

# The Effect of Carbon Emission Disclosure on Firm Value: Environmental Performance and Industrial Type

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## Abstract

This research aims to examine the effect of carbon emission disclosure on firm value and to reveal environmental performance and industrial type as the moderating variables. This study used 82 samples of companies listed on the Indonesia Stock Exchange (IDX) and receiving awards in the Indonesian Sustainability Reporting Award (ISRA) in 2014-2018. This study used a multiple linear regression analysis to test the hypotheses. The results showed that carbon emission disclosure had a positive and significant effect on firm value as carbon emission disclosure is a form of corporate concern on environment positively responded by the market and becomes the basis for investors to make their considerations in assessing the company sustainability. Besides, environmental performance and industrial type can strengthen the influence relationship of carbon emission disclosure on firm value since environmental performance was assessed based on ISO 14001 certification ensuring that the company has tried to preserve the environmental sustainability by creating a good environmental management system. Moreover, companies categorized into high profile industrial type have tried to change their unfavorable image and avoid lawsuits by performing carbon emission disclosure to gain positive responses from the market.

**Keywords:** Carbon Emission Disclosure, Environmental Performance, Indonesian Sustainability Reporting Award, Firm Value, Industrial Type

**JEL Classification Code:** E44, F31, F37, G15

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## 1. Introduction

The firm theory explains that each business entity is established aiming at maximizing the firm value to increase the prosperity of its shareholders. Firm value is the price that buyers are willing to pay whenever the company is sold and reflects the business value at a particular time. Theoretically, firm value is the amount that one needs to pay when buying/taking over a business entity. High firm value is perceived as

the company's the high profitability value since profitability reflects the investment returns where company profits have become an important part in deciding the dividend distributions. Therefore, it can be concluded that firm value is affected by the company's profitability level. High firm value can affect the market response; investors will assume that the company has a good operational performance and precisely makes the business world so far only focus on making profits.

Businesses which seem to be profit-oriented encourage people to put more pressure due to the recent environmental conditions. The recent extreme climate changes have caused the number of greenhouse gas emissions continuously increase due to the company's industrial activities. This is supported by the Carbon Disclosure Project (CDP) data in 2013 showing that 50 of 500 largest companies in the world were responsible for 3/4 of the total 3.6 billion metric tons of greenhouse gas emissions on the Earth's atmosphere. Thus, the business world is recently trying to change the image of companies perceived by the world community aiming at only maximizing their profits. At present, companies not only pursue profits but also responsible for the damages affecting both people and environment. Juniarti and Sentosa (2009)

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explained that the sustainability of the recent companies is determined by their ability to manage their economic, social, and environmental performance.

Choi *et al.* (2013) found that the carbon emission disclosure scores have considerably increased over time. Besides, the results showed that larger firms with higher visibility tended to make more comprehensive carbon emission disclosure. The results indicated that the legislation of National Greenhouse and Energy Reporting Act (NGER Act) in 2007 has developed the voluntary carbon emission disclosure in 2008. Moreover, those demanding to reveal the companies' carbon emission disclosure included community environment, business environment, and government pressuring the companies to respond to the threats of environmental sustainability resulted from the effects of extreme climate changes. Companies can respond to this demand by disclosing the carbon emissions produced from their operational activities. The stakeholders may consider that the carbon emission disclosure is a form of corporate responsibility in responding to the demand for reducing the impacts of environmental damage.

Carbon emission disclosure will not only facilitate the company to obtain the stakeholders' support but also affect the firm value; therefore, this disclosure is no longer considered as a burden since increasing the firm value. Delmas and Nairn-Birch (2011) in their research showed that the greater the carbon emission disclosure, the greater the companies can improve their operational performance measured by their profitability level. Increasing the carbon emissions positively impacts the financial performance when using the accounting-based measures (ROA), yet negatively impacts on the market-based financial performance measures. Hobart (2006) in his research showed that profitability possibly increased the firm value. The results of both studies concluded that carbon emission disclosure possibly increased company profitability, while profitability can increase firm value.

