



Determinants of Carbon Emission Disclosure: A Study on Non-Financial Public Companies in Indonesia

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Abstract

This study investigates the direct and indirect associations between carbon emission disclosure with firm size, financial performance, and environmental performance. The samples were selected using a purposive technique and obtained 113 observations. Data are collected by downloading sustainability reports, annual reports, and annual financial statements and analyzed using WarpPLS 7.0 software. The authors find that firm size has a negative influence on financial performance. Firm size has a positive influence on environmental performance and carbon emission disclosure. Financial performance and environmental performance do not affect the carbon emission disclosure and do not mediate the effect of firm size on carbon emission disclosure.

Keywords: firm size; financial performance; environmental performance; carbon emission disclosure

INTRODUCTION

Climate change is a central issue that triggers the attention of various parties. The potential impacts of climate change can threaten the achievement of sustainable development, prompting a global agreement to specifically place Climate Action as one part of the 2030 Sustainable Development Goals (SDGs). The world agreement on

responding to climate change is also being carried out through the annual Conference of the Parties (COP) meeting organized by the United Nations Framework Convention on Climate Change (UNFCCC). COP21 meeting resulted in Paris Agreement. The Paris Agreement agreed global effort to limit global average temperature below 2°C compared to pre-industrialization and increase the

ability to adapt impact of climate change to achieve climate resilience.

On September 7, 2021, the International Federation of Accountants (IFAC) released Corporate Reporting: Climate Change Information and the 2021 Reporting Cycle. IFAC state that investors demand transparency on the impact of climate change in sustainability reporting or integrated reporting and corporate financial reporting. Various world regulatory bodies such as the FSB, TCFD, and IOSCO report that corporate disclosure on economic impact due to climate change is still low, and exposure on sustainability investee are incomplete, inconsistent, and cannot be compared.

Among the various types of greenhouse gases that cause climate change, Carbon Dioxide (CO₂) is still the type of greenhouse gas most often monitored for its development. Many scientific studies use carbon emission as an indicator to describe environmental degradation in a particular area. The higher carbon emission reflects that the air quality in the area is getting worse. On the other hand, a decrease in carbon emission indicates that air quality improves.

Energy Flow Accounts and Greenhouse Gas Emissions Accounts of Indonesia 2015-2019 published by

BPS - Statistics Indonesia (2021) state that in 2015-2019, carbon emissions in the business sector caused by energy use in Indonesia showed a pattern that tend to increase from year to year. In fact, since 2018, carbon emissions have started to increase significantly 2019.

The production of carbon emissions is often associated with industrial activities carried out by firms, thus triggering the birth of the concept of carbon accounting. The term carbon accounting emerged as part of the Kyoto Protocol commitment by several countries worldwide. Carbon accounting can be defined as a form of firm obligation to recognize, measure, record, present and disclose carbon emissions (Irwhantoko & Basuki, 2016).

Firm size can increase carbon emission disclosure. A large firm will have a more significant impact on the environment, and the availability of information regarding these impacts should be more. Saraswati, Puspita, & Sagitaputri (2021), Saraswati, Amalia, & Herawati (2021), Pratiwi, Maharani, & Sayekti (2021), Ratmono, Darsono, & Selviana (2020), M. W. Abdullah, Musriani, Syariati, & Hanafie (2020), and Iswati & Setiawan (2020) show that firm size has a positive influence on carbon emission disclosure. However, Kholmi, Karsono, & Syam

(2020) and Krisnawanto & Solikhah (2020) did not find the influence of firm size on carbon emission disclosure.

Financial performance can increase carbon emission disclosure. A firm with good financial performance has a high profitability value. The firm with high profitability has the economic capacity (resources) to carry out carbon emission disclosure. Andrian & Kevin (2021), Saraswati, Puspita, et al. (2021), Saraswati, Amalia, et al. (2021), Pratiwi et al. (2021), and M. W. Abdullah et al. (2020) show that financial performance has a positive influence on carbon emission disclosure. However, Kholmi et al. (2020) and Krisnawanto & Solikhah (2020) did not find the influence of financial performance on carbon emission disclosure. An interesting thing was found by Ratmono et al. (2020) stated that financial performance had a negative influence on carbon emission disclosure.

Carbon emission disclosure can be increased with environmental performance. The environmental performance can be known based on the PROPER rating given by the Ministry of Environment and Forestry, Republic of Indonesia. A firm with good environmental performance will encourage them to present and

disclose credible information, especially information related to environmental management. Setiawan & Iswati (2019), Krisnawanto & Solikhah (2020), and Putri, Budianto, & Esa (2020) show that environmental performance has a positive influence on carbon emission disclosure. However, Kholmi et al. (2020) and Pratiwi et al. (2021) did not find the influence of environmental performance on carbon emission disclosure. An interesting thing was found by M. W. Abdullah et al. (2020) stated that environmental performance had a negative influence on carbon emission disclosure.

