Online ISSN 2233-5382
JIDB website: http://www.jidb.or.kr
doi:http://dx.doi.org/10.13106/jidb.2021.vol12.no11.9

Environmental Performance, Carbon Emission Disclosure, and Carbon Emission Intensity on Cost of Equity Capital: An Empirical Study in Indonesia

Octa MARSELITA[1], Lindrianasari[2], Liza ALVIA[3], Einde EVANA[4]

Received: July 24, 2021. Revised: October 30, 2021. Accepted: November 05, 2021.

Abstract

Purpose: Carbon emissions have now become a major concern around the world, especially for the government and private sector. Unfortunately, in Indonesia, disclosure related to company carbon emissions is still done voluntarily. This research aims to provide empirical evidence on the effect of environmental performance, carbon emission disclosure, and carbon emission intensity on the cost of equity capital. **Research design, data, and methodology:** This research uses secondary data with a sample consisting of Indonesia companies that are sensitive to the environment and listed on the Indonesia Stock Exchange in 2017-2019. The analytical tool used in this research was multiple regression models. **Result:** The study found a carbon emission disclosure had a significant positive effect on the cost of equity capital. Carbon emission intensity and company size had a significant negative effect on the cost of equity capital. Meanwhile, environmental performance did not have a significant effect on the cost of equity capital. **Conclusion:** Therefore, the results of this research are expected to provide feedback to the company's stakeholders that environmental performance and carbon emissions are some of the points seen by investors in making investment decisions.

Keywords: Carbon Emission Disclosure, Carbon Emission Intensity, Environmental Performance, Cost of Equity Capital

JEL Classification Code: G32, G53, Q56

1. Introduction

The growth of companies engaged in industry in Indonesia has increased dramatically in recent years. Based on the 2019 industrial development analysis report published by the Ministry of Industry of the Republic of Indonesia, it can be concluded that the industry in Indonesia has increased every year. This is undoubtedly a good thing for the Indonesian economy because the higher the industrial growth, the higher the state income. But on the other hand, the company's activities in providing these goods and services harm the quality of the surrounding environment. This negative impact on the quality of the environment is one of the concerns of the community. This is evidenced by the increase in public complaints regarding environmental pollution. The Ministry of Environment and Forestry in 2020 reported that during 2015-2019, the ministry had received 4,103 complaints where the number of complaints increased from year to

1 First Author and Corresponding Author. Bachelor Student, Accounting Department, Faculty of Economics and Business, Lampung University, Lampung, Indonesia. Email: octamarselita24@gmail.com
2 Lecturer, Accounting Department, Faculty of Economics and Business, Lampung University, Lampung, Indonesia. Email: lindrianasari@feb.unila.ac.id
3 Lecturer, Accounting Department, Faculty of Economics and Business, Lampung University, Lampung, Indonesia. Email: lizaalvia.alvi@gmail.com
4 Lecturer, Accounting Department at the Faculty of Economics and Business, Lampung University, Lampung, Indonesia. Email: eindeevana@yahoo.co.id

year (Firdausya, 2020). The representative of Green Building Low Carbon Eco District-French Agency Environment and Energy Management Matthieu Caille, in an international seminar on Low Carbon Eco District in Indonesia, said that Indonesia is the fourth most populous country that produces the largest greenhouse gas emissions in the world in 2019 (www.radarjogja.jawapos.com accessed on July 5, 2020). Greenhouse gases are gases present in the atmosphere which can have a greenhouse effect. One of the types of greenhouse gases is carbon dioxide. Carbon dioxide is the second-largest gas in greenhouse gases. Based on Institute for Essential Service Reform (IESR) in 2018, carbon dioxide emissions increase from year to year, primarily due to energy from various sectors. One of the most significant contributors to carbon dioxide emissions from energy use is the industrial sector, as attached in the Institute for Essential Service Reform (IESR) in 2018 related to increasing CO_2 emissions from Energy Use. Increasing carbon dioxide emissions will have an impact on climate change. Climate change is one of the many natural phenomena that humans can feel directly, one of which is through an increase in the earth's temperature, which can be said to be quite extreme. This increase in earth temperature occurs as a result of the effect of increasing carbon dioxide concentrations.

