A quantitative research method was applied in this study by relying on secondary data gathered from the published annual and sustainability reports of energy sector firms listed on the Indonesia Stock Exchange (IDX). The collected data were analyzed to determine the effect of environmental expenditure, financial leverage, environmental performance, and profitability, represented by Return on Assets (ROA), on corporate value. The investigation focuses on the 2021–2024 reporting period to evaluate the extent to which these factors contribute to changes in firm value (Sugiyono, 2023).

The study population included all 91 energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period. The research sample was determined through purposive sampling, in which companies were selected based on specific criteria established to meet the objectives of the study (Sugiyono, 2019). To be included in the sample, companies had to satisfy three requirements: (1) remain continuously listed on the IDX from 2021 to 2024, (2) provide complete annual and sustainability reports for each year of the study period, and (3) disclose environmental expenditure data consistently throughout the observation period. After applying these criteria, 41 firms were identified as eligible for analysis. Since the study covered four consecutive years, the final dataset consisted of 164 firm-year observations.

Table 1. Processed by myself, 2026.

Variabel	Pengertian	Rumus	Sumber
Environmental cost (X1)	Costs incurred by the company in connection along with environmental management activities due to the impact of the company's operations.	$\text{Environmental Cost} = \frac{\text{Environmental Cost}}{\text{Net profit after tax}}$	(Saputri, <i>et al</i> 2023)
Leverage (X2)	The ratio used to measure how much of a company's assets are financed by debt.	$\text{DAR} = \frac{\text{Total Debt}}{\text{Total Assets}}$	(Fernando <i>et al</i> , 2024)
Environmental Performance (X3)	The company's level of success in managing the environmental impact of its operational activities.	PROPER Rating: Gold = 5, Green = 4, Blue = 3, Red = 2, Black = 1	(Cahyani dan Puspitasari, 2023)
Profitability (ROA) (X4)	The company's ability to generate profits from all assets owned.	$\text{ROA} = \frac{\text{Net profit}}{\text{Total Assets}}$	(Kasmir, 2021)
Company Value (Y)	Investors' perception of the company's level of success is reflected in the share price.	$\text{Tobins' Q} = \frac{\text{EVM} + \text{Debt}}{\text{Total Assets}}$	(Hardiansyah <i>et al</i> , 2021;125)

Five variables were analyzed in this study, with their measurements based on ratio and ordinal scales. The ratio-scale variables consisted of environmental expenditure, leverage as indicated by the Debt to Asset Ratio (DAR), profitability as proxied by Return on Assets (ROA), and firm value represented by Tobin's Q. In contrast, environmental performance was measured using an ordinal scale. Meanwhile, environmental performance variables are measured based on PROPER ratings using an ordinal scale. Differences in measurement scale characteristics between variables have the potential to cause Differences in the data range, so all variables were first transformed into a standardized score (Z-score) before statistical analysis.

Data standardization was carried out using the Z-score method. Each observation was converted by deducting the variable's mean from its original value and dividing the difference by the corresponding standard deviation. As a result, the standardized dataset has a mean of 0 and a standard deviation of 1. This ensures that all variables have a uniform scale, allowing for more proportional comparisons and improving the accuracy of regression analysis in identifying relationships between study variables.

The environmental cost variable (X_1) is defined as all expenses allocated by a company to support the management, prevention, and recovery of environmental impacts arising from operational activities. This variable is measured using the ratio between total environmental costs and net profit after tax, as proposed by Saputri et al. (2023). This ratio serves as an indicator of how far a company is willing to dedicate its financial resources to environmental preservation initiatives. Meanwhile, the leverage variable (X_2) represents the degree to which a company relies on debt as a source of financing for its assets. The level of leverage is represented by the Debt-to-Asset Ratio (DAR), determined by dividing total liabilities by total assets. This ratio shows the extent to which a company's assets are financed through debt. An increase in the DAR value suggests greater reliance on external financing, which may increase the firm's financial risk and its burden in meeting debt obligations (Fernando et al., 2024).

