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Influence of green investment, institutional ownership and environmental performance on company value with profitability as a mediation variable: A Study on energy sector listed on Indonesia stock exchange 2019 –2023

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Abstract: This study aims to analyze the impact of green investment, institutional ownership, and environmental performance on firm value, with profitability as a mediating variable in energy sector companies listed on the IDX between 2019 and 2023. Firm value reflects investors' perceptions of a company's future prospects, where sustainability practices are increasingly considered strategic in investment decisions. Using secondary data from the annual and sustainability reports of energy sector corporations, this study employs a quantitative method. Panel data methodologies were used for analysis, and the research design is cross-sectional. The results indicate that institutional ownership, environmental performance, and green investment all significantly affect corporate value. While environmental performance has no direct effect on firm value, green investment and institutional ownership both have a positive and substantial impact. It has been established that profitability mediates the relationship between institutional ownership and firm value, as well as green investment, but it does not mediate the relationship between environmental performance and firm value. These findings highlight the importance of financial success in strengthening the strategic impact of sustainability activities on company value in the energy industry.

Keywords: *Environmental performance, Firm value, Green investment, Institutional ownership, Mediation, Profitability.*

1. Introduction

The value of a company represents an investor's view of its future potential, as seen through its stock price and market capitalization. A higher stock price indicates a greater company value [1]. The Price to Book Value (PBV), which contrasts the market price of a company's shares with its book value, is one of the primary metrics used to evaluate the worth of a business. PBV was chosen in this study because it is able to represent the company's performance and potential more comprehensively [2].

In the context of theory, two approaches explain the formation of corporate value. First, Signaling Theory by Michael Spence emphasizes the importance of positive signals such as information disclosure, innovative investment, and commitment to sustainability to attract investor trust [3]. Secondly, according to Suchman [4] Legitimacy Theory, a company can gain social legitimacy through ethical practices and social responsibility, which positively influence its reputation and market value [5].

Regulatory frameworks also contribute to driving the enhancement of company value. The Indonesian government through the OJK requires sustainability reporting to increase transparency and attract investors who consider environmental, social, and governance aspects (POJK 51/2017). However, the effectiveness of this regulation still faces challenges in consistent implementation and supervision [6].

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The company's value is also impacted by the energy industry dynamics in Indonesia from 2019 to 2023. The US-China trade war and excess US oil supplies put pressure on this industry in 2019, which led to a decline in oil prices and a weakening of energy equities [7]. Oil prices plummeted in 2020 due to the COVID-19 epidemic, even reaching levels that were negative. Fuel consumption decreased drastically and the financial performance of energy companies, including Pertamina and PLN, experienced a sharp decline [8].

In 2021, the energy sector was still sluggish due to weak demand and high corporate debt. Large stocks such as PGAS and INDY recorded significant declines, reflecting investor caution in the face of uncertainty [9]. In 2022, the decline in global commodity prices again put pressure on the energy sector, with the JCI falling due to weakening energy stocks. Negative sentiment was also influenced by the slowdown in Japanese industry and the Bank of Japan's policies [10].

In 2023, the sector faces additional pressure from weakening coal prices and concerns about a global recession. Several major energy stocks such as UNTR, BUMI, and ADRO experienced significant declines. The global market correction, especially from China and the US, also worsened the condition of energy sector stocks in Indonesia [11].

In conclusion, a company's value is influenced not only by its financial performance but also by its communication strategy, sustainability practices, and how it responds to market conditions and regulations. These factors interact to shape investor perceptions, which are ultimately reflected in the company's market value [12].

The phenomenon of the surge in green energy company valuations reflect a shift in investment strategies toward a focus on sustainability. In the 2019–2023 period, the volatility of the energy sector due to commodity price dynamics and the global crisis showed that companies committed to *green investment* and sustainability were more resilient in the face of uncertainty [3]. Institutional ownership plays a role in strengthening governance and transparency, thereby increasing company value [13]. On the other hand, good environmental performance also strengthens reputation and attracts investors who prioritize ESG principles [14].

A company's worth is mediated by profitability, which links environmental performance, institutional ownership, and green investment [15]. Allocating funds to ecologically beneficial initiatives, such energy efficiency and renewable energy, is known as green investment [3]. Decision-making based on sustainability is usually encouraged by institutional ownership, which is the percentage of shares held by organizations such as insurance companies and pension funds [16]. Good environmental performance reduces legal and operational risks, and drives corporate profits [17].

Indonesia's energy sector as a strategic sector faces pressure to transform towards sustainable business practices. However, challenges in the form of high costs and technology are the main obstacles in implementing *green investment*. The Ministry of Environment's PROPER program measures environmental performance, but more research is needed to determine how institutional ownership affects business value [18]. In this context, profitability is an important element that can solidify the impact of sustainability on company value [5, 19]. Investigating the empirical relationship between these factors is crucial in light of this phenomena, especially for energy sector businesses that are listed on IDX. Considering the background, the research problem is as follows:

1. What are the characteristics of *green investment*, Institutional Ownership, environmental performance, corporate value, and profitability in energy sector companies on IDX in 2019 – 2023?
2. What are the descriptive results of *green investment*, Institutional Ownership, environmental performance, corporate value, and profitability in energy sector companies on IDX in 2019 – 2023?
3. Is *green investment*, do institutional ownership and environmental performance simultaneously affect company value in energy sector companies listed on IDX in 2019–2023?
4. Is *green investment* do institutional ownership and environmental performance partially influence company value in energy sector companies on IDX in 2019–2023?

