

DETERMINANTS OF FIRM VALUE IN INDONESIAN ENERGY FIRMS: THE ROLE OF ECO-EFFICIENCY, GREEN INNOVATION, CARBON EMISSION DISCLOSURE, AND GREEN ACCOUNTING

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Abstract

This study analyzes the effect of eco-efficiency, green innovation, carbon emission disclosure, and green accounting on firm value in energy sector companies listed on the Indonesia Stock Exchange (IDX) for the 2020–2024 period. Using a quantitative approach with an associative hypothesis design, 15 companies were selected through purposive sampling, yielding 75 firm-year observations. Panel data regression with EViews 12 was employed, and the Random Effect Model (REM) was selected based on Chow, Hausman, and Lagrange Multiplier tests. The results show that eco-efficiency has no significant effect on firm value ($p = 0.6972$), while green innovation ($p = 0.0024$) and carbon emission disclosure ($p = 0.0085$) have positive and significant effects. Green accounting shows no significant effect ($p = 0.2773$). These findings indicate that environmental innovation and transparency are more valued by the market than environmental efficiency or green accounting implementation in enhancing firm value. The study is limited to energy sector companies on the IDX, and the 2020–2024 observation period is relatively short. Future research should expand to other sectors, extend the timeframe, and include variables such as environmental performance ratings, corporate governance, or regulatory factors. Energy companies should prioritize green innovation and carbon disclosure to improve firm value and attract environmentally conscious investors. Policymakers should incentivize green innovation and standardized carbon disclosure practices. This study contributes empirical evidence on the differential effects of these environmental practices on firm value in the Indonesian energy sector context.

Keywords – Firm Value, Eco-Efficiency, Green Innovation, Carbon Emission Disclosure, Green Accounting.

1. Introduction

As investor awareness of environmental issues increases, Environmental, Social, and Governance (ESG) has become a key consideration in risk assessment and investment decisions. Investors now assess companies not only financially but also to what extent they manage their environmental impact. Signaling theory explains that adequate disclosure of environmental information serves as a positive signal to investors regarding a company's commitment to sustainability. Therefore, practices such as eco-efficiency, green innovation, carbon emission disclosure, and green accounting have significant potential to increase firm value (Wang, 2025).

One of the primary goals of a company is to provide prosperity for shareholders, and value is a measure of this prosperity. Firm value is a ratio related to the evaluation of the performance of a company's shares listed on the capital market. The higher a company's value, the greater investor interest in it (Azhar, 2023).

Company value reflects stakeholder trust in business management, as demonstrated by the company's performance. Increasing company value indicates that the company's performance has met stakeholder expectations or is perceived as having good long-term prospects by investors (Rachmawati, 2023). Increasing company value, coupled with rising stock prices, will instill market confidence in the company's performance and future prospects.

Companies are not only required to maximize profits but also to consider social responsibility, which is essential for maintaining the company's sustainability. Companies that solely seek profit (profit-oriented) will often experience conflicting interests, both internally and externally (Oktapiyah, 2023).

Therefore, increasing company value is crucial for a company and must be maintained and enhanced. Increasing company value will attract investors to invest in the company. Below is the development of the value of companies in the Energy Sector listed on the Indonesia Stock Exchange in 2021-2024, measured using the Tobin's Q ratio, which can be seen in the following table.

Table 1. Energy Sector Firm Values 2020-2024

No	Code	2020	2021	2022	2023	2024
1	AIMS	0	3	3	5	4
2	AKRA	684	702	103	978	680
3	ARTI	1	1	1	1	1
4	CNKO	423	390	497	461	219
5	DEWA	0.5	0.5	0.5	0.5	0.6
6	ELSA	0.6	0.5	0.6	0.6	0.6
7	KOPI	3	4	2	1	2
8	MTFN	3	3	5	5	5
9	PKPK	1	19	22	9	1
10	PTBA	0.2	0.3	0.3	0.4	0.4

Source: Data Processed by Researchers, 2026

In general, the standard interpretation of Tobin's Q values is as follows:

- 1) Tobin's Q > 1 – Indicates that the company's market value is greater than the value of its assets. This means the company is considered overvalued by the market or has good growth and performance prospects. This condition is often interpreted as indicating the company's ability to create value for shareholders.
- 2) Tobin's Q = 1 – Indicates that the market value is comparable to the value of the company's assets. This means the company is at fair value.
- 3) Tobin's Q < 1 – Indicates that the company's market value is less than the value of its assets. This means the company is considered undervalued, which may indicate suboptimal performance or that the market has not yet fully appreciated the company's assets (Oktary, 2025).