The environmental performance variable (X_3) is used to indicate how well a company manages its environmental responsibilities and reduces the negative impacts of its business activities. This study measures environmental performance based on the Corporate Performance Rating Program in Environmental Management (PROPER) established by the Ministry of Environment and Forestry (KLHK). Under this rating system, companies are classified into five categories—black, red, blue, green, and gold—with corresponding scores of 1, 2, 3, 4, and 5, where higher scores represent better environmental performance. A higher PROPER rating signifies stronger corporate performance in implementing environmental management practices and complying along with environmental protection standards. The profitability variable (X_4) is used to measure how effectively a company utilizes its assets to produce profits. This research employs Return on Assets (ROA) as the profitability indicator, which is obtained by dividing net income after tax by total assets. A higher ROA indicates better efficiency in generating profits from the company's available assets (Cahyani & Puspitasari, 2023).

Return on Assets (ROA) measures a company's efficiency in converting its total assets into net earnings. The dependent variable of this research is firm value (Y), which is represented by Tobin's Q. This indicator is obtained by dividing the company's total market value, consisting of equity market capitalization and total liabilities, by the total value of its assets (Pasaribu et al., 2023). Tobin's Q is considered an appropriate measure of firm value because it reflects investors' assessments more effectively than accounting-based measures. As it incorporates market information, this indicator is able to capture not only current company performance but also future growth opportunities and long-term value creation.

This study relied exclusively on secondary data collected through the documentation method. The data were extracted from annual reports, financial statements, sustainability reports, and PROPER assessment results of energy sector companies listed on the Indonesia Stock Exchange (IDX) for the 2021–2024 period. All information was obtained from official and publicly accessible sources, including the IDX website, company publications, and reports issued by the Ministry of Environment and Forestry. After the data collection stage was completed, the dataset was organized and analyzed using the Statistical Package for the Social Sciences (SPSS) to examine the effects of environmental expenditure, leverage, environmental performance, and profitability on firm value.

Table 2. Descriptive Statistical Test

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Y (TOBINS Q)	164	.00113	7.81403	1.2266871	1.27549377
X1 (ENVIRONMENTAL COST)	164	.00000	1.30672	.0680045	.20819805
X2 (DAR)	164	.00046	4.96406	.5550621	.58083525
X3 (PROPER)	164	0	5	2.62	1.614
X4 (ROA)	164	.00001	3.54002	.1549546	.39684720
Valid N (listwise)	164				

The descriptive statistics indicate that the Environmental Cost variable has an average value of 0.068 and a standard deviation of 0.208. Leverage, represented by the Debt-to-Asset Ratio (DAR), shows a mean of 0.555 with a standard deviation of 0.581. The environmental performance variable, measured using the PROPER rating system, records an average score of 2.62 and a standard deviation of 1.614. Profitability, assessed through Return on Assets (ROA), has a mean value of 0.155 and a standard deviation of 0.397. In addition, firm value, represented by Tobin's Q, has an average of 1.227 with a standard deviation of 1.275. These findings suggest that the data exhibit considerable variation across the variables analyzed, indicating that the observed companies display diverse characteristics during the study period.

Table 3. Classical Assumption Test
Normality Test
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		164
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	8.40049162
Most Extreme Differences	Absolute	.041
	Positive	.041
	Negative	-.034
Test Statistic		.041
Asymp. Sig. (2-tailed)		.200 ^{c,d}

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

The normality test was conducted using the Kolmogorov–Smirnov method and produced an Asymp. Sig. value of 0.200. Because this value is higher than the significance level of 0.05, the regression residuals are considered to follow a normal distribution. Therefore, the normality assumption is fulfilled, indicating that the regression model is suitable for further statistical analysis and hypothesis testing.

