

Carbon Emission Disclosure and Environmental Performance Effect on Firm Value

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ABSTRACT: Companies as carbon emitters must show their responsibility towards the environment by reducing carbon emissions. In order to gain legitimacy, companies need to disclose their carbon emission and have good environmental performance. These two aspects are very important because they will impact investors' perceptions and the value of the firm. This paper determines the impact of the disclosure of carbon emissions and environmental performance on firm value. The sample is seven companies on the SRI-KEHATI index from 2016-2020 (5 years). This study used quantitative methods. The secondary data is obtained from published financial reports by the Indonesia Stock Exchange (www.idx.com), sustainability reports, annual reports published through the company's website, and the Ministry of Environment and Forestry's Decree about the PROPER selection from (proper.menlhk.go.id). In order to test the hypothesis, multiple linear regression is used. This study result shows that: carbon emission disclosure has no affect the firm's value. While the environmental performance positively affects the firm value, the carbon emission disclosure and environmental performance positively affects firm's value.

KEYWORDS -Carbon Emission Disclosure, Environmental Performance, Firm Value

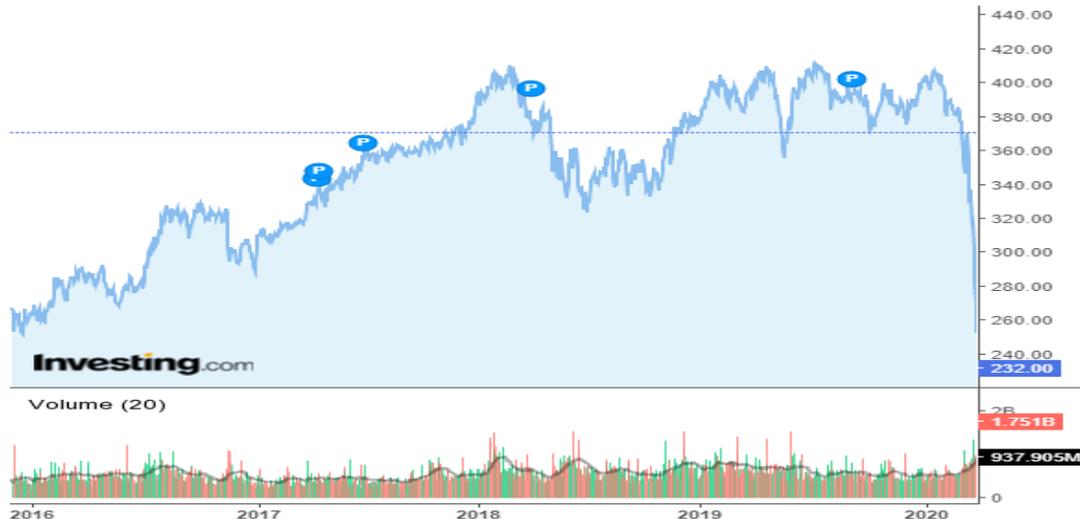
I. INTRODUCTION

Global warming is now a severe issue. The global average surface temperature climbed by more than 1.2°C in 2020 from the late 19th century[1].This is caused by the accumulation of greenhouse gases (GHG)dominated by carbon dioxide into the atmosphere. In a certain period, the accumulation of GHG can cause climate change that will affect the quality of human life in the entire world. According to the World Resources Institute data, in 2018, Indonesia ranked 8thout of the world's top 10 highest carbon-emitters countries by generating 965.3 MtCO_{2e} or 2.03% of total world emissions. The Indonesian government responded to this fact and showed its commitment to reducing carbon emissions by being a part of the Climate Change Conference of the Parties (COP26) held in Glasgow, which aims to achieve Net Zero Emissions by 2050 [2]. In order to support the COP26, President Joko Widodo ratified Peraturan Presiden No. 98 Tahun 2021 about carbon pricing. This regulation is in line with the Minister of Finance Indonesia's instructions, Sri Mulyani, who requested the Indonesian Stock Exchange (IDX) to take an active role as a credible carbon trading platform [3].

As carbon emitters, public companies whose shares are owned by the publicalso must play an active role in reducing their emissions. Companies can show their participation by disclosing their emission information in sustainability also annual reports[4].This disclosure will show that the company takes serious actions to reduce emissions and provide information to show transparency to the stakeholder. On the other side, companies known as the cause of environmental damage can reduce investors' interest and even make investors cancel investment in the company. This will impact the corporate's performance and decline in the stock price, which will eventually reduce the firm's value[5].

