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Research Article

The Influence of Board of Directors' Demographic Background on Carbon Emission Disclosure (An Empirical Study on Energy Sector Companies Listed on the Indonesia Stock Exchange in 2021–2023)

Luh Putu Citra Kusuma[1*], I Nyoman Wijana Asmara Putra[2]

[1] Faculty of Economics and Business; Udayana University, Indonesia; e-mail : citra.kusuma21@student.unud.ac.id
[2] Faculty of Economics and Business; Udayana University, Indonesia; e-mail :wijana_asmara@unud.ac.id
***** Corresponding Author: **Luh Putu Citra Kusuma**

Abstract: Carbon emission disclosure is a form of corporate concern aimed at maintaining emission levels below permitted thresholds through written disclosures in sustainability reports. One of the factors identified as influencing carbon emission disclosure is the demographic background of the board of directors, including age, nationality, and educational background. This study aims to examine the influence of the board of directors' demographic background on carbon emission disclosure. The population in this study consists of energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period. The sample was selected using a purposive sampling method, resulting in 117 observations. Learning theory serves as the theoretical basis for the analysis and interpretation of the findings. Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) software. The results indicate that age, nationality, and education of the board of directors have a positive effect on carbon emission disclosure. The theoretical implication of this study is that demographic backgrounds of board members contribute to the adoption of environmental reporting practices. Practically, the findings are expected to provide useful information and considerations for companies, investors, and policymakers in decision-making processes.

Keywords: Age, Nationality, Education, Board of Directors, Carbon Emission Disclosure.

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1. INTRODUCTION

This study aims to identify the factors influencing carbon emission disclosure among energy companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period. Environmental issues are inherently multidimensional and arise from various contributing factors. One of the most pressing environmental concerns that has drawn significant attention from stakeholders is carbon emissions or greenhouse gases (GHG), whose impact on climate change cannot be overlooked (Konadu et al., 2022). According to Kompas.com, 2022 marked a record-high for CO_2 emissions as reported by the International Energy Agency (IEA), with energy-related GHG emissions rising by 0.9% to 36.8 gigatons, and coal emissions increasing by 1.6%. Furthermore, the Statistical Review of World Energy 2024 ranks Indonesia as the sixth-largest GHG emitter in 2023, contributing a total of 704.4 million tons of CO_2-equivalent.

In response, the Indonesian government has demonstrated its commitment to reducing carbon emissions through Presidential Regulation No. 71 of 2011 on the Implementation of the National Greenhouse Gas Inventory and Presidential Regulation No. 61 of 2011 on the National Action Plan for Greenhouse Gas

Emission Reduction. Article 4 of Presidential Regulation No. 61/2011 explicitly stipulates that companies must also participate in emission reduction efforts. These legal frameworks serve as the foundation for establishing national mechanisms to reduce emissions across various sectors, including industry, forestry, peatlands, agriculture, energy, transportation, waste processing, and other carbon-intensive activities. Climate change, primarily driven by global warming, has emerged as a critical environmental concern in recent years.

Currently, awareness of sustainability issues is growing, including in the Indonesian regulatory landscape. Article 66(2c) of Law No. 40 of 2007 on Limited Liability Companies requires annual reports to include information on corporate social and environmental responsibility. Additionally, Financial Services Authority (OJK) Circular Letter No. 30/SEOJK.04/2016 mandates disclosures on social and environmental responsibilities in public companies' annual reports. However, carbon emission disclosure in Indonesia remains limited, as it is largely voluntary. Such disclosure represents a company's social and moral accountability to the public and is part of supplemental reporting encouraged under the Indonesian Financial Accounting Standards (PSAK), aimed at reducing carbon emissions and addressing societal pressure concerning environmental degradation from corporate activities (Dewayani & Ratnadi, 2021). This type of reporting constitutes non-financial information and is considered a key indicator of corporate performance. Stakeholders increasingly view it as a positive step toward maintaining a company's reputation (Astiti & Wirama, 2020).

This study applies learning theory to explain the influence of the board of directors' demographic background on corporate carbon emission disclosure. Learning theory explores how individuals acquire, process, and apply knowledge through experience and environmental interaction. Within this theoretical framework, the decision to disclose carbon emissions is understood not solely as a matter of regulatory compliance, but also as being shaped by the cognitive abilities and values acquired through the directors' learning experiences. The greater a director's environmental knowledge—acquired through education, professional experience, or cultural background—the more likely they are to promote carbon emission disclosure as a form of corporate responsibility. Thus, learning theory bridges the relationship between individual characteristics in corporate governance and non-financial reporting practices. As key decision-makers, board members carry demographic traits that reflect the scope and nature of their lifelong learning. Four major learning theory approaches are relevant to this study: cognitive, constructivist, behavioral, and social learning. Cognitive learning theory emphasizes mental processes such as reasoning and understanding, which are closely related to the director's age and education in shaping their awareness of environmental issues. Constructivist theory posits that knowledge is actively and reflectively constructed, suggesting that education and nationality influence the board's strategic perception of sustainability. Behavioral theory views learning as a product of habitual and reinforced actions, offering insight into the tendency of senior directors to maintain long-established behavioral patterns. Social learning theory highlights the role of social interaction and environmental observation,

