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The Influence of Board of Directors Diversity on Carbon Emission Disclosure

Sutri Handayani[1], Djoko Suhardjanto[2], E. Muhtar[3], Setianingtyas Honggowati[4], Kusumaningdiah Retno Setiorini[5]*

Abstract

The purpose of this research is to investigate the impact of gender diversity and citizenship on disclosure of carbon emissions with media exposure as a moderator for companies listed on the Indonesian Stock Exchange between 2017-2021. The underlying foundation is legitimacy theory, and the Media Exposure variable is used as a moderator to explain the influence of Gender Diversity and Nationality of Board of Directors on Carbon Emission Disclosure. This research uses a quantitative questionnaire survey. The research sample consisted of 315 respondents from company annual reports on the Indonesia Stock Exchange for the 2017-2021 period, and multiple linear regression was used to validate the research model. The findings of this study indicate that the diversity of nationality on the board of directors has a positive effect on Carbon Emission Disclosure, and this relationship is strengthened through media exposure. This is because companies spend money to reduce environmental impacts, and the involvement of various Boards of Directors, companies will tend to disclose carbon emissions. Gender diversity on the board of directors has no effect on Carbon Emission Disclosure, and media exposure has no effect. gender diversity in the Board of Directors has no impact on Carbon Emission Disclosure. This research is useful for all stakeholders in companies based in Indonesia. The participation of directors from various countries encourages companies to carry out carbon emission disclosures. The relationship between board member diversity and carbon disclosure is strengthened when public opinion is formed through media exposure about a company's environmental performance.

Keywords: *Carbon Emission Disclosure, Diversity of the Board of Directors, Media Exposure.*

1. Introduction

One of the intensively developing problems that could threaten the future of the world is climate change (Kılıç & Kuzey, 2018). Industry plays an important role in the climate change happening on our planet. His GHK of 3.6 billion tons is responsible for his 50 out of his 500 largest companies in the world. The business sectors operated by 50 companies were dominated by the energy, materials and utilities sectors. Greenhouse gas emissions,

[1] Student Doctoral Program in Economics Science, Postgraduate School, Universitas Sebelas Maret, sutrihandayani37@student.uns.ac.id, Orcid ID: https://orcid.org/0000-0002-0859-7142
[2] Faculty of Economics and BusinessUniversitas Sebelas, Maret, Surakarta, Indonesia, djokosuhardjanto.feb@staff.uns.ac.id, Orcid ID: https://orcid.org/0000-0002-5027-0311
[3] Department of Accounting, Faculty of Economics and Business, Universitas Sebelas Maret, muhtar66@staff.uns.ac.id
[4] Department of Accounting, Faculty of Economics and Business, Universitas Sebelas Maret, setianingtyas_27@yahoo.co.id
[5] Department of Accounting, Faculty of Economics, Universitas Alma Ata, Yogyakarta, k.retno.s@almaata.ac.id, Orcid ID: https://orcid.org/0000-0001-8868-0941

which are the result of the industrial sector's business activities, have increased by 1.65% over the past four years (CDP, 2013). This puts pressure on companies to disclose information about their plans and strategies to reduce their greenhouse gas emissions and climate change impacts (Alsaifi et al., 2020).

Adopt at the COP-21 (21st) session of the United Nations Framework Convention on Climate Change the Paris Agreement to replace the Kyoto Protocol, which aims to limit the increase in global average temperature from 1.5°C to 2°C. The commitment and contribution of each state party (parties) must be explained and reported in the Nationally Determined Contribution (NDC) designed by each party (Ditjenppi.menlhk,2017). Indonesia's first NDC was submitted to the UNFCCC in November 2016 using the Nawacita basis which are Indonesia's 9 strategic development goals, where these goals are in line with Indonesia's commitment to climate resilience and low carbon development. Based on the Brown to Green Report issued by Climate Transperacy (2018) from 1990 to 2015 Indonesia's GHG emissions have increased almost threefold (196%) and are expected to continue to increase until 2030, this is contrary to the Paris Agreement target (UU RI No.6, 1994) dan (UU RI No.17 2004).