Some public companies are registered in the Sustainable and Responsible Investment Index or (SRI)-KEHATI on IDX, a green index established by the KEHATI Foundation in 2009. By October 2017, the SRI-KEHATI index had grown to 17.9%, outperforming the Jakarta Composite Index (JCI), which reached 13,39%

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[6]. This shows that shareholders pay attention to environmental aspects when investing in sustainable companies, disclosing the carbon emissions information. However, over contemporary years, there have been fluctuations in the stock price index, which illustrates the change in a firm value, as shown in Fig. 1 below.

Figure 1. Indonesia Composite Index, SRI-KEHATI 2016-2020

Source: Investing.com (2021)

To gain legitimacy, the company must meet society's expectations by obtaining good environmental performance. Environmental performance can be measured by PROPER (*Program for Pollution Control, Evaluating and Rating*). There are five ratings in PROPER, which are categorized based on colour: gold (exquisite), green (great), blue (meets the requirements), red (poor), and black (inferior). PROPER ranking in 2016-2020 is described in Fig. 2 below.

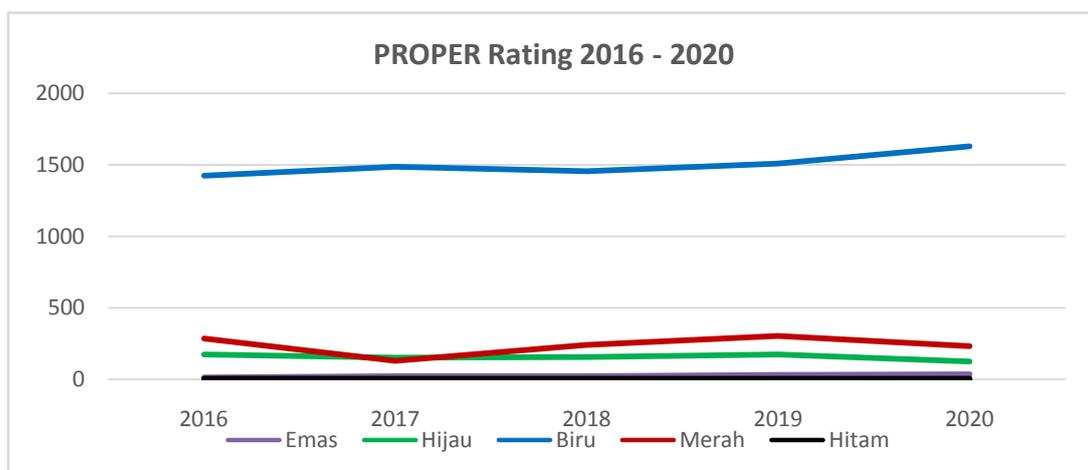


Figure 2. PROPER Rating 2016-2020

Source: Data Analysis (2021)

Fig.2 illustrates the fluctuation of PROPER ratings achieved by companies. Many companies get red and blue ratings indicating that they have not maximized their environmental performance. Therefore, the

companies must continuously improve their environmental management efforts as polluters who harm the environment. In addition to disclosing carbon emissions that contain efforts to reduce carbon emissions, environmental performance can also impact the company's value because environmentally friendly companies will minimize investor risk.

Research [7], [8], [9], [5], [10], [11] conclude that disclosure of carbon emissions positively affect company's value. In contrast to the studies above, [12] show that the disclosure of carbon emissions has no effect on firm value. While [13] show that disclosing carbon emissions negatively affects firm value. [14],[15], [16],[11] showed that environmental performance positively affects firm value. In contrast to several studies above, research [17] and [18] show that environmental performance does not affect firm value. The differences between previous studies encourage the author to research this topic again.

II. LITERATURE REVIEW AND HYPOTHESIS

2.1 Legitimacy Theory

The theory of legitimacy is often associated with the concept of a social contract, commonly used in social and environmental disclosures [19]. A social contract is a contract that arises when the community offers rights and authority for the company to legally access its resources which results in an obligation for the company to meet the community's expectations by demonstrating social and environmental responsibility. When the company meets the community's expectations and society believes that the company meets their expectations, then legitimacy is obtained. Still, the community's expectations can change, and the company needs to disclose its social and environmental responsibility activities to show whether or not there has been a change in activity [20]. Therefore, the company's actions in meeting community expectations are implemented by carrying out social responsibility activities that are not profit-oriented but focus on other aspects, such as environmental and social aspects closely related to the company's sustainability.

