KnE Social Sciences
3rd JESICA
The 3rd Jakarta Economic Sustainability International Conference
Volume 2024

Research Article

Do Green Innovation, Carbon Emission Disks Affect Company Value with Environmental Performance as A Moderator?

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Abstract.

This research is a quantitative study that aims to determine the effect of green innovation as measured by four indicators of disclosure items and carbon emission disclosure on company value, moderated by environmental performance. The sample of this research was taken from manufacturing sector companies listed on the Indonesia Stock Exchange in the 2020-2022 period, which were selected based on the purposive sampling method. Data were obtained from 37 companies, with a total sample size of 111. The results of the test indicate that (1) Green innovation does not have a significant influence on company value. (2) Carbon emission disclosure does not have a significant influence on company value. (3) Environmental performance does not strengthen the relationship between green innovation and company value, and (4) Environmental performance does not strengthen the relationship between carbon emission disclosure and company value. According to the results, it can be observed that these variables are less effective in influencing company value, suggesting the need for further research.

Keywords: company value, green innovation, carbon emission disclosure, environmental performance

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Published: 4 July 2024

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the 3rd JESICA Conference Committee.

1. Introduction

The presence of industries in a country is undoubtedly one of the factors influencing its progress and development. All industrial sectors have undergone changes in their operational systems and business processes as a result of globalization. Due to factors such as globalization, increased market complexity, and climate change, businesses must operate in a demanding and ever-changing environment. According to Agustia et al. [1] every business which operating in an industry faces challenges, one of which is pollution related to the production of waste products that can endanger human health or the environment when the waste ends up in soil, water, or air. Stakeholders seek better information from companies regarding how they consider economic, social, and environmental aspects, as this can indirectly impact the company value and sustainability.

Investors place monetary value on a company based on its performance. Good performance can enhance the business value, making it in the company's best interest to have the necessary funds to operate at peak efficiency [2]. According to a report from Kontan.com.id- Jakarta, the Manufacturing Company Index indicated that several companies experienced a decline in stock prices in 2019. One such example is PT Japfa Comfeed Indonesia Tbk (JPFA), which experienced a decrease of 39.09%, reaching Rp. 935 per share. The value of a manufacturing company may indirectly be influenced by the decline in stock prices because it affects investor's perceptions of the company. The company value reflects how investors perceive management handling the company. The market will have confidence in the company's performance and future prospects if its valuation is high. Implementing environmental strategies can help balance a company's operations between environmental and economic considerations [1]. One of the most effective efforts for a company to improve its business is through sound business practices through innovation, and if it is related to environmental conditions, the best type of innovation that aims to enhancing environmental quality known as green innovation.

Green innovation is a type of environmentally friendly innovation that focuses on reducing pollution, waste, and implementing environmental management systems to minimize the environmental impact of operational procedures [3]. By utilizing creative technologies, systems, practices, and manufacturing processes, companies can achieve strategic goals and reduce the environmental damage. Companies are pressured by investor demands to move competitively, leading to the competition of innovative products. According to the Ministry of Environment and Forestry of Indonesia, the total of waste production in the country is estimated to reach 68.5 million tons in 2021. Environmentally friendly innovations that enhance environmental quality throughout their life cycle can help companies to achieve and maintain their company value [4].

Currently, climate change has become a deeply discussed topic. This climate change is occurring due to the increase in greenhouse gases, one of which is CO2. The industrial sector is responsible for 29% of carbon emissions. This is because industrial growth is directly correlated with the increase of pollution caused by industrial processes or activities, which elevate the risk of air and water contamination. Global warming is caused by several factors, one of which is environmental degradation. The Environmental Agency of Jakarta monitors and enforces legal regulations against industries whose emissions are known to harm the air. There are 1,550 industrial smokestacks in Jakarta. Typically, these industrial operations have numerous smokestacks. Public can also express their concerns about potential environmental pollution caused by industries.