Industrial types producing the most carbon emissions are companies categorized into high profile industry. Based on the data released by the Reducing Emissions from Deforestation and Forest Degradation Management Agency (BP REDD), it was predicted that in 2020, the total carbon emissions in Indonesia will reach 2,950 billion tons or approximately 40% of those produced by the high profile industry sector (energy, transportation, agriculture, and others). The companies categorized into high profile industry are not only required to disclose their carbon emissions but also to have a good environmental performance by building an environmental management system based on the ISO 14001 certification and obtaining the ISO 14001 certification. ISO 14001 is an internationally recognized standard; therefore, companies with the ISO 14001 certification can nationally and internationally improve their competitiveness. The purpose of disclosing the carbon emission and building a good environmental performance by having the ISO 14001 certification for companies categorized into high

profile industry is to improve their image since they have the highest percentage of carbon emissions which possibly causes environmental damages.

The other objective is to avoid lawsuits that the companies are allowed to be sued and made to pay the substantial fines for causing the environmental damages and disrupting the companies' financial stability, and even obtaining the sanctions in the form of revocation of business licenses. Therefore, it can be concluded that the companies disclosing their carbon emissions and possessing the ISO 14001 certification can sustainably guarantee their investors. The implication in this research is to provide materials for companies to pay more attention to the environment not as their burden but can provide benefits in the form of a firm value increase. Companies should concern more on environment because their sustainability is determined by their ability to manage their economic, social, and environmental performance. Therefore, managers should have disclosed the companies' carbon emissions as a form of corporate environmental responsibility to properly develop their environmental performance by adopting the ISO 14001.

Furthermore, this study implied that the policy-makers should know that the companies in Indonesia should disclose their carbon emissions not as not only a voluntarily but obliged activities as it does not burden, yet benefit the companies for their good image and to increase their firm value. The carbon emission disclosure can be used as the government's instrument to monitor the level of carbon emissions produced by the companies, Thus, the government's objective to reduce the level of carbon emissions in Indonesia can be well achieved.

## 2. Literature Review and Hypotheses

### 2.1. Literature Review

Gray *et al.* (1995) explained that the legitimacy theory has played its role to facilitate the relationship between company and its stakeholders. Companies use their social reporting to maintain a more healthy relationship with the related parties to continuously gain more profits and grow. In recent ventures, in a dynamic political and social environment, the corporate social responsibility is increasingly interpreted as a way wherein companies obtain the 'organizational legitimacy'. *Legitimacy theory* is a mechanism supporting organizations in executing and developing the voluntary social and environmental disclosures to fulfill their social contract which allows the recognition of their goals and survival in a turbulent environment. Therefore it can be concluded that the companies' sustainability will depend on the impact of their goals in allocating their economic resources to the community in correcting the social inequalities and reducing the impact of environmental damages due to the companies' operational activities.

Signaling Theory is widely used for the voluntary carbon emission disclosure in the annual or sustainability

reports. Signals will arise from information disclosed by the companies. The disclosed information can be in the form of financial or non-financial information. The information disclosure related to the environmental performance can be a positive signal for the stakeholders as the companies have voluntarily disclosed the information needed by the stakeholders.

Hendriksen and Breda (2001) explained that there were three types of carbon emission disclosure:

- 1) Adequate Disclosure, which only discloses the minimum items required by the standard.
- 2) Fair Disclosure, which only discloses the minimum items required by the standard plus the other relevant information.
- 3) Full Disclosure, which discloses all information relevant to the required standard.

Firm value is the investor's perception on the companies' success in managing the companies associated with their corporate profitability. High firm value can be obtained from the companies' high stock prices. Companies with high firm value will affect the markets' responses as the investors consider that the companies' high firm value certainly guarantees that the companies have good prospects.

Environmental performance is the ability to create a good environmental performance. The way to assess the environmental performance is by assessing the ISO 14001 certification ownership. ISO 14001 is an international standard regarding to the environmental management systems which establish the requirements for a structured management approach. The ISO 14001 shows the companies' commitment in terms of sustainable environmental improvement.

Roberts (1992), classified the industrial types into two groups. First, high profile industry group, which covers automotive, aviation, media and communication, energy, machinery, health, transportation, oil and mining, chemical, forest, paper, agribusiness, tobacco, and food & beverage products. Second, low profile industry group, which covers textiles, personal products, household products, buildings, finance and banking, medical equipment suppliers, property, and retail companies. He empirically tested the ability of stakeholder theory to explain one specific corporate social responsibility activity, that is, social responsibility disclosure. The results showed that the measures of stakeholder power, strategic posture, and economic performance were significantly related to the levels of corporate social disclosure.