Firm size can improve financial performance and environmental performance. Firm size can be seen from total assets owned. The greater total asset owned indicates that the firm has more ability (resources) to accommodate the wishes of stakeholders to create value. Organizations that can effectively manage their relationships with stakeholders will last and perform well (Argandoña, 2011; Fontaine, Haarman, & Schmid, 2006). Khan, Nouman, Teng, Khan, & Jadoon (2017), Meiyana & Aisyah (2019), and R. Abdullah et al. (2019) show that firm size has a positive influence on financial performance. Farlinno & Bernawati (2020), Widiastutik &

Khafid (2021), and Tiurmauli, Rokhmawati, & Fathoni (2018) show that firm size has a positive influence on environmental performance.

Carbon emission disclosure is assessed as not optimal, whereas carbon emission intensity continues to increase, becoming the urgency of this study. This study intends to develop various previous research that give different results. Based on this inconsistency and supported by Legitimacy theory and Stakeholder theory, a research model can be designed. In the elaboration of the variables, this study has a novelty to investigate indirect association between carbon emission disclosure with firm size, financial performance, and environmental performance.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Legitimacy Theory

Legitimacy theory is derived from the concept of organizational legitimacy by Dowling & Pfeffer (1975). Organizations seek to establish conformity between social values related to organizational activities and behavioral norms that are acceptable in a larger social system where the organization is a part. When there is a difference, it will threaten the organization's legitimacy. Legitimacy is a strategic factor to develop the

organization in the future. Legitimacy constructs firm strategy, especially effort to place in an increasingly advanced society.

Legitimacy theory is one of the most widely discussed theories to explain the phenomenon of voluntary social and environmental disclosure (Mousa & Hassan, 2015). Legitimacy is a firm management system oriented toward society, individual government, and society groups (Gray, Owen, & Adams, 1996). For this reason, as the system that prioritizes alignment with society, the firm's operation must be congruent with the community's expectations. Thus, carbon emission disclosure as one of voluntary environmental disclosure can be used to gain, maintain, or improve the legitimacy of the firm.

Stakeholder Theory

Stakeholder theory emphasizes the interconnection between business and customers, suppliers, employees, investors, communities, and other parties interested in the firm. The theory states that the firm must create value and benefit for all stakeholders, not just shareholders (Argandoña, 2011; Fontaine et al., 2006).

The firm is not only responsible to the owner of the firm (shareholder) but also becomes wider to the

stakeholders. This phenomenon can occur due to the demands of society as a result of negative externalities that arise and inequalities. The firm responsibility, initially measured based on economic indicators in the financial statements, must shift to non-economic indicators for internal and external stakeholders. Thus, carbon emission disclosure as one of non-economic indicators can be used to create value and benefit for all stakeholders.

The essence of stakeholder theory, there is interconnection with legitimacy theory, implies that a firm should reduce the expectation gap with the community (public) to increase legitimacy, which turns out to be a common thread. Thus, the firm should maintain its reputation by shifting the orientation pattern (goal) originally measured solely by economic measurement, which tends to shareholder orientation, towards non-economic measurement as a form of concern and alignment with stakeholders.

Hypotheses Development

Based on stakeholder theory, firm size can improve financial performance. The firm size can be seen from total assets owned. The greater total assets owned indicate that the firm has more ability

(resources) to accommodate stakeholder wishes to create value. If the value has been created effectively, the firm financial performance will increase.

Empirical studies that have been conducted by Khan et al. (2017), Meiyana & Aisyah (2019), and R. Abdullah et al. (2019) prove that firm size has a positive influence on financial performance. Thus, the first hypothesis is:

H₁: Firm size has a positive influence on financial performance.

Based on stakeholder theory, firm size can improve environmental performance. The large firm has complex operational activities. Increasing the frequency of operating activities will impact the environment. It will trigger the attraction of the media and public. The attraction can respond by improving environmental performance.

Empirical studies that have been conducted by Farlinno & Bernawati (2020), Widiastutik & Khafid (2021), and Tiurmauli et al. (2018) prove that firm size has a positive influence on environmental performance. Thus, the second hypothesis is:

H₂: Firm size has a positive influence on environmental performance.

Based on legitimacy theory, firm size can improve carbon emission disclosure. Mousa & Hassan (2015) states that social and environmental disclosure can gain, maintain, and improve organizational legitimacy. Firms with a more extensive operating process will receive higher pressure and attention from society and carbon emission disclosure in response to that pressure and attention. It aims to gain and maintain the legitimacy of the firm. The operating activities of a large firm will have a more significant impact on the environment. Thus, it will be easy for external parties or the community to put pressure and challenges on the firm.