After identifying that 77 business entities violated the environmental regulations in 2019, Ministry of Environment and Forestry imposed fines on them. This number is significantly higher than the 18 violations in the previous year. Based on the described cases, the Indonesian Government has taken various efforts to preserve the environment and reduce carbon emissions, including through Presidential Regulations. One relevant Presidential Regulation is related to the National Action Plan for Greenhouse Gas Emission Reduction (RAN-GRK), which issued under the Presidential Regulation Number 61 year 2011. Reducing Indonesia's greenhouse gas emissions by 26% - 41% by 2020 is the goal of RAN-GRK. However, current data indicates that carbon emissions in Indonesia is still do not align with the objectives set in the RAN-GRK. Various factors influence this, including rapid economic growth, increased consumption of fossil energy, deforestation, and high mobility.

Carbon Emission Disclosure is a beneficial information for investors as it demonstrates that when the investment risk in a company is low, it will results in lower equity costs for the company and impacts profit improvement [5]. Phenomena such as the increase in average global temperature, polar ice melting, and rising sea levels are profound environmental issues that require global cooperative action for effective mitigation. The Indonesian government has invested in renewable energy sources such as solar, wind, and bioenergy in an effort to reduce dependence on fossil fuels and mitigate carbon emissions. Sustainable economy is an approach that focuses on balanced economic growth with environmental preservation. In Indonesia, the shift towards a sustainable economy has been a government target. According to [6], the manufacturing industry is a sector that poses environmental pollution potential due to waste generated. Therefore, manufacturing companies have a responsibility to manage the waste from their production processes to minimize an environmental pollution. In November, there was a decline in the country's manufacturing performance, with the Purchasing Managers' Index (PMI) dropping to 51.5 from 51.9 in October, according to HSBC research. HSBC noted that manufacturing activity in Indonesia increased last month, maintaining an upward trend for five consecutive months, although it was lower than the PMI on October.

To enhance the environment in conducting business, everyone involved must collaborate. Indonesia remains an attractive place for investment, but there is still much research to be done, such as regulations, bureaucracy, and infrastructure. Carbon Emission Disclosure can be effectively implemented by companies, and if it is done properly, it can increase public trust, especially among stakeholders, thereby enhancing the company value. The implementation of Green Innovation can also serve as a supportive system for stakeholders in assessing a company, and with environmental performance,

company have the ability to educate the public that they consider the environmental condition for future generations in addition to the current situation.

Previous researchers have examined and observed the results of factors related to company value. Research related to green innovation obtained from [7] found a significant positive influence, while [8] reported no significant effect. Further research related to the carbon emissions disclosure obtained from [9] and [10] indicated a significant positive influence, whereas [11] stated that carbon emissions disclosure had no significant effect. Further research related to environmental performance, as found in [12] revealed its moderating effect on the relationship between carbon emission disclosure and company value, while [13] stated not to find a correlation between environmental performance and company value in their investigation.

Research investigating whether green innovation, carbon emissions, and environmental performance influence firm value with environmental performance as a moderator has great potential to provide important insights for business practitioners, policy makers, and the public. Findings from such research can help strengthen understanding of the relationship between green innovation practices and carbon emissions management and corporate financial performance, as well as highlight the role of environmental performance in the process. The implications of this research can support the adoption of more sustainable business strategies, strengthen environmental policies, and promote corporate social responsibility in responding to the challenges of climate change and sustainable development globally.

Based on the background explanation, along with the exploration of phenomena and previous research findings that have not been consistent, the researcher conducts study related to company value influenced by green innovation and carbon emission disclosure with a more comprehensive measurement and introduces the moderating variable, which is environmental performance. The period from 2020 to 2022 is chosen to study all manufacturing companies listed on the Indonesia Stock Exchange.

2. Literature Review

This study employs two grand theories, the first one is the stakeholder theory, where proposes this theory explaining that stakeholder theory delineates groups for which a company is responsible, aiming to assist management in understanding the stakeholder environment and effectively managing it, as well as enhancing activities and minimizing stakeholder losses. The second one is signaling theory, where puts forth this theory

explaining signals as the way a company must release relevant information for external parties to consider investment decisions and minimize decision-making errors.