Table 4. Multicollinearity Test
Coefficients^a

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	X1 (ENVIRONMENTAL COST)	.975	1.025
	X2 (DAR)	.974	1.027
	X3 (PROPER)	.964	1.038
	X4 (ROA)	.959	1.043

a. Dependent Variable: Y (TOBINS Q)

The multicollinearity test results show that the Environmental Cost variable has a tolerance value of 0.975 and a Variance Inflation Factor (VIF) of 1.025. Leverage, represented by the Debt-to-Asset Ratio (DAR), records a tolerance of 0.974 and a VIF of 1.027. Environmental Performance, measured using the PROPER rating, produces a tolerance value of 0.964 with a corresponding VIF of 1.038. Meanwhile, the profitability variable, represented by Return on Assets (ROA), has a tolerance value of 0.959 and a VIF of 1.043. Because all tolerance values are above 0.10 and every VIF value is substantially lower than 10, the regression model satisfies the multicollinearity assumption. These findings indicate that the independent variables are not highly correlated and therefore do not create multicollinearity issues within the model.

Table 5. Heteroscedasticity Test
Coefficients^a

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	7.192	.824		8.731	.000
	X1 (ENVIRONMENTAL COST)	-2.570	1.839	-.111	-1.398	.164
	X2 (DAR)	1.222	.667	.148	1.831	.069
	X3 (PROPER)	-.255	.234	-.085	-1.087	.279
	X4 (ROA)	-1.065	.971	-.088	-1.097	.274

a. Dependent Variable: ABS

The heteroscedasticity test was conducted using the Glejser method. The results indicate significance values of 0.164 for Environmental Cost, 0.069 for the Debt-to-Asset Ratio (DAR), 0.279 for Environmental Performance (PROPER), and 0.274 for Return on Assets (ROA). Since each significance value is greater than the 0.05 threshold, no indication of heteroscedasticity is found in the

regression model. Therefore, the assumption of constant residual variance is fulfilled, suggesting that the regression model is suitable for subsequent statistical testing.

Table 6. Autocorrelation Test

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.561 ^a	.314	.297	9.01396	2.051

a. Predictors: (Constant), X4 (ROA), X2 (DAR), X1 (BIAYA LINGKUNGAN), X3 (PROPER)

b. Dependent Variable: Y (TOBINS Q)

The Durbin–Watson statistic obtained from the autocorrelation test is 2.051. Because this value is close to 2, it indicates that the regression model is not affected by autocorrelation. In other words, the residuals associated along with one observation do not show a systematic relationship along with the residuals of other observations. Therefore, the autocorrelation assumption is fulfilled, confirming that the regression model is appropriate for use in the subsequent analysis of this study.

Table 7. Multiple Linear Regression Analysis
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-10.416	7.599		-1.371	.172
	X1 (ENVIRONMENTAL COST)	.275	.069	.267	4.018	.043
	X2 (DAR)	1.065	.072	.246	3.696	.023
	X3 (PROPER)	.444	.067	.442	6.615	.035
	X4 (ROA)	.223	.073	.205	3.060	.003

$$Y = -10,416 + 0,275X_1 + 1,065X_2 + 0,444X_3 + 0,223X_4$$

A. Constant

The regression model produces a constant value of -10.416, which represents the estimated level of Firm Value (Tobin's Q) when the values of Environmental Costs, DAR, PROPER, and ROA are assumed to be zero. This intercept reflects the initial level of the dependent variable before the influence of all explanatory variables is taken into account.

B. Environmental Costs (X₁)

The estimated coefficient for the Environmental Costs variable is 0.275, indicating that a one-unit increase in environmental costs is associated along with a 0.275-unit increase in Firm Value, assuming the other variables remain constant. The positive coefficient suggests that greater corporate spending on environmental initiatives is linked to higher firm value.

C. DAR (X₂)

The leverage variable, measured by the Debt-to-Asset Ratio (DAR), has a regression coefficient of 1.065. This finding implies that each one-unit rise in DAR is expected to increase Firm Value by 1.065 units, provided that the remaining variables are unchanged. Therefore, DAR demonstrates a positive association along with firm value.