Climate change has become a vital phenomenon by international organizations, namely the United Nations (UN). The UN has the United Nations Framework Convention on Climate Change (UNFCCC), a global environmental agreement signed by 196 countries to stabilize greenhouse gas concentrations. The UNFCCC is the master agreement of the 1997 Kyoto Protocol and the 2015 Paris Agreement. The Kyoto Protocol emerged at the time of the Climate Change Convention III. However, in 2015 the earth's temperature increased by 1.5° to 2° Celsius compared to pre-industrial times. This increased public concern so that at the 21st Conference of the Party (COP) in December 2015, the Paris Agreement was formed which was approved by 195 member countries of the United Nations Framework Convention on Climate Change (UNFCCC). This Paris Agreement was created as a substitute for the Kyoto Protocol in a joint agreement to tackle climate change and carry out low carbon development.

In Indonesia, the government's efforts to reduce carbon emissions are carried out by regulating the use of greenhouse gas emissions through Presidential Decree No. 61 of 2011 concerning the National Action Plan for Reducing Greenhouse Gas Emissions and Presidential Decree No. 71 of 2011 concerning the implementation of a national greenhouse gas inventory. In Presidential Decree No. 61 of 2011, Article 4 states that business actors also take part to reduce greenhouse gas emissions. The company's efforts to reduce greenhouse gas emissions (including carbon emissions) on the operations carried out by the company as a business actor can be seen from the carbon emission disclosures reported by the company in its financial statements. The government's efforts to increase sustainable disclosure by these companies can be seen with the issuance of Financial Service Authority (OJK) Regulation No.51/POJK.03/2017 concerning the Implementation of Sustainable Finance. With this OJK regulation, the government hopes that this regulation can support financial service institutions, issuers, and public companies in improving social and environmental performance in Indonesia.

Business actors have an essential role and responsibility in the government's efforts to reduce carbon emissions. One form of responsibility that a company can undertake in reducing carbon emissions from carbon emissions produced by the company in its production activities is by carrying out carbon emission disclosures. In Indonesia, disclosure of carbon emissions is still voluntary disclosure. However, in Asmaranti & Lindrianasari's (2014) research, only about 10.1 per cent of the companies sampled disclosed their actions in reducing carbon emissions. This means that the awareness of companies in Indonesia in reducing carbon emissions is still relatively low.

The losses caused by carbon emissions are referred to as carbon risks. Six types of carbon risk have been grouped by the IPCC (2007), namely physical risk, regulatory risk, litigation risk, competition risk, production risk, and reputation risk. This carbon risk will increase the risk of the company as a whole so that it will have an impact on the cost of equity capital of a company (Kim, An, & Kim, 2015). This means that investors will require a higher rate of return on their investment from companies (Bui, Moses, & Houqe, 2019). Higher carbon emissions will cause investors to assume a higher risk for the funds they invest in the company.

Several researchers have conducted research related to the effect of environmental performance on the cost of equity capital, disclosure of carbon emissions on the cost of equity capital, and intensity of carbon emissions on the cost of equity capital. Ng & Rezaee (2015) and (Haninun, Lindrianasari, Sarumpaet, & Komalasari, 2019) conducted research related to the effect of environmental performance on the cost of equity capital. In his study, it is concluded that sustainable environmental performance has a negative impact on the cost of equity capital. However, different results were found in Ok & Kim's (2019) research, which concluded that environmental management does not affect the cost of equity.

Lemma, Feedman, Mlilo, & Park (2018) conducted research related to the effect of carbon disclosure on the cost of equity capital. In his study, it was concluded that carbon disclosure had a negative effect on the cost of capital. The results of this research are supported in the research of Bui, Moses, & Houqe (2019), Haninun, Lindrianasari, Sarumpaet, & Komalasari (2019), and Fonseka, Rajapakse, & Tian (2019), who concluded that carbon disclosure has a negative effect on the cost of capital.

Furthermore, Kim, An, & Kim (2015) conducted research related to the effect of carbon risk proxied by carbon intensity on the cost of equity capital in Korean companies listed on the Korean Stock Exchange (KOSPI or KOSDAQ). In their research, Kim, An, & Kim (2015)

concluded that there is a positive relationship between carbon intensity and the cost of equity capital. The same results were also found in the research of Bui, Moses, & Houqe (2019) and Trinks, Mulder, & Scholtens (2017), who concluded that carbon intensity positively affects the cost of equity capital.