The business world can gain a competitive advantage in the market by adopting the "environmentally friendly innovation" approach, which encompasses reducing the company's environmental impact and improving productivity through more responsible resource management. Product innovations that demonstrate environmental concern can enhance productivity and open new prospects for the business world, as claimed by [7]. This aligns with the research findings from [7] and [1], indicating a significant positive influence between green innovation and company value. Based on this explanation, the following hypothesis are proposed:

H_1 : Green Innovation has a significant positive influence on Company Value.

The signaling theory involves two parties: management, which assigned to provide signals and investors as the recipients of these signals. According to the signaling theory, voluntary disclosure of non-financial information is expected to act as a positive signal to investors, thereby enhancing company value. The form of transparency and corporate responsibility can be observed through the disclosure of carbon emissions as an effort to mitigate environmental damage caused by the company's operational activities. This consistent with the findings of articles by [5] and [10], both showing a positive influence on company value. Based on this explanation, the following hypothesis are fulfilled:

H_2: Carbon Emission Disclosure has a significant positive influence on Company Value

Company must continuously innovate and adapt to the rapidly changing environment in the current era. Improving the environmental performance of an organization requires a strong focus on environmentally friendly innovation. Additionally, the business world needs to be concerned about the future of the upcoming generations and the environmental impact of their production methods. The effective implementation of green innovation can be facilitated by companies through the adoption of good environmental performance. The Signaling Theory in this study explains the influence of green innovation on company value. The use of green innovation in a company is a positive signal provided by the company to investors, indicating that the company has a promising future in terms of its long-term sustainability. Investors can leverage these positive signals as a basis for making investment decisions in an effort to enhance the value of the business. This aligns with what was stated by [7] and [1]. Therefore, the hypothesis derived is:

H_3 : Environmental Performance can moderate the relationship between Green Innovation and Company Value.

Companies need to consider all their stakeholders, including the public sector, staff members, shareholders, clients, vendors, and other parties. Given the annual increase in global temperatures, stakeholders are now more aware of a company's carbon emissions. The company value and stakeholder trust will increase when they accurately reporting carbon emissions. Companies can provide information about carbon emissions to demonstrate that they have contributed to climate change awareness and are committed to reducing their impact. Therefore, companies must fulfill their role by considering their stakeholders and taking a responsible environmental actions. According to Signaling Theory, information disclosed by businesses is crucial when making investment decisions. In situations where two parties have different sets of information, one sending party must determine whether and how to send this information, while the receiving party must determine how to interpret the signal. This is where Signaling Theory becomes useful in describing behavior [14]. In this study, which is in line with the research findings by [9] and [10] demonstrating the positive impact of carbon emission disclosure on shareholder value, along with the moderating role of environmental performance. This study will examine how a company's carbon emission disclosure affects its stock price, with environmental performance as a moderating element.

H_4: Environmental Performance can moderate the relationship between Carbon Emission Disclosure and Company Value.

In line with the previous studies, here is the research model as presented by the previous researchers (Figure 1):