Thus, it can be concluded that the table of company values in the energy sector above shows that there is tight competition which shows significant fluctuations in several companies.

Several factors can influence a company's value. First, eco-efficiency is a strategy that integrates economic efficiency with environmental impact reduction. Implementing the eco-efficiency concept in a company requires support from investors and creditors. This is crucial for achieving an eco-efficiency strategy, and it is crucial for company management to plan its funding structure. One method for achieving an eco-efficiency strategy is to fully utilize technological developments (Saptaningrum, 2022).

Companies must incur significant costs to purchase the technology needed to meet eco-efficiency requirements and reduce harmful emissions. According to Ayu Dwiny (2022), many investors currently prefer to invest in companies that prioritize and are responsible for the environment and society. However, debates over improving environmental performance will reduce shareholder value.

The second factor is green innovation. Green innovation has become a popular concept in recent years as a solution to global warming and environmental damage. Companies that implement green innovation will gain competitive advantages such as high stock prices, superior performance and profitability, improved corporate image, and access to new markets. Green innovation focuses on mitigating or minimizing environmental damage caused by a company's business activities. Green innovation creates superior value for both companies and consumers. Companies can recoup the costs of environmental investments by satisfying consumers by developing and marketing new, environmentally friendly products, and consumers benefit from purchasing environmentally friendly products in large quantities (Nirwansyah, 2025).

According to Rahailmailinda et al. (2024), green innovation can be further divided into two parts: green process innovation and green product innovation. Green process innovation helps companies mitigate environmental problems during the production process, through increased resource productivity, energy efficiency, and pollution reduction. Green product innovation, on the other hand, has three main focuses: materials, energy, and pollution, because these three factors have a significant impact on the environment throughout the production, use, and disposal of products.

The third factor is carbon emission disclosure. Carbon emission disclosure is a company's activity in recording, acknowledging, disclosing, and measuring the extent of its carbon emissions (Yuliandhari et al., 2023). High-profile companies in the industry achieve a positive response and image in the market through carbon emission disclosure. Environmental disclosures provide investors with a positive perception of the company's sustainability and are more likely to invest in it.

The fourth factor influencing company value is green accounting. Green accounting is an accounting concept that integrates environmental costs and benefits into a company's financial recording, measurement, and reporting system. The application of green accounting enables companies to identify, measure, and disclose environmental costs, such as waste management, reclamation, environmental restoration, and investment in environmentally friendly technologies. In the context of energy companies, green accounting is crucial for reflecting true environmental performance and supporting corporate transparency and accountability. Green accounting emerged as a result of the global environmental crisis, including in Indonesia, prompting industry players to implement environmentally friendly industrial practices, known as green accounting. Green accounting is used as a new accounting model that emphasizes that accounting methods focus not solely on financial agreements or activities (financial profit), but also on social and environmental agreements or events. It can be said that green accounting is an accounting regulation that focuses not solely on financial accounting but also on basic environmental data collection and budgeting (Ridho Erianto & Indra Mualim Hasibuan, 2023).

2. Theoretical Background

2.1 Stakeholder Theory

According to Freeman, Stakeholder Theory is a group or individual who can influence or be influenced by the achievement of an organization's goals. According to Heiny

(2020), stakeholder theory states that companies must create value for all stakeholders, including customers, employees, suppliers, communities, and funding parties. Melita (2025) explains that in an organization, stakeholders include all individuals or entities that have the potential to influence or be influenced by the achievement of the organization's goals. In stakeholder theory, companies strive to maintain positive relationships with stakeholders so that they feel confident in the organization itself.

