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Sari, Petty Aprilia; Rays, Muh.; Purwanti, Purwanti et al.

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Kontakt/Contact
ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics
Düsternbrooker Weg 120
24105 Kiel (Germany)
E-Mail: *rights[at]zbw.eu*
https://www.zbw.eu/econis-archiv/

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Achievement of Carbon Emission Disclosure as a Mediator between Factors Increasing Firm Value: Eco-efficiency and Green Innovation

Petty Aprilia Sari[1]*, Muh. Rays[1], Purwanti[1], Imam Hidayat[2]

[1]Department of Accounting, Institute of Economic Science Putra Perdana Indonesia, Indonesia, [2]Faculty of Economics and Business, University of Muhammadiyah Tangerang, Indonesia. *Email: pettyapriliasari@gmail.com

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ABSTRACT

Investors today are more interested in investing in that care about the environment, but there are still many companies that focus only on financial gains and ignore environmental issues. Companies are being charged with disclosure of their emissions and climate transaction plans. Companies that disclose Carbon Emission Disclosure have different values in the eyes of investors and other stakeholders. The study aims to determine the impact of Eco-efficiency and Green Innovation on Firm Value by disclosing Carbon Emission as Intervening Variable on Manufacturing Companies listed on the Indonesian Stock Exchange in the period 2019-2023. Research uses a quantitative approach. The samples used in this study were 24 companies selected using purposive sampling techniques. The data used is 120 observations. Hypothesis testing using Ordinary Least Square regression and robust regression with Stata 17.0. The results of the research showed that the eco-efficiency variable had a significant positive impact on Firm Value, Green Innovation had an significant positive effect on Firm Value, Carbon Emission Disclosure had a major positive impact upon Firm Value, Eco-Efficiency had a substantial positive influence on Carbon Emission Disclosure, Green Innovating had a significant positive effect upon Carbon Emission Disclosure, Carbon emission disclosures were unable to mediate the impact of Eco- Efficiency on Firm Value, and Carbon Emission Disclosure was capable of mediating the green innovation's impact on the Firm Value.

Keywords: Eco-efficiency, Green Innovation, Firm Value, Carbon Emission Disclosure
JEL Classifications: G14, M14, O16, Q56

1. INTRODUCTION

The value of a company can be defined as the realisation value of an asset when the company is to be sold or the value of the share price. (Agustia et al., 2019). Kurnia et al. (2020) stated that investor judgment has a significant weight in securing the Firm Value. High stock prices will increase the value of the company (Saharudin, 2019) (Mudjijah et al., 2019), Endah Prawesti Ningrum (2022). (2020). Investors and prospective investors are obliged to collect information for purposes of consideration in making investment decisions in capital markets. (Ahmad et al., 2022). Tobin's Q is used to measure the value of a company because it is considered capable of providing the best information (Utomo, 2019), Hafidz and Deviyanti (2022) (Herawaty, 2008). The value of the company improves the well-being of the owners which will also be expected by the shareholders (Sudiyatno, 2010), Lumentur and Mangantar (2019), Pasaribu et al. (2019). Companies must meet the needs of a wide range of stakeholders including the environment, employees, and communities in order to succeed (Edward and Evan, 1990).

As the times evolve and business dynamics, other factors emerge that can influence the value of companies such as eco-efficiency and green innovation. Agustia (2020), (Kurnianta and Dianawati, 2020), (Yuliandhari et al., 2023), Christoffersen et al. (2013), Anggraeni (2015) stated that the presence of environmental issues not only affects the environment, but can disrupt the economy

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of a country. One of the interesting phenomena to study is how stock price fluctuations in the capital markets relate to the issue of rising Firm Value. Based on 5-year observations of 15 samples of manufacturing companies in the period 2019-2023, the Firm Value movements tend to be unstable and declining. One example is that by 2020, eleven Indonesian manufacturing companies namely with company codes ASII, HMSP, ICBP, INDF, INTP, ISSP, JPFA, KLBF, TOTO, ULTJ, and UNVR, suffered a decline in Firm Value. The decrease in the Firm Value during this period was due to the decline in the closing stock price. These drops could be caused by a global pandemic that has slowed economic growth and hampered business activity. Besides, the population's purchasing power has declined so that the sales target has not been achieved.