## 2.2. Hypotheses

Firm value is the reflection of investors' view on how the companies manage their functions whether well managed or not. High company value can make the market positively react and investors not only believe in the companies' performance, but also their future prospects. Investors assume that the

companies' survival is not only influenced by their high profitability but also determined by their balanced economic performance combination, focus on social justice and corporate responsibility for their sustainability (Juniarti & Sentosa, 2009).

Choi *et al.* (2013) revealed that there was a demand from environment, business, and politics for companies to respond to the threats caused by the extreme global warming. Carbon emission disclosure implemented by the companies can be seen by the stakeholders as a form of concrete action made by the companies to reduce their carbon emissions. Furthermore, larger firms with higher visibility tend to make more comprehensive carbon disclosures.

Anggraeni (2015) investigated the impact of greenhouse gas (GHG) emission disclosure and environmental performance on firm value, and then examined the role of environmental performance in moderating their relationship. The samples were firms listed in PROPER's rank and IDX in 2010-2013. Consistent with the signaling and legitimacy theories, the results showed that carbon emission disclosure had a positive impact on firm value, while environmental performance did not. However, it was found that ranks as a proxy for the environmental performance did not represent the firms' environmental performance as a whole. Thus, it was not proven that rank could moderate the relationship between carbon emission disclosure and firm value. Islam *et al.* (2017) stated that industrial production and GDP per capita had a significant relationship with carbon emission. Further analysis through variance decomposition showed that carbon emission had a consistent impact on industrial production over time, while, industrial production had a high impact on emission in a short run, yet faded in the long run.

Haniffah (2002) explained that firm size, profitability, environmental performance influenced firm value through the Islamic Social Reporting (ISR) disclosure. The research was conducted on companies listed on the Jakarta Islamic Index (JII) in 2013 – 2017. The results showed that environmental performance directly and positively influenced firm value, however, had no significant impact through ISR disclosure. It means environmental performance affected the ISR disclosure level, yet did not impact firm value. Thus, ISR disclosure did not mediate the relationship between environmental performance and firm value. ISR disclosure had a positive but not significant effect on firm value. It showed that high or low level ISR disclosure did not affect firm value. According to the stakeholder theory, a company is not only an entity which stands and runs its activities for itself but also provide benefits to its stakeholders, including investors, government, consumers, surrounding communities, and other parties.

**H1:** Carbon emission disclosure has a positive and significant effect on firm value.

Based on the legitimacy theory, a company will try to get its legitimacy or recognition from the public due to its

existence. The company's effort to gain its legitimacy from the community is by aligning its economic goals with its environmental and social goals. Therefore, if a company wants to increase its value, the company should well manage its environmental and social performances.

As community is also a part of the companies' stakeholders to trust in the form of legitimacy, companies should have good social and environmental performances. Many investors will be more interested in investing their capital in the companies which good images and reputations in the community have because good image and reputation in the community or customers will reflect people's high satisfaction and loyalty related to the company products. In a long run, these will also increase the companies' sales and profitability level. Therefore, the firm value can also increase.

Environmental performance assessed based on the ownership of ISO 14001 certification is intended that the stakeholders can recognize the companies' commitment and performance related to their environmental performance. If a company has the ISO 14001 certification, it can be the company's added value. The certification ownership of ISO 14001 reflects the company's commitment to improve its environmental performance. The ISO 14001 certification also shows that the company's environmental management system has been assessed, evaluated, and declared meeting the requirements specified in ISO 14001.

Therefore, the certification ownership of ISO 14001 assesses the environmental management system starting from planning, implementation and operation stages, checks and corrective actions, management review, and continuous improvement to more credible information for investors to understand the company's environmental performance. This assessment is trusted by the investors since issued by an independent institution to assess in detail the six principles of environmental management system applied by the company in accordance with the standards.

Many companies tend to only disclose good information and hide information related to the environment that they do not pay much attention because it will negatively affect the company's reputation. This bad news can decrease the investors' confidence to the company and lead to the withdrawal of the invested funds. Thus, the ISO 14001 certification can guarantee the company that it has a good environmental performance environmental responsibility, and reputation as well as positively affect the investors' perceptions. The investors will assume that the company has well performed its environmental performance. Thus, the investors believe that the company is the perfect place to make their investment.