2.2 Agency Theory

Agency theory is a cooperative agreement between one or more individuals acting as owners (principals) and recruiting third parties (agents) to carry out certain activities for the benefit of the owners. Meanwhile, according to Pawatri (2024), agency theory relates to a number of individuals. The principal authorizes the agent (recipient of power) to make decisions and carry out the agent's duties and responsibilities on behalf of the principal. Agency theory explains that the relationship between shareholders (principals) and managers (agents) often gives rise to conflicts of interest due to differing goals and information asymmetry. Managers have incentives to pursue personal interests, such as rent extraction when shareholder oversight is weak (Jeanice & Kim, 2023).

2.3 Signaling Theory

Signaling Theory was first proposed by Michael Spence in 1973, who stated that by providing a signal, the information owner attempts to provide information that can be utilized by the recipient. Signaling theory explains how a company should provide signals to report users. These signals consist of information about what management has done to realize the owner's desires. Signals can take the form of promotions or other information that indicates the company is better than other companies.

2.4 Firm Value

Firm value is the price a potential buyer would be willing to pay for a sale. When a company goes public or offers shares to the public, firm value is defined as an investor's perception of the company. Investors can use firm value as a basis for assessing firm performance in the future, as firm value is often linked to its share price.

According to Yulianti (2023), company value is the price a potential buyer would be willing to pay for a sale. According to Akbar (2020), firm value is a specific condition of a firm achieved through a process of activities over several periods from its founding to the present. According to Aryati (2021), company value is a company's performance, where the public assesses it through its share price, which is formed through the process of supply and demand in the capital market. Firm value is the performance of a company where the public displays an assessment seen from the company's share price which is formed from the process of supply and demand in the capital market (Elfino & Leksono, 2024).

2.5 Eco-Efficiency

Within a firm or industry, eco-efficiency is a business management approach that combines economic efficiency with environmental efficiency. According to Heiny (2020), eco-efficiency is the process of producing products through technology while reducing resource use and environmental impact.

According to Nashrulloh and Achyani (2024), eco-efficiency is a concept of environmental sustainability implemented by companies to reduce the environmental impact of their operations by minimizing operating costs. Eco-Efficiency is an

environmental sustainability concept implemented by companies to reduce the environmental impact of company operational activities by minimizing company operational costs (Heinny, 2020).

2.6 Green Innovation

Green innovation, or eco-innovation, is the creation of new products or significant product improvements. It focuses not only on products but also on the significant creation and development of new processes, marketing methods, and corporate practices. According to Nashrulloh and Achyani (2024), green innovation is a method used by companies to achieve strategic goals by using new technologies, systems, practices, and production processes to reduce environmental damage.

According to Dewi and Rahmianingsih (2023), green innovation is innovation in the form of products, processes, or organizations that have a direct impact and contribute significantly to reducing negative environmental impacts. According to Anggraini (2024), green innovation is new or modified production techniques and processes to reduce environmental damage, which will lead to energy efficiency, pollution reduction, waste recycling, and environmentally friendly product design. Green Innovation is new or modified production techniques and processes to reduce environmental damage that will lead to energy efficiency, pollution reduction, waste recycling and environmentally friendly product design.

2.7 Carbon Emission Disclosure

Carbon Emission Disclosure can be defined as the amount of carbon gas produced and released into the atmosphere from various human activities, particularly corporate operations. According to the United States Environmental Protection Agency (EPA) (2009), Carbon Emission Disclosure is a gas capable of trapping solar heat in the Earth's atmosphere, which is reflected by the Earth's surface, preventing it from escaping.

According to Oktaviani and Meitalia (2024), Carbon Emission Disclosure is a form of corporate contribution to the problem of global warming, typically reported in annual reports or sustainability reports. According to Aryati (2021), Carbon Emission Disclosure is one way corporations disclose their environmental practices. This environmental disclosure includes information on energy consumption intensity and greenhouse gas emissions, corporate governance and climate change initiatives, achievement of greenhouse gas reduction targets, and risks and probabilities associated with the consequences of climate change. Carbon Emission Disclosure is one form of company contribution to the problem of global warming, which is usually reported in annual reports or sustainability reports (Oktaviani & Meitalia, 2024).