Today, apart from financial performance, stakeholders also expect responsibility for the social impacts they cause (Bui et al., 2020). Carbon Emission Disclosure (CED) is an accounting treatment developed to address this issue. By presenting and disclosing carbon emissions resulting from the company's operational activities in the annual report which is presented annually, it can be a company effort in its efforts to reduce and prevent the carbon emissions they produce(Pratiwi, 2018). In Indonesia itself, the reporting of carbon emissions is still voluntary, so there are still a few companies that present Carbon Emission Disclosures in their reports.

Research conducted by (Ben-Amar et al., 2017) which states that with more female boards of directors, company awareness of environmental issues will increase and is also supported by research by (Hollindale et al., 2019) which also found a positive relationship significant difference between the gender diversity of the board of directors and the Carbon Emission Disclosure. However, (Kılıç & Kuzey, 2018) rejects the linkage of gender diversity of the board of directors to Carbon Emission Disclosure, this research shows that gender diversity of the board of directors does not guarantee that companies will be more responsive to their Carbon Emission Disclosure reporting.

In addition to examining the relationship between the gender diversity of the board of directors, (Kılıç & Kuzey, 2018) also examines the relationship between the diversity of nationality of the board of directors and the reporting of a company's Carbon Emission Disclosure. The nationality of the board of directors can be a critical factor in how the interests of various stakeholders are treated within the company(Estélyi & Nisar, 2016). The results of research conducted by Kılıç & Kuzey (2018) state that the diversity of nationality of the board of directors has a significant positive effect on Carbon Emission Disclosures and companies that have more foreign boards of directors will respond more to Carbon Emission Disclosures.

Research by Li et al. (2018) which analyzed the influence of environmental legitimacy as an external informal mechanism seen from Media Exposure to Carbon Emission Disclosure in 500 companies listed on CDP China 100, states that there is Media Exposure about environmental activities that have an influence significantly negative on the area of Carbon Emission Disclosure, but this is not in line with research conducted by Citra (2016) which states that media exposure has no effect on Carbon Emission Disclosure. Abdullah et al., (2020); Nisak & Yuniarti (2018), who also conducted research on Carbon Emission Disclosures, used media exposure as a moderating variable and pointed out that media exposure strengthens the relationship between stakeholder pressure, international environmental certification, company size and profitability with Carbon Emission Disclosures.

This study aims to see the effect of Gender Diversity and the Nationality of the Board of Directors on Carbon Emission Disclosure with the latest research, namely using the Media Exposure variable as a moderator. This research was conducted based on the research of (Afni et al., 2018; Karaman et al., 2018).

2. Literature review and hypotheses development

2.1 Legitimacy Theory

Legitimacy Theory is a theory that is extensively used in explaining environmental disclosure. Organizational legitimacy by Dowling & Pfeffer (1975) is a basic concept that developed into legitimacy theory. Legitimacy theory says that companies operate within society, through a "social contract" that binds companies to society, companies agree to comply with social values/norms in society (Guthrie & Parker, 1989). In order for a company to gain acceptance (legitimacy) from stakeholders and society, the company must comply with social values/norms as well as community expectations (Bui et al., 2020). O'Donovan (2002) argues that legitimacy theory states that if there is a greater possibility that social perceptions of organizational actions shift in a detrimental direction, then the desire of the organization to be able to manage how social perceptions will affect the legitimacy of the organization will also be greater. Therefore a company must know how legitimacy can be obtained, maintained, and also lost. If society does not recognize the legitimacy of an organization, in other words there is a gap in legitimacy between the values of the organization and society, the organization can change or use another strategy to address the existing gap. The determination of this strategy depends on management's perception of threats to organizational legitimacy (Mäkelä & Näsi, 2010).

According to Borghei-Ghomi & Leung(2013) disclosing information is an effective step in a company's efforts to convey its activities and also convey management perspectives regarding environmental, social, and other relevant company issues. Seeing the existing problems, namely regarding how companies attempt to mitigate GHGs, it is only natural that the public expects companies to mitigate their operations through Carbon Emission Disclosures.

2.2 Carbon Emissions Disclosure

Carbon Emission Disclosure (CED) is a historical and prospective report on a company's carbon performance and also contains other climate-related information addressed to stakeholders (Pitrakkos & Maroun, 2020). Carbon Emission Disclosure in Velte et al. (2020) is explained as part of regular information provided to internal and external company stakeholders which contains information on company carbon performance, company strategies related to climate change, and the risks and opportunities that exist from impacts climate change. The Carbon Emission Disclosure report is part of the company's CSR report. Carbon performance provides a quantitative description of carbon emissions, measurement of carbon emissions and the process of reducing carbon emissions (Hoffmann & Busch, 2008). Carbon Emission Disclosures by their nature are divided into two, some are voluntary (such as the Greenhouse Gas [GHG] and CDP protocols) and some are mandatory (such as the EU Emissions Trading Scheme [ETS], Japan's GHG system, and the Unified Database of Emissions & Resources Resources). Generation [eGRID]) (Velte et al., 2020).