Empirical studies that have been conducted by Saraswati, Puspita, et al. (2021), Saraswati, Amalia, et al. (2021), Pratiwi et al. (2021), Ratmono et al. (2020), M. W. Abdullah et al. (2020), and Iswati & Setiawan (2020) prove that firm size has a positive influence on carbon emission disclosure. Thus, the third hypothesis is:

H₃: Firm size has a positive influence on carbon emission disclosure.

Based on legitimacy theory, financial performance can improve carbon emission disclosure. Mousa & Hassan (2015) states that social and environmental disclosure can gain,

maintain, and improve organizational legitimacy.

To maintain legitimacy, a firm can disclose information about carbon emissions. Better financial performance means higher tendency for operational activities. The impact of high operational activities will increase the intensity of carbon emissions produced by the firm.

A firm with good financial performance should be more committed to disclosing carbon information. The same thing is confirmed by Choi, Lee, & Psaros (2013) that firms with good financial performance tend to have more resource capabilities to make voluntary disclosures. Thus, more profitable firms have pressure to reduce the impact of environmental pollution resulting from their operational activities.

Empirical studies that have been conducted by Andrian & Kevin (2021), Saraswati, Puspita, et al. (2021), Saraswati, Amalia, et al. (2021), Pratiwi et al. (2021), and M. W. Abdullah et al. (2020) prove that financial performance has a positive influence on carbon emission disclosure. Thus, the fourth hypothesis is:

H₄: Financial performance has a positive influence on carbon emission disclosure.

Based on legitimacy theory, environmental performance can improve carbon emission disclosure. Mousa & Hassan (2015) states that social and environmental disclosure can gain, maintain, and improve organizational legitimacy.

Firms with good environmental performance will improve the quality of environmental disclosure by providing more credible and informative information to the public. By improving the quality of information, the legitimacy gap can be avoided.

Firms that have superior environmental performance should have a proactive environmental strategy. This will lead the firm to make disclosures that support environmental sustainability, including disclosures related to information on the firm carbon emission.

Empirical studies that have been conducted by Setiawan & Iswati (2019), Krisnawanto & Solikhah (2020), and Putri et al. (2020) prove that environmental performance has a positive influence on carbon emission disclosure. Thus, the fifth hypothesis is:

H₅: Environmental performance has a positive influence on carbon emission disclosure.

Based on legitimacy theory, firm size is hypothesized to affect carbon emission disclosure through financial performance indirectly. It can happen when the firm has achieved good financial performance, and then the firm will disclose carbon emissions to obtain a public image and legitimacy from the community. Carbon emission disclosure requires high cost, in-depth study, and a relatively long time. Thus, the firm will have many considerations before disclosing carbon emissions because it is still voluntary.

Each firm has its priority scale. In a profit-oriented firm, the main goal is to obtain maximum profit. After the main objective is achieved, other purposes will be tried to achieve, such as disclosing carbon emissions. Thus, financial performance can mediate firm size on carbon emission disclosure. Thus, the sixth hypothesis is:

H₆: Financial performance mediate the positive influence of firm size on carbon emission disclosure.

Based on legitimacy theory, firm size is hypothesized to affect carbon emission disclosure through environmental performance indirectly. It can happen when the firm has achieved good environmental performance, and then the firm will

disclose carbon emissions to obtain a public image and avoid a legitimacy gap. Social pressures will arise when a firm cannot achieve achievements in environmental performance. Thus, the firm will seek to minimize these pressures through concrete actions that can be used as a database for environmental disclosure.

Environmental performance is an achievement of the firm in dealing with environmental problems. Environmental performance can be measured through the result of the PROPER rating. Whether large or small, firms will focus on taking concrete actions as reflected in the acquisition of a PROPER rating. Then, based on the performance results, it will be used as a basis for disclosing carbon emissions.

PROPER assessment is divided into mandatory on the Ministry of Environment and Forestry, Republic of Indonesia recommendation, and self-assessment. It is mandatory for firms that have a significant impact on environmental pollution. Thus, the firm should focus on achieving PROPER performance because it is mandatory, then it will indirectly influence the firm to disclose carbon emissions because it is voluntary. Thus, the seventh hypothesis is:

H₇: Environmental performance can mediate the positive influence of

firm size on carbon emission disclosure.

METHOD

The population in this study was firms listed on the Indonesia Stock Exchange (IDX). The observation period was from 2016 to 2020. The sample in this study was selected using a purposive sampling technique. There were three criteria used in choosing the research sample.