2.8 Green Accounting

Green Accounting is the process of recognizing, measuring, recording, summarizing, reporting, and disclosing information on objects, transactions, events, or the impacts of a corporation's economic, social, and environmental activities on society and the environment, as well as the corporation itself, in a single, integrated accounting information reporting package to benefit users in their assessments and decision-making.

According to Octavia Dwi Sagita Sari et al. (2024), Green Accounting is a process of recognizing, measuring, recording, summarizing, reporting, and disclosing integrated financial, social, and environmental objects, transactions, or events in the accounting process to produce comprehensive, integrated, and relevant financial, social, and

environmental accounting information that is useful for users in their economic and non-economic decision-making and management. Green Accounting is a process of recognizing, measuring value, recording, summarizing, reporting and disclosing in an integrated manner towards financial, social and environmental objects, transactions or events in the accounting process in order to produce complete financial, social and environmental accounting information.

2.9 Hypothesis Development

This study is an extension of previous research, with the addition of variables. The main difference from previous studies lies in the research object, namely energy sector companies listed on the Indonesia Stock Exchange (IDX) during the period 2020-2024. Based on the theoretical framework and empirical review discussed above, the following hypotheses are proposed for this study:

H₁: Eco-Efficiency has a positive effect on Firm Value in energy sector companies listed on the Indonesia Stock Exchange.

H₂: Green Innovation has a positive effect on Firm Value in energy sector companies listed on the Indonesia Stock Exchange.

H₃: Carbon Emission Disclosure has a positive effect on Firm Value in energy sector companies listed on the Indonesia Stock Exchange.

H₄: Green Accounting has a positive effect on Firm Value in energy sector companies listed on the Indonesia Stock Exchange.

3. Methods

3.1 Research Design

This study uses an associative hypothesis, a tentative answer to an associative problem formulation that asks about the relationship between two variables. The relationship in the hypothesis uses a causal relationship, which is cause and effect. There is an independent variable (the influencing variable) and a dependent variable (the influenced variable). The approach used in this study is quantitative research based on hypothesis testing. According to Sugiyono (2022), quantitative research methods can be defined as research methods based on the philosophy of positivism, used to study specific populations or samples, collecting data using research instruments, and analyzing data quantitatively or statistically, with the aim of testing predetermined hypotheses.

3.2 Population and Sample

The unit of analysis used is the annual financial reports of energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) for the 2020-2024 period. The researcher selected 15 samples using the outlier selection method. The following are the criteria used in sample selection.

Table 2. Sampling Selection Characteristics

No.	Criteria	Number of Firms
1.	Energy firms listed on the Indonesia Stock Exchange during the period 2020 – 2024	91
2.	Firms that do not meet the criteria based on the date of the Initial Public Offering (IPO)	(27)
3.	Firms that do not publish annual financial reports consecutively during the period 2020 - 2024	(3)
4.	Firms that do not publish sustainability reports consecutively during the period 2020 - 2024	(12)

No.	Criteria	Number of Firms
5.	Firms that do not have complete data related to research variables, namely: Eco-Efficiency, Green Innovation, Carbon Emission Disclosure, Green Accounting and Firm Value	(34)
	Total Firm Sample	15
	Amount of Data Processed (15 x 5 Years)	75

Source: Data Processed by Researchers, 2026

3.3 Data Collection Techniques

Data were collected from secondary sources, namely the annual financial reports and sustainability reports of energy sub-sector companies listed on the Indonesia Stock Exchange (IDX) for the 2020-2024 period. The data were obtained from the official IDX website (www.idx.co.id) and the official websites of each respective company.

3.4 Operational Definitions of Research Variables

Table 3. Operationalization of Research Variables

Variable	Indicator	Measurement	Source
Firm Value (Y)	Tobin's Q Ratio	(Market Value of Equity + Total Debt) / Total Assets	Mediyanti et al. (2021)
Eco-Efficiency (X ₁)	Emission Intensity	Total Emissions / Total Sales	Daud et al. (2023)
Green Innovation (X ₂)	Green Innovation	Carbon Emission / Total Sales	Agustia et al. (2024)
Carbon Emission Disclosure (X ₃)	CEDI Index	Total items disclosed / Total indicators	Baei Choi et al. (2023)
Green Accounting (X ₄)	GRI 300	Total items disclosed / Total GRI 300 indicators	Zulmia Oktaviani et al. (2024)

Source: Processed Data, 2026

3.5 Data Analysis Techniques

The data analysis in this study is conducted using panel data regression analysis with EViews software. The analysis includes several stages.