2.2 Signalling Theory

Signal theory describes the behaviour of individuals or companies in receiving information from financial statements [21]. According to [22], there are four main elements in signal theory: signals, signal senders, signal receivers, and feedback. The signal contains a collection of information collected by management to realize the investors' desire. The signal can be a kind of information disclosure, including the company's carbon emissions. This information can signal the investor while also notifying them that the company cares about the environment, which increases the firm's value [23].

2.3 Triple Bottom Line Theory

The term (TBL) is currently used to describe corporate sustainability. This term was first used in 1994 by John Elkington. He suggested that companies include three different baselines in their annual reports: profit, people, and the planet, commonly called the 3P [24]. According to [25], the triple bottom theory is used to understand the values, problems, and company processes that should be considered to minimize the adverse effects of their activities and generate economic, social, and environmental value.

2.4 Carbon Emission Disclosure

Carbon emission is the carbon gas release process into the earth's atmosphere that causes climate change; the word "carbon" is used since the measurement of greenhouse gases is calculated in CO₂e [26]. Therefore, the term carbon emissions refer to overall emissions, including carbon and greenhouse gases. There are two schemes for disclosing carbon emissions; voluntary and mandatory. In Indonesia, it is still voluntary. However, disclosure schemes are mandatory in other countries such as the US, Canada, Europe, China, and South Africa [27]. In the last few decades, the demand for a report on carbon emissions has increased significantly due to climate change; this makes access to data about carbon emissions by various parties crucial to making the decisions to ensure future climate actions can be informed effectively [27].

2.5 Environmental Performance

Environmental performance can be defined as the company's capability to achieve excellent environmental performance by managing and incorporating environmental aspects into company operational activities. According to Lober (1996) in [28], one of the dimensions of environmental performance measurement is regulatory compliance which measures the performance based on the company's compliance with applicable environmental regulations. This form of compliance can be seen from the carried-out ratings. In Indonesia, environmental performance ratings are assessed through PROPER (Program for Pollution Control, Evaluating and Rating). PROPER is a program that aims to evaluate the company's performance in environmental management to achieve environmental compliance and excellence.

2.6 Firm Value

Investors consider several aspects before making investment decisions. One of them is the firm value, which reflects the investor perceptions about the company's achievement in its financial performance related to the stock prices. Tobin's Q ratio is used to measure the firm's value. According to [8], Tobin's Q is a ratio that compares the stock's market value with its book value, focusing on the company's relative value to replace the current total cost of assets.

2.7 Carbon Emission Disclosure on Firm Value

In line with signalling theory, disclosing carbon emissions can be a signal for investors. These signals show a company's seriousness in solving existing environmental issues[29]. This positive signal will lead investors to invest and increase firm value. To gain legitimacy, the corporate can disclose its environmental information, including the disclosure of carbon emissions to the stakeholders[30]. According to the legitimacy theory, management uses annual reports as disclosures to eliminate public concerns, especially those that can cause public concern (Lindblom, 1994 in [20]). Disclosure of carbon emissions can be done to eliminate public concerns. This concern raises the perception that companies are less concerned about the environment, so investors discourage their interest in making an investment, which can affect the company's value. [31] found companies that disclose greenhouse gas emissions tend to increase their company values.[8] also found that CED significantly positively affects company value, meaning that firm disclosures, especially carbon emissions, can be a good signal for investors. Other studies by [5], [17], [11], [10] found a positive effect of CED on firm value. Based on the description, the first hypothesis is formulated as follows:

H₁: Disclosure of carbon emissions positively affect firm value

2.8 Environmental Disclosure on Firm Value

The company uses many resources in its operations and produces waste, including air emissions. Therefore, companies must be responsible for the environment through good environmental performance. This will demonstrate the company's commitment to the environment, create a positive perception of the company, and increase the value of the company. This statement is supported by research conducted by Desfita (2009) in [11], showing that announcements of environmental performance ratings contain information that has impacted the stock prices. Furthermore, research [15] also found that environmental performance positively affects the firm value, indicating the acceptance of the legitimacy theory that the company is observant of its environmental management. Therefore, the second hypothesis is:

H₂: Environmental performance positively affects firm value

2.9 Carbon Emission Disclosure and Environmental Performance on Firm Value.

The first and second hypotheses show that each independent variable positively affects the dependent variable. Then the third hypothesis is:

H₃: Carbon emission disclosure and environmental performance positively affect the firm value

III. RESEARCH METHOD

3.1 Research Design

This research uses a quantitative method, examining the carbon emissions disclosure and environmental performance effect on firm value. The unit of analysis is the company. Time horizon combines cross-sectional and time-series data, commonly called panel data.