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5. Does profitability mediate the influence of *green investment*, Institutional Ownership, and environmental performance on corporate value in energy sector companies on IDX in 2019 – 2023?

This study aims to determine the characteristics *of investment*, Institutional Ownership, environmental performance, firm value, and profitability in energy sector companies listed on the Indonesia Stock Exchange in 2019 – 2023. To find out the descriptive results of *green investment*, Institutional ownership, environmental performance, firm value, and profitability in energy sector companies on IDX in 2019 – 2023.

1. To know the characteristics *of investment*, institutional ownership, environmental performance, firm value, and profitability in energy sector companies on IDX in 2019–2023.
2. To find out the results of the related descriptive analysis of *green investment*, institutional ownership, environmental performance, firm value, and profitability in energy sector companies on the IDX in 2019–2023.
3. To find out the simultaneous effect of *green investment*, institutional ownership, and environmental metric on the value of company in energy sector companies on the IDX in 2019–2023.
4. To find out the partial effect of *green investment*, institutional ownership, and environmental metric on the value of company in energy sector companies on the IDX in 2019–2023.
5. To determine the role of profitability as a mediating variable in the *green investment*, institutional ownership, and environmental metric's relationship on company value in energy sector companies on the IDX in 2019–2023.

This study provides theoretical contributions to the development of *green investment* and institutional governance literature, as well as practical benefits for companies and investors to increase corporate value through sustainability strategies. The results can also be used as a reference in making sustainability-based policies in the energy sector [12].

The exact impact of green investment and institutional ownership is unclear because different research show different results, despite the fact that many show a favorable correlation between sustainability practices and business value.

Research conducted by Larasati [20] found that green investment does not positively influence company value, which contrasts with the findings of other studies. However, the results of the study [21] show that "*disclosure* environmental accounting, environmentally friendly process innovation, and environmental management accounting positively influence economic performance."

The gap between theoretical expectations and actual phenomena, along with inconsistent findings from previous studies, has prompted the author to examine more deeply the influence of green investment, institutional ownership, and environmental performance on firm value. Therefore, this research focuses on analyzing these relationships within energy sector companies on the IDX in 2019–2023.

"Influence *Green Investment*, Institutional Ownership and Environmental Performance on Firm Value with Profitability as a Mediating Variable (Study on Energy Sector Companies on the IDX in 2019-2023)".

The research hypothesis might be stated as follows in light of the previously discussed framework of thought and research ideas:

H_1: Green Investment, Institutional Ownership, Environmental Performance, and Profitability simultaneously influence Company Value in companies in the oil and gas sector. Energy on the IDX in 2019 - 2023

H_2: Green Investment partially positively impacts Company Value in Energy sector companies on the IDX in 2019–2023.

H_3: Institutional Ownership partially impacts Company Value positively in Energy sector companies on the IDX in 2019–2023.

H_4: Environmental Performance partially impacts Company Value positively in Energy sector companies on the IDX in 2019–2023.

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H_5: Green Investment partially positively impacts profitability in energy sector companies listed on the Indonesia Stock Exchange in 2019–2023.

H_6: Institutional Ownership has a partial positive effect on Profitability in Energy sector companies listed on the Indonesia Stock Exchange in 2019–2023.

H_7: Environmental Performance has a partial positive effect on Profitability in Energy sector companies listed on the Indonesia Stock Exchange in 2019–2023.

H_8: Profitability has a partial positive impact on Company Value in Energy sector companies on the IDX in 2019–2023.

H_9: Profitability mediates the effect of Green Investment on Company Value in Energy sector companies on the IDX in 2019–2023.

H_{10}: Profitability mediates the effect of Institutional Ownership on Firm Value in Energy sector companies on the IDX in 2019–2023.

H_{11}: Profitability mediates the effect of Environmental Performance on Firm Value in Energy sector companies on the IDX in 2019–2023.

2. Research Methods

With profitability serving as a mediating variable, this study uses a quantitative research approach to examine the impact of institutional ownership, green investment, and environmental performance on business value. The study makes use of secondary data from company reports that are posted on the IDX official website. Using an ex post facto survey approach, the research methodology gathers information from the companies' yearly sustainability and annual reports.

2.1. Time and Place of Research

A cross-sectional survey design is used in this study, meaning that data is gathered at a particular moment in time. However, the analysis spans a five-year period, from 2019 to 2023, focusing on companies within the energy sector. The information comes from sustainability and annual reports that are posted on the IDX

This study utilizes secondary data collected through a panel data method, in which data are consistently sourced from the same entities over a specified period. In particular, the information came from the sustainability and annual reports of energy businesses that were listed on the IDX between 2019 and 2023.

2.2. Operational Variables

ROA, a measure of profitability, acts as the mediating variable in this investigation. It shows how well a business can make money in relation to its overall assets. ROA is utilized to assess the efficiency with which a company manages its resources to produce profits. As a mediator, profitability functions as an intermediary that links green investment, institutional ownership, and environmental performance to firm value. Accordingly, this research investigates whether the influence of these three predictors on firm value is enhanced through improvements in financial performance, as indicated by profitability.