One of the factors increasing the value of the company is Eco-Efficiency or Ecological economic efficiency which is an effort that can be undertaken by the company to minimize the use of raw materials, energy, water, as well as waste against the environmental impact in the production process. (Kementrian Lingkungan Hidup, 2003). The concept of eco-efficiency is an effort in support of sustainable development (Putri, 2019). Another factor is Green Innovation is the driving force in creating green development, where this concept is important to stop the trend of environmental damage and ensure sustainable growth of corporate economic activities, Xie (2022), Agustia et al. (2019). One manufacturing company that is doing green innovation is PT Unilever Indonesia, which introduced refill station as an eco friendly shopping alternative in support of "Indonesia Free Plastic Pollution by 2040" movement. The cement manufacturers realize that dust from their production poses can damage the environment, so they innovate to reduce the dust by replacing the Electro Precipitator EP with the Bag Filter.

Damas et al. (2021), Panggau and Septiani (2017), Prena et al., (2019), stated that eco-efficiency affects the value of a company. Yuliandhari et al. (2023) states that echo-effectiveness does not affect the Firm Value. It means whether or not the company's ownership of ISO 14001 certification does not affect the investor's decision to invest. Xie (2022), Zhang (2020), Tjahjadi et al. (2023), stated that green innovation affects the value of a company in the short term, Other research conducted by Mahsina and Agustia (2023) states that green innovations have no influence on the Firm Value, it is because to implement green innovation requires a cost and also not a little time.

Carbon Emission Disclosure is used as an intervening variable that acts as a mediator to see how the relationship between independent variables eco-efficiency and green innovation versus Firm Value-dependent variables with measurement updates uses the GRI 305 standard. Companies that are able to disclose their Carbon Emission Disclosure more fully and comprehensively appear to be more attractive to investors as well as prospective investors, because they are directly linked to the company's future sustainability. Supported by research conducted by Yuliandhari et al. (2023) which stated that the disclosure of Carbon Emission Disclosurehad a significant positive impact on the value of the company. Investors can make this disclosure of Carbon Emission Disclosurea benchmark in assessing the company's performance. With the disclosure of carbon emissions, investors will be able to understand the company's obligations to environmental management so as to prevent future demands.

2. LITERATURE REVIEW

The stakeholder theory explains that companies that demonstrate responsibility for environmental impact will attract investors to invest (Kurnianta and Dianawati, 2020). The implementation of the concept of eco-efficiency in this study is characterized by the presence of an ISO 14001 certificate which will be one of the competitive advantages for the company, which will give a positive assessment of stakeholders as it is considered to contribute to environmental conservation efforts (Silaban and Dewi, 2023). Spence (1973) made the discovery of signal theory while studying job market signaling. He claimed that asymmetric information existed in the labor market. Afterwards, Spence (2002) disclosed that signal theory is connected to business initiatives to share information with other parties in order to affect investment choices made by parties outside the corporation. This is in line with the theory of signals that the possession of ISO 14001, will be a positive signal for stakeholder, which would increase public confidence, gain a positive response from the market, and influence the rising share price and value of the company in the future (Aviyanti and Isbanah, 2019). This will boost investor response along with increased share sales, so the Firm Value is also rising.

H_1: Eco-efficiency has a positive impact on Firm Value

According to stakeholder theory, corporate managers have an obligation to meet the needs of consumers, investors, competitors, suppliers, governments and other stakeholders to ensure their survival and to a competitive advantage. Because green innovation is one of the key factors for companies to their goals, especially for companies that are in the midst of competitive business competition and an unstable environment (Agustia et al., 2019). The implementation of the concept of green innovation is expected to have an impact on future cash flows derived from production, operations, advertising and marketing processes, reputation and other aspects, thereby affecting the economic markets and the value of the company (Ramadhan et al., 2023).