The existence of good news from companies possessing the ISO certification will well guarantee the environmental performance and certainly improve the company's image perceived by investors and other stakeholders as well as increase the firm value as supported with the research conducted by Auliya (2018) showing that environmental

performance had a positive and significant effect on firm value (Tobin's Q), while environmental performance (PROPER) partially had a positive and significant effect on firm value (Tobin's Q) with CSR as the intervening variable.

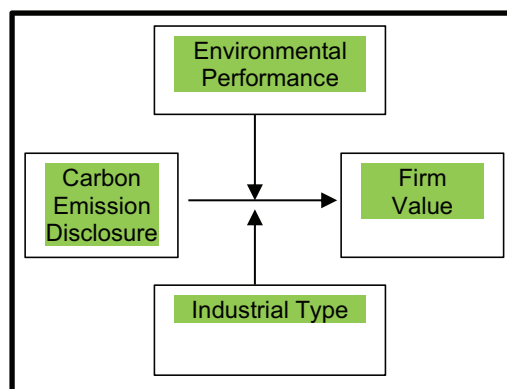
**H2:** *Environmental performance can strengthen the influence relationship of carbon emission disclosure on firm value.*

The company's role for both social and natural environment disclosed in an annual report can be the company's instrument to gain a good reputation and image. Those can also help the company categorized into high profile industrial group to improve the negative image previously perceived by the stakeholders due to the negative impact arising from the produced products or its operational activities.

In general, it is difficult for high-profile industrial group companies to change the negative image of their products and operational activities to the public perception. Thus, this problem must be well overcome by choosing the proper strategies, such as a narration in the annual report related to the social responsibility and corporate environment. This can change the public opinions, attentions, and expectations. This strategy can be an alternative taken by the companies classified into the high profile industrial group to improve their image and reputation.

Based on the signaling theory, the corporate investors and stakeholders will consider this as good news and the company's good performance in managing its activities, especially related to the environmental responsibility. Therefore, investors will not hesitate to put their capital to eventually increase the firm value. The research conducted by Simanullang (2018) showed that company size and industrial type had a positive and significant effect on firm value with carbon emission disclosure as the intervening variable.

**H3:** *Industry types can strengthen the influence relationship of carbon emission disclosure on company value.*



**Figure 1:** Conceptual Framework

### 3. Research Design

#### 3.1. Sample Selection

The population used in this research was companies listed on the IDX for the last five years from 2014 to 2018. To obtain the required samples, the researchers used a purposive sampling technique by setting specific criteria in accordance with research objectives to answer the research problems. The sampling criteria were as follows:

- 1) Companies listed on the IDX receiving awards in the Indonesian Sustainability Reporting Award (ISRA) in the last five years from 2014 to 2018.
- 2) Companies listed on the IDX starting from January 2014 and listed on the IDX until the end of December 2018.
- 3) The company issued a complete financial statement in the annual reporting period ended on 31 December.
- 4) The company published the annual or sustainability reports within the period of 2014 to 2018.
- 5) The company explicitly disclosed its carbon emissions (at least one item in carbon emission disclosure).

#### 3.2. Research Variables

##### *Independent Variable*

Carbon emission disclosure was measured using a content analysis method. This method used a carbon emission checklist adopted from the research conducted by Choi *et al.* (2013). The checklist was developed based on a questionnaire sent by the Carbon Disclosure Project (CDP) consisting of five major disclosure groups: climate change, greenhouse gas emission, energy consumption, greenhouse gas emission reduction and cost, and carbon emission accountability. Each disclosure group was further broken down into 18 acquisition items.