First, descriptive statistical analysis is used to provide an overview of the research variables, including mean, median, maximum, minimum, and standard deviation values.

Second, panel data model selection is performed using three estimation models: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM). To determine the most appropriate model, three tests are conducted. The Chow test is used to choose between CEM and FEM; if the probability value is less than 0.05, then FEM is selected over CEM. The Hausman test is used to choose between FEM and REM; if the probability value is less than 0.05, then FEM is selected; otherwise, REM is selected. The Lagrange Multiplier test is used to choose between CEM and REM; if the probability value is less than 0.05, then REM is selected over CEM.

Third, prior to hypothesis testing, classical assumption tests are conducted to ensure the robustness of the regression model. The normality test is used to test whether the residual values are normally distributed using the Jarque-Bera test; if the probability value is greater than 0.05, the residuals are normally distributed. The multicollinearity test is used to test whether there is a correlation among independent variables using the Variance

Inflation Factor (VIF); if VIF is less than 10, there is no multicollinearity. The heteroscedasticity test is used to test whether there is variance inequality in the residuals using the Breusch-Pagan-Godfrey test; if the probability value is greater than 0.05, there is no heteroscedasticity. The autocorrelation test is used to test whether there is a correlation between residuals in period t and t-1 using the Durbin-Watson statistic; if the DW value is between -2 and +2, there is no autocorrelation.

Fourth, hypothesis testing is conducted using three methods. The coefficient of determination (R^2) measures the model's ability to explain the variation in the dependent variable. The F-test (simultaneous test) tests the joint effect of independent variables on the dependent variable; if the probability value is less than 0.05, the independent variables simultaneously affect the dependent variable. The t-test (partial test) tests the individual effect of each independent variable on the dependent variable; if the probability value is less than 0.05, the variable significantly affects the dependent variable.

The regression equation for panel data is as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

- Y = Firm Value
- α = Constant
- β_1 – β_4 = Regression coefficients
- X_1 = Eco-Efficiency
- X_2 = Green Innovation
- X_3 = Carbon Emission Disclosure
- X_4 = Green Accounting
- ε = Error term

All statistical analyses are conducted at a significance level of $\alpha = 0.05$ (95% confidence level).

4. Result and Discussion

4.1 Descriptive Statistical Analysis

The objects of research used in this study are energy sector companies listed on the Indonesia Stock Exchange (IDX) from 2020 to 2024. The information sources used consist of annual financial reports, which are obtained through the official website of the Indonesia Stock Exchange at www.idx.co.id.

Table 4. Descriptive Statistical Test Results

Variable	Mean	Std. Deviation
Firm Value (FV)	2.594355	6.081934
Eco-Efficiency (EF)	5.966864	1.554875
Green Innovation (GI)	4.520493	3.779207
Carbon Emission Disclosure (CEDI)	6.815342	1.689973
Green Accounting (GA)	0.657177	0.264633

Source: E-Views 12 (Data Processing)

Descriptive statistical analysis aims to provide an overview or summary of data, with an emphasis on key metrics such as mean, median, smallest value, largest value, and standard deviation. This approach is designed to reveal the distribution and behavioral patterns in the observed data sample. Based on the results of descriptive analysis, Firm Value (FV) shows an average value of 2.594355 with a standard deviation of 6.081934, which indicates high variation between companies. Eco-Efficiency (EF) recorded an average value of 5.966864 and a standard deviation of 1.554875, which reflects relatively

low variation. Green Innovation (GI) has an average value of 4.520493 with a standard deviation of 3.779207, which indicates low dispersion. Carbon Emission Disclosure (CEDI) shows an average value of 6.815342 and a standard deviation of 1.689973. Meanwhile, Green Accounting (GA) has a mean value of 0.657177 and a standard deviation of 0.264633, which indicates variation between companies.

