The Effect of Board Diversity on Carbon Emission Disclosure

Rizkika Putri Rahmawati[1]*, Rita Wijayanti[2], Kurnia Rina Ariani[3]

[1, 2, 3] Faculty of Economic and Bussines, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia

Abstract

Purpose: Climate change has emerged as a growing concern on a global scale, prompting organizations to prioritize carbon-friendly practices. There is a growing call for businesses to actively reduce carbon emissions by implementing initiatives in their operational processes. The Indonesian government pays great attention to the issue of global climate change. This can be seen from the 17 sustainable development goals, climate change is one of the goals that is starting to be socialized. Rising global temperatures result from heightened levels of greenhouse gas emissions released into the atmosphere, so companies must take responsibility through emission reduction activities. Disclosure of carbon emissions is to assess carbon emissions in order to set targets for reducing these emissions. This study seeks to assess how effectively climate change has been tackled and the various factors that contribute to the tampering of data on carbon emissions. The factors tested in this research include other female directors, foreign directors, and independent directors.

Metodology: The study involves examining annual non-financial firms that are listed on the Indonesia Stock Exchange (IDX) have reported between 2020 - 2022 using content analysis. Quantitative methods are employed, and samples are selected through purposive sampling techniques. The hypothesis testing is conducted using SPSS 25, and the analysis involves the application of the multiple linear regression model.

Result: According to the study's findings, disclosure of carbon emissions is positively impacted by board independence, diversity in nationality, and profitability. However, disclosure of carbon emissions is unaffected by corporate size, leverage, or gender diversity on the board.

Applications/Originality/Value: The study makes a meaningful contribution to the advancement of green accounting in Indonesia, with the aspiration that stakeholders can enhance their evaluation and planning processes to augment carbon emission disclosure by companies in the country.

Introduction

The escalating concerns related to global warming and climate change have garnered heightened attention, emphasizing the need to secure the long-term sustainability of our planet wo(Kılıç & Kuzey, 2019). The threat of global warming has garnered strong attention from various stakeholders, including the environment, business world, and political leaders, who are confronted with a number of challenges that need to be addressed (Bae Choi et al., 2013). According to the Global Carbon Project in 2020, Indonesia ranked tenth in terms of the largest carbon emissions production in the world (Global Carbon Atlas, 2021). Damage to the environment is a result of the atmospheric release of carbon emissions, leading to global warming (Mahardika, 2022). Despite Indonesia often being referred to as the "lungs of the world," the country indeed has a significant impact on climate change by producing approximately 590 million tons of carbon dioxide in 2020 (Global Carbon Atlas, 2021). This climate change emergency phenomenon has prompted stakeholders to increasingly realize that companies must have a core goal of achieving profit by enhancing future value (Febriani, 2020).

Businesses have significant hurdles because they need to realize that global warming is a hazard to the planet. The Earth's climate has changed in ways never seen before due to human-caused global warming of 1.1°C, unlike any in human history. With this global temperature increase, climate system changes are occurring in every region of the world, ranging from rising sea levels, more extreme weather events, to rapid melting of sea ice. It is likely that over 50% of the global temperature increase will reach or exceed 1.5°C between 2020 and 2040 in all examined scenarios. In the high-carbon intensity scenarios, global temperature rise could also increase to 3.3°C to 5.5°C by the year 2100 (IPCC, 2023).

Global frameworks and accords, such the Paris Agreement, the United Nations Framework Convention on Climate Change, and the Sustainable Development Goals, function as benchmarks for advancement. Three primary categories of actions encompass emissions reduction, adaptation to climate impacts, and the provision of funding for necessary adjustments. It is essential to switch from fossil fuels to renewable energy sources, such as solar or wind power, in order to reduce emissions that contribute to global warming. Urgent action is imperative. Despite an increasing number of countries committing to achieving To keep global warming to less than 1.5°C, net-zero emissions by 2050 and a large

---

* Corresponding author: rizkikap62@gmail.com

emission decrease of 50% by 2030 are necessary. Achieving this goal requires a substantial decrease in the utilization of coal, oil, and gas, with over two-thirds of current fossil fuel reserves needing to remain unburned by 2050 to avert catastrophic climate change. (United Nations, 2022).

Various sectors contribute to global greenhouse gas emissions, with the energy sector emerging as the primary contributor, as per Climate Watch data. This sector has the capacity to generate 36.44 gigatons of carbon dioxide equivalent (Gt CO_2e), constituting 71.5% of total emissions. Specifically, the electricity sector stands out as the leading global producer of CO_2. China holds the position of the world's largest CO_2 emitter from electricity generation, with a recorded figure of 4,693.8 $MtCO_2$. In comparison, Indonesia is ranked 9th among the world's largest CO_2 emitters from electricity generation, generating 192.7 $MtCO_2$. (CNBC, 2023).