H_2: Green Innovation Positively Affects Firm Value

The correlation between Carbon Emission Disclosure and Firm Value is in line with the theory of legitimacy and the signals theory. The legitimacy theory reveals that, in carrying out its operational activities, the company will seek to obtain legitimacy from the environment and in line with signal theory, the disclosure of Carbon Emission Disclosure is regarded as a positive signal indicating that the company has played an active and responsible role in reducing its environmental impact. These positive signals are expected to be well received by stakeholders, shareholders, thus affecting investment decisions and resulting in rising share prices and Firm Value (Alfayerds and Setiawan, 2021).

H_3: Carbon Emission Disclosure Positively Affects Firm Value

According to the theory of corporate legitimacy, it should

be designed not only to pursue profit but also to take social responsibility to society in order to maintain the company's own survival. (Noor et al., 2022). In this research, eco-efficiency is projected through the ownership of ISO 14001 certificates by the company. Companies that have an ISO 14001 certificate show that the company has implemented an environmental management system well, as it provides comprehensive information to facilitate detailed communication on various aspects of environmental governance. (Iswati and Setiawan, 2020). Companies that implement environmental management systems generally disclose data and emissions voluntarily, they tend to provide information about greenhouse gases that is more credible than companies that do not implement an environmental governance system.

H_4: Eco-efficiency has a positive impact on carbon emission disclosure

With increased awareness of green development worldwide, many nations are moving away from focusing just on growth and toward developing sustainable economic models and safeguarding the health of the environment (Song et al., 2019). Implementing green innovation can reduce Carbon Emission Disclosure both directly and indirectly. Innovation that can reduce emissions directly, for example, is the creation of technologies that can capture and store emissions, whereas innovation that can cut emissions indirectely is the development of air quality management technologies. (L. Xu et al., 2021). Therefore, companies that implement green innovation have a greater incentive to reveal Carbon Emission Disclosure issues in their operational activities. That would affect the views of stakeholders and prove that the company deserves recognition and legitimacy from the public.

H_5: Green Innovation Positive Impact on Carbon Emission Disclosure

The objective of eco-efficiency is to ensure that present and future generations can use natural resources fairly (Abdelhalim et al., 2023). In other words, the concept of ecological efficiency seeks to efficiency in utilization and ensure that natural resources are not over-exploited, and can reduce the impact of environmental damage in order to create long-term sustainability. This is in line with the stakeholder theory that the application of eco-efficiency can help management in minimizing the negative impact of operations that can affect the interests of stakeholders. One of the environmental impacts that is currently a major issue in the world is climate change and global warming. In order to demonstrate support for a proactive society towards social and environmental issues, various institutions have made efforts involving pollution reduction, one of which is to ensure that the institutions are ISO 14001 certified. (Mita Sari and Sulfitri, 2023).

H_6: Eco-efficiency has a positive impact on Firm Value through Carbon Emission Disclosure

Based on the theory of legitimacy, Carbon Emission Disclosure is a form of corporate responsibility for the Carbon Emission Disclosure it produces, so companies are considered legitimate to the public. In addition, by disclosing carbon emissions, it will be easier for companies to detect operational impacts that have a negative impact on environmental sustainability. So that the company can take steps to address the problems related to the environment. In general, green innovation is a necessary measure to evaluate, and implement ways to reduce environmental damage. (Ramadhan et al., 2023).