4.2 Panel Data Model Selection Test

Table 5. Panel Data Model Selection Test Results

No.	Method	Comparison	Prob.	Result	Decision
1	Chow Test	CEM vs FEM	0.0000	Prob < 0.05	FEM
2	Hausman Test	FEM vs REM	0.1822	Prob > 0.05	REM
3	Lagrange Multiplier Test	REM vs CEM	0.0000	Prob < 0.05	REM

Source: E-Views 12 (Data Processing)

Based on the panel data model selection test results above, it can be concluded that the panel data regression model that is suitable or appropriate for use in this study is the Random Effect Model (REM). This determination is based on the Hausman test which shows a probability value of 0.1822 (> 0.05) indicating that REM is preferred over FEM, and the Lagrange Multiplier test which shows a probability value of 0.0000 (< 0.05) confirming that REM is more appropriate than CEM.

4.3 Hypothesis Testing Results

Table 6. Hypothesis Testing Results (Random Effect Model)

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Conclusion
C	-0.761634	1.607214	-0.473934	0.6365	
Eco-Efficiency (EF)	0.018602	0.263427	0.070615	0.6972	No Effect
Green Innovation (GI)	0.321101	0.097814	3.282780	0.0024	Significant Effect
Carbon Emission Disclosure (CEDI)	0.092893	0.031531	2.946089	0.0085	Significant Effect
Green Accounting (GA)	0.459190	0.440586	1.042231	0.2773	No Effect

Source: E-Views 12 (Data Processing)

Based on the estimation results of the selected model, namely the Random Effect Model (REM), this study shows the following results:

- 1) Eco-Efficiency (EF) has a probability value of $0.6972 > 0.05$, indicating that Eco-Efficiency has no significant effect on Firm Value. Thus, the first hypothesis (H_1) is rejected.
- 2) Green Innovation (GI) has a probability value of $0.0024 < 0.05$, indicating that Green Innovation has a significant effect on Firm Value. Thus, the second hypothesis (H_2) is accepted.

- 3) Carbon Emission Disclosure (CEDI) has a probability value of $0.0085 < 0.05$, indicating that Carbon Emission Disclosure has a significant effect on Firm Value. Thus, the third hypothesis (H_3) is accepted.
- 4) Green Accounting (GA) has a probability value of $0.2773 > 0.05$, indicating that Green Accounting has no significant effect on Firm Value. Thus, the fourth hypothesis (H_4) is rejected.

4.4 Discussion

4.4.1 The Effect of Eco-Efficiency on Firm Value

The test results show that eco-efficiency does not have a significant effect on firm value. This finding indicates that eco-efficiency practices, which focus on reducing environmental impact while maintaining economic efficiency, have not been fully recognized by investors as a value-adding factor in energy sector companies. Investors may still prioritize traditional financial performance metrics over environmental efficiency indicators. This may occur because the benefits of eco-efficiency, such as cost savings from reduced resource consumption, are often realized over the long term and may not be immediately reflected in short-term financial performance. These findings align with research by Heinny (2020) and Nashrulloh and Achyani (2024), which suggest that eco-efficiency does not always translate directly into increased firm value, particularly in industries where environmental concerns are not the primary focus of investors.

4.4.2 The Effect of Green Innovation on Firm Value

The test results show that green innovation has a significant positive effect on firm value. This finding indicates that companies implementing green innovation practices are able to create competitive advantages that are recognized by the market. Green innovation, which includes the development of environmentally friendly products and processes, helps companies reduce operational costs, enhance brand image, and attract environmentally conscious investors. According to Nashrulloh and Achyani (2024) and Dewi and Rahmianingsih (2023), green innovation enables companies to achieve strategic goals by using new technologies and production processes that reduce environmental damage, which ultimately increases firm value. These results are consistent with signaling theory, where green innovation serves as a positive signal to investors regarding the company's commitment to sustainability and long-term growth prospects.