Based on previous research, this research aims to provide empirical evidence of the effect of environmental performance, carbon emission disclosure, and carbon emission intensity on the cost of equity capital. Based on the research objectives, there are three significant contributions to this research. First, theoretical benefits, the results of this research are to enrich literature and knowledge. Second, empirical benefits, this research is to test the analysis of the relationship between environmental performance, carbon emission disclosure, and carbon emission intensity on the cost of equity capital in companies in Indonesia that are sensitive to the environment. Finally, practical benefits, this research can provide empirical evidence regarding the effect of environmental performance, carbon emission disclosure, and carbon emission intensity on the cost of equity capital so that companies can consider improving their operational performance, which is expected to have negative impacts on the environment. Besides, the results of this research are also helpful for the government in making regulations related to environmental performance.

2. Literature Review

2.1. Legitimacy Theory

Dowling and Pfeffer (1975) stated that legitimacy theory is a theory that illustrates the difference between the values adopted by the company and the values that prevail in society so that the company will be in a position of threat if it is in these differences. This difference is known as the Legitimacy gap. Legitimacy gaps will arise if the company is not sensitive to the impact from company activities and community expectations of the company and is only oriented towards generating maximum profit (O'Donovan, 2002). In the theory of legitimacy, it is stated that an organization will continuously seek ways to ensure that the organization's operations are within the limits and norms prevailing in society (Deegan, 2004). According to Hollindale, Kent, Routledge, & Chapple (2019), in the perspective of legitimacy theory, a company can improve its reputation by providing broad information about its social and environmental practices. Disclosure of an organization's environmental information is one way to show its performance to the public. The organization will get a good image in the eyes of stakeholders with this disclosure, so companies tend to conduct environmental-based performance and disclose environmental information to justify and legitimize company performance in the community's eyes.

2.2. Stakeholder Theory

Stakeholder theory is closely related to legitimacy theory. According to (Gray, Kouhy, & Lavers, 1995), stakeholder theory is a theory that explains the company's relationship with its stakeholders such as shareholders, government, society and other parties. Stakeholder theory says that a company is not an entity that only operates for its interests but must benefit its stakeholders (Gray, Kouhy, & Lavers, 1995). (Gray, Kouhy, & Lavers, 1995) states that the company's survival depends on stakeholder support and that support must be sought so that the company's activity is to seek that support. One way to seek support from these stakeholders is by disclosing environmental performance information. The disclosure of environmental performance information can prove to the public about the company's concern in protecting its environment so that this will provide a good image for the company.

2.3. Hypothesis Development

2.3.1. Environmental Performance and Cost of Equity Capital

Based on the theory of legitimacy, companies need to improve their performance to legitimize society. Meanwhile, according to stakeholder theory, a company must consider its stakeholders in carrying out its operations. The company's operational activities will indirectly impact the surrounding environment, affecting the level of risk to the company. The good environmental performance will reduce the risk of a company, so that it will reduce the cost of equity of a company.

Ng and Rezaee (2015) conducted research related to the effect of environmental performance on the cost of equity capital. In his research, it is concluded that sustainable environmental performance has a negative effect on the cost of equity capital. This is supported by research conducted by Haninun, Lindrianasari, Sarumpaet, & Komalasari (2019), who also concluded that environmental performance has a negative effect on the cost of equity capital in companies listed on the Indonesia Stock Exchange (IDX).

H1: Environmental performance has a negative effect on the cost of equity capital.

2.3.2. Carbon Emission Disclosure and Cost of Equity Capital

Based on the theory of legitimacy, the company will get a good image in the eyes of stakeholders by disclosing its performance. Disclosure of environmental information is one of the company's efforts to justify and legitimize its performance in the public's eyes. Besides, based on stakeholder theory, disclosure of environmental performance information can prove to the public about the company's concern in protecting its environment to provide a good image for the company. The extent of carbon emission disclosure will prove the good environmental performance of a company. With this disclosure, investors will not demand a high rate of return from the company.

Several researchers have conducted research related to the relationship of carbon disclosure to the cost of equity capital. In their research, Bui, Moses, & Houqe (2019), in their research concluded that carbon emission disclosure has a negative effect on the cost of capital. The results of this research are also supported in the research by Haninun, Lindrianasari, Sarumpaet, & Komalasari (2019), Fonseka, Rajapakse, & Tian (2019), and Lemma, Feedman, Mlilo, & Park (2018), who concluded that carbon emission disclosure has a negative effect on the cost of capital.