##### *Dependent Variable*

The company value was measured using the Tobin's Q ratio comparing the ratio of stock market value with book value. This ratio focuses on the company's current relative value to the replacing total cost. The Tobin's Q formula is as follows (Hobart, 2006):

$$\left( \frac{\text{Year-end closing price} * \text{Total shares outstanding}}{\text{Total liability}} \right) / \left( \frac{\text{Total asset} + \text{Total liability}}{\text{Total liability}} \right)$$

**Table 1:** Carbon Emission Check List

Item	Category	Description
CC-1	Climate Change (CC): Risk and Opportunity	Assessment or description of risk (specific or general rules or regulations ) related to climate changes and actions taken to manage those risks.
CC-2		Present (and future) assessments related to the implications of finance, business, and opportunity on climate change.
GHG-1	Greenhouse Gas Emission (GHG)	Description of the methodology used to calculate the greenhouse gas emissions (e.g. GHG or ISO protocol).
GHG-2		The existence of external verification to calculate the GHG emission quantities, by whom and on what basis.
GHG-3		Total greenhouse gas emissions (metric tons of CO2-e) produced.
GHG-4		Scope of disclosure 1 and 2, or direct GHG emission 3.
GHG-5		GHG emission disclosure based on its origin or source.
GHG-6		Disclosure of GHG emissions by facility or segment level.
GHG-7		Comparison of GHG emissions in the previous years.
EC-1	Energy Consumption (EC)	Amount of energy consumed (such as impression-joules).
EC-2		Calculation of energy used from the renewable resources.
EC-3		Disclosure by type, facility, or segment.
RC-1	Reduction and Cost (RC)	Details of plans or strategies to reduce GHG emissions.
RC-2		Details of the current GHG emission reduction target levels and emission reduction targets.
RC-3		Reduction of emissions and costs or savings currently achieved as the result of reduction plan.
RC-4		Costs of future emissions considered in capital expenditure planning.
AEC-1	Accountability of Emission Carbon (AEC)	Indication that the board (or other executive body) is responsible for the climate change-related actions.
AEC-2		A description of mechanism by which the board (or other executive body) reviews the development of the related company.

Source: Choi *et al.* (2013)

### **Moderating Variables**

This study uses two moderating variables:

- 1) Environmental performance  
 Environmental performance was measured based on the certification ownership of ISO 14001 and assessed using dummy variables (Nurjanah, 2015).
- 2) Industrial Types  
 Industrial types were assessed based on the company type category. Roberts (1992) classified company types into two: high profile industry and low profile industry. Industrial type variables were also assessed using dummy variables.  
 High Profile : 1  
 Low Profile : 0

### **Control Variables**

This research used four control variables:

- 1) Profitability, measured using the ratio of Return on Asset (ROA).
- 2) Company Size, assessed based on the total net sales.
- 3) Institutional Ownership, measured using the number of the largest shares owned by the institution divided by the number of outstanding shares.
- 4) Leverage, measured using the Debt to Equity Ratio (DER).

**Table 2:** Dummy Value of Environmental Performance Variables

Companies possessing ISO 14001 certification	Companies possessing ISO 14001 certification
Variable Value = 1	Variable Value = 0

**Table 3:** Results of Research Sample Selection

Information	2014	2015	2016	2017	2018
Companies receiving awards in ISRA from 2014 to 2018.	35	37	50	36	56
Companies not listed on the IDX yet receiving awards in ISRA.	(18)	(18)	(35)	(21)	(39)
Companies listed on the IDX after January 2014 and no longer listed on the IDX before December 2018.	(0)	(0)	(0)	(1)	(0)
Companies not publishing complete financial, annual, or sustainability reports within the period of 2014 to 2018.	(0)	(0)	(0)	(0)	(0)
Companies explicitly not disclosing their carbon-emissions.	(0)	(0)	(0)	(0)	(0)
Total Samples	17	19	15	14	17

Sources: [www.ncsr-id.org](http://www.ncsr-id.org) and [www.idx.co.id](http://www.idx.co.id)

### **3.3. Regression Analysis Model**

To determine the effect of carbon emission disclosure on firm value and the effect of environmental performance and industrial type as the moderating variables, a multiple linear regression analysis was performed. The multiple linear regression analysis model used was as follows:

$$\begin{aligned} \text{Firm Value} = & \alpha + \beta_1 \text{Carbon Emissions Disclosure} \\ & + \beta_2 \text{Environmental Performance} \\ & + \beta_3 \text{Industrial type} + \beta_1 \text{Carbon Emission} \\ & \text{Disclosure} * \beta_2 \text{Environmental Performance} \\ & + \beta_1 \text{Carbon Emission Disclosure} * \beta_3 \text{Industrial} \\ & \text{type} + \beta_4 \text{Profitability} + \beta_5 \text{Company Size} \\ & + \beta_6 \text{Institutional Ownership} + \beta_7 \text{Leverage} + e \end{aligned}$$