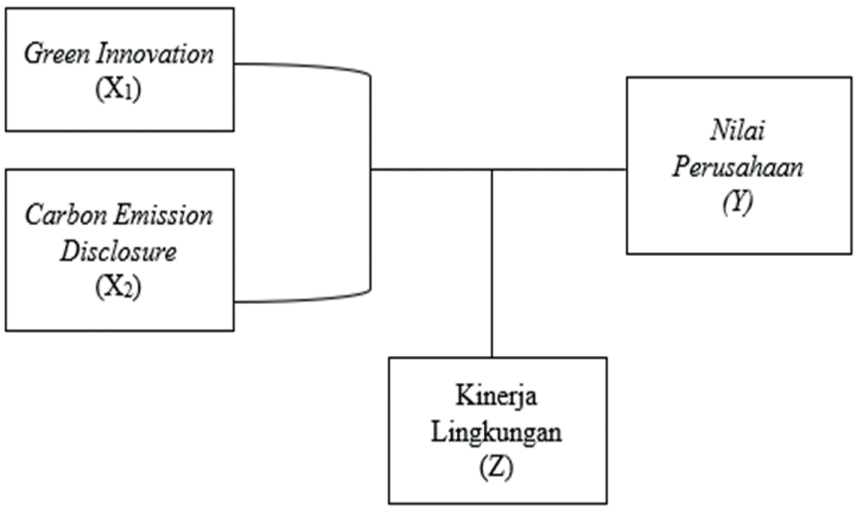

Figure 1: Research Design.

3. Research Methodology

Population comprises the entire set of subjects to be studied. This research includes all companies listed on the Indonesia Stock Exchange in the manufacturing sector during the period 2020 – 2022. The sampling technique employed in this study is purposive sampling, where the sample is selected based on specific criteria. The criteria required for sample selection are:

1. Manufacturing companies listed on the Indonesia Stock Exchange (IDX) between January 2020 and December 2022
2. Company that has been in operation and received a PROPER rating from 2020 to 2022.
3. Each year between 2020 and 2022, company publish annual reports or sustainability reports, available online at http://www.idx.co.id and on the company's website.

This study used purposive sampling to select manufacturing companies because manufacturing companies often face a variety of environmental issues due to their complex factory operations. From the massive use of hazardous chemicals to high energy consumption, their production processes can produce emissions of air pollutants, liquid waste, and solid waste that have the potential to harm local ecosystems and human health. In addition, the selection of companies that have operated and received a PROPER rating from 2020 to 2022 used purposive sampling because researchers wanted to obtain data from companies that have environmental records that have been verified and recognized by competent institutions, such as PROPER.

3.1. Data collection technique

This research applied a quantitative approach with secondary data. The data source for this study was obtained from the annual financial reports of all manufacturing companies in Indonesia listed on the Indonesia Stock Exchange (IDX) during the period 2020 – 2022, accessible at the URL http://www.idx.co.id . Additionally, sustainability reports of Indonesian manufacturing companies for the period 2020 – 2022 were also gathered from each company's respective website. The data collection method involved literature review and observation of financial and sustainability reports.

3.2. Data analysis technique

In conducting data analysis for this research, the researcher utilized the data analysis technique with Stata v.14 as a tool for multiple regression. Data presentation in descriptive statistics was accomplished through tables, graphs, mean results, data dispersion with average calculations, standard deviation, and percentage calculations. Panel Regression Data represents a combination of observed companies over a specified period. In the selection of OLS, REM, and FEM, three models were used, i.e. Chow test, Lagrange multiplier test, and Hausman test, as outline in the book by [15].

3.3. Classic Assumption Test

There are four classic assumption tests that will be elaborated in this research:

1. Normality Test, the statistical test used for normality testing is based on a significance level with a value of 0.05. This test has various ways of indicating how the data is distributed normally. This research employs the skewness kurtosis test.

2. Multicollinearity Test, this test indicates the presence of VIF results that are not more than 10, signifying that the formulated model does not have a strong correlation. Conversely, if the obtained VIF is more than 10, the model has a correlation with independent variables.

3. Heteroskedasticity Test, if the variance of the residual for one observation remains the same between other observations, it is known as homoskedasticity. If it differs, it is known as heteroskedasticity.

4. Autocorrelation Test, this test functions to determine the correlation of the predicted model with the change in time on the existing variables.

3.4. Hypothesis Test

Coefficient of Determination (R^2), the coefficient of determination value has a range between zero and one. The closer the adjusted R2 value is to 1, the better the model's ability to explain the dependent variable, and vice versa.