First, it belonged to the non-financial sector. Several previous empirical studies by Hapsari & Prasetyo (2020), Krisnawanto & Solikhah (2020), and Tiurmauli et al. (2018) used a sample of firms in the non-financial sector. This criterion was used due to firm operational activities in the financial sector did not significantly impact carbon emission pollution. Thus, it was irrelevant to be used as a sample. Second, it was included in the PROPER ranking. The list of the PROPER ranking was seen in the Ministerial Decree issued by the Ministry of Environment and Forestry, Republic of Indonesia. Third, publish the sustainability report, annual report, and annual financial statements. That reports could be prepared simultaneously through an integrated report. Based on the criteria described above, the number

Table 1. Sample

Criteria	Year					Total
	2016	2017	2018	2019	2020	
Population*	513	549	606	661	712	3,041
First selection criteria	(89)	(91)	(96)	(99)	(103)	(478)
Passed first selection criteria**	424	458	510	562	609	2,563
Second selection criteria	(346)	(382)	(434)	(473)	(517)	(2,152)
Passed second selection criteria***	78	76	76	89	92	411
Third selection criteria	(65)	(59)	(56)	(61)	(57)	(289)
Passed third selection criteria****	13	17	20	28	35	113

Notes:

*The data was taken from Indonesia Stock Exchange (IDX) official website as of February 5, 2022. The data was recapitulated with Microsoft Excel software, then filtered based on the date of share listing. Thus, the authors obtained the number of companies listed from 2016 to 2020.

**The selection result used the new industrial sector classification reference IDX Industrial Classification (IDX-IC), which is divided into 12 sectors: (1) Energy, (2) Basic Materials, (3) Industrials, (4) Consumer Non-Cyclicals, (5) Consumer Cyclicals, (6) Healthcare, (7) Financials, (8) Properties & Real Estate, (9) Technology, (10) Infrastructures, (11) Transportation & Logistic, and (12) Listed Investment Product.

***The selection result used the Ministerial Decree issued by the Ministry of Environment and Forestry, Republic of Indonesia.

****Reports were available in full and could be downloaded on each firm's website.

that passed was 113 observations. Table 1 present the result of sample selection and the number of observations.

This study used one dependent variable, namely carbon emission disclosure, one independent variable, namely firm size, and two mediator variables, namely financial performance and environmental performance. Carbon emission disclosure measured how widely (amount) information about carbon emission, giving a score for each disclosure item on the checklist instrument developed by Choi et al. (2013). Each item was measured by a dichotomous scale. If the firm fully disclosed the items, it would get 18 points.

Firm size was a parameter to assess the size of a firm. One of the most widely used proxies to determine the firm size was to calculate the natural logarithm value of total assets. Financial performance was a parameter to assess the firm financial achievement. This study used Return on Equity ratio as a proxy for the financial performance variable.

Environmental performance was a parameter to assess the firm achievement related to the ecological aspect. Environmental performance was measured by obtaining a PROPER rating. There were five PROPER color levels, and each color level had a weight. Gold color meant 'perfect' with weight 5. Green color meant 'very good' with weight 4. Blue color meant 'good' with weight 3. Red color meant

'bad' with weight 2. Black color meant 'very bad' with weight 1. The environmental performance could be determined by calculating the weighted average value.

This study used a parallel multiple mediator model. Parallel multiple mediator was a model that investigated the influence of the independent variable (X) on the dependent variable (Y) through two or more mediator variables (M) (Ghozali, 2019). The hypotheses were tested by path analysis method with SEM-PLS alternative approach assisted by WarpPLS 7.0 software and Kock_2013_MediationSobel.xls.spread-sheet.

Parametric technique to test the significance of parameters were unnecessary due to SEM-PLS did not assume a certain distribution for parameter estimation (Ghozali, 2014). SEM-PLS evaluation model was based on predictive measurements that have non-parametric characteristics. The evaluation model consists of the outer model (measurement model) and the inner model (structural model).

RESULTS AND DISCUSSION

In table 2, descriptive statistics are presented on each research variable. Based on table 2, the average value for carbon emission disclosure

is 8.203540 from 113 observations. The lowest carbon emission disclosure value is 1 and the highest is 16. The standard deviation value is 3.625700. The skewness coefficient value is more than zero (skewness = 0.081054), indicating that most data values are greater than the average value. Thus, for data distributed skewed to the right (positive skewness), the median has a better ability than the average to represent the data. The data tend to cluster to the left of the distribution. The kurtosis value of -0.662616 is smaller than 3, indicating that the distribution form a platykurtic curve.

The average value for firm size is 30.445210 from 113 observations. The lowest firm size value is 27.526839 and the highest is 32.387031. The standard deviation value is 1.049749. The skewness coefficient value is less than zero (skewness = -0.829404), indicating that most data values are lesser than the average value. Thus, for data distributed skewed to the left (negative skewness), the median has a better ability than the average to represent the data. The data tend to cluster to the right of the distribution. The kurtosis value of 0.760020 is smaller than 3, indicating that the distribution form a platykurtic curve.