Presidential Regulation No. 61 of 2011 regarding the National Action Plan for Greenhouse Gas Emission Reduction and Presidential Regulation No. 46 of 2018 concerning Greenhouse Gas Management serve as examples of Indonesia's commitment to its efforts to reduce greenhouse gas emissions. In Presidential Regulation No. 61 of 2011, it is explained that businesses also play a role in reducing greenhouse gas emissions (including carbon emissions). Companies' contributions to greenhouse gas reduction efforts can be determined through the disclosure of their carbon emissions. According to Presidential Regulation No. 47 of 2012, commercial enterprises contribute to greenhouse gas reduction efforts, including carbon emissions. Companies can aid in emission reduction by disclosing their emissions as business entities. Additionally, since they are responsible for the environment, carbon emission disclosure can enhance their legitimacy in the eyes of the public (Aji et al., 2023).

With the issue of increasing carbon emissions from a company contributing to climate change, corporate stakeholders are showing heightened concern for the company's negative environmental impact. Stakeholders are exerting pressure on the company to take responsibility by disclosing the company's carbon emissions. Carbon emission disclosure serves form of transparency for the company in revealing its efforts to address the environmental repercussions of the carbon emissions it generates. One of the primary ways that large organizations address this situation is through voluntary carbon disclosure (Mateo-Márquez et al., 2022).

How the board of directors performs its duty determines whether or not a corporation will disclose its carbon emissions. The makeup and functions of the board of directors are fundamentally affected by a critical problem regarding board diversity. Board the distribution of variances in traits, viewpoints, and attitudes toward making decisions among board members. A statement that everyone has equal opportunity at the organization. The presence of women on the board, the number of non-native directors, and the number of independent directors in a corporation are indicators of board diversity.

A greater understanding of environmental concerns by corporations is correlated with greater representation of women on the board of directors (Ben-Amar et al., 2017). Women often exhibit tendencies or inclinations more accommodating and assertive, and they are more likely to embrace innovative environmental practices that reduce environmental impact compared to men. Consequently, the presence of female board members has a noteworthy impact on carbon disclosure, underscoring the need of gender diversity in corporate boards (Hossain et al., 2017). Companies with an increased number of directors from foreign backgrounds willing to enhance their carbon performance due to the increased communication channels available to build a carbon image (Mardini & Elleuch Lahyani, 2022). Independent directors are considered capable of improving a company's performance because they can represent the interests of all shareholders and potentially contribute to carbon emission disclosure in the company, independent directors would do exceptionally well in managin, thereby contributing to the improvement of long-term value and transparency. (Jizi et al., 2014). Because external directors is a positive relationship between independent directors and sustainability reporting; they are less susceptible to pressure from management and shareholders than internal directors. (Hussain et al., 2018).

This study is driven by particular concerns, with the initial motivation stemming from the choice to investigate the disclosure of carbon emissions in Indonesia, a developing economy. Prior studies have mostly concentrated on the advanced economies' disclosure policies regarding carbon emissions Rankin et al., (2011); Bae Choi et al., (2013); Liao et al., (2015); Yunus et al., (2016); Ben-Amar et al., (2017). Conversely, there is a lack of extensive investigation into how corporate governance attributes, including factors like the size of the board, its level of independence, and the existence of board committees all play a role in shaping corporate reporting behaviors regarding carbon emissions. Furthermore, there is a lack of research exploring the relationship between board gender diversity and the disclosure of carbon emissions. Prado-Lorenzo & Garcia-Sanchez, (2010) and Liao et al., (2015). An additional motivation for this study in this context is to fill in the gaps in the existing literature by determining if a prominent. There is a connection between a number of board diversity dimensions. and the degree of carbon emission disclosure. These include diversity gender, nationality, and independence. Moreover, in realm of board diversity, there is a dearth of prior research in Indonesia specifically Investigating the link between diversity in nationality, board independence, and the disclosure of carbon emissions.

Theoritical Framework
Stakeholder Theory
Fundamentally, the Stakeholder Theory implies that a company operates not solely for its own purposes but is must also obligated to provide value and benefits to a variety of parties with interests in the organization. These parties include the public, governmental bodies, creditors, suppliers, shareholders, consumers, and other interested parties. When the

Stanford Research Institute originally coined the term "stakeholder" in 1963, it meant a group that might provide funding to keep an organization operating. (Harmoni, 2013).

Stakeholders are persons or organizations that have the power to affect or be influenced by an organization's procedures for achieving its goals. According to the stakeholder theory, a business must consider its stakeholders' interests in addition to its owners' and investors, commonly referred to as shareholders, but it is also accountable for providing benefits to society, the social environment, and the government, collectively referred to as stakeholders. In line with its definition, stakeholders play a significant role in a company's sustainability. This is due to the fact that stakeholders have the power to manage the resources required for a business to survive. Businesses need to foster relationships with interested parties or stakeholders by attending to their needs and preferences. This is especially important for stakeholders who have a say in the resources that are available for the business's operational activities, like labor, clients, and owners (Hörisch et al., 2014).