Model Feasibility Test (FI-Test), this model is used to assess the feasibility of the regression model used. The test is employed to obtain results to determine whether the independent variables can optimally explain the dependent variable. According to

Ghozali (2017), the F-statistic test is conducted to calculate the accuracy level of the regression function against the sample statistically to obtain accurate values.

Partial Regression Test (T-Test), T-test is performed to determine how independent variables influence the dependent variable individually. The significance level applied are generally 1%, 5%, or 10%.

3.5. Multiple Linear Regression Model Without Moderation

$Y = \alpha 1 + \beta_1 GIN + \beta_2 CED + e$

3.6. Multiple Linear Regression Model With Moderation

$Y = \alpha 2 + \beta_3 GIN + \beta_4 CED + \beta_5 PROPER + \beta_6 GIN*PROPER + \beta_7 CED*PROPER + e$

3.7. Operational definition and variables measurement

3.7.1. Dependent Variable (Y)

Aompany value as the condition achieved by a company, indicating society's trust in the company from its establishment to the present. Tobin's Q can be calculated using the following formula:20

$Tobin'sQ\ i\ t =$ MVEi,t+Total Liability

Total Asset

Details :

Tobins'Q = Proxy of company value

MVE = Number of shares outstanding

i = At company i

t = In year t

3.7.2. Independent Variable (X)

Green Innovation revers to new concepts or adjustments made to manufacturing procedures with the aim of reducing adverse environmental impacts. Examples of such initiatives include waste recycling, energy efficiency, pollution reduction, and environmentally friendly product design. Some indicators used in the analysis include: (1) the use of cutting-edge technology to reduce waste, energy, and water in the production

process; (2) using environmentally friendly materials to reduce pollution or hazardous substances; (3) using environmentally friendly product packaging, such as paper or plastic; and (4) the recyclability or reusability of materials or components.

For each of these indicators, businesses, or companies that have implemented their activities in accordance with these indicators receive a score of 1, if a company has not, the indicator receives a score of 0. The total points for all indicators are divided by the total number of points for each indicator generated by each sample [1].

$$\text{GIN} = \frac{Total\ value\ of\ disclosures\ related\ to\ green\ innovation}{Total\ value\ of\ all\ indicators} \text{ x } 100\%$$

One of the most crucial elements for all stakeholders, especially investors who are interested in companies expressing environmental concerns when making investment decisions is the transparency of information regarding carbon emissions. The measure of carbon emission disclosure is the publication of the carbon emission disclosure index in annual reports or sustainability reports, both of which are typically independent. The eighteen components forming the five categories of the carbon emission disclosure index. For each item, the score is one if disclosed and zero if not disclosed. The ratio is calculated by summing all the scores and dividing this total by the total number of disclosures. The following formula is used to calculate carbon emission disclosure:

$$\text{CED} = \frac{Number\ of\ items\ disclosed}{Number\ of\ disclosure\ items} \text{ x } 100\%$$

3.8. Moderating Variable

Environmental performance is a company's initiative to foster a healthy (green) environment as a sign of accountability and its performance. The measurement of environmental performance, which assigns scores from 1 to 5 for each PROPER certificate success achieved by companies based on the following criteria:

TABLE 1: Provision of PROPER Level Ratings.

Color	Category	Score
Gold	Very Great	5
Green	Great	4
Blue	Middle	3
Red	Poor	2
Black	Very Poor	1

4. Result and Discussions

4.1. Descriptive statistics

Table 2: Descriptive Statistics Results.

Variable	Obs	Mean	Std. Dev.	Min.	Max
TOBINSQ_W	111	3.773554	6.027383	0.4598914	45.55053
GIN	111	0.6824324	0.1387687	0.50	1
CED	111	0.4914915	0.1498593	0.0555556	0.833333
KL	111	3.387387	0.6898112	2	5

Note: TOBINSQ: Company value; GIN: Green Inovation; CED: Carbon Emission Disclosure; KL: Environmental performance.