D. PROPER (X₃)

The PROPER variable records a coefficient value of 0.444, meaning that an increase of one unit in the PROPER rating is predicted to raise Firm Value by 0.444 units while holding other variables constant. This positive coefficient indicates that stronger environmental performance and a better environmental reputation contribute to a more favorable market valuation of the company.

E. ROA (X₄)

The profitability variable, Indicated by Return on Assets (ROA), has a regression coefficient of 0.223. This Impact indicates that every one-unit improvement in ROA is expected to increase Firm Value by 0.223 units, assuming other factors remain unchanged. The positive relationship suggests that firms along with higher profitability tend to receive more favorable evaluations from investors, leading to greater firm value.

Table 8. Hypothesis Testing
Partial Hypothesis Testing (T-Test)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-10.416	7.599		-1.371	.172
	X1 (ENVIRONMENTAL COST)	.275	.069	.267	4.018	.043
	X2 (DAR)	1.065	.072	.246	3.696	.023
	X3 (PROPER)	.444	.067	.442	6.615	.035
	X4 (ROA)	.223	.073	.205	3.060	.003

A. The Effect of Environmental Costs on Firm Value (Tobin's Q)

The partial hypothesis test demonstrates that the Environmental Cost variable has a statistically Substantial effect on Firm Value. This is evidenced by a t-statistic of 4.018 and a significance value of 0.043, which is below the 0.05 threshold. The estimated regression coefficient of 0.275 is positive, indicating that increases in environmental expenditures are associated along with higher firm value.

Accordingly, the findings support the first study hypothesis, confirming that environmental costs positively and Substantially influence Firm Value (Tobin's Q).

B. The Effect of Debt-Reduced Assets (DAR) on Firm Value (Tobin's Q)

The Impacts of the t-test also reveal that the Debt-to-Asset Ratio (DAR) has a statistically Substantial impact on Firm Value. The analysis produced a t-value of 3.696 along with a significance level of 0.023, which is lower than the 0.05 criterion. In addition, the positive regression coefficient of 1.065 indicates that a higher level of leverage, as measured by DAR, is associated along with an increase in Firm Value. Based on these findings, the second hypothesis is supported, suggesting that DAR has a positive and Substantial effect on Firm Value (Tobin's Q).

C. The Effect of PROPER on Company Value (Tobin's Q)

The results of the partial regression analysis show that Environmental Performance, represented by the PROPER rating, has a statistically significant effect on Firm Value. This finding is evidenced by a t-value of 6.615 and a significance level of 0.035, which is lower than the 0.05 criterion. In addition, the positive regression coefficient of 0.444 indicates that a higher PROPER rating is associated with an increase in firm value. Therefore, the third hypothesis (H3) is accepted, indicating that better environmental performance contributes positively and significantly to Firm Value, as measured by Tobin's Q.

D. The Effect of ROA on Company Value (Tobin's Q)

The results of the t-test demonstrate that profitability, measured by Return on Assets (ROA), has a statistically significant effect on Firm Value. This conclusion is supported by a t-value of 3.060 and a significance value of 0.003, which is below the 0.05 significance level. The regression coefficient of 0.223 is positive, indicating that higher profitability is associated with an increase in firm value. These findings suggest that companies with greater efficiency in generating profits are more likely to obtain higher market valuations. Consequently, the fourth hypothesis (H4) is accepted, confirming that ROA has a positive and statistically significant effect on Firm Value, as measured by Tobin's Q.