H_7: Green Innovation Positively Affects Firm Value Through Carbon Emission Disclosure

3. RESEARCH DESIGN

3.1. Sampel dan Data Description

The population in this study is manufacturing companies listed on the Indonesian Stock Exchange in the period 2019-2023 is as many as 228 companies. After going through the purposive sampling process, we obtained a sample of as many as 24 companies that were wrong and the criterion was that the company was awarded the PROPER award by the Ministry of Environment and Forestry for five consecutive years. (2019-2023). The data analysis method used is panel data regression with the help of Stata software version 17 as a tool to perform data analysis. One method that can be used to estimate the regression model parameters is the Ordinary Least Square (OLS) method and Robust Least Square or robust regression is an alternative to the least square regression where the data is filled with deviant data. This procedure is also useful to detect influential observations. If the data deviates too much, then this procedure will be useful to address the problem. (Jonathan Sarwono, 2016).

3.2. Operational Definition and Measurement

As far as the operational definition of this study can be referred to in Table 1.

3.3. Data Analysis and Hypothesis Testing

To facilitate analysis then the hypothesis chart will be divided into two: regression analysis, regression 2 analysis and Sobel calculation Test to find out the significance of influence between independent variables through intervening variables against dependent variables.

Regression 1: $Y_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 Y_2 + \varepsilon$

Regression 2: $Y_2 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

Sobel test: Z-value= a×b/SQRT (b2×Sa2+a2×Sb2)

Information:

Y1	=Firm Value (CV)
Y2	=Carbon Emission Disclosure (CED)
α	=Konstanta
β	= Regression coefficient of each variable
x1	= Eco-Efficiency (EF)
x2	= Green Innovation (GI)
ε	= error

4. RESEARCH RESULTS AND DISCUSSION

Table 1: Variable operational measurement

Variable	Definition	Measurement	Reference
Dependent 1 Firm Value (CV)	The Firm Value is the realisation value of an asset at the time the company is to be sold or the value of the stock price	Tobin's Q = (Market Value of Equity+Book Value of Debt)/ Total Assets	(Agustia et al., 2019; Kurnia et al., 2021)
Independent 1 Eco-Efficiency (EF)	Eco-Efficiency is an ecological resilience concept adopted by the company by minimizing costs spent to reduce the negative environmental impact resulting from the company's operational activities.	Variabel Dummy: 1=have ISO 140001 0=don't have ISO 14001	(Aviyanti and Isabanah, 2019; Amalia et al., 2017)
Independent 2 Green Innovation (GI)	Green Innovation is an innovation carried out by a company by creating a competitive advantage while reducing environmental damage so that it can generate economic benefits.	GI=Total Items Revealed/Total Disclosure Items (4)	(Agustia et al., 2019)
Dependent 2 Carbon Emission Disclosure (CED)	Carbon Emission Disclosure is an element in carbon accounting that involves the company's responsibility to measure, recognize, document, present and disclose Carbon Emission Disclosure for the operational activities carried out by the company.	CED=Total Items Revealed/Total Disclosure Items (19)	(Dewi et al., 2023; Kurnia et al., 2020)

Table 2: Code and name of the company sample

No	Company code	Company name
1	NIKL	PT Pelat Timah Nusantara Tbk
2	JPFA	PT Japfa Comfeed Indonesia Tbk
3	MAIN	PT Malindo Feedmill Tbk
4	KMTR	PT Kirana Megatara Tbk
5	VOKS	PT Voksel Electric Tbk
6	ADES	PT Akasha Wira International Tbk
7	MLBI	PT Multi Bintang Indonesia Tbk
8	MYOR	PT Mayora Indah Tbk
9	ULTJ	PT Ultra Jaya Milk Industry and Trading Company Tbk
10	GGRM	PT Gudang Garam Tbk
11	KLBF	PT Kalbe Farma Tbk
12	MERK	PT Merck Indonesia Tbk
13	SIDO	PT Industri Jamu dan Farmasi Sido Tbk
14	CINT	PT Chitose International Tbk
15	ADMG	PT Polychem Indonesia Tbk
16	PEHA	PT Phapros Tbk
17	TOTO	PT Surya Toto Indonesia Tbk
18	AMFG	PT Asahimas Flat Glass Tbk
19	KIAS	PT Keramika Indonesia Assosiasi Tbk
20	IPOL	PT Indopoly Swakarsa Industry Tbk
21	CPRO	PT Central Proteina Prima Tbk
22	ESSA	PT Essa Industries Indonesia Tbk
23	UNVR	PT Unilever Indonesia Tbk
24	HMSP	PT Hanjaya Mandala Sampoerna Tbk

4.1. Research Object Description

Manufacturing sector companies that have met the criteria as a sample are as many as 24 companies with a 5-year research period so the amount of data that will be used in this study is as much as 120 observation data (Table 2).