Table 2. Descriptive Statistics

Variables		Descriptive Statistics
Carbon Emission Disclosure	N	113
	Mean	8.203540
	Minimum	1
	Maximum	16
	Standard Deviation	3.625700
	Skewness	0.081054
	Median	8
	Kurtosis	-0.662616
Firm Size	N	113
	Mean	30.445210
	Minimum	27.526839
	Maximum	32.387031
	Standard Deviation	1.049749
	Skewness	-0.829404
	Median	30.604891
	Kurtosis	0.760020
Financial Performance	N	113
	Mean	0.154707
	Minimum	-0.317804
	Maximum	1.450882
	Standard Deviation	0.318832
	Skewness	2.935368
	Median	0.075736
	Kurtosis	8.293991
Environmental Performance	N	113
	Mean	0.541003
	Minimum	0.133333
	Maximum	2.200000
	Standard Deviation	0.493992
	Skewness	1.521080
	Median	0.266667
	Kurtosis	1.417398

The average value for financial performance is 0.154707 from 113 observations. The lowest financial performance value is -0.317804 and the highest is 1.450882. The standard deviation value is 0.318832. The skewness coefficient value is more than zero (skewness = 2.935368), indicating that most data values are

greater than the average value. Thus, for data distributed skewed to the right (positive skewness), the median has a better ability than the average to represent the data. The data tend to cluster to the left of the distribution. The kurtosis value of 8.293991 is higher than 3, indicating

that the distribution form a leptokurtic curve.

The average value for environmental performance is 0.541003 from 113 observations. The lowest environmental performance value is 0.133333 and the highest is 2.200000. The standard deviation value is 0.493992. The skewness coefficient value is more than zero (skewness = 1.521080), indicating that most data values are greater than the average value. Thus, for data distributed skewed to the right (positive skewness), the median has a better ability than the average to represent the data. The data tend to cluster to the left of the distribution. The kurtosis value of 1.417398 is smaller than 3, indicating that the distribution form a platykurtic curve.

Outer Model Analysis

The outer model calculation results are present in table 3. Validity analysis can be seen from the loading

factor value of all variables above 0.5. It indicates that the research variables are valid. Reliability analysis can be seen from the composite reliability value and Cronbach's alpha above 0.70. It indicates that the research variables are reliable. Based on table 3, all the requirements of the outer model analysis are fulfilled, it can be concluded that the research model is valid and reliable.

Inner Model Analysis

The inner model calculation results are present in table 4. The model fit index includes average path coefficient, average R2, and average variance factor. The criteria for average path coefficient and average R2 with a p-value below 0.1 while the average variances factor is below 5. Based on table 4, all the requirements of the inner model are fulfilled, it can be concluded that the model fits with the data.

Table 3. Outer Model Analysis

Variables	Loading Factor	Composite Reliability	Cronbach's Alpha
Carbon Emission Disclosure	1	1	1
Firm Size	1	1	1
Financial Performance	1	1	1
Environmental Performance	1	1	1

Table 4. Inner Model Analysis

Model Fit and Quality Indices
Average path coefficient (APC)=0.208, P<0.001
Average R-squared (ARS)=0.126, P<0.001
Average adjusted R-squared (AARS)=0.114, P<0.001
Average block VIF (AVIF)=1.052, acceptable if <= 5, ideally <= 3.3
Average full collinearity VIF (AFVIF)=1.249, acceptable if <= 5, ideally <= 3.3

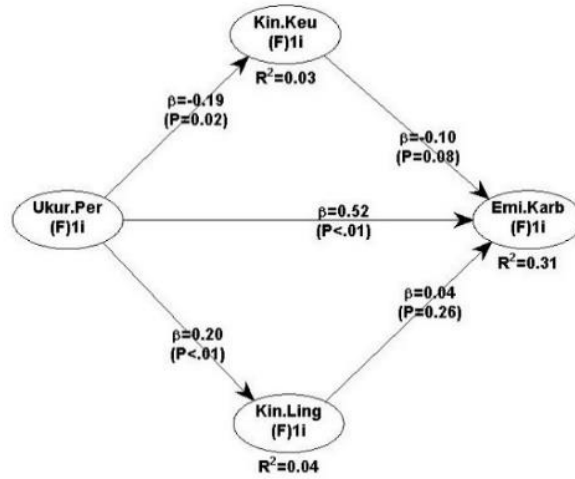


Figure 1. Path Analysis of the Firm Size, Financial Performance, Environmental Performance, and Carbon Emission Disclosure