Table 9. Coefficient of Determination Test (R^2)

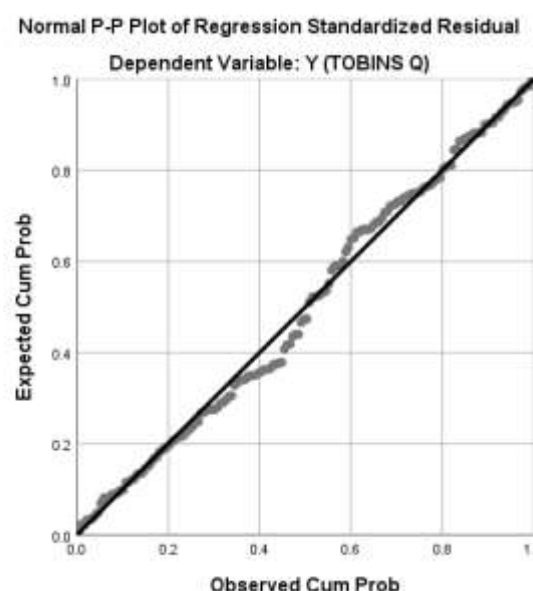
Model	R	R Square	Model Summary ^b		Durbin-Watson
			Adjusted R Square	Std. Error of the Estimate	
1	.561 ^a	.314	.297	9.01396	2.051

a. Predictors: (Constant), X4 (ROA), X2 (DAR), X1 (ENVIRONMENTAL COST), X3 (PROPER)

b. Dependent Variable: Y (TOBINS Q)

Based on the coefficient of determination analysis, the regression model obtained an R-square value of 0.314. This finding indicates that the combined contribution of Environmental Cost, leverage (DAR), Environmental Performance (PROPER), and profitability (ROA) explains 31.4% of the changes in Firm Value, measured by Tobin's Q. The other 68.6% is explained by additional factors outside the scope of this study and therefore is not captured by the proposed research model. These findings suggest that, although the independent variables contribute to explaining changes in Firm Value, a substantial proportion of its Difference is influenced by additional determinants beyond the scope of this study.

Table 10. Normal P-P Plot of Regression Standardized Residual



IMPACTS AND DISCUSSION

The results of this study indicate that Environmental Cost (X_1), leverage represented by the Debt-to-Asset Ratio (DAR) (X_2), Environmental Performance (X_3), and profitability measured by Return on Assets (ROA) (X_4) all have a positive and statistically significant effect on Firm Value (Y) in energy sector companies listed on the Indonesia Stock Exchange during the 2021–2024 period. These findings suggest that higher environmental expenditure, effective debt utilization, improved environmental performance, and greater profitability contribute to increasing firm value, as reflected in Tobin's Q . Therefore, all research hypotheses ($H1$ – $H4$) are accepted, indicating that the proposed relationships between the independent variables and firm value are supported by the empirical evidence.

The Impacts of this study are consistent along with the Signaling Theory introduced by Ross (1977), which argues that firms communicate information to the market in order to signal their future prospects and overall business condition. These signals extend beyond financial performance and also encompass non-financial disclosures, including environmental responsibility and the adoption of sustainable business practices. When the information conveyed is perceived positively, investor confidence in the company's future performance is strengthened, leading to greater investment interest and, ultimately, a higher level of firm value.

The Substantial positive relationship between environmental costs and firm value suggests that environmental expenditures should not be regarded merely as additional operating costs. Instead, these expenditures represent long-term strategic investments that can create sustainable economic value. Financial resources devoted to activities such as waste treatment, emission reduction, the adoption of environmentally friendly technologies, and compliance along with environmental regulations reflect the company's commitment to sustainable business practices. Such initiatives provide favorable signals to investors regarding the company's dedication to Environmental, Social, and Governance (ESG) principles. As a result, the company is able to strengthen its corporate reputation, enhance stakeholder confidence, and improve its market valuation. These findings are in line along with the study conducted by Ramadhani and Wicaksono (2023), which concluded that environmental costs positively contribute to firm value by reinforcing corporate reputation and increasing investor trust.