## **4. Empirical Results**

### **4.1. Sample Results**

Based on the results of sample selection criteria, 82 research samples were obtained with the following details:

### **4.2. Statistical Results**

The results of multiple linear regression tests were as follows:

The multiple linear regression test results showed that carbon emission disclosure had a positive and significant effect on firm value. Thus, the second hypothesis was supported. Since the value of carbon emission disclosure variable had a positive *t* value of 2.375, it means that carbon emission disclosure had a positive effect on firm value with a significance value of 0.021.

Since the carbon emission disclosure variable had a significant effect with the value of less than 0.05, the first hypothesis was supported. The test results also showed that the initial coefficient of carbon emission disclosure before moderated was 0.173.

The regression test results showed that environmental performance could strengthen the influence relationship of carbon emission disclosure on firm value. Thus, the second hypothesis was supported. Since the value of carbon emission disclosure variable multiplied by the environmental performance variable had a positive *t* value of 3.206, it means that environmental performance had a positive effect with a significance value of 0.003. It means that environmental performance had a significant effect as the value was less than 0.05.

The test results showed that the coefficient value of carbon emission disclosure variable after being moderated with the environmental performance variable had a coefficient value of 0.326, while that of carbon emission disclosure in the first regression model was only 0.173. The increasing coefficient value of carbon emission disclosure variable by 0.153 after moderated by environmental performance variable indicated a reinforcing influence.

The regression test results above showed that the industrial type could strengthen the influence relationship of carbon emission disclosure on firm value. Thus, the third hypothesis was supported. Since the value of carbon emission disclosure variable multiplied by the industry type variable had a positive *t* value of 3.369, it means that industrial type had a positive effect with a significance value of 0.002.

It also means that industrial type had a significant effect as the value was less than 0.05.

The table above also shows the coefficient of carbon emissions disclosure variable after being moderated with the industry type has a coefficient value of 0,263, while the initial coefficient of carbon emissions disclosure variable before being moderated is 0,173. Therefore, there is an increase in the coefficient value by 0.09. The increase in the coefficient value indicates that the moderating variable can strengthen the relationship between carbon emissions disclosure and firm value.

### 4.3. Result and Discussion

#### 1) The Effect of Carbon Emission- Disclosure on Firm Value.

The multiple linear regression test results showed that carbon emission disclosure positively and significantly affected firm value. It shows that the more the company discloses its carbon emissions, the more the company value will increase. The results of this study were in line with research conducted by Anggraeni (2015) showing that the greenhouse gas emission disclosure had a positive and significant effect on firm value. The carbon emission disclosure included the disclosure of plans to reduce carbon emissions by comparing the annually produced amount of carbon emissions and enabled the companies supported by the stakeholders. As a result, investors will not hesitate to make investments in the related companies.

**Table 4:** First Multiple Linear Regression Test

Model	Coefficients <sup>a</sup>			T	Sig.
	Unstandardized Coefficients		Stand. Coeff.		
	B	Std. Error	Beta		
(Constant)	17.718	5.711		3.102	.003
Carbon Emission Disclosure	.173	.073	.189	2.375	.021
Environmental Performance	-.125	.082	-.124	-1.525	.133
Industrial type	-.279	.092	-.278	-3.045	.004
Profitability	.455	.067	.811	6.785	.000
Leverage	-.096	.055	-.223	-1.734	.089
Company Size	-4.761	1.634	-.252	-2.914	.005
Institutional Own.	-.552	.231	-.172	-2.390	.020

a. Dependent Variable: Firm Value

**Table 5:** Second Multiple Linear Regression Test

Model	Coefficients <sup>a</sup>			T	Sig.
	Unstandardized Coefficients		Std. Coeff.		
	B	Std. Error	Beta		
(Constant)	29.833	8.170		3.652	.001
Carbon E.D. * Environmental P.	.326	.102	.429	3.206	.003
Profitability	.395	.100	.535	3.939	.001
Leverage	.023	.103	.036	.224	.825
Company Size	-8.600	2.402	-.429	-3.580	.001
Institutional Own.	-1.849	.756	-.339	-2.448	.021