Legitimacy Theory

Suchman (1995), The idea or presumption that an entity's activities are consistent with society norms, values, and acknowledged standards is known as perceived legitimacy. It suggests that people view the entity's behavior as desirable and in line with the social norms that are ingrained in conventions. This emphasizes how important legitimacy is to a company's ability to continue operating and growing. Every business needs legitimacy because the public perception of a company's legitimacy plays a vital role in shaping its destiny.

According to the legitimacy theory, organizations always work to make sure that others see them as functioning within social norms and limitations. They aim to ensure that stakeholders view their activities as legitimate (Deegan & Unerman, 2011). Mahadeo et al., (2011) separate legitimacy into two categories: moral legitimacy, which stems from doing what is right for society at large, and pragmatic legitimacy, which is based on the organization's best interests. This classification establishes the kind and quantity of information that is made public. According to this research, companies that adhere to the pragmatic legitimacy side will only reveal information that benefits their immediate stakeholders, whereas companies that follow the moral legitimacy side will disclose information about carbon emissions.

Carbon Emission Disclosure

The release of carbon into the atmosphere is referred to as carbon emissions. Carbon emissions are associated with greenhouse gases and are a major contributor to climate change. CO_2 emissions have been increasing over time at global, regional, national, and local levels due to the growing use of energy from organic (fossil) sources, land-use changes, forest fires, and increased anthropogenic activities.

Businesses are now required to disclose information more freely. Companies exhibit accountability and transparency by providing information in their annual reports. Mandatory disclosure and voluntary disclosure are the two categories into which the material revealed in the annual reports falls. Businesses frequently reveal information if it adds value to the company. On the other hand, if the information may damage the company's reputation or status, it could be suppressed.

As mentioned in PSAK No. 1 (revised 2009), paragraph 12, environmental disclosure includes things like disclosures about carbon emissions and are a part of the supplementary report. Greenhouse gas emissions (GHG) intensity and energy use, corporate governance, climate change strategies, performance against targets for reducing GHG emissions, and opportunities and risks associated climate change's effects are all included under the environmental disclosure category. (Cotter & Najah, 2013).

This study measures carbon emission disclosure using a number of factors that were taken from the study by (Bae Choi et al., 2013). The following five major categories have been identified as being relevant to climate change and carbon emissions. There are eighteen things classified in these five categories.

Hypothesis

The impact of board gender diversity on carbon emission disclosure

According to WHO, gender is defined as differences in status and roles between men and women which are formed by society in accordance with the cultural values prevailing in a certain period. Diversity in board direction leads to knowledge, creativity, and innovation which in turn leads to excellence competitive. Directive gender diversity can enrich perspectives in decision making. According to Bear et al., (2010), board diversity can enhance the likelihood that diverse knowledge, perspectives, and concepts are taken into account when making decisions. With the existence of female gender representation in the boardroom, a company's awareness of environmental issues is also likely to increase (Ben-Amar et al., 2017). The existence of women in corporate boards can reduce greenhouse gas emissions and their impact (Konadu et al., 2017). In general, women are more concerned with environmental issues than men. In addition, women tend to take action to reduce environmental risk. Akhtaruddin & Hossain (2009) indicates a favorable correlation between carbon disclosure and female on the board. Therefore, female board members can significantly contribute to enhancing carbon emission disclosure compared to male board members. The following formulation of the hypothesis can be made in light of these presumptions:

H1: Board gender diversity has a positive impact on carbon emission disclosure.

The impact of board nationality on carbon emission disclosure

Nationally diverse companies face more scrutiny from shareholders, customers, and other interested parties, especially on environmental responsibility issues. Due to these shortcomings, the company may not get much interest from influential people. Management can be encouraged to disclose carbon emissions if it consists of a diverse group of people, and the oversight role of foreign commissioners can help them better understand stakeholder demands and interests. A company's business procedures and choices may also be influenced by the presence of international board members. The research conducted by El-Bassiouny & El-Bassiouny, (2019) indicates that the nationality status of the board of directors has an influence on corporate social responsibility reporting, with foreign directors demonstrating a greater awareness of climate change challenges. The existence of foreign directors in company can enhance environmental transparency (Mardini & Elleuch Lahyani, 2022). The inclusion of foreign directors offers a new perspective that leads to more informed decision-making (Estelyi, 2016). Consequently, the amount of information disclosed in carbon emission disclosure reports may be significantly influenced by the nationality of the board of directors. The following formulation of the hypothesis can be made in light of these presumptions:

H2: Board nationality has a positive impact on carbon emission disclosure.

The impact of board independent on carbon emission disclosure

When carrying out corporate governance responsibilities, important to understand that the effectiveness in addressing the existence of agency issues between shareholders and management depend on the make-up of the board of directors. This composition is determined by taking the percentage of non-executive directors to the total number of directors (Akhtaruddin & Hossain, 2009). A presumption exists that having independent directors positively affects a business's engagement in climate-related initiatives and disclosure of carbon emissions through various avenues. Initially, it is anticipated that independent directors play a crucial role in supervising management activities, focusing on improving long-term value and maintaining a high degree of openness (Jizi et al., 2014). Within the framework of the independence of the board of directors and shareholder theory is seen as having a positive correlation through sustainability reporting. This is due to the existence of external directors are perceived to be less swayed by manager and shareholder pressures more so than internal director pressures (Hussain et al., 2018). Numerous prior investigations have consistently highlighted a noteworthy positive influence of board independence on the disclosure of carbon-related information (Liao et al., 2015). The following formulation of the hypothesis can be made in light of these presumptions:

H3: Board independence has a positive impact on carbon emission disclosure.