2.3 Theoretical framework and hypotheses

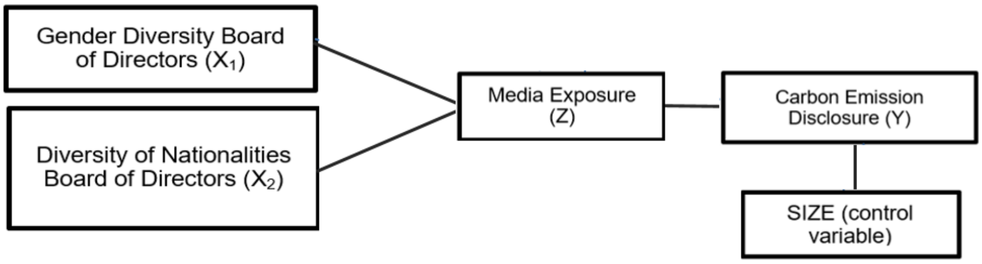

Fig. 1 Theoretical framework based on legitimacy theory

2.3 Hypothesis

2.3.1 Gender Diversity Board of Directors

Gender diversity of the Board of Directors is a variation in the characteristics of the members of the board of directors which can be seen based on background and character (Coffey & Wang, 1998). Involving women on the board shows that the company reduces the level of discrimination, which means the company provides equal opportunities for everyone regardless of their gender and so indirectly the company's reputation in front of investors will increase (Gonenc & Krasnikova, 2022). By recruiting a gendered board of directors of women in the company will add perspective and opinion in board of directors discussions and participation of women in management can also have a positive impact on corporate social responsibility (Barako & Brown, 2008). Liao et al. (2015); Marietza & Hatta(2021) found that women tend to be more committed, willing to be involved, diligent and create a positive aura on the board of directors. Thus women's board of directors are assumed to play a positive role in matters related to environmental issues (Liao et al., 2015).

H1: Gender Diversity of the Board of Directors has a positive and significant effect on Carbon Emission Disclosure

2.3.2 Diversity of Nationalities Board of Directors

Nationality is a pointer related to the identity of an individual's origin based on the place of birth or homeland chosen by the individual, and the national element attached to the individual is called nationality value. This national element will affect the performance of an individual in carrying out their duties (Nekhili et al., 2017). According to (Harjoto et al., 2015) diversity of nationalities within the board of directors can manage better relations with stakeholders who have diverse needs and interests. Because, with the diversity of nationalities will represent diverse characteristics and perspectives. The presence of differences in language and cultural background within the board of directors will increase the efficiency of decision making by the board of directors, and increase company value (Estélyi & Nisar, 2016). According to (Carter et al., 2003), boards of directors who have a thicker diversity of backgrounds and ethnicities are considered to be more active. And with the diversity of the board of directors will increase the company's connections with suppliers, customers, and boards of directors from other companies that will be useful for the company(Bear et al., 2010).

H2: Nationality diversity of the Board of Directors has a positive and significant effect on Carbon Emission Disclosure

2.3.3 Media Exposure

According to (Abdullah et al., 2020) Media Exposure is an activity of hearing, reading, and viewing mass media messages that occur both at the individual and group levels. Voinea & Kranenburg (2017) explains Media Exposure as a tool for connecting companies and stakeholders regarding social responsibility information and other related general company information. The role of the media in increasing public pressure on companies has been extensively researched using legitimacy theory (Nurdiawansyah et al., 2018). In society, the media also has an important role as a means of information communication, and information related to company activities is also information covered in the media (Jannah & Muid, 2014).

Positive Media Exposure is an important goal that will influence decisions taken in a company, because positive Media Exposure will increase the company's legitimacy in the eyes of stakeholders (Wang & Zhang, 2021). Therefore it is important for companies to pay attention to the media to maintain its image and value in the eyes of stakeholders(Berthelot & Robert, 2011).