4.2. Descriptive Statistical Analysis

Descriptive statistics of the sample Manufacturing company period 2019-2023 are presented in Table 3.

Based on the above descriptive statistical analysis table it can be seen that the study has a total of 120 data and the maximum value shown for the variable depends on the value of the company and the minimum value indicated for the independent variable i.e. eco-efficiency and green innovation.

4.3. Panel Data Regression Model Equation

The regression analysis used in this study is the analysis of double linear regression through OLS approaches and robust regression. This method of analysis is used to determine the influence of independent variables on dependent variables. The regression analysis of equation model I was carried out to determine the impact of Eco-Efficiency, Green Innovation and Carbon Emission Disclosure on the Firm Value in Manufacturing Companies listed in the Indonesian Stock Exchange period 2019-2023. While the regression analyses of the Equation model II were conducted to find out the influence of ECO-Eficiency and Green Innovations on carbon emission disclosure in manufacturing companies listed on the Indonesian Stock Exchange period 2019-2023. The regression analysis of model I and model II equations can be seen in the Table 4.

4.4. Interpretation of Research Results

Based on the results obtained, then can be seen the acceptable and rejected hypotheses in the Table 5.

4.4.1. Eco-efficiency to firm value

According to the Ministry of Environment (2023) Eco-efficiency is an effort made by a company in minimizing the use of raw materials, energy, water and waste resulting from the production process so that the impact on the environment is also decreasing. This research proves previous studies by Panggau and Septiani (2017), Prena et al. (2019), and Aviyanti and Isbanah (2019) that stated that eco-efficiency has a positive impact on the value of companies. Companies that implement the concept of eco-efficiency tend to have a higher Firm Value than companies that have not yet implemented the concept. This is due to the growing confidence of investors and stakeholders to invest their capital in companies that are not only profit-oriented but also aware of their responsibilities in protecting the environment.

4.4.2. Green innovation to firm value

Green innovation has a positive impact on Firm Value. As we know that at this time the rate of industrial growth is increasing, factory construction is happening everywhere. However, these industries are often disadvantaged by the earth's ability to bear the negative impact of the production processes they run. Implementation of green innovation is one of the efforts that companies must

Table 3: Results of descriptive analysis

Variable	Obs	Mean	SD	Min	Max
Firm Value (CV)	120	2.303649	2.703716	0.372603	16.26333
Eco-Efficiency (EF)	120	0.7583333	0.4298883	0.0000	1.0000
Green Innovation (GI)	120	0.6854167	0.2721217	0.0000	1.0000
Carbon Emission Disclosure (CED)	120	0.3311404	0.2010698	0.0526316	0.6842105

Table 4: Results of regression analysis of model I and II equations

	CV (Y1)	Coeff	Robust SE	t	P>[t]	95% conf	interval
Model 1	EF (X1)	1.17593	0.3546303	3.32	0.001	0.4735402	1.87832
	IH (X2)	3.33057	0.8100776	4.11	0.000	1.726109	4.935031
	CED (Y2)	2.361631	0.993457	2.38	0.019	0.3939639	4.329298
	Constanta	−1.652957	0.6955162	−2.38	0.019	−3.030515	−0.2754
	CED (Y2)	**Coeff**	**Robust SE**	**t**	**P>[t]**	**95% conf**	**interval**
Model II	EF (X1)	0.104128	0.037467	2.78	0.006	0.0299265	0.1783295
	GI (X2)	0.2835974	0.0587703	4.83	0.000	0.167206	0.3999888
	Constanta	0.577943	0.0517384	1.12	0.266	−0.044671	0.1602595