Research Method

The method used to analyze the issues in this research is quantitative, as numerical variables such as annual report data are used to address these issues. The non-financial Indonesian companies that published yearly reports on the Indonesia Stock Exchange (IDX) between 2020 - 2022 make up the study's population. Direct access to the websites of the companies and IDX (www.idx.com) was used to obtain the data. Purposive sampling, a research technique used to gather data for particular goals and utility, is the sample strategy employed (Sugiono, 2016).

This study's dependent variable, carbon emission disclosure, is calculated using an adjusted carbon disclosure index from Darus et al., (2020) and modified to suit the Malaysian context to assess the quality of disclosure carbon information, consisting of 18 items. The assessment employs a rating scale ranging from 0 to 4 to appraise the quality of disclosed information. A rating of "4" is assigned to quantitatively disclosed carbon information accompanied by monetary values. A rating of "3" is given for quantitative disclosure without monetary values. A score of "2" is allocated for specific but non-quantitative information regarding carbon disclosure, while general information receives a score of "1". In cases where no carbon information is disclosed, a score of "0" is assigned. The evaluation of carbon information disclosure employs an index with equal weights, where one point is assigned for each disclosed item. The total value divided by the sum of the revealed values serves as the indication for calculating carbon emission disclosure.

Board independence, board diversity in terms of nationality, and board gender diversity are the study's independent variables. Gender diversity on the board: more female board members are able to offer more information and specifics. The involvement of women directors in top management can influence a company's decisions regarding accounting conservatism (Witono et al., 2023). It may be calculated by dividing the percentage of female board members by the total number of directors. Diversity of nationalities within a company can enhance environmental transparency (Mardini & Elleuch Lahyani, 2022). Foreign board directors usually have different and diverse ideas and perspectives due to the uniqueness of each country. By dividing the total number of board directors by the number of foreign board directors, it may be computed. Board independence might possibly enhance a firm's climate change and carbon emission disclosure measures since it is neither prejudiced or linked with any one company. It is expected that independent directors would be efficient in managing the company, emphasizing enduring worth and maintaining a high standard of openness. Because they are not beholden to any one firm, independent directors are able to monitor and guide corporate operations in a positive way. This is particularly true when it comes to discussing concerns related to climate change and disseminating data on carbon emissions (Jizi et al., 2014). By dividing the total number of directors by the number of independent directors, it may be calculated.

In research variable control include firm size, profitability, and leverage, as these factors have been previously discussed in accounting literature for their potential influence on companies' voluntary environmental disclosure. Larger-sized entities, due to their heightened visibility and increased public scrutiny, may face external pressures that drive them to disclose information about their environmental policies and practices (Yunus et al., 2016). Consequently, due to the influence larger organizations are anticipated to be more willing to voluntarily reveal information about their carbon emissions under this pressure. Consequently, an expected outcome is a favorable correlation exists between the disclosure of carbon emissions and the size of the company. Firm size is a measurement of a company's size based on the current categorization, which can be either large or small. (Mujiyati & Ulinuha, 2023). The natural logarithm of total assets was the metric utilized in this study to determine the size of the firm. This measurement's justification is that businesses in stronger financial positions would probably have more resources available to them to cover the expenses related to discovering, gathering, and releasing the information needed for disclosure of carbon emissions (Bae Choi et al., 2013). Furthermore, the act of making environmental disclosures can serve as a strategy for cultivating public trust and legitimacy, especially in comparison tomore methods employed for profit generation (Chithambo & Tauringana, 2014). Therefore, it is projected that profitability and disclosures of carbon emissions will positively correlate. The profitability of the firms was determined by dividing their net income by the total of their equity and assets. It is anticipated that giving more information on social and environmental projects will reduce the likelihood of disputes arising between creditors and owners, which will reduce agency expenses (Prado-Lorenzo & Garcia-Sanchez, 2010). As entities become more dependent on funding from creditors, there is a likelihood that they will engage in peroviding voluntary disclosures to align with expectations. of their creditors (Rankin et al., 2011). As a result, it is anticipated that a positive correlation exists the relationship between disclosures of carbon emissions and leverage. Leverage was calculated in this instance using the ratio of total liabilities to total assets.

Research model

The research looks at the relationship between board diversity and carbon emission disclosure using a panel data regression model. The following is the multiple linear regression formula used in this study:

$$Y=a+\beta_1 GDR+\beta_2 NSL+\beta_3 IND+\beta_4 FSZ+\beta_5 PRF+\beta_6 LEV+\varepsilon$$

Explanation:
Y: Carbon emission disclosure
α: Constant
ß: Regression coefficient
GDR: Board gender diversity
NSL: Board nationality diversity
IND: Board independent
FSZ: Firm size
PRF: Profitability
LEV: Leverage
Ɛ: Error

Research Results
Deskriptive Statistics

A summary or description of data based on values like the mean, maximum, minimum, total, range, and standard deviation is provided by descriptive statistics (Ghozali, 2018:19).