3.2 Research Population and Sample

The population is the members of the SRI-KEHATI index listed on the IDX. Non-probability and purposive sampling techniques were used to select the sample. The following are the criteria for determining the sample: 1) Companies listed on the SRI-KEHATI index for five years from 2016-2020. 2) Companies that publish financial and sustainability or annual reports in 2016-2020. 3) Companies that consistently participate in PROPER in 2016-2020. 4) Companies that explicitly disclose at least one item of carbon emissions in the carbon emission disclosure index. The election results show seven sample companies with a five-year research period, so the number of observations is 35.

3.3 Data and Data Collection Techniques

This study uses documentary data sourced from secondary data. There were several sources used to obtain the data: the Indonesia Stock Exchange (www.idx.co.id), the SRI-KEHATI (kehati.or.id), the company website, and the PROPER website (proper.menlhk.go.id).

3.4 Research Variable

In this study, CED is measured by the index developed by Choi et al. (2013). This disclosure index has 18 disclosure items. The CED value is obtained by dividing the total company's disclosing items by the total of items which is 18. The environmental performance variable is measured by PROPER rating. The PROPER rating is given to the location of the factory, land, or mine (site) owned by the company. Therefore, the PROPER rating scoring average is used to measure environmental performance. Tobin's Q is used to measure the firm value variable, which is calculated by the following formula:

$$q = (MVS + D) / TA \quad (1)$$

MVS = Market value of all the outstanding stock (stock closing price x outstanding share)

D = Debt (current liability – current assets) + long-term liability)

TA = Total assets

3.5 Data Analysis Method

This research analyzed the data using descriptive statistical and multiple linear regression analysis. Before the regression model was tested, the normality, heteroscedasticity, multicollinearity, and autocorrelation tests were conducted. In addition, the coefficient of determination is calculated. Finally, H_1 and H_2 are tested using the t-test individually, and H_3 is tested using the F-Test.

Data analysis was performed using the IBM SPSS 26 application. The multiple linear regression equation is:

$$TBQ = \alpha + \beta_1 CED + \beta_2 EP + e \quad (2)$$

TBQ = Tobin's Q (Firm Value)

α = Constanta

β_1, β_2 = Coefficient Regression

CED = Carbon Emission Disclosure

EP = Environmental Performance

e = Error

IV. RESULT AND DISCUSSION

4.1 Statistic Descriptive

This analysis in this study refers to the max, min, average, and standard deviation values of all variables; disclosure on carbon emissions, environmental performance, and firm value are shown in Table 1 below:

Table 1 Statistic Descriptive

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Carbon Emission Disclosure	35	0,11	0,72	0,4079	0,16554
Environmental Performance	35	2,75	3,60	3,1139	0,17066
Firm Value	35	0,65	22,87	3,3575	6,06373

Source: Output IBM SPSS 26,data analysis(2022)

According to Table 1, the CED value is between 0.11 to 0.72. The lowest score is 0.11 owned by PT Indofood Sukses Makmur Tbk in the 2016. The highest score is 0.72, owned by PT United Tractors Tbk in 2016. This means that the company has disclosed 15 of the 18 items. The mean value is 0.4079 or 40.79% of the total carbon emission disclosure items. The standard deviation value of 0.16554 is less than the mean value, indicating that the data distribution is not good.

The environmental performance variable has the lowest value of 2.75, owned by PT United Tractors for 2016. The highest value is owned by PT Semen Indonesia (Persero) Tbk of 3.60 for the 2016 period with a mean of 3.1139, which means the company averages average obtains a blue rating or has met the applicable standards and regulations. The standard deviation for the environmental performance variable is 0.17066, which is smaller than the average value.

The lowest firm value, 0.65, was obtained by PT Indofood Sukses Makmur Tbk for 2020. Tobin's Q value of less than 1 means the company's failure to manage company assets and the low potential for investment growth. The highest company value is owned by PT Unilever Indonesia Tbk, 2017, with a value of 22.87. This shows that the company's management has managed its assets well to have a high investment growth potential. The mean is 3.3575, and the standard deviation is 6.06373, which is greater than the average value.