2.3. Population and Sample

Companies in the energy sector that were listed between 2019 and 2023 on the IDX make up the study's sample. The following particular criteria were used in the purposive sampling technique: Businesses that regularly release financial reports, sustainability reports, green investment data, shareholder ownership information, and actively participate in the PROPER program for five consecutive years. Of the 83 listed energy sector companies, only 16 companies met the criteria and were sampled. The total observations obtained were 80 (16 companies × 5 years), so that the data analyzed had adequate coverage and continuity.

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2.4. Data Collection

Secondary data for this study was extracted from the sustainability and annual reports of energy sector companies listed between 2019 and 2023 on the IDX. The IDX's official website and the individual company websites were the sources of the secondary data. The technique used to collect data is as follows, the documentation collection technique will be carried out using secondary data, data on energy sector businesses listed on the IDX between 2019 and 2023. Information gathered from the official IDX website and the websites of the individual enterprises will be used to identify these businesses, which were chosen as the study sample. This literature study's collection method involves reviewing, evaluating theories, and creating citations that follow writing guidelines and make reference to journals, articles, scientific books, and other sources that support and are connected to the research being done.

2.5. Data Analysis and Hypothesis Testing Techniques

In order to determine the significance of the link between the predictors and response variable, both separately (partial) and jointly (simultaneous), hypothesis testing is done in this research. The t-test and the F-test are two of the analytical techniques used. Each predictor's partial impact on the response variable is evaluated using the t-test, which uses a p-value of less than 0.05 to denote statistical significance. A result is deemed significant if the F-calculated value is more than the F-table value or if the significance level is less than 0.05. The F-test evaluates the combined impact of all independent factors on the response variable. Furthermore, the proportion of the response variable's variance that can be explained by the predictors is measured using the coefficient of determination (R^2). A higher R2 value suggests that the model is better at explaining the phenomenon being studied. In the context of this research, hypothesis testing also includes an analysis of the mediating role of profitability through a stepwise regression method and the Sobel test. This is intended to determine whether green investment, institutional ownership, and environmental performance influence firm value directly, or indirectly through profitability as a mediating variable.

3. Results and Discussion

3.1. Descriptive Statistical Test

According to the descriptive analysis's findings, there is a significant difference between energy sector businesses between 2019 and 2023. Green investment has an average of IDR 234 billion with high disparity. Institutional ownership averages 66.8%, although there are negative outliers. Environmental performance is quite good (average score 3.65). The average ROA is 4.59%, and PBV is 1.93, reflecting positive market perceptions. The significant variance found emphasizes how important it is to examine how environmental performance, institutional ownership, and green investment affect firm value, with profitability acting as a mediating factor. This relationship is illustrated in the following figure.

Figure 1.
Descriptive Statistical Test Results.

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Green Investment	78	183.87000	6.45173E+11	23459862621	98935781590
Institutional Ownership	80	0.19990000000	0.99990000000	0.66786091250	0.21320776544
Environmental Performance	80	3	5	3.65	.781
ROA	80	2.0500000000	10.790000000	4.5927500000	1.2530357820
PBV	80	-.0746153318	16.683002993	1.9309996701	2.6214342734
Valid N (listwise)	78				

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3.2. Classical Assumption Test

3.2.1. Normality Test

Table 1.
Normality Test Results.

Residual Type	Kolmogorov-Smirnov Statistic	df	Sig. (p-value)	Shapiro-Wilk Statistic	df	Sig. (p-value)
Unstandardized Residual	0.192	78	< 0.001	0.706	78	< 0.001

Note: a. Lilliefors Significance Correction.

Based on the P-P Plot results, which exhibit a pattern closely aligning with the diagonal line, and taking into account the acceptable deviation tolerances within the regression analysis, it can be inferred that the assumption of residual normality in this regression model is reasonably satisfied, albeit not entirely perfect. The visualization of the P-P Plot can be seen in Figure 1.

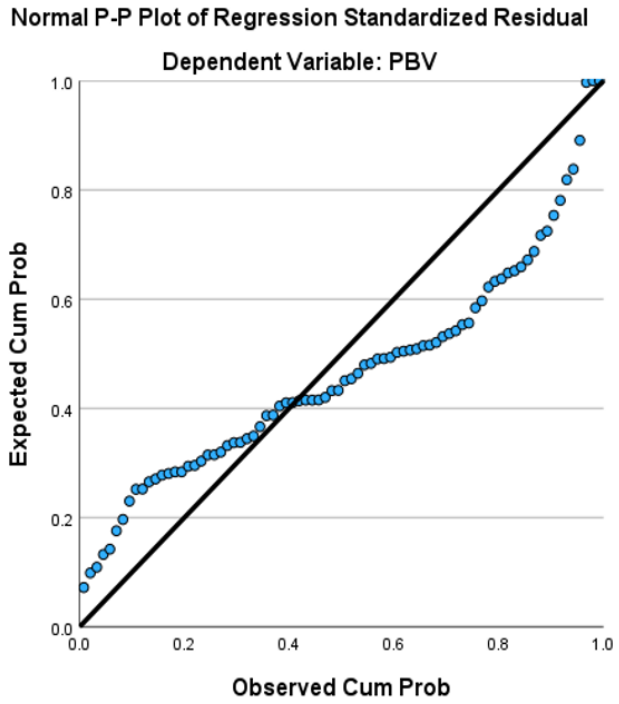

Figure 1.
Normal P-P Plot.