H3: Media Exposure strengthens the relationship between the Board of Directors' Gender Diversity and Carbon Emission Disclosure

H4: Media Exposure strengthens the relationship between the National Diversity of the Board of Directors and Carbon Emission Disclosure

3. Research methods

The objects in this study are companies that have been listed on the Indonesia Stock Exchange in the period 2017 to 2021. The sample in this study is determined by the criteria that must be met including companies that have been listed on the Indonesia Stock Exchange in the 2017-2021 period, the company reports a complete annual report in the 2017-2021 reporting year, the company successively received the PROPER award for the 2017-2021 period, and the company disclosed information related to carbon emissions in its reporting in its annual report or sustainability report for the 2017-2021 reporting year. Where after adjustments were made, there were 63 companies that met the research criteria where the research observation period was 5 years so that the total sample of this research was 315 companies. The data source for this research comes from the Annual Report and Sustainability Report of each company which are published on the Indonesia Stock Exchange website and the company's online pages for the 2017-2021 reporting year. The data that has been collected will be processed and processed using IBM SPSS 25.

3.1 Carbon Emission Disclosure Measurement

Measurement of Carbon Emission Disclosure will be based on the 33 Item Carbon Emission Disclosure scoring results developed by researchers, namely the maximum total score is 33 and at least 0.

$$\mathrm{CED} = \frac{\text{Total Company Score}}{\text{Maximum score}} \text{ x } 100\%$$

3.2 Measurement of Gender Diversity of the Board of Directors

Referring to the calculation method used by Kılıç & Kuzey (2019), namely by using the Blau heterogeneity index. Using the Blau heterogeneity index is more precise in assessing diversity because the Blau formula is indeed designed to measure the diversity within a population (Teg, 2016). The Blau index values range from 0 (homogeneous) to 0.5 (heterogeneous). The higher the index value, the higher the gender diversity of the board of directors and vice versa.

$$1 - \sum_{i=1}^{n} \mathrm{P}^{i2}$$

Information:

Pi = Percentage of board members as gender female/male in each category

n = The number of categories used is 2 (women and men)

3.3 Measurement of Nationality Diversity of the Board of Directors

This calculation also refers to the calculation method used by Kılıç & Kuzey (2018), namely by using the Blau heterogeneity index. However, the categories used are changed to the percentage ratio of foreign and local directors.

$$1 - \sum_{i=1}^{n} P^{i2}$$

Pi = percentage of members of the Foreign/Local Board of Directors in each category

n = the number of categories used is 2 (foreign and local)

3.4 Media Exposure Measurement

The measurement of Media Exposure will be based on the measurement used by (Ulfa & Ermaya, 2019), namely using a dummy variable, but this research will give a value of 1 to the company's Media Exposure not from the company's website, but from the company that received Media Exposure regarding its environmental performance at 1 the year prior to the reporting period, and a value of 0 for those not covered by the media.

3.5 Control Variable Measurement

In this study, company size will be measured by looking at the natural logarithm (Ln) of the company's total assets in 1 year. This measurement is based on measurements taken (Liao et al., 2015).

3.6 Multiple Linear Regression Analysis

There are two multiple linear regression analysis in this study. The first model is used to test hypotheses 1 to 2 formulated as follows:

$$Y = \alpha + \beta_1 (GD) + \beta_2 (ND) + \beta_3 (SIZE) + e$$

The second model will be used to test hypotheses 3 to 4 which are intended to test the effect of the moderating variable, formulated as follows:

$$Y = \alpha + \beta_1 (GD) + \beta_2 (ND) + \beta_3 (SIZE) + (\beta_4 (GD).\ M) + (\beta_5 (ND).\ M) + e$$

Information:

Y = Carbon Emissions Disclosure (CED)

α = Constant

GD = Gender Diversity of the Board of Directors (X1)

ND = National Diversity of the Board of Directors (X2)

SIZE = Company Size

M = Media Exposure (Z)

β1-β5 = Multiple Regression Coefficient

e = term error

3.7 Measures

Research has been conducted on the influence of Gender Diversity and Nationality of the Board of Directors on Carbon Emission Disclosure with Media Exposure as a moderator for companies listed on the Indonesia Stock Exchange in the 2017-2021 period. By using legitimacy theory in explaining phenomena related to Carbon Emission Disclosure. The tests performed were descriptive statistics, regression analysis of model 1 and model 2.