Table 5. Hypotheses Testing

	Hypotheses	Path Coefficient	p-Value	Results
H ₁	Firm Size → Financial Performance	-0.187	0.023	Rejected
H ₂	Firm Size → Environmental Performance	0.195	<0.001	Accepted
H ₃	Firm Size → Carbon Emission Disclosure	0.516	<0.001	Accepted
H ₄	Financial Performance → Carbon Emission Disclosure	-0.095	0.084	Rejected
H ₅	Environmental Performance → Carbon Emission Disclosure	0.045	0.257	Rejected
H ₆	Firm Size → Financial Performance → Carbon Emission Disclosure	0.0178	0.1478	Rejected
H ₇	Firm Size → Environmental Performance → Carbon Emission Disclosure	0.0088	0.2680	Rejected

Hypotheses Testing

Testing the direct effect hypotheses can be seen from the output of WarpPLS 7.0 software. Testing the indirect effect hypotheses

can be seen based on the result of the Sobel Test, which is calculated using the Kock_2013_MediationSobel.xls spreadsheet.

The first hypothesis, which states that firm size has a positive influence on financial performance, is rejected. Based on table 5, the p-value of firm size to financial performance is 0.023, which is significant (smaller $\alpha = 0.05$). Obtaining -0.187 path coefficient means the negative direction influence. Thus, it can be concluded that firm size has a negative influence on financial performance.

The second hypothesis, which states that firm size has a positive influence on environmental performance, is accepted. Based on table 5, the p-value of firm size to environmental performance is <0.001 , which is significant (smaller $\alpha = 0.05$). Obtaining 0.195 path coefficient means the positive direction influence. Thus, it can be concluded that firm size has a positive influence on environmental performance.

The third hypothesis, which states that firm size has a positive influence on carbon emission disclosure, is accepted. Based on table 5, the p-value of firm size to carbon emission disclosure is <0.001 , which is significant (smaller $\alpha = 0.05$). Obtaining 0.516 path coefficient means the positive direction influence. Thus, it can be concluded that firm size has a positive influence on carbon emission disclosure.

The fourth hypothesis, which states that financial performance has a positive influence on carbon emission disclosure, is rejected. Based on table 5, the p-value of financial performance to carbon emission disclosure is 0.084, which is not significant (higher $\alpha = 0.05$). Obtaining -0.095 path coefficient means the negative direction influence. Thus, it can be concluded that financial performance does not affect carbon emission disclosure.

The fifth hypothesis, which states that environmental performance has a positive influence on carbon emission disclosure, is rejected. Based on table 5, the p-value of environmental performance to carbon emission disclosure is 0.257, which is not significant (higher $\alpha = 0.05$). Obtaining 0.045 path coefficient means the positive direction influence. Thus, it can be concluded that environmental performance does not affect carbon emission disclosure.

The sixth hypothesis, which states that financial performance can mediate the influence of firm size on carbon emission disclosure positively, is rejected. Based on table 5, the p-value of firm size to carbon emission disclosure through financial performance is 0.1478, which is not significant (higher $\alpha = 0.05$). Obtaining 0.0178 path coefficient

means the positive direction influence. Thus, it can be concluded that financial performance does not mediate the effect of firm size on carbon emission disclosure.

The seventh hypothesis, which states that environmental performance can mediate the influence of firm size on carbon emission disclosure positively, is rejected. Based on table 5, the p-value of firm size to carbon emission disclosure through environmental performance is 0.2680, which is not significant (higher $\alpha = 0.05$). Obtaining 0.0088 path coefficient means the positive direction influence. Thus, it can be concluded that environmental performance does not mediate the effect of firm size on carbon emission disclosure.

Discussion

The first hypothesis, which states that firm size has a positive influence on financial performance, is rejected. The result of testing the first hypothesis proves that firm size has a negative influence on financial performance. The result is consistent with previous findings by Ullah, Pinglu, Ullah, Zaman, & Hashmi (2020), Matar & Eneizan (2018), Ullah, Kashif, & Ullah (2017), and Olawale, Ilo, & Lawal (2017).

The dominance of large firm size with poor financial performance causes the direction of this research result to be negative. The sample faces two obstacles that impact the decline in financial performance. The trade war between the United States and China caused world economic growth to weaken. As is known, these countries are countries with the largest economies in the world. The economic downturn of these countries affected the entire economy of other countries, including Indonesia.

Export is one of the drivers of Indonesia's economic growth. The United States and China are Indonesia's two main trading partners. The weakening of these economies could make the demand for goods from Indonesia (export) fall. This condition will affect firm performance in the non-financial sector.