3.3. Multicollinearity Test

The findings of regression analysis indicate that institutional ownership has a positive and significant impact on firm value, indicating that higher institutional ownership raises the value of Indonesian energy sector enterprises. Meanwhile, Green Investment also shows a positive influence although statistically only significant at the 10% level, indicating that environmentally friendly investment has significant potential in increasing company value, especially in the long term and in the context of sustainability. As indicated below in Table 2.

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Table 2.
Results Coefficients.

Model	Variable	Unstd. Coeff. (B)	Std. Error	Std. Coeff. (Beta)	t	Sig. (p-value)	Tolerance	VIF
1	(Constant)	0.842	2.197		0.383	0.703		
	Green Investment	7.386E-12	0.000	0.276	1.832	0.071	0.439	2.278
	Institutional Ownership	5.906	1.296	0.480	4.558	< 0.001	0.902	1.108
	Environmental Performance	-0.188	0.374	-0.056	-0.501	0.618	0.811	1.232
	Profitability	-0.497	0.312	-0.237	-1.594	0.115	0.450	2.220

Note: a. Dependent Variable: Company Value.

Conversely, Environmental Performance and Profitability variables do not exhibit a significant impact on company value. However, both are still relevant for further analysis, especially as mediating or moderating variables. Furthermore, the multicollinearity test findings show that there aren't any significant issues between the independent variables (VIF < 5), so that all variables are worthy of being maintained in the regression model. This finding provides a positive basis for encouraging the implementation of green investment and strengthening the institutional role in the strategy of increasing company value. This is illustrated in the table below

Table 3.
Multicollinearity Test Results.

Model	Dimension	Eigenvalue	Condition Index	Constant	Green Investment	Institutional Ownership	Environmental Performance	Profitability
1	1	3.942	1.000	0.00	0.00	0.00	0.00	0.00
1	2	0.935	2.053	0.00	0.41	0.00	0.00	0.00
1	3	0.084	6.870	0.00	0.12	0.68	0.10	0.02
1	4	0.029	11.600	0.00	0.18	0.04	0.48	0.60
1	5	0.010	19.617	0.99	0.29	0.27	0.42	0.37

3.4. Heteroscedasticity Test

All independent variables—Green Investment, Institutional Ownership, Environmental Performance, and Profitability—have significance values of 1.000, according to the findings of the heteroscedasticity test conducted using the Glejser technique. Since this value is well above the 0.05 threshold, it indicates no significant relationship between the absolute residuals and any of the independent variables. Thus, it may be said that heteroscedasticity phenomenon is not spotted in the regression model. In other words, the residuals have constant variance (homoscedasticity), fulfilling the classical assumptions of linear regression and allowing for more accurate and reliable interpretation of the regression results. As illustrated in Table 4 below.

Table 4.
Heteroscedasticity Test Results.

Model	Variable	Unstd. Coeff. (B)	Std. Error	Std. Coeff. (Beta)	t	Sig. (p-value)	Tolerance	VIF
1	(Constant)	-2.030E-15	2.197		0.000	1.000		
	Green Investment	0.000	0.000	0.000	0.000	1.000	0.439	2.278
	Institutional Ownership	0.000	1.296	0.000	0.000	1.000	0.902	1.108
	Environmental Performance	0.000	0.374	0.000	0.000	1.000	0.811	1.232
	Profitability	0.000	0.312	0.000	0.000	1.000	0.450	2.220

Note: a. Dependent Variable: Unstandardized Residual.

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3.5. Regression Analysis Test

3.5.1. Total Effect Test (X Against Y)

This model evaluates the impact of three independent variables—Environmental Performance, Institutional Ownership, and Green Investment—on Company Value as determined by the Price to Book Value (PBV), with reference to the output of the first-stage multiple regression analysis (Model 1). Every variable has been incorporated into the model, as indicated in Table 5.

Table 5.
Variables Entered.

Model	Variables Entered	Variables Removed	Method
1	Environmental Performance, Institutional Ownership, Green Investment	None	Enter

When taken into account collectively, the three independent variables and PBV have a relatively substantial positive association (R = 0.489). Furthermore, the model's significant contribution to accounting for PBV fluctuations is demonstrated by the R Square value of 0.239, which indicates that these factors account for 23.9% of the variation in company value. Even after adjusting for sample size and predictor count, the model's predictive validity is further supported by the Adjusted R Square value of 0.209. As shown in Table 6 below.

Table 6.
Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.489	0.239	0.209	0.895219929284737	0.843

Note: a. Dependent Variable: PBV.

An F value of 7.941 with degrees of freedom (df) of 3 and 76 is displayed in the ANOVA table. The entire regression model is statistically significant at the 95% confidence level if the significance value (Sig.) is less than 0.001. Put differently, the combination of Green Investment, Institutional Ownership, and Environmental Performance significantly affects Firm Value as determined by PBV. These results imply that the observed association is not the result of chance and that the three variables together explain some of the variation in PBV. As indicated in Table 7.