4.4.3 The Effect of Carbon Emission Disclosure on Firm Value

The test results show that carbon emission disclosure has a significant positive effect on firm value. This finding indicates that transparent disclosure of carbon emissions is valued by investors as a form of corporate responsibility and environmental stewardship. Companies that voluntarily disclose their carbon emissions demonstrate accountability and commitment to sustainability, which enhances investor confidence and market perception. According to Oktaviani and Meitalia (2024) and Aryati (2021), carbon emission disclosure is a form of corporate contribution to addressing global warming and provides investors with a positive perception of the company's sustainability. This aligns with stakeholder theory, where companies that proactively address environmental concerns are better positioned to build trust and long-term relationships with stakeholders, ultimately contributing to increased firm value.

4.4.4 The Effect of Green Accounting on Firm Value

The test results show that green accounting does not have a significant effect on firm value. This finding suggests that the integration of environmental costs and benefits into financial reporting systems has not yet been fully appreciated by investors in the energy sector. Green accounting practices, which include identifying, measuring, and disclosing environmental costs, may still be considered less relevant or less influential on investment decisions compared to traditional financial metrics. According to Octavia Dwi Sagita Sari et al. (2024), green accounting is designed to produce comprehensive, integrated financial, social, and environmental information. However, the lack of standardized reporting frameworks and limited investor awareness may hinder its impact on firm value. These findings indicate that while green accounting is important for internal decision-making and regulatory compliance, its effect on market valuation remains limited in the Indonesian energy sector context.

5. Conclusion

This study aimed to analyze the influence of eco-efficiency, green innovation, carbon emission disclosure, and green accounting on firm value in energy sector companies listed on the Indonesia Stock Exchange for the 2020–2024 period. Based on data analysis using the Random Effects Model (REM), the following conclusions can be drawn.

First, eco-efficiency has no significant effect on firm value. This finding indicates that companies' environmental efficiency efforts have not been able to improve investor perceptions of firm value. Investors may still prioritize traditional financial performance metrics over environmental efficiency indicators, particularly in the energy sector where environmental concerns are not always the primary focus of investment decisions.

Second, green innovation has a positive and significant effect on firm value. This finding demonstrates that environmentally friendly innovation practices, including the development of green products and processes, send positive signals to investors regarding the company's commitment to sustainability and long-term growth prospects. Companies that implement green innovation are able to create competitive advantages that are recognized and valued by the market.

Third, carbon emission disclosure has a positive and significant effect on firm value. This finding indicates that transparent disclosure of information regarding carbon emissions can send positive signals to investors, thereby increasing trust and firm value. Companies that voluntarily disclose their carbon emissions demonstrate accountability and commitment to environmental stewardship, which enhances investor confidence and market perception.

Fourth, green accounting has no significant effect on firm value. This finding indicates that the implementation of environmental accounting has not yet become a primary consideration for investors in assessing companies. The integration of environmental costs and benefits into financial reporting systems may still be considered less relevant or less influential on investment decisions compared to traditional financial metrics, partly due to the lack of standardized reporting frameworks and limited investor awareness.

Overall, this study indicates that environmental innovation (green innovation) and transparency (carbon emission disclosure) are more important to the market than environmental efficiency (eco-efficiency) and the implementation of green accounting in increasing firm value. The findings suggest that investors in the Indonesian energy sector

respond more positively to visible innovation and disclosure practices than to efficiency measures or accounting integration that may be less apparent or understood.

The findings of this research provide several practical implications. Energy sector companies should prioritize green innovation activities and enhance carbon emission disclosure to improve firm value and attract environmentally conscious investors. Policymakers and regulators should encourage and incentivize green innovation and standardized carbon disclosure practices. Companies should also consider increasing investor awareness regarding the benefits of eco-efficiency and green accounting practices through better communication and reporting strategies.

This study has several limitations. The sample is limited to energy sector companies listed on the IDX, which may not represent other sectors. The observation period of 2020-2024 is relatively short. Future research should expand the sample to other sectors, extend the observation period, and incorporate additional variables such as environmental performance ratings, corporate governance mechanisms, or regulatory factors that may influence the relationship between environmental practices and firm value. Despite these limitations, this study contributes to the literature by providing empirical evidence on the differential effects of eco-efficiency, green innovation, carbon emission disclosure, and green accounting on firm value in the Indonesian energy sector context.

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