Not yet over with the trade war between the United States and China, the world was hit by the Covid-19 pandemic. The increasing escalation of the spread of the Covid-19 pandemic in Indonesia and worldwide has resulted in a decline in economic and business activities. The Indonesian government formulated various policies to limit all activities and physical contact. This policy will undoubtedly affect the firm ability to

generate profit, then decrease financial performance.

The second hypothesis, which states that firm size has a positive influence on environmental performance, is accepted. This finding support stakeholder theory. The result is consistent with previous findings by Farlinno & Bernawati (2020), Widiastutik & Khafid (2021), and Tiurmauli et al. (2018).

Firm size is measured from total assets owned. The large firm has very complex operational activities. The increasing complexity of the firm operational activities will increase the firm waste production by triggering environmental pollution (Widiastutik & Khafid, 2021). It will cause attraction the media and public.

The attractiveness that arises from the firm operational activities can be responded to by improving good environmental performance. One of the benchmarks that can measure environmental performance is the result of PROPER. PROPER was initiated by the Ministry of Environment and Forestry, Republic of Indonesia, in 1995.

The third hypothesis, which states that firm size has a positive influence on carbon emission disclosure, is accepted. This finding support legitimacy theory. The result is consistent with previous findings by

Saraswati, Puspita, et al. (2021), Saraswati, Amalia, et al. (2021), Pratiwi et al. (2021), Ratmono et al. (2020), M. W. Abdullah et al. (2020), and Iswati & Setiawan (2020).

A large firm generally has a reasonably high dependence on the capital market. This condition is prone to triggering information asymmetry problems. To prevent this, the firm can invest more of its resources in disclosing both financial and non-financial information (Fontana, D'Amico, Coluccia, & Solimene, 2015). Example non-financial information is information regarding the impact of the firm operation on carbon emission pollution.

The large firm already has a well-established integrative information system. The integrative information system is designed to monitor and utilize as a basis for firm data in conducting analysis. With this system, the parent firm can unify all firm activities and its subsidiaries. Thus, the firm will find it easier to carry out information.

The fourth hypothesis, which states that financial performance has a positive influence on carbon emission disclosure, is rejected. The result of testing the fourth hypothesis proves that financial performance does not affect carbon emission

disclosure. This finding does not support legitimacy theory. The result is consistent with previous findings by Kholmi et al. (2020) and Krisnawanto & Solikhah (2020).

When a firm discloses carbon emissions, but the disclosure cause investor and other stakeholders to find it difficult to understand, this disclosure will not get the maximum result. The economic concept explains that economic actors try to make the smallest sacrifices to obtain maximum results. On the other hand, carbon emission disclosure requires a relatively high cost.

The decline in firm financial performance was caused by the trade war between the United States and China. Then, its condition was followed by the increasing escalation Covid-19 pandemic in Indonesia and worldwide. One strategy that can be done is to minimize high-cost activities and focus on restoring economic performance. It encourages the firm to carry out various cost-efficient. Thus, financial performance cannot affect carbon emission disclosure, primarily those still voluntary.

If the firm has good financial performance but is aware of environmental ethics, they will consider carbon emission topics to report. However, management

awareness that is still low on ethics is considered the influence of financial performance on carbon emission disclosure insignificant. Moreover, carbon information in Indonesia is currently not mandatory.

The fifth hypothesis, which states that environmental performance does not affect carbon emission disclosure, is rejected. The result of testing the fifth hypothesis proves that environmental performance does not affect carbon emission disclosure. This finding does not support legitimacy theory. The result is consistent with previous findings by Pratiwi et al. (2021) and Kholmi et al. (2020).

In this study, the sample is firms that have good environmental performance. The firm environmental performance can be seen from the PROPER rating. The PROPER rating is dominated by blue color, which means the firm has made the required environmental management efforts under applicable laws and regulations.

The promotion and publication of a good PROPER rating directly represent the firm commitment to addressing environmental problems. The better the PROPER rating obtained; the firm will lose the motivation to disclose carbon emission. Carbon emission disclosure

requires a high cost, and they will become reluctant to do so. This thinking is in line with Dewi, Latrini, & Respati (2019), Selviana & Ratmono (2019), and Apriliana, Ermaya, & Septyan (2019), which state that firms with a good PROPER rating do not see the need to disclose carbon emission because they are considered to have been good in implementing carbon emission reduction strategies.

The PROPER award aims to encourage firms to comply with environmental regulations and achieve environmental excellence. However, carbon emission disclosure in Indonesia is not mandatory. In other words, there are no formal sanctions if the firm does not take such action. It causes the environmental performance has no significant influence on carbon emission disclosure.

The sixth hypothesis, which states that financial performance mediates the positive influence of firm size on carbon emission disclosure, is not supported by the data. The result of testing the sixth hypothesis proves that financial performance does not mediate the effect of firm size on carbon emission disclosure. This finding does not support legitimacy theory.