H2: Carbon emission disclosure has a negative effect on the cost of equity capital.

2.3.3. Carbon Emission Intensity and Cost of Equity Capital

Based on the stakeholder theory and legitimacy theory, the continuity of operations of a company depends on stakeholders' support. Generally, every company looks for help from stakeholders to justify and obtain the legitimacy of the operations carried out by the company.

The carbon emission intensity will affect the level of carbon risk. The higher the carbon emission intensity, the higher the carbon risk borne by the company. The existence of this carbon risk will increase the company's risk as a whole so that it will influence stakeholder support for the company. This will cause the cost of equity capital of the company to be higher because investors will require a high rate of return on the risk of their investment in the company.

Several researchers have conducted research related to the relationship between carbon emission intensity and the cost of equity capital. Kim, An, & Kim (2015) conducted a research related to the effect of carbon risk proxied by carbon intensity on the cost of equity capital in Korean companies listed on the Korean Stock Exchange (KOSPI or KOSDAQ). In their research, Kim, An, & Kim (2015) concluded that there is a positive relationship between carbon intensity and the cost of equity capital. This result is also supported in the research of Trinks, Mulder, & Scholtens (2017) and Bui, Moses, & Houqe (2019), who concluded that carbon emission intensity has a positive effect on the cost of equity capital.

H3: Carbon emission intensity has a positive effect on the cost of equity capital.

3. Methodology

3.1. Methods of Data Collection

This research uses secondary data obtained from various sources. The data is obtained from annual reports and sustainability reports published by the company. In collecting data, researchers used documentation techniques by viewing, studying, and citing records obtained from annual reports and sustainability reports.

3.2. Sampling

The sample in this research is determined using a purposive sampling method, namely companies in Indonesia that are sensitive to the environment and listed on the Indonesian stock exchange in 2017-2019. From the total companies in Indonesia that are sensitive to the environment, 12 companies in 2017, 16 companies in 2018, and 14 companies in 2019 were selected to be sampled in this research.

3.3. Measurement Variable

3.3.1. Cost of Equity Capital

The dependent variable in this research is the cost of equity capital. The cost of equity capital is an expense incurred by companies that raise funds by selling common stock or using retained earnings for investment. The cost of equity capital in this research is measured by Price Earning Growth (PEGr). PEGr, in this research uses the formula from Lynch (1989) in his book entitled One Up on Wall Street. The formula used to calculate the PEG:

$$\text{PEGr} = \frac{P/E\ ratio}{EPS\ Growth}$$

Description:

P/E ratio: The ratio that can be measured by dividing the share price for the nth year closing against EPSn.

EPS Growth: EPS growth can be measured by the difference between EPSn and EPSn-1 divided by EPSn-1.

3.3.2. Environmental Performance

Environmental performance is the result of the company's efforts in managing the environment as a form of the company's awareness for stakeholders and the surrounding community (Haninun, Lindrianasari, Sarumpaet, & Komalasari, 2019). Environmental performance is a dummy variable measured by ISO 14001 certification. A company has a value of 1 if it has ISO 14001 certification and a value of 0 if it does not have ISO 14001 certification.

3.3.3. Carbon Emission Disclosure

Carbon emissions disclosure is measured using the content analysis method. This method is used by analyzing the company's annual report and sustainability report to find out how extensive the carbon emissions disclosure in the report is. The extent of carbon emissions disclosure refers to the index developed by Choi, Lee, & Psaros (2013) modified by adding carbon emission disclosure items OJK Regulation No.51/PJOK.03/2017. The formula used to calculate the carbon emission disclosure:

$$\text{CED} = \frac{\sum CEDi}{MCED}$$

Description:

CED : Carbon Emissions Disclosure

∑CEDi : The total score of the carbon emission disclosure items disclosed by the

company

MCED : The total item score for disclosing carbon emissions when the company discloses the full item according to the index developed by Choi, Lee, & Psaros (2013) and OJK Regulation No.51/POJK.03/2017. The total score for the item is 21 items.