4. Results and discussion

The results of testing the classical assumptions of the regression analysis model in this study. Where the model meets the assumptions in the normality test with the Kolmogorov-Smirnov (K-S) and Skewness-Kurtosis tests, the multicollinearity test, the heteroscedasticity test with the Glejser test, and the autocorrelation test with the Durbin-Watson test (DW test).

4.1 Descriptive Statistics

In Table 1 shows the results of the descriptive statistical analysis for a sample of 315 companies in Indonesia in the 2017-2021 period. The average level of Carbon Emission Disclosure (CED) of companies in Indonesia is 0.321 or around 32.1%, which means that as a whole companies listed on the Indonesia Stock Exchange have not fully disclosed information related to their carbon emissions in their annual and sustainability reports. report for the 2017-2021 period, and a standard deviation value of 0.275 or around 27.5%. This implicitly explains that companies listed on the Indonesia Stock Exchange have various Carbon Emission Disclosure (CED) values and small deviation values because the average value is greater than the standard deviation value.

Table 1. Results of Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CED	315	0,057	0,945	0,321	0,275
GD	315	0,000	0,500	0,133	0,180
ND	315	0,000	0,500	0,201	0,205
SIZE	315	24,111	32,573	29,447	1,579
SIZE_Rupiah	315	28596605330,000	136623419300000,000	17279986170000,000	25112986030000,000

Data source: secondary data processed by researchers (2023)

Table 2. Tabulation of Dummy Media Exposure Variables

Dummy Variables	Frequency	Percent	CummulativePercent
0	211	67%	67%
1	104	33%	100%
Total	315	100%	

Data source: secondary data processed by researchers (2023)

The gender diversity of the board of directors and the nationality of the board of directors has an average value of 0.133 or around 13.3% and 0.201 or around 20.1%. Which means that the level of gender and nationality diversity or heterogeneity in the board of directors of companies listed on the Indonesia Stock Exchange is still very low. Based on the data contained in table 2, 67% of the sample companies did not have Media Exposure related to their environmental performance one year prior to the observation year (2016, 2017 and 2018). This figure shows that Media Exposure related to the company's environmental performance is still minimal.

4.2 Regression Analysis Results

Table 3. R Square analysis

Model	R Square	Adjusted RSquare
494[a]	0,244	0,227
618[a]	0,382	0,358

Data source: secondary data processed by researchers (2023)

Based on table 3 model-1 can explain the dependent variable Carbon Emission Disclosure of 22.7% where the other 77.3% is explained by variables outside the modeling and model-2 can explain the dependent variable Carbon Emission Disclosure of 35.8% where 64.2% others are explained by variables outside the modeling.

Table 4. Statistical test t

Model		t	Sig.
1	(Constant)	-5,269	0,000
	GD	0,168	0,434
	ND	2,772	0,003
	SIZE	4,893	0,000
Model		t	Sig.
2	(Constant)	-3,837	0,000
	GD	-0,113	0,910
	ND	1,860	0,055
	GIxM	2,715	0,007
	GDxM	-0,691	0,490
	NDxM	2,008	0,046
	SIZE	4,028	0,000

Data source: secondary data processed by researchers (2023)

Table 5. Results of Multiple Linear Regression Test Model-1

Model		Unstandardized Coefficients	
		B	Std.Error
1	(Constant)	-1,801	0,342
	GD	0,017	0,100
	ND	0,233	0,084
	SIZE	0,057	0,011

Data source: secondary data processed by researchers (2023)

Table 6. Results of Multiple Linear Regression Test Model-2

Model		Unstandardized Coefficients	
		B	Std. Error
2	(Constant)	-1,265	0,330
	GD	-0,013	0,111
	ND	0,061	0,102
	GIxM	0,047	0,017
	GDxM	-0,116	0,168
	NDxM	0,314	0,157
SIZE			0,011

Data source: secondary data processed by researchers (2023)

5. Discussion

The first hypothesis testing in the study was the effect of the gender diversity of the Board of Directors on Carbon Emission Disclosure. Where after the statistical testing it was carried out the results were obtained that H2 was rejected because the gender diversity of the Board of Directors had a t-count value (0.168) which was smaller than the t-table value (1,653), the probability value of significance (0.434) was greater than the significance value limit (0,050). Then it can be concluded that the gender diversity of the board of directors has no effect on carbon emission disclosure. The results of this study are in line with the research conducted by Kılıç & Kuzey (2019) which rejects the existence of the gender diversity of the Board of Directors of the Carbon Emission Disclosure, this study shows that the gender diversity of the Board of Directors does not guarantee the company will be more responsive and broader in reporting Carbon Emission Disclosure.