4.2 Classic Assumption Test

Five outlier's data were removed to pass the normality test because the values are very extreme and different from other observations. So the number of observations becomes 30. After the outliers are removed, all classical assumption tests are met, as evidenced by the Kolmogorov-Smirnov test where the Assymp. Sig. (2-tailed) of 0.200, whose value is more significant than 0.05. This is a sign that the data is normal. The independent variables' tolerance value of < 0.1 , which is 0.903, and a VIF value of > 10 , which is 1.108, indicates no multicollinearity problems. The data points in the scatter plot graph spread above and below zero on the Y-axis. There is no clear pattern, meaning there is no heteroscedasticity problem in the research regression model. Finally, the run test shows the Assymp. Sig. (2-tailed) value of 0.094. This value is greater than alpha, which is 0.05, which means that the residual is random. Therefore, the regression model in this study has no autocorrelation problem.

4.3 R-Square

The R Square value is 0.303 or 30.3%, meaning the independent variables explain the dependent variable very limited. 0.303 is between 0.19 and 0.33, so the capability of independent variable's influence on

the dependent variable in this study is weak. The results of Adjusted R Square of 0.252 or 25.2% indicate that the variation of the CED and environmental performance can explain 25.2% of the variable firm value. At the same time, 74.8% is affected by other factors outside this study that can affect the company's value.

4.4 Multiple Regression Linear Analysis

The hypothesis was tested by using multiple linear regression with an alpha of 5%. In addition, multiple linear regression models were used to determine CED and environmental performance effects on firm value. The following Table 2 is presented the result of the multiple linear regression analysis:

Table 2 Multiple Linear Regression

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-1,421	,737		-1,928	,064		
	Carbon Emission Disclosure	,105	,226	,079	,468	,644	,903	1,108
	Environmental Performance	,751	,244	,521	3,080	,005	,903	1,108

a. *Dependent Variable:* Firm Value

Source: Output IBM SPSS 26, data analysis (2022)

Based on Table 2, the regression equation model in this study is:

$$TBQ = -1,421 + 0,105CED + 0,751EP + e \quad (3)$$

TBQ = Tobin's Q (Firm Value)
CED = Carbon Emission Disclosure (CED)
EP = Environmental Performance
e = Error

Based on (3), the firm value can be predicted by the two independent variables, CED and environmental performance. If the CED and EP are zero, the firm value will decrease by a constant value of 1.421. On the contrary, CED can forecast an increase in the firm value by 0.105. Similarly, environmental performance can forecast an increase in company value of 0.751.

4.5 t-Test

The first research hypothesis states that disclosing carbon emissions positively impacts firm value. According to Table 2, Sig. Value is 0.644, more significant than the alpha, 0.05. It can be said that statistically, the first hypothesis is not proven and cannot be accepted. So, in conclusion, the disclosure of carbon emissions has no effect on the company's value.

The second hypothesis states that environmental performance positively affects firm value. Based on Table 2, the environmental performance Sig. Value is 0.005, smaller than the alpha of 0.05. This indicates that the second hypothesis is statistically proven and can be accepted.

4.5 F-Test

Table 3 shows the result of the F-test:

Table 3 F-Test

Model		Sum of Squares	Df	F	Sig.
1	Regression	0,498	2	5,875	0,008
	Residual	1,144	27		
	Total	1,641	29		

Source: Output IBM SPSS 26, data analysis (2022)

The third hypothesis states that the CED and environmental performance positively affects firm value. The result of the test shows the Sig. Value is 0.008, smaller than alpha 0.05, so the alternative hypothesis is accepted. Then, the third hypothesis is proven and can be obtained. In conclusion, CED and environmental performance simultaneously affect the firm value.

4.6 Discussion

4.7.1 Carbon Emission Disclosure Effect on Firm Value

This study indicated that the CED has no impact on firm value, meaning that the intensity of the disclosure of carbon emissions in the company's sustainability report or annual report doesn't affect investors' decisions, so it does not affect the firm value. This study finding also cannot confirm the signal theory and legitimacy theory. Based on the descriptive statistical analysis results, the mean value of carbon emission disclosure is 0.4079, which means that the average company sampled in this study only discloses seven to eight items of the 18. This shows that the disclosure of carbon emission levels in sustainability reports or company annual reports is low. This is supported by regulations in Indonesia that do not yet regulate the company's obligation to disclose carbon emissions in its sustainability reports or annual reports. So the company does not need to disclose detailed and complete information on carbon emissions. In addition, during the research period, government policies related to corporate carbon emissions, such as carbon trading and carbon taxes, are still in the drafting and socialization stage, so they have not been fully implemented. Therefore, investors have not disclosed the company's carbon emissions as the primary consideration in their investment decisions. The results of this study are in accordance with the previous research conducted by [12], which found no effect of the disclosure of carbon emissions on firm value. The results of this study also cannot confirm previous research conducted by [5], [17], [11], [10] which showed a positive effect of carbon emission disclosure on firm value.