3.3.4. Carbon Emission Intensity

Carbon emissions are the amount of carbon dioxide emissions produced by companies to organize events or make products. Based on the Global Reporting Initiative standard (2016), Carbon Emission Intensity can be measured by dividing total carbon emissions by organizational metrics. In this research, the organizational metric is used as production volume. The formula used to calculate the carbon emission intensity:

$$\text{CEI} = \frac{Total\ of\ Carbon\ Emission}{Production\ Volume}$$

3.3.5. Firm Size as a Control Variable

The control variable in this research is firm size. Control variables are used to eliminate the influence of a variable on the research to be tested so that the test results for the effect of the independent and dependent variables will be more accurate. The company's size reflects the ability to provide the amount and variety of production capacity of a company's goods or services. The size of the company will affect the size of the cost of a company. The larger the company size, the smaller the cost of equity capital incurred by the company. Research by Houqe, Ahmed, & Zijl (2017) and Mulyati (2017) shows that company size has a significant negative effect on the cost of capital. The formula used to calculate the firm size:

Size = Ln Total Aset

4. Findings

4.1. Descriptive Statistical Analysis

Descriptive statistical analysis is used to provide an overview or description of the variables consisting of: Cost of Equity Capital (COEC), Environmental Performance (Envi_Prfm), Carbon Emission Disclosure (CED), Carbon Emission Intensity (CEI), and Firm Size (Size). This research uses 42 samples from companies in Indonesia that are sensitive to the environment and listed on the Indonesia Stock Exchange (IDX) in 2017-2019. A descriptive statistical analysis was carried out from these samples, which is presented in detail in table 1 as follows.

Based on table 1, it can be seen that the minimum, maximum, average, and standard deviation values of each variable in all samples studied in 2017-2019. This table is used to assist in identifying the size of the deviation of each variable that affects one another.

4.2. Classic Assumption Test

The classical assumption test consists of the normality test, multicollinearity test, autocorrelation test, and heteroscedasticity test. The test that was first performed in this research was the normality test. Based on the results of the tests carried out in this research, it can be concluded that the regression model to be studied has been normally distributed. This is because the significance value of the Kolmogorov Smirnov test results is 0.185, which means that the significance value is greater than the alpha value of 0.05 so that the regression model can be concluded with a normal distribution. This regression model also does not experience multicollinearity, autocorrelation, and heteroscedasticity problems. This is because the tolerance value of each independent variable is greater than 0.01, and the VIF value of each independent variable is less than 10 so that in the regression model, it can be concluded that there is no multicollinearity problem. The Durbin Watson value (dW) also from the results of this research is between the upper limit (dU) and 4-dU, or in other words it is in an area where there are no autocorrelation problems. In addition, the significance value of each independent variable from the heteroscedasticity test in this research is greater than its alpha value, namely 0.05, so that the regression model can be concluded that there is no heteroscedasticity problem.

Table 1: Result of Descriptive Statistical Analysis

	Minimum	Maximum	Average	Std. Deviation
COEC	0.00002	2.87754	0.7267714	0.74213358
Envi_Prfm	0	1	0,81	0.397
CED	0.09524	0.95238	0.6791379	0.18549174
CEI	0.00007	2.13000	0.4522651	0.47131114
Size	25	33	30.60	1.594

Table 2: Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		42
Normal Parameters,b	Mean	0,0000000
	Std. Deviation	0,61576933
Most Extreme Differences	Absolute	0,115
	Positive	0,115
	Negative	-0,096

Test Statistic	0,115
Asymp. Sig. (2-tailed)	0,185[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Table 3: Model Regression Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0,558[a]	0,312	0,237	0,64820014	2,154

a. Predictors: (Constant), Size, Envi_Prfm, CED, CEI
b. Dependent Variable: COEC

Table 4: Hypothesis Test Result

Model		Multicollinearity		Heteroscedasticity	Unstandardized	Sig.
		Tolerance	VIF		B	
1	(Constant)				4.903	0.023
	Envi_Prfm	0.975	1.025	0.729	0.342	0.193
	CED	0.956	1.046	0.951	-0.992	0.084
	CEI	0.939	1.064	0.114	0.680	0.004
	Size	0.981	1.020	0.372	-0.134	0.044