a. Dependent Variable: Firm Value

**Table 6:** Third Multiple Linear Regression Test

Model	Coefficients <sup>a</sup>			T	Sig.
	Unstandardized Coefficients		Std. Coeff.		
	B	Std. Error	Beta		
(Constant)	13.952	8.912		1.565	.130
Carbon E.D. * Industrial type	.263	.078	.318	3.369	.002
Profitability	.481	.064	.652	7.532	.000
Leverage	-.066	.080	-.095	-.822	.418
Company Size	-3.906	2.655	-.178	-1.471	.153
Institutional Own.	-1.654	.697	-.318	-2.374	.025

a. Dependent Variable: Firm Value

Choi et al. (2013) explained that community environment, business environment, and government have continuously pressured the companies to respond to the threats of environmental damages caused by the greenhouse gas emission stored in the earth atmosphere, causing extreme global warming. The companies can respond to this pressure by disclosing their carbon emissions. Carbon emission disclosure will be assessed by the stakeholders as a tangible form of corporate concern to the environment and a form of corporate responsibility to the society and environment. This is in line with the legitimacy theory explaining that the purpose of companies to disclose their carbon emissions is to get their legitimacy from the stakeholders. Machmuddah et al. (2020) also stated that corporate social responsibility disclosure had a positive and significant effect on firm value, while profitability moderated the effect of corporate social responsibility disclosure on firm value. Lee (2014) indicated that both information communication technology and product distribution sectors have played an important role in fostering the environmental and economic sustainability both within their sectors and overall economy of South Korea and at the same time acted as an important contributor to the green economic growth.

The legitimacy obtained by a company is also part of the company's efforts to collaborate three basic pillars in the business world, namely profit, planet, and people. At present, the company's survival is determined by the company's ability to manage its economic, social, and environmental performance (Juniarti & Sentosa, 2009). Carbon emission disclosure in Indonesia is still limited to voluntary disclosure.

Thus, this disclosure has become the investors' concern due to the signaling theory. Carbon emission disclosure can be good news for investors as the company has voluntarily provided the information required by the investors. They assumed that the companies which disclose their carbon emissions had the commitment to reduce the impact of environmental damages resulted from their operational activities. Therefore, investors will be more interested in investing in companies. Carbon emission disclosure is a form of corporate concern for environmental sustainability and also becomes a key for the company's sustainability. The efforts made by the company in terms of company sustainability will certainly be supported by the stakeholders to guarantee the company businesses' sustainability. The SRI-KEHATI index in 2013 showed that the 25 companies disclosing their carbon emissions had a share value of 10% greater than the others which did not disclose their carbon emissions. It shows that the market positively respond to the company's environmental responsibility.

## ***2) The Influence of Environmental Performance in Moderating the Effect Relationship of of Carbon Emission Disclosure on Firm Value.***

The effect of environmental performance as a moderating variable in the multiple linear regression test showed that environmental performance could strengthen the effect relationship of carbon emission disclosure on firm value. It showed that the companies disclosing carbon emission and possessing the ISO 14001 certification could further enhance the company value. The results of this study were in line with those obtained by Auliya (2018) showing that environmental performance had a positive and significant effect on firm value. The environmental performance showed the company's commitment in building a good environmental management system.

The company's efforts will be certainly supported by the stakeholders. Thus, the investors will be interested in making investment in the related company. The environmental performance assessed based on the certification ownership of ISO 14001 can show that the company's environmental performance is considered good. The ISO 14001 is an internationally recognized standard which regulates the environmental management systems. The company will strive to well build its environmental performance by adopting the ISO 14001. This effort is also an effort made by the companies to respond to pressure given by the stakeholders to reduce the impact of environmental damages resulted from their operational activities.

The legitimacy theory explains that the certification ownership of ISO 14001 is intended to obtain the stakeholders' legitimacy for the existence of the company. The certification ownership of ISO 14001 shows the company's commitment



to sustainably improve its environmental performance. Based on the signaling theory, the certification ownership of ISO 14001 can be a positive information signal perceived by the stakeholders. The ISO 14001 certification is also a company's efforts to improve or enhance its image perceived by the stakeholders and then consider that the related company has paid more attention to the environment.