There are 111 data points used as observations, obtained from 37 manufacturing companies listed on the Indonesia Stock Exchange (IDX). It can be seen that the mean < standard deviation for GIN, CED, and KL, indicating uneven data distribution and a wide range of standard deviations causing low fluctuations. Meanwhile, TOBINS'Q has a mean > standard deviation, indicating the data distributed evenly and high fluctuations.

4.1.1. Panel Data Regression

For the panel data regression results, the REM method was selected, because in the Chow Test, FEM was selected (<0,05), in the LM test, REM was selected (<0,05), and finally in the Hausman Test, REM was selected (>0,05).

4.1.2. Classic Assumption Test

In the normality test, it is tested using winsorized skewness kurtosis because the previous data was not normally distributed. Winsorized is applied with a 2% value, due to persistently high skewness and kurtosis values, the 2% threshold was used for company value (TOBINSQ). As a result, skewness value became < 3 and the kurtosis value < 10.

The multicollinearity test yielded results with VIF >10, indicating that the variables are not correlated with each other and are free from multicollinearity.

Based on Table 4, it can be seen that two variables, GIN and CED, are still not free from multicollinearity symptoms. To address this issue, the researcher employed the orthogonal data method. By generating new variables, namely GIN_O and CED_O, so that this study can be free from multicollinearity symptoms, as can be seen in Table 4.

Table 3: Kurtosis Skewness Test Results after Winsorized.

Variable	Skewness	Kurtosis
TOBINSQ_W	2.459974	9.031325
GIN	-0.017552	2.531661
CED	-0.107408	2.845868
KL	0.9936962	3.404302

Note: TOBINSQ: Company value; GIN: Green Inovation; CED: Carbon Emission Disclosure; KL: Environmental performance. Data after winsorizing 2% treatment

Table 4: Multicollinearity Test Results.

Variable	VIF	I/FIV
GIN_O	1.05	0.951018
CED_O	1.05	0.949319
KL	1.00	0.998080

Note: GIN: Green Inovation; CED: Carbon Emission Disclosure; KL: Environmental performance

Furthermore, in testing for heteroskedasticity, since both regression models used in this study are random effects and tested using the Generalized Least Square (GLS) approach, both panel data regression models are free from autocorrelation symptoms and are not affected by heteroskedasticity.

4.2. Hypothesis test

In the R^2 test, the result obtained is 16,03%. Therefore, it can be concluded that the independent variable can directly explain the financial performance variable by 16,03%. The R2 value for the direct model is 0,0224. This explains the capability of the independent variable and the moderating variables of green innovation, carbon emission disclosure, and environmental performance to describe changes in the company value by 2,24%. Meanwhile, the R square value for the moderation model is 0,0230. This explains the ability of the independent variables and the moderating variables of green innovation, carbon emission disclosure, and environmental performance to describe changes in the company value by 2,30%. Model with a moderating variable, i.e. environmental performance, can provide additional influence in explaining the effect of its independent variable on the company value as the dependent variable.

Based on the Table 5, The first independent variable, GIN_O (Green innovation), has a probability of 0,656, which is > the significance level of 0,05, with a coefficient of -0,57 pointing in the negative direction. Hence, it can be concluded that GIN_O does

Table 5: T-Test Results.

Variable	Direct model			Moderation Model		
	Coefficient	t	Prob	Coefficient	t	Prob
GIN_O	-0.5715562	-0.45	0.656	-0.1066802	-0.11	0.914
CED_O	0.2870755	1.10	0.273	-1.783337	-1.41	0.160
KL_O				-1.285319	-1.13	0.259
GIN*KL_O				-0.350897	-0.03	0.980
CED*KL_O				2.771084	1.65	0.098
Cons	3.911329	3.4	0.001	3.52128	4.59	0.000
R-squared	0.0224			0.0230		

Note: GIN: Green Inovation; CED: Carbon Emission Disclosure; KL: Environmental performance

not have a significant influence on the value of manufacturing companies listed on the Indonesia Stock Exchange in 2020-2022. The second independent variable, CED_O (carbon emission disclosure) also has a probability value greater than the significance level of 0,05, with the positive coefficient value of 0,29. It can be concluded that CED_O does not have a significant influence on the value of manufacturing companies listed on the Indonesia Stock Exchange in 2020 – 2022.