In addition, leverage, Indicated by the Debt-to-Asset Ratio (DAR), was found to exert a positive and statistically Substantial effect on firm value. These Impacts indicate that optimally managed debt can be utilized as a funding source to support business expansion, increase production capacity, and strengthen company growth. Based on the Signaling Theory perspective, a company's ability to manage debt effectively reflects management's competence in developing a healthy capital structure while meeting its financial obligations. This condition provides investors along with confidence that the company has good prospects, which impacts on increasing company value. These findings support study by Hakim and Aris (2023), which concluded that leverage can positively contribute to firm value if debt funds are utilized productively and are able to generate a rate of return exceeding the company's debt costs.

Environmental performance, evaluated through the PROPER rating system, was also found to have a positive and Substantial influence on firm value. This finding suggests that firms achieving higher PROPER ratings are more likely to attain greater market value. The PROPER assessment reflects a firm's effectiveness in managing environmental impacts while complying along with applicable environmental regulations. Superior environmental performance enhances a company's credibility and strengthens its reputation among investors, regulators, and the broader community. Consequently, a favorable PROPER rating serves as a positive signal that the company is committed to responsible and sustainable business practices, thereby contributing to higher firm value. This finding aligns along with study by Sapulette and Limba (2021), which demonstrated that environmental performance positively impacts company value by enhancing a company's reputation, reducing environmental risks, and strengthening investor confidence.

Profitability, as measured by Return on Assets (ROA), has also been shown to have a positive and Substantial impact on firm value. This finding indicates that a company's ability to generate profits through efficient asset utilization is a factor that can increase firm value. A high level of profitability reflects management's effectiveness in managing company resources, thereby generating sustainable profits. This condition provides a positive signal to investors regarding the company's growth prospects, its ability to generate future cash flow, and the stability of its operational performance. According to Signaling Theory, profitability represents one of the most important signals considered by investors when evaluating a company's performance and future potential. A company that consistently generates higher profits is generally perceived as having stronger growth prospects and better financial stability, which enhances investor confidence. As confidence in the firm's future performance increases, demand for its shares is likely to rise, leading to an improvement in firm value. The findings of this study are consistent along with those reported by Adeneye et al. (2023), who concluded that profitability plays a Substantial role in enhancing firm value because strong financial performance reinforces market confidence and encourages positive investor perceptions.

Overall, the findings demonstrate that firm value is determined by a combination of both financial and non-financial factors rather than financial performance alone. Environmental costs and environmental performance represent a company's commitment to sustainability and responsible environmental management, whereas leverage and profitability reflect management's effectiveness in utilizing financial resources and maintaining an appropriate capital structure. Collectively, these four variables communicate favorable signals to investors regarding the company's governance quality, future growth potential, and long-term sustainability, thereby contributing to higher firm value. This positive perception subsequently drives increased market confidence, which in turn leads to increased company value. Therefore, energy sector firms need to optimize environmental cost management, maintain a healthy capital structure, improve environmental performance by achieving a better PROPER rating, and maintain consistent profitability levels. These efforts are expected to create sustainable corporate value while strengthening the company's competitiveness in the capital market.

CONCLUSIONS

The Impacts of this study demonstrate that environmental costs, leverage measured by the Debt-to-Asset Ratio (DAR), environmental performance, and profitability Indicated by Return on Assets (ROA) each have a positive and statistically Substantial influence on the firm value of energy sector firms listed on the Indonesia Stock Exchange over the 2021–2024 observation period. These findings suggest that greater investment in environmental initiatives, efficient management of the company's debt financing, stronger environmental performance, and an enhanced ability to generate profits all contribute to increasing firm value by strengthening positive perceptions among investors.

The findings further demonstrate that firm value is shaped not only by a company's financial performance but also by its commitment to sustainable business practices and other non-financial dimensions. Consequently, firms should prioritize the efficient allocation of environmental expenditures, maintain an optimal capital structure, continuously improve environmental performance, and sustain strong profitability. By consistently implementing these strategic initiatives, firms can enhance investor confidence, strengthen their competitiveness in the capital market, and support the creation of long-term sustainable corporate value.

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