Statistically, financial performance cannot influence carbon

emission disclosure. Carbon emission disclosure requires high-cost, in-depth study, and a relatively long time. The firm will have many considerations before disclosing carbon emissions. The decline in firm financial performance due to the trade war and increasing escalation Covid-19 pandemic prompted firms to carry out various cost efficiencies and focus on recovering financial performance.

Each firm has its priority scale. In a profit-oriented firm, the goal that must be set is to achieve the best financial performance. After the main goal is achieved, other goals will be aligned and strived to achieve, such as disclosing carbon emission. In this study, the firm has not been able to achieve this main goal. Thus, the mediating effect between firm size and carbon emission disclosure through financial performance is insignificant.

The seventh hypothesis, which states that environmental performance can mediate the positive influence of firm size on carbon emission disclosure, is not supported by the data. The result of testing the seventh hypothesis proves that environmental performance does not mediate the effect of firm size on carbon emission disclosure. This finding does not support legitimacy theory.

Statistically, environmental performance cannot influence carbon emission disclosure. The publication of a good PROPER rating directly represents the firm commitment to addressing environmental problems. The better the PROPER rating obtained; the firm will lose the motivation to disclose carbon emission. Carbon emission disclosure requires a high cost, and they will become reluctant to do so.

The PROPER award aims to encourage firms to comply with environmental regulations and achieve environmental excellence. However, carbon emission disclosure in Indonesia is not mandatory. In other words, there are no formal sanctions if the firm does not take such action. It causes the environmental performance has no significant influence on carbon emission disclosure.

CONCLUSION, IMPLICATION AND LIMITATION

The following describes some conclusions referring to the research objectives: (1) firm size has a negative influence on financial performance, (2) firm size has a positive influence on environmental performance, (3) firm size has a positive influence on carbon emission disclosure, (4) financial performance does not affect carbon

emission disclosure, (5) environmental performance does not affect carbon emission disclosure, (6) financial performance does not mediate the effect of firm size on carbon emission disclosure, and (7) environmental performance does not mediate the effect of firm size on carbon emission disclosure.

The result of this study theoretically does not fully support the legitimacy theory and stakeholder theory. It happens because not all hypotheses are supported. Thus, the findings of this study imply that further studies are needed.

The contribution of the results of this study theoretically: (1) providing empirical evidence for further research development, and (2) is useful for enriching references about climate change as part of environmental and social accounting.

The result of this study practically finds that carbon emission disclosure in non-financial public companies in Indonesia is considered not optimal. In the future, it is hoped that the disclosure will be even better, not only for non-financial companies but also for financial companies. In fact, OJK as regulator of financial industry in Indonesia, has started to make it mandatory for the financial industry, as in many financial

industry authorities in other countries.

The practical contribution of the result of this research: (1) capital market analysts will gain a deeper understanding in providing recommendations (considerations) to potential investors to invest in environmentally friendly companies, and (2) standard setters will gain understanding to immediately accommodate transparency on the impacts of climate change not only in sustainability/integrated reporting but also in corporate financial reporting. This claim is contained in Corporate Reporting: Climate Change Information and the 2021 Reporting Cycle, released by IFAC (International Federation of Accountants) on September 7, 2021.

There has been no policy regarding binding sanctions or consequences if a firm does not disclose carbon emissions. Carbon emission disclosure in Indonesia currently does not have strong regulations or laws. It indicates that stakeholders do not have a strong basis for suppressing and demanding firms to disclose information about carbon emissions.

The policy recommendation based on the result of this research is to mandate the firm carbon emission disclosure policy immediately. The

existence of a clear legal regarding corporate carbon emission disclosure will indirectly attract investors, both local and international investors, to improve Indonesia's investment climate. Providing incentives for participating in global carbon market can be implemented. Policies related to greenwashing practices also need to be enforced and should be a concern of the government.

The use of the carbon emission disclosure measurement instrument is limited to the instrument developed by Choi et al. (2013). It is highly recommended to develop the instrument to measure carbon emission disclosure and its indicators to be expanded and adapted to the current condition due to the Covid-19 pandemic. Refer to the GRI Standards, especially GRI 305: Emissions 2016, one of the most widely used standards as a reference for firms worldwide to disclose greenhouse gas emissions.

The sample selection is limited to one country. Foreign firms can be considered as a sample for further research. Based on the release Katadata (2021), ten countries have the largest CO₂ emissions per capita. These countries are the Middle East, Canada, Saudi Arabia, the United States of America, Australia & New Zealand, Russia, South Korea,

Kazakhstan & Turkmenistan, Taiwan, and Japan. A comparative study between companies at home and abroad will motivate firms to disclose carbon information.

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