Table 7.
ANOVA.

Model	Squares Source	Sum of Square	df	Mean Square	F	Sig. (p-value)
1	Regression	19.092	3	6.364	7.941	<0.001
	Residual	60.908	76	0.801		
	Total	80.000	79			

Note: a. Dependent Variable: PBV.
b. Predictors: Environmental Performance, Institutional Ownership, Green Investment.

With a coefficient of 0.483, a t-value of 4.584, and a significance level below 0.001, the regression coefficient analysis shows that Institutional Ownership significantly increases PBV. This finding implies that a higher level of institutional ownership raises the market's assessment of the company's worth. Although it has not yet attained statistical significance (p = 0.329), Green Investment exhibits a positive direction of influence on PBV (coefficient 0.108). Environmental Performance shows a weak negative relationship (coefficient -0.058; p = 0.601), but this insignificance does not necessarily negate its practical contribution in the long term, given the importance of environmental factors in modern investor assessments. As shown in Table 8.

Table 8.
Coefficients.

Model	Variable	Unstd. Coeff. (B)	Std. Error	Std. Coeff. (Beta)	t	Sig. (p-value)	Tolerance	VIF
1	(Constant)	0.001	0.100		0.006	0.995		
	Green Investment	0.108	0.110	0.106	0.982	0.329	0.855	1.170
	Institutional Ownership	0.483	0.105	0.483	4.584	< 0.001	0.902	1.109
	Environmental Performance	-0.058	0.111	-0.058	-0.525	0.601	0.817	1.225

Note: a. Dependent Variable: PBV.

The findings show that the VIF values are less than 10 and the tolerance values are greater than 0.1. *Green investment* has a VIF of 1.170, institutional ownership of 1.109, and environmental performance of 1.225. This indicates that the model is free from multicollinearity issues, meaning the three independent variables do not exhibit interdependence. This result is also supported by the test Collinearity Diagnostic which shows that no single dimension dominates the overall variance of the model, with a value of Condition Index highest is only 1,602, which is far below the general threshold of 30. As shown in the following table.

Table 9.
Collinearity Diagnostics.

Model	Dimension	Eigenvalue	Condition Index	Constant	Green Investment	Institutional Ownership	Environmental Performance
1	1	1.584	1.000	0.00	0.18	0.16	0.20
1	2	1.000	1.258	1.00	0.00	0.00	0.00
1	3	0.800	1.407	0.00	0.34	0.74	0.02
1	4	0.617	1.602	0.00	0.48	0.10	0.77

Note: a. Dependent Variable: PBV.

Furthermore, the residual analysis shows that the residual values have a mean near zero and a standard deviation of 0.878, ranging from -1.494 to 4.912. This evenly distributed residual value indicates that the regression model is quite stable and does not contain extreme outliers that can affect the validity of the model. The predicted value or PBV value of the model prediction results ranges from -1.11 to 0.78, with an average approaching zero and a reasonable deviation. The standard residual value is also within the tolerance limit, which is between -1.669 to 5.487, indicating that the model does not have extreme deviations. Even if only one of the independent variables exhibits a substantial influence, this regression model generally shows a good ability to explain the variation in PBV. This is illustrated in Table 10 below.

Table 10.
Residuals Statistics.

Statistics	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-1.1182440519332892770	0.7807922959325506	0.00000000000000000000	0.49160261228	80
Residual	-1.494511365890503	4.9122786521911162	0.00000000000000000000	0.878057571826681	80
Std. Predicted Value	-2.275	1.588	0.000	1.000	80
Std. Residual	-1.669	5.487	0.000	0.981	80

Note: a. Dependent Variable: PBV.

Overall, the regression model shows positive and significant results simultaneously, with sufficient contribution in explaining the variation of Firm Value (PBV). Although partially only Institutional Ownership shows a significant influence, the direction of the positive coefficient of *Green* Investment

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continues to demonstrate the potential of its strategic role in raising the value of the business. The absence of multicollinearity problems and the stability of the model further strengthen the validity of these results as a basis for mediation testing at the next stage.

3.6. Test of the Influence of X on the Mediator (X□ M)

A summary of the test results is presented in Table 11 below.

Table 11.
Variables Entered.

Model	Variables Entered	Variables Removed	Method
1	Environmental Performance, Institutional Ownership, Green Investment	None	Enter

Note: a. Dependent Variable: PBV.

With a R value of 0.742, the findings show that the three independent variables taken together show a strong association with ROA. According to the R Square value of 0.550, institutional ownership, environmental performance, and green investment account for 55% of the variation in ROA. Even after adjusting for the amount of variables and data, the model's clear power is still good, as indicated by the Value Adjusted R Square of 0.532. The assumption of independent residuals is satisfied, as indicated by the Durbin-Watson score of 2.304, which indicates that the model does not exhibit considerable autocorrelation. As indicated in Table 12.

Table 12.
Summary Models.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	0.510	0.260	0.220	0.888482276335290	0.260	6.586	4	75	< 0.001	0.859

Note: a. Dependent Variable: PBV.
b. Predictor: Environmental Performance, Institutional Ownership, Green Investment.