4.7.2 Environmental Performance Effect on Firm Value

The next finding shows that environmental performance positively impacts firm value. This means that the better the environmental performance obtained by the company, the better the value of the company, and it also increases or shows a unidirectional relationship between environmental performance and company value. The good environmental performance will be a positive signal for investors in their investment decisions, which will lead to an increase in stock prices which is a reflection of the firm value. Supported by the current situation where environmental issues are crucial, companies must be responsible for their environment, which is indicated by good environmental performance. This shows that environmental aspects are important for the company, in addition to social and economic aspects, which are the three main aspects of the company in the triple bottom line concept in order to make the company sustain. The public will respond positively to improving the firm's image by having excellent environmental performance. The descriptive statistical analysis results in this study indicate that the mean value of the environmental performance is 3.1139. This means that the company's average PROPER rating is categorized in the blue rating, which indicates that they have complied with the requirements for environmental management by the ministry of the environment. Although the average value is classified as blue, some companies still get a red rating. This poor environmental performance can reduce the company's reputation so that the company's image towards the environment is not good. Furthermore, it can affect other aspects such as the company's economy because environmental performance, measured by PROPER, is also one of the requirements in obtaining credit at the Bank for companies. The results of this study confirm research [5], [17], [11], [10] which states that there is a positive effect of environmental performance on firm value.

4.7.3 The Effect of Carbon Emission Disclosure and Environmental Performance on Firm Value

The last finding of this research is that there is a simultaneous effect between the variable of CED and environmental performance on firm value. The carbon emission information disclosed by the company and the environmental performance obtained by the company can affect the firm value positively. Alternatively, it can be said that the more information on carbon emissions reported by the company, the higher the value of environmental performance obtained by the company can increase the firm value. This finding also proves a positive response from the Market related to the company's carbon emission information and the company's environmental performance. Partially, disclosing carbon emissions does not affect the firm value. But, the independent variables in this study positively affect company value when viewed together with environmental performance. This shows that these two factors need to be considered because they can affect the firm value. The era of taking sides with the earth and the environment has arrived and will increase in the future. So to win the hearts of stakeholders, especially investors, it is time for companies to show their concern for the earth and the environment through complete disclosure of carbon emissions and better environmental performance.

V. CONCLUSION

According to the results and discussion described above, the conclusion are: 1) Carbon emissions disclosure does not affect firm value, which means whether or not a disclosure of carbon emissions by companies does not affect investor decisions so that it does not affect company value. This could be due to the low level of carbon emissions disclosure in the sample of this study, disclosure of carbon emissions in Indonesia is voluntary, and government regulations or policies related to carbon emissions have not been fully applied, such as carbon taxes and carbon trading schemes. 2) Environmental performance positively affects firm value. So, the better the environmental performance obtained by the company, the better the value of the company, and it will also increase company value. 3) Carbon emissions disclosure and environmental performance positively affects firm value. This means that more information on carbon emissions disclosed by the company and the higher environmental performance score obtained by the company will increase the firm value.

The suggestions given in this study include: 1) The company is expected to be responsible for the waste, including carbon emissions. Therefore, it would be better for the company to disclose its carbon emission information entirely as a form of transparency and show its seriousness in reducing carbon emissions. The company is also expected to implement an environmental management system so that the company's environmental performance is getting better. 2) Regulator immediately completed the preparation of derivative regulations regarding the economic value of carbon and carbon taxes and carried out socialization to companies so that companies could prepare as well as possible to support the Indonesian government's target of achieving the carbon emission reduction target of 26% by 2020 and up to 41 % in 2030. 3) Future researchers are expected to expand the research sample by using companies listed in other Indonesian Stock Exchange indices or a particular sector in other periods. Then further researchers can also use other environmental performance measurement tools such as ISO 14001 certification or the GRI index.