Table 5: Conclusions of the hypothesis test results

Hypothesis	Testing	Result
H_1	Eco-efficiency has a positive impact on Firm Value	Accepted
H_2	Green Innovation Positively Affects Firm Value	Accepted
H_3	Carbon Emission Disclosure Positively Affects Firm Value	Accepted
H_4	Eco-efficiency has a positive impact on carbon emission disclosure	Accepted
H_5	Green Innovation Positive Impact on Carbon Emission Disclosure	Accepted
H_6	Eco-efficiency has a positive impact on Firm Value through Carbon Emission Disclosure	Reject
H_7	Green Innovation Positively Affects Firm Value Through Carbon Emission Disclosure	Accepted

implement to deal with it. According to the stakeholder theory, corporate managers have an obligation to meet the needs of consumers, investors, suppliers, orders, and other stakeholders in ensuring their survival and in achieving competitive advantage. This research is proof of previous research conducted by Zhang (2020), Damas et al. (2021) and Tjahjadi et al. (2023) that green innovation has a positive impact on the value of companies. Companies that implement green innovation can minimize adverse environmental impacts and can signal to investors that the company will continue to grow and sustainable.

4.4.3. Disclosure of carbon emission disclosure to the firm value

Carbon Emission Disclosure has a positive impact on the Firm Value. Carbon emission disclosure is a real manifestation of corporate accountability in correcting the social gap between the company and society, which has the potential to reduce the losses resulting from the negative operational impacts of the company, especially the operational impact that generates emissions. By disclosing Carbon Emission Disclosurethe company has shown good faith in terms of information transparency. This is a positive signal that is expected to be well received by stakeholders, especially by investors, which can affect the sale of shares and lead to a rise in the Firm Value. This research is proof of studies conducted by Damas et al. (2021), Alfayerds and Setiawan (2021) and Yuliandhari et al. (2023) which states that the disclosure of Carbon Emission Disclosurehas a positive impact on the value of companies. As the company discloses more information, the investor's interest in investing their capital in the company will also increase, which will affect the Firm Value.

4.4.4. Eco-efficiency to carbon emission disclosure

Eco-efficiency has a positive impact on Carbon Emission Disclosure. In this study, eco-efficiency is projected with ISO 14001 certificate ownership. Having this ISO certificate indicates that the company has implemented a good environmental management system. Therefore, companies that implement eco-efficiency will generally disclose data and information voluntarily, they tend to provide information about greenhouse gas emissions that is more credible than companies that do not implement the concept of ecological efficiency. This study is proof of previous studies conducted by Iswati and Setiawan (2020) and Narsa and Jannah (2021) which stated that eco-efficiency has a positive impact on the disclosure of carbon emissions.

4.4.5. Green innovation towards carbon emission disclosure

Green innovation has a positive impact on Carbon Emission Disclosure. Companies that implement green innovation have a greater chance in minimizing the Carbon Emission Disclosurethat come from their operational activities. These emission reductions can be direct or indirect. Emissions can be reduced directly, for example, by using lower-energy technologies, and by making efforts to reduce waste, while emissions are reduced indirectly, for instance, by creating air management technologies. Therefore, companies that implement green innovation have a greater incentive to disclose their carbon emissions. This research is proof of a previous study by Xu et al. (2021) which stated that green innovation has a positive impact on carbon emission disclosure.