Table 1. Descriptive Statistics

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Error	Std. Deviation Statistic
Y_CED	74	,014	,167	,06588	,004803	,041320
X_GDR	74	,000	,600	,18399	,017744	,152638
X_NSL	74	,000	1,000	,28113	,029803	,256379
X_IND	74	,000	,500	,13595	,014084	,121151
X_FSZ	74	10,461	19,840	15,79549	,200956	1,728687
X_PRF	74	-,517	,593	,07294	,016551	,142381
X_LEV	74	-1,979	24,849	1,50488	,347948	2,993163

Table 1 displays the findings of the descriptive statistics for the independent and dependent variables. Carbon Emission Disclosure (CED) ranges from 0.14% to 1.67%. The average CED is 0.65%, indicating that the level of details about Indonesian non-financial companies' disclosure of carbon emissions is very low. The average board gender diversity is 0.18%, with a minimum amount of 0% and a maximum of 6%. The average nationality diversity is 2.81%, with a

minimum amount of 0% and a maximum of 10%. The average board independence is 1.35%, with a minimum amount of 0% and a maximum of 5%. Company size, measured using the logarithm, shows an average of 15.79, with a minimum amount of 10.46 and a maximum of 19.84. Profitability levels tend to be low, with an average of 0.07%, a minimum amount of -0.51%, and a maximum of 5.9%. Meanwhile, the company's leverage rate averages 15%, with a minimum amount of -19% and a maximum of 24.8%.

Classical Assumption Test

Classical assumption tests, such as those for heteroskedasticity, autocorrelation, multicollinearity, and normality, are carried out prior to hypothesis testing. Here is how the traditional assumption tests are carried out:

Normality Test

According to Ghozali, (2018:30), Finding out if the error term or residuals in a regression model have a normal distribution is the goal of the normality test. The Kolmogorov-Smirnov test is often used to assess the residuals' normalcy.

Table 2. Normality Test

		Unstandardized Residual
N		74
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	,03720585
Most Extreme Differences	Absolute	,096
	Positive	,096
	Negative	-,057
Test Statistic		,096
Asymp. Sig. (2-tailed)		,086[c]

The normality test results from Table 2 indicate that the Asymp. Sig. (2-tailed) value is 0.086. As a result, the Asymp. Sig. (2-tailed) value is more than 0.05. Thus, it may be said that the distribution of the data is normal.

Multikolinearity Test

To find out if in a regression model, the independent variables are correlated, the multicollinearity test is used (Ghozali, 2018). Ideally, A good regression model should not have any relationship between the independent variables. Acceptance and Diversity Readings of the Inflation Factor (VIF) can be used to assess the presence of multicollinearity.

Table 3. Multikolinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	X_GDR	,830	1,205
	X_NSL	,782	1,279
	X_IND	,790	1,265
	X_FSZ	,788	1,270
	X_PRF	,864	1,157
	X_LEV	,921	1,086

a. Dependent Variable: Y_CED

The multicollinearity test results are shown in Table 3, and they demonstrate that the tolerance and VIF values of every variable fall within acceptable bounds. To be more precise, all tolerance levels exceed 0.10 and all VIF numbers are fewer than 10. Therefore, it may be said that the variables in the regression model do not exhibit multicollinearity.

Autocorelation Test

The purpose of the autocorrelation test is to determine if there is autocorrelation between the error disturbances at time period t and the errors at time period t-1 (lag errors) in a linear regression model.

Table 4. Autocorelation Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,435a	,189	,117	,038836	1,888

a. Predictors: (Constant), X_LEV, X_GDR, X_PRF, X_IND, X_FSZ, X_NSL
b. Dependent Variable: Y_CED

As can be seen from Table 4, 1.888 is the Durbin-Watson statistic. As a result, it can be said that there is no autocorrelation in the model because this number is between -2 and +2.

Heteroskedasticity Test

According to Ghozali, (2018:137), the purpose of the heteroskedasticity test is to determine if the variance of residuals in a regression model is unequal between observations.