The overall statistical significance of the regression model is demonstrated by a F value of 30.961 at a significance level of $p < 0.001$. This indicates that *Green Investment*, Institutional Ownership, and Environmental Performance simultaneously contribute to the variation of corporate profitability. As shown in Table 13.

Table 13.
ANOVA.

Model	Source	Sum of Squares	df	Mean Square	F	Sig. (p-value)
1	Regression	43.999	3	14.666	30.961	< 0.001
	Residual	36.001	76	0.474		
	Total	80.000	79			

Note: a. Dependent Variable: ROA.
b. Predictor: Environmental Performance, Institutional Ownership, Green Investment.

The financial benefits of green investment are highlighted by the second-stage regression results, which show that it significantly and favorably affects ROA ($\beta = 0.711$; $p < 0.001$). Additionally, ROA is positively impacted by Environmental Performance, albeit statistically insignificantly ($\beta = 0.079$; $p = 0.357$). Conversely, Institutional Ownership exhibits a negligible and adverse effect ($\beta = -0.026$; $p = 0.745$). As indicated in Table 14.

Table 14.
Coefficient Analysis.

Model	Variable	Unstd. Coeff. (B)	Std. Error	Std. Coeff. (Beta)	t	Sig. (p-value)	Tolerance	VIF
1	(Constant)	0.004	0.077		0.055	0.956	–	–
	Green Investment	0.711	0.084	0.702	8.440	< 0.001	0.855	1.170
	Institutional Ownership	-0.026	0.081	-0.026	-.327	.745	.902	1.109
	Environmental Performance	0.079	0.085	0.079	0.927	0.357	0.817	1.225

Note: a. Dependent Variable: ROA.

Furthermore, the stability of the regression model is confirmed by the multicollinearity test findings, which show no evidence of multicollinearity because all tolerance values are higher than 0.10 and all VIF values are less than 10. As indicated in Table 15.

Table 15.
Collinearity Diagnostics.

Model	Dimension	Eigenvalue	Condition Index	Constant	Green Investment	Institutional Ownership	Environmental Performance
1	1	1.584	1.000	0.00	0.18	0.16	0.20
	2	1.000	1.258	1.00	0.00	0.00	0.00
	3	.800	1.407	0.00	0.34	0.74	0.02
	4	.617	1.602	0.00	0.48	0.10	0.77

Note: a. Dependent Variable: ROA.

The residual distribution is within normal limits, indicating that there is no *outlier* extremes that interfere with the validity of the model. Thus, this model meets all the assumptions of classical regression and is reliable.

As shown in Table 16.

Table 16.
Residuals Statistics.

Statistics	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-0.273057490587234	4.666357040405273	0.000000000000000000000	0.746286773867907	80
Residual	-1.819512367248535	-1.479993581771851	0.000000000000000000000	0.675066129351734	80
Std. Predicted Value	-0.366	6.253	0.000	1.000	80
Std. Residual	-2.644	2.150	0.000	0.981	80

Note: a. Dependent Variable: ROA.

Overall, this analysis shows that *Green Investment* has proven to be the most influential and significant variable on ROA, indicating that a sustainable investment approach is not only important from an environmental perspective, but also provides real benefits to the company's profitability. Although other variables have not shown significance, the direction of their influence remains positive (except Institutional Ownership), indicating a potential contribution in a long-term strategic context.

3.7. Test the Influence of X and M on Y (X + M on Y)

According to the findings from the third-stage multiple regression analysis, which is the final model in this analysis, all independent variables, namely Return on Assets (ROA), Institutional Ownership, Environmental Performance, and *Green Investment* entered simultaneously *(method enter)* to test its

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influence on the dependent variable *Price to Book Value* (PBV). The purpose of this model is to determine how much each variable contributes to explain variations in the company's market value. As shown in Table 17.

Table 17.
Variables Entered/Removed.

Model	Variables Entered	Variables Removed	Method
1	ROA, Institutional Ownership, Environmental Performance, Green Investment	None	Enter

Note: a. Dependent Variable: ROA.

An F value of 6.586 and a significance level below 0.001 in the study findings show that the regression model is statistically significant overall. This suggests that PBV is significantly impacted by the four variables taken together. A reasonably significant positive link between PBV and ROA, institutional ownership, environmental performance, and green investment is indicated by the correlation coefficient (R) of 0.510. In the meantime, the coefficient of determination (R2) value of 0.260 indicates that this model accounts for around 26% of the variation in PBV, with the remaining 74% being ascribed to extraneous factors. The *Adjusted R Square value* of 0.220 further supports the conclusion that the model possesses moderate yet sufficient predictive capability. As shown in Table 18.

Table 18.
Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	0.510	0.260	0.220	0.888482276335290	0.260	6.586	4	75	< 0.001	0.859

Note: b. Predictors: (Constant), ROA, Institutional Ownership, Environmental Performance, Green Investment
c. Dependent Variable: PBV.

According to the findings of the ANOVA test, the regression model is statistically significant with a F value of 6.586 and a significance level (Sig.) less than 0.001 (<0.05). This implies that, taken together, the variables ROA, Institutional Ownership, Environmental Performance, and Green Investment significantly influence PBV. This indicates that the four variables together are able to predict changes in the company's market value, as represented by PBV. As shown in Table 19.

Table 19.
ANOVA.