To examine the moderator variable, as seen in Table 5, the hypothesis test results with the moderator are as follows. The first moderator variable is the multiplication of green innovation with environmental performance, or GIN*KL_O. It has a t-value of -0,03, meaning that t-table > t-value, thus H0 is accepted and H1 is rejected. The coefficient value is -0,350897, indicating a negative direction. In the test results, this moderator variable yields a significance value greater than 0,05, specifically 0,980. It can be concluded that environmental performance does not strengthen the influence between green innovation and company value. The second moderator variable is the multiplication of carbon emission disclosure with environmental performance, or CED*KL_O. It has a t-value of 1,65, indicating that t-table > t-value, thus H0 is accepted and H1 is rejected. It can be seen from Table 5 that the positive coefficient value is 2,771084. In the test results, this moderator variable yields a significance value greater than 0,05, specifically 0,098. It is concluded that environmental performance does not strengthen the influence between carbon emission disclosure and company value.

4.3. Discussions

4.3.1. Green innovation does not have a significant positive influence on company value

Based on the test results, it is found that green innovation does not have a significant positive impact on company value. It is evident that the implementation of green innovation requires significant costs. However, with the numerous elements needed to achieve an environmentally friendly production process, substantial capital is required. Both companies and investors may not experience immediate returns due to the considerable time and investment needed for green innovation, which is fundamentally undertaken for the long-term sustainability of the company. Starting from the selection of raw materials, making an environmentally friendly packaging, the development of a product, to the marketing of the environmentally friendly product, significant costs are incurred. Therefore, time is necessary for environmentally friendly innovation to become visible and impactful. Consequently, as not all businesses adopt environmentally friendly innovations, this may not result in favorable effects on company value. This finding in line with the research by [16] which shows that green product innovation does not significantly influence company value. Thus, this study does not support the stakeholder theory.

4.3.2. Carbon emission disclosure does not have a significant positive effect on company value

Based on the test results, it is found that carbon emission disclosure does not have a significant positive impact on company value. Carbon emission disclosure is still carried out voluntarily by manufacturing companies in Indonesia, acknowledging that this disclosure is not mandated by applicable regulations. However, many companies still have the motivation to voluntarily disclose this information, believing that such disclosure can add value to the company. The findings of this study contradict the signaling hypothesis, which suggests that a company's carbon emission disclosure might indicate to investors that everything is going well and can enhance its business value. This study support the findings of [17], who did not find a statistically significant relationship between carbon emission disclosure and stock prices. Although not all companies have implemented carbon emission disclosure, those that have implemented it use voluntary disclosure strategies to minimize their environmental impact. This illustrates that investors do not consider carbon emission disclosure by companies as a significant factor in investment decision-making. The results of this study also contradict with the signaling hypothesis.

4.3.3. Environmental performance moderates the influence of green innovation on company value

Environmental performance is defined as a company's initiative to cultivate a healthy (green) environment as a sign of accountability and its performance. Based on the hypothesis results, information about the moderating role of environmental performance on green innovation and company value is obtained. This hypothesis is rejected or it can be interpreted that environmental performance is unable to strengthen the relationship between green innovation and company value. The study's results do not support the signaling theory, which suggests that implementing green innovation can provide a signal as good news for investors and enhance the company value. This is consistent with the findings from [18] which indicate that the inability of environmental performance to strengthen the relationship between green innovation and company value may occur because management feels no need to make significant improvements in both disclosure and implementation of green innovation.