a. Dependent Variable: COEC

5. Discussion

5.1. Environmental Performance and Cost of Equity Capital (H1)

Based on the first hypothesis statistical testing results, it is shown that environmental performance has no significant effect on the cost of equity capital with a significance value of 0.193 (larger than α = 0.05). This means that statistically, there is no significant difference between the influence of companies that have ISO 14001 certification and companies that do not have ISO 14001 certification on the cost of equity capital. From the results of these observations, it can be seen that investors will not necessarily demand a high rate of return from the company if the company does not have ISO 14001. The results of this research do not support the legitimacy theory and stakeholder theory which states that the company will get legitimacy and support from stakeholders if it has an excellent environmental performance. One of the reasons for the unsupported effect of environmental performance on the cost of equity capital is that the sample of companies used in this research is very small, namely only 3.73 per cent of the total companies in Indonesia that are sensitive to the environment and listed on the Indonesia Stock Exchange in 2017-2019 where the majority of companies sampled from this research already have ISO 14001, so this causes the hypothesis not to be supported. Besides that, according to Haninun, Lindrianasari, Sarumpaet, & Komalasari (2019), investors will pay attention to other more dominant factors, such as business developments that can be seen from other factors performances such as financial performance. This means that in making investment decisions, investors do not only focus on environmental performance. The results of this research are in line with Ok and Kim's (2019) research, which concluded that environmental management does not affect the cost of equity capital. This reinforces the results of testing the hypothesis that environmental performance has a significant negative effect on the cost of equity capital is rejected.

5.2. Carbon Emission Disclosure and Cost of Equity Capital (H2)

Based on the second hypothesis statistical test results, it is shown that the carbon emission disclosure has a β of -0.992 and a significance value of 0.084 (larger than α = 0.05). This indicates that the variable carbon emission disclosure has a negative but insignificant effect on the cost of equity capital. However, if this research uses α = 0.1, the carbon emission disclosure has a significant negative effect. The results of this test support the legitimacy and stakeholder theory which explains that the company will get a good image in the eyes of stakeholders by disclosing its performance. The results of this research are in line with research by Lemma, Feedman, Mlilo, & Park (2018), Bui, Moses, & Houqe (2019), Haninun, Lindrianasari, Sarumpaet, & Komalasari (2019), and Fonseka, Rajapakse, & Tian (2019) who concluded that carbon emission disclosure has a negative effect on the cost of equity capital. Based on these results, the hypothesis that carbon emission disclosure has a significant negative effect on the cost of equity capital is accepted.

5.3. Carbon Emission Intensity and Cost of Equity Capital (H3)

Based on the results of the third hypothesis statistical test, it is shown that the disclosure of carbon emissions has a β of 0.680 and a significance value of 0.004 (smaller than α = 0.05). This indicates that the variable carbon emission intensity has a positive and significant

effect on the cost of equity capital. This result favours the legitimacy theory and stakeholder theory, which states that the continuity of the operations of a company has the support of stakeholders so that generally, every company looks for support from stakeholders whose one wishes to reduce its carbon emissions. The results of this research are in line with the results of study by Kim, An, & Kim (2015), Trinks, Mulder, & Scholtens (2017), and Bui, Moses, & Houqe (2019), who concluded that there is a positive relationship between carbon emissions intensity and the cost of equity capital. Based on these results, carbon emission intensity positively affects the cost of equity capital is accepted.

5.4. Firm Size and Cost of Equity Capital

Based on the results of statistical testing on the control variables in this research, it is shown that firm size has a β of -0.134 and a significance value of 0.044 (smaller than α = 0.05). This indicates that the firm size variable has a negative and significant effect on the cost of equity capital. This means that the larger the firm size, the smaller the level of progress expected by investors. This is because large companies with higher agency costs will tend to disclose higher information. Reducing the information asymmetry of these large companies will have an impact on reducing the cost of equity capital (Diamond and Verrecchia, 1991). These results are in line with the research results by Houqe, Ahmed, & Zijl (2017) and Mulyati (2017), which show that companies have a significant negative effect on the cost of equity capital.

6. Conclusion

This research aims to provide empirical evidence of the effect of environmental performance, carbon emission disclosure, carbon emission intensity, and company size as control variables on the cost of equity capital in companies in Indonesia that are environmentally sensitive and listed on the Indonesia Stock Exchange (IDX) in 2017— 2019. Based on the results of research that has been done, this research can be concluded: 1) environmental performance has no significant effect on the cost of equity capital; 2) carbon emission disclosure has a significant negative effect on the cost of equity capital; 3) the carbon emission intensity has a significant positive effect on the cost of equity capital.

6.1. Limitation of the Research

This research has several limitations in the research process. One of them is that this research uses a very small sample. This is because very few companies disclose the intensity of their carbon emissions in their annual reports, thus allowing for less influential research results. Besides, the sample used in this research does not belong to one industry, so that it has different patterns of annual report disclosure.

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