Model	Squares Source	Sum of	df	Mean Square	F	Sig. (p-value)
1	Regression	20.795	4	5.199	6.586	< 0.001
	Residual	59.205	75	0.789		
	Total	80.000	79			

Note: a. Dependent Variable: PBV
b. Predictors: (Constant), ROA, Institutional Ownership, Environmental Performance, Green Investment.

The regression coefficient table presents the analysis results of the relationship between multiple predictors and the response variable, PBV (*Price to Book Value*). The output shows that the Institutional Ownership variable significantly impacts PBV positively, with a B coefficient of 0.477 and a p-value below 0.001, highlighting its substantial role in influencing PBV. Green Investment also demonstrates a positive relationship with PBV, reflected by a B coefficient of 0.262; however, its p-value of 0.087 suggests that the effect is not significant at the 5% threshold statistically. The Environmental Performance and ROA variables, on the other hand, exhibit negative coefficients (-0.041 and -0.217, respectively) and p-value greater than 0.05, suggesting that they have no discernible impact on PBV in this model. As indicated in Table 20 below.

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Table 20.
Coefficients.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.002	0.099		0.016	0.987
	Green Investment	0.262	0.151	0.259	1.733	0.087
	Institutional Ownership	0.477	0.105	0.477	4.561	<0.001
	Environmental Performance	-0.041	0.111	-0.041	-0.371	0.712
	LONG	-0.217	0.148	-0.217	-1.469	0.146

Note: a. Dependent variable: PBV.

In the Residuals Statistics section, it can be seen that the minimum residual value is -1.299 and the maximum is 4.784 with the average residual approaching zero, which indicates that this model is relatively good at predicting PBV values. *Standard deviation* from the residual of 0.865 indicates the spread of prediction errors that are still within reasonable limits. Meanwhile, the standard prediction value and standard residual show a fairly normal data distribution, with maximum and minimum values that are not too extreme. Overall, these results indicate that the regression model used is adequate enough to describe the relationship between the variables of Institutional Ownership and *Green Investment* on PBV, although other variables such as Environmental Performance and ROA do not provide significant contributions in predicting PBV. As shown in Table 21.

Table 21.
Residuals Statistics.

Statistics	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.313050389289856	-0.969475448131561	0.000	0.513056654752184	80
Residual	1.299374938011169	-4.78485883331299	0.000	0.865696885094662	80
Std. Predicted Value	-2.559	1.890	0.000	1.000	80
Std. Residual	-1.462	5.385	0.000	.974	80

Note: a. Dependent Variable: ROA.

Multiple regression analysis reveals that ROA, Green Investment, Institutional Ownership, and Environmental Performance all significantly impact PBV at the same time ($F = 6.586$; $p < 0.001$). With Institutional Ownership as the most important component, this model can account for 26% of the variation in PBV. Green Investment shows a positive effect although not yet significant, while Environmental Performance and ROA continue to provide positive contributions to the model. The residual value approaching zero indicates that the model has quite good prediction accuracy.

3.8. Mediation Test

3.8.1. Results of the Profitability Mediation Test between:

3.8.1.1. Green Investment on Company Value

Green investment has a positive but statistically insignificant impact on business value, according to the results of the mediation test. Although ROA is greatly impacted by green investment, company value is not much impacted by the latter. This suggests that ROA does not serve as a significant mediating variable, although Green Investment continues to exhibit a positive trend in enhancing firm value.

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Table 22.
Results of the Green Investment Mediation Test on Company Value (PBV) Through ROA

Regression Testing Stage	Variable Relationship	Coefficient (β)	Significance (p-value)	Information
Level 1	Green Investment on Company Value (PBV)	0.108	0.329	Positive, but not significant
Level 2	Green Investment Against ROA	0.711	< 0.001	Positive and significant strong
Level 3	Green Investment Against PBV (with ROA as a mediator)	0.262	0.087	Positive, but still not significant in terms of weak mediation indications
	ROA to Company Value (PBV)	-0.217	0.146	ROA is not significant as a mediation path

3.8.1.2. Institutional Ownership of Firm Value

Firm Value (PBV) is positively and significantly impacted by institutional ownership ($\beta = 0.483$; $p < 0.001$), although ROA is not significantly impacted ($\beta = -0.026$; $p = 0.745$). The impact of Institutional Ownership on PBV is still substantial ($\beta = 0.477$; $p < 0.001$) when ROA is added as a mediating variable, suggesting that the effect is direct rather than mediated through profitability. As indicated in Table 23.

Table 23.
Results of Mediation Test of the Influence of Institutional Ownership on Company Value (PBV) through ROA.

Regression Testing Stage	Variable Relationship	Coefficient (β)	Significance (p-value)	Information
Level 1	Institutional Ownership of Firm Value (PBV)	0.483	< 0.001	Positive and significant immediately
Level 2	Institutional Ownership of ROA	-0.026	0.745	Negative and insignificant; has no effect on profitability
Level 3	Institutional Ownership of PBV (with ROA as a mediator)	0.477	< 0.001	Still significant; no mediation by ROA
	ROA to Company Value (PBV)	-0.217	0.146	Not significant; negative direction

3.8.1.3. Environmental Performance on Corporate Value

Environmental Performance affects ROA in a favorable but negligible way ($\beta = 0.079$; $p = 0.357$) and Company Value negatively and statistically insignificantly ($\beta = -0.041$; $p = 0.712$). No mediating effect of ROA was identified. Although the results are not yet significant, the positive trend suggests that environmental performance may contribute to enhancing a company's profitability and competitiveness in the long run. As shown in the following table.