The second hypothesis testing in the study was the influence of the diversity of the board of directors' nationality on Carbon Emission Disclosure. Where after the statistical testing it was carried out the results were obtained that H3 was accepted because the diversity of the Board of Directors' nationality had a t-count value (2,772) which was greater than the t-table value (1,653), the probability value of significance (0.003) was smaller than the significance value limit (0,050) and positive coefficient values. It can be concluded that the diversity of the board of directors' nationality has a positive and significant effect on carbon emission disclosure. Companies that have a board of directors with diverse nationality backgrounds show that companies are also better in conducting carbon emission disclosure. The results of this study are in line with research conducted by Kılıç & Kuzey (2019) showing that the diversity of the board of directors' nationality will increase the tendency of the company to carry out carbon emission disclosure.

The third hypothesis testing in the study is the influence of exposure media in strengthening the relationship between the gender diversity of the Board of Directors and Carbon Emission Disclosure. Where after the statistical testing it was carried out the results were rejected because the T-count value (0.691) was smaller than the t-table value (1,653), the probability value of the significance (0.490) was greater than the significance value limit (0.050) and the value positive coefficient. Then it can be concluded that the exposure media cannot moderate the relationship between the gender diversity of the board of directors and the carbon emission disclosure. These results indicate that the decision of the Board of Directors of Women's Berderators about Carbon Emission Disclosure that the company will do is not affected by the company's environmental performance in the period before the next reporting year.

Testing the fourth hypothesis in the study is the influence of media exposure in strengthening the relationship between the diversity of the board of directors and carbon emission disclosure. Where after the statistical testing it is carried out the results are obtained that the H6 is received because the T-count value (2,008) is greater than the t-table value (1,653), the probability value of the significance (0.046) is smaller than the significance value limit (0.050) and the value positive coefficient. Then it can be concluded that media exposure strengthens the relationship between the diversity of the board of directors and carbon emission disclosure. These results indicate that the coverage of the company's environmental performance in the period before the reporting year will affect the decision of the board of directors who have a positive nationality background related to environmental disclosure which will also increase the carbon emission disclosure reported by the company.

There is no research that uses media exposure as a moderation between the gender diversity of the Board of Directors and the diversity of the Board of Directors' nationality of the Carbon Emission Disclosure, but the results of this study have a logic of thinking that is in line with Ridwan's research (2017) and Hidayah (2019) which also conducts research on Carbon emission disclosure but uses other factors in testing it, this study shows that media exposure strengthens the relationship of stakeholders, international environmental certification, company size and profitability with carbon emission disclosure. Organic food sales due to trust deficit.

6. Conclusion

This study found that the diversity of nationality of the Board of Directors has a positive and significant effect on Carbon Emission Disclosures, but the Gender Diversity of the Board of Directors has no effect on Carbon Emission Disclosures. Media Exposure can strengthen the relationship between the Board of Directors' Nationality Diversity and

Carbon Emission Disclosures but cannot moderate the Board of Directors' Gender Diversity towards Carbon Emission Disclosures.

This means that when a company spends money to reduce environmental impact and the involvement of a board of directors with diverse national backgrounds will encourage companies to make better Carbon Emission Disclosures. However, the gender diversity of the board of directors does not affect the breadth of the Carbon Emission Disclosure. Public opinion formed due to Media Exposure about the company's environmental performance will strengthen the relationship between the Nationality Diversity of the Board of Directors and Carbon Emission Disclosure but not with the Gender Diversity of the Board of Directors.

In conducting the research, the researcher realized there were limitations in conducting this research where the number of female board members was still very small, namely only 15% of the total 1890 board members in the 63 sample companies listed on the IDX with an observation period of 5 years, from 2017 to with 2021. The researcher hopes that further research can add country origin in measuring the diversity of nationalities of the board of directors, add years of observation and also use samples from other countries that have different characteristics or regulations from Indonesia. so that the research results can be generalized more broadly. It is also hoped that further research can use a different grand theory in studying Carbon Emission Disclosure such as instrumental theory or ethical theory.

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