REFERENCES

- [1] Earth Observatory NASA, "2020 Tied for Warmest Year on Record," *earthobservatory.nasa.gov*, 2020. <https://earthobservatory.nasa.gov/images/147794/2020-tied-for-warmest-year-on-record>. (accessed Jan. 14, 2021).
- [2] United Nations Climate Action, "COP26 Goals," *un.org*, 2021. <https://ukcop26.org/cop26-goals/> (accessed Nov. 05, 2021).
- [3] F. N. Ulya, "Sri Mulyani Ingin BEI Jadi Platform Kredibel Buat Perdagangan Karbon," *money.kompas.com*, 2021. <https://money.kompas.com/read/2021/11/16/150232426/sri-mulyani-ingin-bei-jadi-platform-kredibel-buat-perdagangan-karbon> (accessed Nov. 26, 2021).
- [4] Y. R. Ummah and D. Setiawan, "Do Board of Commissioners Characteristic and International Environmental Certification Affect Carbon Disclosure? Evidence from Indonesia," *J. Din. Akunt. dan Bisnis*, vol. 8, no. 2, pp. 215–228, Oct. 2021, doi: 10.24815/jdab.v8i2.21332.

- [5] C. Kelvin, F. E. Daromes, and S. Ng, "PENGUNGKAPAN EMISI KARBON SEBAGAI MEKANISME PENINGKATAN KINERJA UNTUK MENCIPTAKAN NILAI PERUSAHAAN," *Din. Akuntansi, Keuang. dan Perbank.*, vol. 6, no. 1, pp. 1–18, 2017.
- [6] S. Sidik, "Reksadana Terbaru RHB Asset Management Usung Konsep Investasi Berkelanjutan. 8 November," *tribunnews.com*, 2017. <https://www.tribunnews.com/bisnis/2017/11/08/reksadana-terbaru-rhb-asset-management-usung-konsep-investasi-berkelanjutan> (accessed Dec. 05, 2021).
- [7] D. Zuhrufiyah and D. Y. Anggraeni, "Pengungkapan Emisi Karbon dan Nilai Perusahaan (Studi Kasus pada Perusahaan di Kawasan Asia Tenggara)," *J. Manaj. Teknol.*, vol. 18, no. 2, pp. 80–106, 2019, doi: 10.12695/jmt.2019.18.2.1.
- [8] M. Hardiyansah, A. T. Agustini, and I. Purnamawati, "The Effect of Carbon Emission Disclosure on Firm Value: Environmental Performance and Industrial Type," *J. Asian Financ. Econ. Bus.*, vol. 8, no. 1, pp. 123–133, 2021, doi: 10.13106/jafeb.2021.vol8.no1.123.
- [9] C. Saka and T. Oshika, "Disclosure effects, carbon emissions and corporate value," *Sustain. Accounting, Manag. Policy J.*, vol. 5, no. 1, pp. 22–45, 2014, doi: 10.1108/SAMPJ-09-2012-0030.
- [10] U. M. I. Hanifah, "Analisis Karakteristik Perusahaan terhadap Carbon Emission Disclosure dan Pengaruh Carbon Emission Disclosure terhadap Nilai Perusahaan," *Naskah Publ. New*, pp. 1–14, 2017.
- [11] O. Rusmana and S. M. N. Purnaman, "Pengaruh Pengungkapan Emisi Karbon dan Kinerja Lingkungan terhadap Nilai Perusahaan," *J. Ekon. Bisnis dan Akunt.*, vol. 22, no. 1, pp. 42–52, 2020.
- [12] C. Primanandari, G. Ayu, and N. Budiasih, "THE EFFECT OF CARBON EMISSION DISCLOSURE AND CORPORATE SOCIAL RESPONSIBILITY DISCLOSURE ON FIRM VALUE (Study on Mining Companies Listed on the Indonesia Stock Exchange 2016-2019)," *Am. J. Humanit. Soc. Sci. Res.*, no. 5, pp. 423–431, 2021, [Online]. Available: www.ajhssr.com
- [13] A. Firmansyah, P. H. Jadi, W. Febrian, and E. Fasita, "Respon Pasar Atas Pengungkapan Emisi Karbon Di Indonesia : Bagaimana Peran Tata Kelola Perusahaan?," *J. Magister Akunt. Trisakti*, vol. 8, no. 2, pp. 151–170, 2021, doi: 10.25105/jmat.v8i2.9789.
- [14] A. Melinda and R. Wardhani, "The Effect of Environmental, Social, Governance, and Controversies on Firms' Value: Evidence from Asia," *vol. 27*, pp. 147–173, 2020, doi: 10.1108/s1571-038620200000027011.
- [15] I. Hariati and Y. W. Rihatiningtyas, "Pengaruh Tata Kelola Perusahaan Dan Kinerja Lingkungan Terhadap Nilai Perusahaan," *J. Akunt. Keuang. Drh.*, vol. 11, no. 2, pp. 52–59, 2016.
- [16] F. E. Daromes and M. F. Kawilarang, "Peran Pengungkapan Lingkungan Dalam Memediasi Pengaruh Kinerja Lingkungan Terhadap Nilai Perusahaan," *J. Akunt.*, vol. 14, no. 1, pp. 77–101, 2020, [Online]. Available: <http://ejournal.atmajaya.ac.id/index.php/JARA/article/view/1263>
- [17] A. Dharmawansyah, "PENGARUH PENGUNGKAPAN EMISI KARBON DAN KINERJA LINGKUNGAN TERHADAP NILAI PERUSAHAAN PADA PERUSAHAAN INDUSTRI YANG TERCATAT PADA BURSA EFEK INDONESIA (BEI)," pp. 1–19, 2019.
- [18] A. P. Sawitri, "Analisis Pengaruh Pengungkapan Akuntansi Lingkungan dan Kinerja Lingkungan terhadap Nilai Perusahaan," *Semin. Nas. Call Pap. FEB Unikama Malang*, vol. (4), pp. 1–11, 2017.
- [19] B. Bae Choi, D. Lee, and J. Psaros, "An analysis of Australian company carbon emission disclosures," *Pacific Account. Rev.*, vol. 25, no. 1, pp. 58–79, 2013, doi: 10.1108/01140581311318968.