Table 5. Heteroskedasticity Test

			X_GDR	X_NSL	X_IND	X_FSZ	X_PRF	X_LEV	UnRes
Spearman's rho	X_GDR	Correlation Coefficient	1,000	-,312**	-,100	-,227	-,115	,184	-,001
		Sig. (2-tailed)	.	,007	,398	,052	,331	,116	,996
		N	74	74	74	74	74	74	74
	X_NSL	Correlation Coefficient	-,312**	1,000	-,287*	,124	,290*	,036	,033
		Sig. (2-tailed)	,007	.	,013	,291	,012	,758	,777
		N	74	74	74	74	74	74	74
	X_IND	Correlation Coefficient	-,100	-,287*	1,000	-,367**	-,249*	-,095	-,041
		Sig. (2-tailed)	,398	,013	.	,001	,032	,418	,732
		N	74	74	74	74	74	74	74
	X_FSZ	Correlation Coefficient	-,227	,124	-,367**	1,000	,365**	,250*	-,022
		Sig. (2-tailed)	,052	,291	,001	.	,001	,032	,849
		N	74	74	74	74	74	74	74
	X_PRF	Correlation Coefficient	-,115	,290*	-,249*	,365**	1,000	-,151	,208
		Sig. (2-tailed)	,331	,012	,032	,001	.	,199	,075
		N	74	74	74	74	74	74	74
	X_LEV	Correlation Coefficient	,184	,036	-,095	,250*	-,151	1,000	-,011
		Sig. (2-tailed)	,116	,758	,418	,032	,199	.	,927
		N	74	74	74	74	74	74	74
	UnRes	Correlation Coefficient	-,001	,033	-,041	-,022	,208	-,011	1,000
		Sig. (2-tailed)	,996	,777	,732	,849	,075	,927	.
		N	74	74	74	74	74	74	74

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The heteroskedasticity test findings, based on Table 5, show that each variable has a significant value greater than 0.05. Therefore, it may be concluded that heteroskedasticity is absent from the regression model.

Multiple Regression Test

Regression analysis shows the direction of the relationship between the dependent and independent variables in addition to assessing the strength of the relationship between two or more variables. It is assumed that the dependent variable has a probabilistic distribution and is random or stochastic. When sampling repeatedly, it is assumed that the independent variable has a fixed value (Ghozali, 2018:96). Three things need to be looked for and interpreted in multiple regression analysis: the t-test (hypothesis test), the F-test (goodness-of-fit test), and the coefficient of determination (R2).

Coefficient of Determination (R^2)

To put it simply, the Coefficient of Determination (R^2) measures how well the model accounts for the variance of the dependent variable. The range of values for the coefficient of determination is 0 to 1. A low R^2 value indicates a significant restriction on the independent variable's ability to explain the dependent variable and vice versa (Ghozali, 2018:97).

Table 6. Coefficient of Determination (R2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,435a	,189	,117	,038836

a. Predictors: (Constant), X_LEV, X_GDR, X_PRF, X_IND, X_FSZ, X_NSL
b. Dependent Variable: Y_CED

In Table 6, the determination coefficient values for R square (R2) and Adjusted R square (Adj. R2) can be observed. The value of Adj. R2 is 0.117, which means that 11.7% of the variance in GDR, NSL, IND, FSZ, PRF, and LEV variables affects carbon emission disclosure. The remaining 88.3% is influenced by other variables not included in the model.

F-Test

The null hypothesis, according to which all of the variables are equal to zero, is tested using the F-test (Ghozali, 2018:98).

Table 7. F-Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,024	6	,004	2,606	,025b
	Residual	,101	67	,002		
	Total	,125	73			

a. Dependent Variable: Y_CED

b. Predictors: (Constant), X_LEV, X_GDR, X_PRF, X_IND, X_FSZ, X_NSL

The significant value of the goodness of fit (Sig. F) is displayed by the F-Test in Table 7. The Sig. F value is 0.025, which is less than 0.05. This means that the variables GDR, NSL, IND, FSZ, PRF, and LEV collectively influence the carbon emission disclosure variable. In other words, the research model is valid.

t-Test

In essence, the t-statistic test shows how much each independent variable affects the variance in the dependent variable (Ghozali, 2018:98).

Table 8. t-Test

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	,065	,052		1,255	,214
	X_GDR	-,022	,033	-,081	-,674	,503
	X_NSL	-,055	,020	-,341	-2,744	,008
	X_IND	,079	,042	,231	1,870	,066
	X_FSZ	,000	,003	,005	,040	,969
	X_PRF	,066	,034	,227	1,921	,059
	X_LEV	,002	,002	,138	1,207	,232

a. Dependent Variable: Y_CED

From Table 8, the t-Test shows the regression coefficients for the regression equation and the significance value (Sig. t) for hypothesis testing. $\beta_1 = 0.503$ demonstrates that the gender diversity of the board has no impact on the disclosure of carbon emissions. $\beta_2 = 0.008$ indicates that nationality board diversity affects carbon emission disclosure. $\beta_3 = 0.066$ indicates that board independence affects carbon emission disclosure. Among the three control variables tested, only one variable affects carbon emission disclosure, which is profitability ($\beta = 0.059$).

Discussion

Two models were used to explore the impact of corporate governance traits on carbon emission disclosure in Indonesian non-financial enterprises. The analysis resilience is demonstrated by the consistency of the outcomes from the study models. H2, which contends that organizations with a higher proportion of independent directors on the board are more likely to engage in carbon emission disclosure, is supported by the fact that independent boards have a considerable impact on the disclosure of carbon emissions. This finding is consistent with the results displayed by Kılıç & Kuzey, (2019); Liao et al., (2015); Ben-Amar et al., (2017); Yunus et al., (2016). The fact that independent directors are not subject to the same pressure from shareholders and management, since internal directors are most likely reason for this good connection (Hussain et al., 2018). The research findings reveal that companies with a greater proportion of independent boards may have greater independence and a inclination to react to the revelation of carbon emissions as a consequence of improved corporate reporting standards' accountability and transparency.