The process to obtain the ISO 14001 certification is by submitting an application for the ISO 14001 certification to an independent certification assessor authorized to provide the ISO 14001 certification. After the company obtains the ISO 14001 certification, the regular audits will be conducted by the assessor every 6 months. A periodic audit is conducted to ensure the compliance of environmental management system maintenance required by the ISO 14001. This will be perceived by the investors that the information on the certification ownership of ISO 14001 as credible information. As a result, the investors are interested in making investments to the related companies. Thus, environmental performance can strengthen the effect relationship of carbon emission disclosure on firm value.

### ***3) The Effect of Industrial Types in Moderating the Effect Relationship of Carbon Emission Disclosure on Firm Value.***

The multiple linear regression test results showed that industrial type as a moderating variable can strengthen the effect relationship of carbon emission disclosure on firm value. It shows that the companies categorized into high profile industry and implementing carbon emissions disclosure could further increase the company value. The results of this study were in line with those obtained by Simanullang (2018) showing that industrial type had a positive and significant effect on firm value. This is because the companies categorized into high profile industry mainly contributed to the environmental damages. Thus, the companies were pressured by the stakeholders to pay more attention to the environment. The efforts were made by the companies in response to these pressures through carbon emission disclosure.

The companies categorized into high profile industry mainly contributing to the environmental damages make them receive an unfavorable image perceived by the public. Based on the legitimacy theory the companies disclosed their carbon emissions to obtain legitimacy from the stakeholders and improve their image. As a result, the investors were interested in making investments to the related companies after considering that the related companies categorized into high profile industry have tried to change their negative image by disclosing their carbon emissions. It means that the related companies well responded to the pressures given to reduce the impact of environmental damages.

The data released by BP REDD showed that approximately 40% of total carbon emissions in Indonesia were caused by the company activities categorized into high profile industry, namely energy, transportation, food and beverage, and agriculture which were highly pressured by the stakeholders compared to those categorized into low profile industry. Thus, the companies are required to take actions in reducing the impact of environmental damages caused by their activities to avoid lawsuits. The companies prosecuted for damaging the environment and considered guilty by the court will be certainly given sanctions possibly in the form of fines paid by the related companies and, in larger amount, can then affect the companies' financial stability. In addition, the sanctions can be in the form of obligation to pay the fines, or even the revocation of business licenses. The companies must seriously pay more attention to the environment to avoid lawsuits. Based on the signaling theory, the company's efforts to pay more attention to the environment by disclosing the carbon emissions can be good news perceived by the investors making investments in the related companies since considering that those companies are safe to make their investments. This effort is also considered as one guarantee related to the company's business sustainability. Thus, the industrial type can strengthen the effect relationship of carbon emission disclosure on firm value.

## **5. Conclusion**

This research aims to examine whether carbon emission disclosure has a positive and significant effect on firm value as well as to reveal environmental performance and industrial type as the moderating variables. This research has drawn some conclusions. First, carbon emission disclosure has a positive and significant effect on firm value. Based on the signaling theory, information related to environment disclosed by the company, especially regarding carbon emission disclosure, will be perceived by the investors as a good news. Second, environmental performance can strengthen the influence relationship of carbon emission disclosure on firm value. Based on stakeholder theory, the company should not only stand for its own interests but also meet the stakeholders' interests. Good environmental performance seen from the certification ownership of ISO 14001 will be good news for stakeholders including investors interested in investing their capital in the related company. Third, industrial type strengthens the influence relationship of carbon emission disclosure on firm value as the companies categorized into high profile industry are demanded by the stakeholders to reduce the impact of environmental damage caused by their operational activities. The companies paying more attention to the environment will make investors more interested in investing their fund in those categorized into high profile industry.

This study has some limitations as only based on the triple bottom line theory. This study only focuses on the influence of determinants (independent, moderating, and control variables) on firm value. Meanwhile, the firm value only focuses on financial side (profit) without accommodating two basic pillars namely environment (planet), and society (people). This study suggests Suggestions for the further study to change the environmental performance measurement indicators to expand the research samples without including the ISO 14001 ownership to possibly measure the environmental performance. In addition, further study can use the GRI index as a basis for assessing the environmental performance. The next researchers can also add the other dependent variables not only to examine the firm value focusing on the financial side but also add the other dependent variables to accommodate the environment and society.

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