Table 24.
Results of the Mediation Test of the Effect of Environmental Performance on Company Value (PBV) through ROA.

Regression Testing Stage	Variable Relationship	Coefficient (β)	Significance (p-value)	Information
Level 1	Environmental Performance → Firm Value (PBV)	-0.058	0.601	Negative and insignificant
Level 2	Environmental Performance → ROA	0.079	0.357	Positive but not significant
Level 3	Environmental Performance → PBV (with ROA as mediator)	-0.041	0.712	Negative and insignificant; there is no mediation by ROA
	ROA → Enterprise Value (PBV)	-0.217	0.146	Negative and insignificant; ROA is not a significant mediator

Collectively, ROA, Institutional Ownership, Environmental Performance, and Green Investment significantly influence Firm Value (PBV). Green Investment has a positive but statistically insignificant direct effect on PBV; however, it significantly affects ROA, indicating that ROA partially mediates this relationship. However, because its effect on ROA is not statistically significant, Institutional Ownership has a positive and large direct impact on PBV without the need for ROA as a mediator. There is no mediation through ROA, as Environmental Performance shows a negative and negligible effect on PBV and a positive but negligible effect on ROA. However, the upward trend of its correlation with ROA points to a possible contribution to raising future profitability.

4. Discussion of Research Results

4.1. The Influence of Green Investment on Company Value

The findings of the regression analysis show that green investments have a large and favorable impact on firm value. According to this, increasing corporate funding for green projects also boosts investor trust in the company's long-term prospects, which raises the market value of the company. Furthermore, the Baron and Kenny method and the Sobel Test showed that the link between green investment and firm value is largely mediated by profitability. This suggests that green investments have a real impact on financial metric, which raises the company's worth, in addition to symbolically improving the company's image.

These results align with the prevailing theories in the field. From the perspective *Signaling Theory* Connelly, et al. [22] by showcasing the company's dedication to sustainability, green investments send a positive message to the market and increase investor trust. Therefore, the output highlights how management theories that support the long-term preservation of company value and sustainable business practices match.

4.2. The Influence of Institutional Ownership on Firm Value

The regression analysis's findings demonstrate that institutional ownership substantially and positively impacts firm value. This suggests that a greater percentage of institutional ownership is associated with a higher market value for the business. Institutional investors, who generally have more qualified resources, information, and expertise, act as effective supervisors of the company's managerial policies and performance. The market will see the company more favorably if this supervisory role reduces agency conflicts and makes decision-making more professional and long-term focused. Additionally, the results of the mediation test show that the relationship between institutional ownership and business value is considerably mediated by profitability. This implies that institutional investors contribute to increased profitability, which directly and indirectly increases firm value.

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These align with several theories underlying corporate behavior and market reactions. In the context of *Good Corporate Governance* (GCG) [23] institutional ownership strengthens the company's internal monitoring mechanism so that it can encourage better governance practices, which ultimately increase the efficiency and value of the company. Thus, these results confirm that the institutional ownership structure has an important contribution in shaping company value through governance, profitability, and market perception channels.

4.3. The Influence of Environmental Performance on Company Value

According to the investigation, profitability does not significantly mediate the positive but statistically negligible influence of environmental performance on business value. This means that even though companies make environmentally friendly efforts, this has not had a real impact on investor perceptions in the Indonesian capital market. Based on Signaling Theory Connelly, et al. [22] environmental performance should be a positive signal, but has not been optimally responded to by the market. This discovery offers businesses a chance to improve their communication and sustainability strategies in order to gain more attention and increase firm worth in the future.

4.4. The Role of Profitability Mediating in Each Relationship

It has been demonstrated that the relationship between institutional ownership and business value and green investment is somewhat mediated by profitability. This suggests that both factors have an impact on business value both directly and indirectly through profitability. Green investment enhances operational efficiency and corporate image, while institutional ownership promotes sound governance—both contributing to improved profits. However, since no discernible impact was found, profitability does not act as a mediator in the relationship between environmental performance and business value. These results highlight how crucial financial results are to maximizing the effect of sustainability activities on corporate value.

5. Conclusion

The value of energy sector companies listed on the IDX in 2019-2023 is significantly impacted by green investment, institutional ownership, and environmental performance taken together. In contrast to environmental performance, which does not have a substantial direct impact, green investment and institutional ownership alone have a positive and considerable impact on business value. Furthermore, it has been established that profitability mediates the relationship between institutional ownership and company value and green investment, but it does not mediate the relationship between environmental metric and firm value. Data characteristics show that most companies have implemented green investment and have high institutional ownership, with varying environmental performance. Company value is generally at a stable level, while profitability shows financial efficiency that still needs to be improved. These findings highlight the critical role of sustainability and governance in enhancing firm value, while also indicating that environmental performance alone may have a limited impact without being supported by strong profitability. Consequently, companies should focus on integrating environmental initiatives with financial performance to build investor confidence and drive long-term value creation.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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