Nationality diversity boards are positively associated with carbon emission disclosure, supporting H3. According to this study, companies that have a higher proportion of foreign directors on their boards are more likely to publish information about their carbon emissions. According to Estelyi, (2016) overseas partners, overseas subsidiaries, or

international activities are examples of the global presence of businesses with foreign directors. As a result, organizations having international representation on their boards may find themselves the focus of pressure from a variety of stakeholder groups about environmental issues. This result is in line with the findings published by Kılıç & Kuzey (2019).

The study's conclusions refute hypothesis 1 by showing that gender diversity boards are not connected to disclosure of carbon emissions. This outcome is consistent with the research findings released by Prado-Lorenzo & Garcia-Sanchez, (2010) and Kılıç & Kuzey, (2019) but contradicts the results reported by Liao et al., (2015) and Ben-Amar et al., (2017). In this case, the non-significant results may be because there are very few women serving as directors on the boards of non-financial corporations in Indonesia.

Profitability is one of the controllable elements that significantly affects the disclosure of carbon emissions. This result indicates a significant positive influence. Several reasons are given because larger companies have more profits and can voluntarily engage in carbon emission disclosure.

Conclusion

The purpose of this study is to assess how board independence, diversity in terms of nationality and gender, and impact carbon emission disclosure in non-financial companies listed on the Indonesia Stock Exchange between 2020-2022. Using the stakeholder theory and legitimacy theory assumptions, this research attempts to expand on previous literature. The main findings show that board independence and carbon emission disclosure are positively correlated, as well as a positive relationship between board diversity in terms of nationality. But there isn't any discernible impact for gender diversity on the board. This implies that companies with nationality diversity boards and independent boards have a relatively high awareness of carbon emission disclosure. Several limitations of This work can act as a basis for more research in the future. One limitation is the scarcity of female directors in top management, as top management positions in companies are still predominantly occupied by men. The study's results support the notion that non-financial Indonesian enterprises still disclose relatively little about their carbon emissions. This has implications for policymakers to establish regulations that encourage disclosure performance.

REFERENCE

Aji, N. P., Rahman, F. A., A'zizah, L. O. F., & Widiawati, M. W. (2023). Carbon Emission Disclosure: The Influence of External Stakeholder Preasure and Enviroment Perfomance. *Sinomics Journal*, *2*(3), 687–700.

Akhtaruddin, M., & Hossain, M. A. (2009). *Corporate Governance and Voluntary Disclosure in Corporate Annual Reports of Malaysian Listed Firms*. https://www.researchgate.net/publication/237435847

Bae Choi, B., Lee, D., & Psaros, J. (2013). An analysis of Australian company carbon emission disclosures. *Pacific Accounting Review*, *25*(1), 58–79. https://doi.org/10.1108/01140581311318968

Bear, S., Rahman, N., & Post, C. (2010). The Impact of Board Diversity and Gender Composition on Corporate Social Responsibility and Firm Reputation. *Journal of Business Ethics*, *97*(2), 207–221. https://doi.org/10.1007/s10551-010-0505-2

Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board Gender Diversity and Corporate Response to Sustainability Initiatives: Evidence from the Carbon Disclosure Project. *Journal of Business Ethics*, *142*(2), 369–383. https://doi.org/10.1007/s10551-015-2759-1

Chithambo, L., & Tauringana, V. (2014). Company Spesific Determinants of Greenhouse Gas Disclosure. *Applied Accounting Research*.

Cotter, J., & Najah, M. M. (2013). Corporate climate change disclosure practices and regulation: The influence of institutional investors. *Critical Studies on Corporate Responsibility, Governance and Sustainability*, *5*, 81–97. https://doi.org/10.1108/S2043-9059(2013)0000005012

Darus, F., Mohd Zuki, H. I., & Yusoff, H. (2020). The path to sustainability: Understanding organisations' environmental initiatives and climate change in an emerging economy. *European Journal of Management and Business Economics*, *29*(1), 84–96. https://doi.org/10.1108/EJMBE-06-2019-0099

Deegan, C., & Unerman, J. (2011). *Financial Accounting Theory: European Edition*.

El-Bassiouny, D., & El-Bassiouny, N. (2019). Diversity, corporate governance and CSR reporting. *Management of Environmental Quality: An International Journal*, *30*(1), 116–136. https://doi.org/10.1108/MEQ-12-2017-0150

Estelyi, K. S. (2016). Diverse Boards : Why do Firm Get Foreign Nationals on their Boards? *Journal of Corporate*, *39*.