Environmental performance is unable to moderate green innovation with company value because the implementation of green innovation requires significant costs. However, with the numerous elements needed to achieve an environmentally friendly production process, substantial capital is required. Both companies and investors may not experience immediate returns due to the considerable time and investment needed for green innovation, which is fundamentally undertaken for the long-term sustainability of the company. Starting from the selection of raw materials, making an environmentally friendly packaging, the development of a product, to the marketing of the environmentally friendly product, significant costs are incurred. Therefore, time is necessary for environmentally friendly innovation to become visible and impactful.

Managerial efforts to control environmental performance have not yielded maximum results, as the data indicates that overall environmental performance of the company is still quite good. Consequently, since not all companies adopt environmentally friendly innovations (green innovation) and environmental performance has not reached its maximum potential, it is unable to influence/enhance investors' assessments of green innovation efforts which ultimately not have an impact on company value.

It can be observed that the average environmental performance in manufacturing companies is still relatively good. This may occur because the environmental performance of a company may remain constant or not improve in each year, while the company value fluctuates so that it has less influence on the company value. Based on

existing data, not all manufacturing companies receive a PROPER rating. Thus, environmental performance cannot be considered to moderate the relationship between green innovation and company value.

4.3.4. Environmental performance moderates the influence of carbon emission disclosure on company value

Environmental performance can be defined as a company providing information about carbon emissions to demonstrate its contribution to climate change and its commitment to reducing its impact. Therefore, companies must fulfill their functions by considering their stakeholders and taking responsibility actions toward the environment. Based on the hypothesis conducted, information was obtained regarding the moderating role of environmental performance in the relationship between carbon emission disclosure and company value. This hypothesis was rejected or can be interpreted as environmental performance is unable to strengthen the relationship between carbon emission and company value. The study's results do not support the signaling theory, suggesting that implementing carbon emission disclosure can signal positive news to investors and enhance company value. This aligns with the previous study by [9] which found no moderating effect of environmental performance on the correlation between carbon emission disclosure and company value. This indicates that market capitalization, used as a proxy for company value, does not respond to carbon emission disclosure concerning a company's environmental management rating.

This could possibly occur because the PROPER rating cannot depict the overall environmental performance of the company. Therefore, with the presence of environmental performance, it does not influence the positive relationship between carbon emission disclosure and company value. The magnitude of a company's assets and operational income will affect the increase in company value, while high total debt does the opposite. The level of carbon emission disclosure by companies is relatively good (not yet optimal). According to signaling theory, the quality of this disclosure is not sufficient to influence investors in their investment decisions, thus the firm value remains unaffected. The role of environmental performance is expected to balance the quality of carbon emission disclosure; however, the average performance of companies is moderate and unable to act as a counterbalance.

5. Conclusion

This research applied a quantitative analysis method, involving calculations and quantitative estimations of factors influencing company value. The factors utilized in this study include green innovation and carbon emission disclosure, with environmental performance as a moderator. The sample consists of all manufacturing sector companies listed on the Indonesia Stock Exchange (IDX) from 2020 to 2022. The entire sample in this study comprises 37 companies, resulting in a total of 111 collected observations. The testing and discussion reveal that green innovation and carbon emission disclosure does not have a significant positive impact on company value. Additionally, environmental performance cannot moderate the influence of green innovation and carbon emission disclosure on company value. Reflecting on the literature review, research methodology, discussion, and conclusion remarks detailed earlier, the researchers offer suggestions. Further exploration is needed regarding green innovation and carbon emission disclosure consistency. There might be companies hiding reports related to carbon emission disclosure. Moreover, for measuring green innovation, other metrics like Total Quality Management (TQM) and green innovation costs can be considered. The government can educate the public and reaffirm and reorganize regulations concerning entities' environmental responsibilities and consider implementing sanctions and rewards to encourage compliance. Investors should consider their investment decisions by examining green operational practices to ensure the sustainability of a company's performance. Future researchers may expand the research scope by considering all companies listed on the IDX or extending the observation period for a larger sample. Additionally, researchers who will conduct similar studies should consider adding independent variables and exploring other factors beyond the scope of this research.

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