4.4.6. Eco-efficiency to firm value through carbon emission disclosure

Carbon Emission Disclosure does not mediate the impact of eco-efficiency on the Firm Value. Based on the results of the research,

the disclosure of Carbon Emission Disclosureis unable to mediate the impact of eco-efficiency on the value of the company. This is because obtaining ISO 14001 certification is costly so that even if a company has an ISO14001 certification, investors will see it as expenditure that is not in line with the main business goal of maximizing shareholder wealth. (Damas et al., 2021). Meanwhile, the disclosure of Carbon Emission Disclosurein Indonesia is still voluntary, if companies are less competent and force to be competitive through Carbon Emission Disclosures then the company will only be increasingly burdened with the cost of disclose. (Irwhantoko and Basuki, 2016). Therefore, the disclosure of Carbon Emission Disclosureis still unable to mediate the relationship of eco-efficiency to the value of the company, because the disclose of carbon will only be considered as an additional cost that may reduce the corporate wealth that will definitely affect the share-sharing of companies.

4.4.7. Green innovation to firm value through carbon emission disclosure

Carbon Emission Disclosure Mediates the Effect of Green Innovation on Firm Value. According to the research, Carbon Emission Disclosure can mediate the impact of green innovation on Firm Value, because companies that implement green innovation tend to have a desire to disclose their carbon emissions, further disclosures of carbon emission are a positive signal to stakeholders that the company has good transparency of environmental information. So it will affect the image and value of the company. This research is proof of a previous study by Tjahjadi et al. (2023) that stated that the disclosure of Carbon Emission Disclosurecan mediate the influence of green innovation on the value of companies.

5. CONCLUSION AND SUGGESTIONS

5.1. Conclusion

Based on the results of statistical tests and based on the discussion described in the previous chapter, the conclusions of this study are as follows:

1. The results of the test of the eco-efficiency variable against the Firm Value variable have a coefficient of 1.17593 with a probability value of 0.001 <0.05. This indicates that Eco-Efficiency has a positive influence on the value of the company.
2. The results of the test of the green innovation variable against the Firm Value variable have a coefficient of 3.33057 with a probability value of 0,000 <0.05. This indicates that Green Innovation has a positive influence on the value of the company.
3. The results of the Carbon Emission Disclosure variable test against the Firm Value variable have a coefficient of 2.361631 with a probability value of 0.019 <0.05. This indicates that the Carbon Emission Disclosure has a positive effect on the Firm Value.
4. The results of the test of the eco-efficiency variable against the Carbon Emission Disclosure variable have a coefficient of 0.104128 with a probability value of 0.006 <0.05. This indicates that eco efficiency affects a positive indication of the Carbon Emission Disclosure.
5. The results of testing the green innovation variable against the Carbon Emission Disclosure variable have a coefficient of 0.2835974 with a probability value of 0,000 <0.05. This indicates that Green Innovation has a positive influence on the Carbon Emission Disclosure.
6. The results of the Carbon Emission Disclosure variable testing mediating the impact of eco-efficiency on the value of the company can be seen from the calculation of the test pulley which shows that the P-value value obtained is 0.07084155>0.05 with the statistical test pule value of t count (1.80649184). It indicates that the Carbon Emission Disclosure is unable to mediate the impact of eco-efficiency on Firm Value.
7. The results of the Carbon Emission Disclosure variable testing that mediates the influence of green innovation on the value of the company can be seen from the calculation of the test pile which shows that the P-value value obtained is 0.0329682<0.05 with the statistical value of a t-test pile (2.13247031). It indicates that Carbon Emission Disclosure is able to mediate the influence of Green Innovation on Firm Value.

5.2. Suggestions

In order for this study to be better in the future, the researchers give some recommendations as follows:

1. To the company

Companies need to update the company's information that is required to be made available to external parties. The company is also expected to be able to publish annual reports and sustainability reports in a complete and sustainable manner, thus stakeholders will be easier to get the information updated and the company is considered to have done information transparency well.

2. For further research
   a. Further research is recommended to use different research methods, proxy or variable measurement that can be used as an update of the research.
   b. The research population is limited to the manufacturing sector; further research is recommended to use different populations for example by using the energy sector or basic material as the population in the research.
   c. The observation period in this study is quite short, i.e. 5 years, further research is recommended to extend the observation time so that the results of data processing are expected to be better.

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