Febriani, R. (2020). PENGARUH LIKUIDITAS DAN LEVERAGE TERHADAP NILAI PERUSAHAAN DENGAN PROFITABILITAS SEBAGAI VARIABEL INTERVENING. *Jurnal Pendidikan, Akuntansi, Dan Keuangan*, *3*(2).

Ghozali, I. (2018). *Aplikasi Analisis Multivariate dengan Program IBM SPSS 25, Edisi 9*.

Harmoni, A. (2013). Stakeholder-Based Analysis of Sustainability Report: A Case Study on Mining Companies in Indonesia. In *204 INTERNATIONAL CONFERENCE ON EURASIAN ECONOMIES*.

Hörisch, J., Freeman, R. E., & Schaltegger, S. (2014). Applying Stakeholder Theory in Sustainability Management: Links, Similarities, Dissimilarities, and a Conceptual Framework. *Organization and Environment*, *27*(4), 328–346. https://doi.org/10.1177/1086026614535786

Hossain, M., Al Farooque, O., Momin, M. A., & Almotairy, O. (2017). Women in the boardroom and their impact on climate change related disclosure. *Social Responsibility Journal*, *13*(4), 828–855. https://doi.org/10.1108/SRJ-11-2016-0208

Hussain, N., Rigoni, U., & Orij, R. P. (2018). Corporate Governance and Sustainability Performance: Analysis of Triple Bottom Line Performance. *Journal of Business Ethics*, *149*(2), 411–432. https://doi.org/10.1007/s10551-016-3099-5

Jizi, M. I., Salama, A., Dixon, R., & Stratling, R. (2014). Corporate Governance and Corporate Social Responsibility Disclosure: Evidence from the US Banking Sector. *Journal of Business Ethics*, *125*(4), 601–615. https://doi.org/10.1007/s10551-013-1929-2

Kılıç, M., & Kuzey, C. (2019). The effect of corporate governance on carbon emission disclosures: Evidence from Turkey. *International Journal of Climate Change Strategies and Management*, *11*(1), 35–53. https://doi.org/10.1108/IJCCSM-07-2017-0144

Konadu, R., Ahinful, G. S., Boakye, D. J., & Elbardan, H. (2017). *Board Gender Diversity, Environmental Innovation and Corporate Carbon Emissions*.

Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *British Accounting Review*, *47*(4), 409–424. https://doi.org/10.1016/j.bar.2014.01.002

Mahadeo, J. D., Oogarah-Hanuman, V., & Soobaroyen, T. (2011). Changes in social and environmental reporting practices in an emerging economy (2004-2007): Exploring the relevance of stakeholder and legitimacy theories. *Accounting Forum*, *35*(3), 158–175. https://doi.org/10.1016/j.accfor.2011.06.005

Mahardika, D. P. K. (2022). Internalisasi Isu Perubahan Iklim Dalam Laporan Keuangan. *Jurnal AKuntansi Multiparadigma*, *13*, 111–127.

Mardini, G., & Elleuch Lahyani, F. (2022). Impact of foreign directors on carbon emissions performance and disclosure: empirical evidence from France. *Sustainability Accounting, Management and Policy Journal*, *13*, 221–246. https://doi.org/10.1108/SAMPJ-09-2020-0323

Mateo-Márquez, A. J., González-González, J. M., & Zamora-Ramírez, C. (2022). An international empirical study of greenwashing and voluntary carbon disclosure. *Journal of Cleaner Production*, *363*. https://doi.org/10.1016/j.jclepro.2022.132567

Mujiyati, & Ulinuha, O. I. (2023). How About Good Corporate Governance, Size, Leverage, Financial Perfomance. *Riset Akuntansi Dan Keuangan Indonesia*, *8*, 93–99.

Prado-Lorenzo, J. M., & Garcia-Sanchez, I. M. (2010). The Role of the Board of Directors in Disseminating Relevant Information on Greenhouse Gases. *Journal of Business Ethics*, *97*(3), 391–424. https://doi.org/10.1007/s10551-010-0515-0

Rankin, M., Windsor, C., & Wahyuni, D. (2011). An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system: Australian evidence. *Accounting, Auditing and Accountability Journal*, *24*(8), 1037–1070. https://doi.org/10.1108/09513571111184751

Suchman, M. C. (1995). Managing Legitimacy: Strategic and Institutional Approaches. *The Academy of Management Review*, *20*(3), 571. https://doi.org/10.2307/258788

Sugiono. (2016). *Metode Penelitian Kuantitatif, Kualitatif, R&D*.

Witono, B., Permatasari, W. D., & Puspawati, D. (2023). Accounting Conservatism: Gender Diversity and Educational Background on the Board of and Educational Background on the Board of Directors and Commissioner Directors and Commissioner. *Riset Akuntansi Dan Keuangan Indonesia* . http://journals.ums.ac.id/index.php/reaksi/index

Yunus, S., Elijido-Ten, E., & Abhayawansa, S. (2016). Determinants of carbon management strategy adoption: Evidence from Australia's top 200 publicly listed firms. *Managerial Auditing Journal*, *31*(2), 156–179. https://doi.org/10.1108/MAJ-09-2014-1087