- [20] C. Deegan, M. Rankin, and J. Tobin, *An examination of the corporate social and environmental disclosures of BHP from 1983-1997*, no. 1989. 2002. doi: 10.1108/09513570210435861.
- [21] H. Mukhibad, "Carbon Emission Disclosure and Profitability – Evidence from Manufacture Companies in Indonesia," *vol. 2018*, pp. 53–67, 2018, doi: 10.18502/kss.v3i10.3118.
- [22] B. L. Conelly, R. D. Ireland, and T. Certo, "Signaling Theory: A Review and Assessment," no. January 2011, doi: 10.1177/0149206310388419.
- [23] D. Hapsoro and Z. N. Falih, "The Effect of Firm Size, Profitability, and Liquidity on The Firm Value Moderated by Carbon Emission Disclosure," *J. Account. Invest.*, vol. 21, no. 2, 2020, doi: 10.18196/jai.2102147.
- [24] T. L. Wheelen, J. D. Hunger, A. N. Hoffman, and C. E. Bamford, *Strategic management and business policy*, 14th ed. New York: Pearson, 2015.
- [25] A. Zak, "Triple bottom line concept in theory and practice," no. January 2015, 2015, doi: 10.15611/pn.2015.387.21.
- [26] Ecolife, "Definition of Carbon Emission," *ecolife.com*. <http://www.ecolife.com/define/carbon-emission.html>. (accessed Dec. 20, 2021).
- [27] R. Datt, "International evidence of changing assurance practices for carbon emissions disclosures," 2021, doi: 10.1108/MEDAR-09-2020-1005.
- [28] D. I. Burhany and Nurniah, "AKUNTANSI MANAJEMEN LINGKUNGAN , ALAT BANTU UNTUK MENINGKATKAN KINERJA LINGKUNGAN DALAM PEMBANGUNAN BERKELANJUTAN," no. 80, pp. 279–298, 2013.
- [29] M. D. Odriozola and E. Baraibar-Diez, "Is Corporate Reputation Associated with Quality of CSR Reporting? Evidence from Spain," 2017, doi: 10.1002/csr.1399.
- [30] S. Berthelot and A. Robert, "Climate change disclosures : An examination of Canadian oil and gas firms," vol. 5, no. 1, pp. 106–123, 2011.
- [31] D. Agustia and I. P. Wijaya, "Executive Compensation, Disclosure of Greenhouse Gas Emissions and Firm Value," *AFEBI Account. Rev.*, vol. 6, no. 1, p. 32, 2021, doi: 10.47312/aar.v6i01.471.