implying that diverse national backgrounds may broaden perspectives and encourage more transparent and robust reporting practices. Based on this, the demographic attributes of the board—age, nationality, and education—are not merely personal characteristics but also essential factors in the strategic learning process that influences corporate decision-making, including carbon emission disclosure.

Previous research on carbon emission disclosure has spanned various industries. Syabilla et al. (2021) studied all publicly listed companies on the IDX during 2017–2019. Chika and Widianingsih (2024) focused on the energy and agriculture sectors from 2017 to 2021. Friza et al. (2023) investigated hotel sub-sector firms for the 2020–2022 period, and Armono et al. (2024) examined manufacturing companies listed on the IDX during 2021–2022. To evaluate consistency across studies and explore relevant influencing factors, this research specifically examines energy sector companies listed on the IDX between 2021 and 2023.

According to the Global Industry Classification Standard (GICS), which categorizes industries based on emission intensity, the energy sector is considered carbon-intensive due to its significantly higher emissions compared to other sectors. The Low Carbon Development Indonesia (LCDI) under the Ministry of National Development Planning (Bappenas) reports that energy accounts for 36% of global GHG emissions. Kompas.com further notes that 2022 saw a record increase in emissions, with CO_2 levels from energy production reaching 36.8 gigatons. The Global Carbon Project also identifies Indonesia as one of the world's top ten carbon-emitting countries, with a sharp 18.3% year-on-year increase in 2022— the highest among all nations.

As one of the largest carbon-emitting sectors, energy companies face growing pressure from stakeholders—government, investors, and society—to be more transparent about their environmental impacts and to take meaningful steps to mitigate emissions. Corporations are expected to communicate these impacts clearly in response to regulatory requirements and sustainability expectations. Accounting science plays a vital role in developing non-financial reporting systems, such as carbon disclosure, to provide relevant information for economic, social, and environmental decision-making.

From an accounting perspective, carbon emission disclosure falls under sustainability accounting. Within this framework, accounting evolves to encompass systematic reporting of companies' ecological impacts. Carbon disclosure forms part of broader environmental reporting aligned with international standards such as the Global Reporting Initiative (GRI). These practices are not only expressions of corporate ethical awareness but also reflect accountability and transparency—fundamental principles of accounting.

This study focuses on how the demographic backgrounds of board members influence carbon disclosure. In Indonesia's two-tier corporate governance system, the board of commissioners supervises while the board of directors manages operational decisions. The board of directors holds the ultimate authority over strategic policies, including those related to environmental and sustainability matters. Therefore, decisions regarding carbon emission disclosure in annual or sustainability reports lie

within their jurisdiction. A director's environmental awareness or relevant experience is likely to enhance responsiveness to stakeholder demands for environmental transparency.

Demographic attributes such as age, nationality, and education can shape the board's policy orientation, including decisions to voluntarily or strategically disclose carbon emissions. A well-balanced board with diverse backgrounds is believed to foster more informed decision-making and improve corporate performance (Hosny & Elgharbawy, 2022). Diversity encompasses differences in age, nationality, education, functional background, and other socio-cultural dimensions (Al-Qahtani & Elgharbawy, 2020).

Board age contributes to performance, as directors of varying ages bring different experiences, networks, and perspectives. Rashid and Barokah (2024) found that age positively affects environmental disclosure breadth in Indonesia, while Firza et al. (2023) reported no significant effect of board age on carbon disclosure. Directors under 50 years old are considered to have richer experience and greater environmental sensitivity, potentially resulting in broader disclosure.

Nationality diversity reflects the presence of board members from different countries. Syabilla et al. (2021) found a positive association between nationality and carbon disclosure, whereas Firza et al. (2023) concluded that foreign directors had no significant influence.

Education represents another dimension of board diversity. Higher education levels are believed to broaden directors' strategic perspectives and preparedness to address future risks. Firza et al. (2023) found that directors with higher education levels better understand environmental performance strategies, thereby supporting carbon emission disclosure.

This study differs from prior research in several ways. First, it focuses on energy companies listed on the IDX during 2021–2023, aligning with Chika and Widianingsih (2024) and aiming to test the consistency of earlier findings. The energy sector is chosen due to its status as one of the largest GHG contributors globally, with emissions tripling from 10 gigatons of CO_2 in 1999 to 33 gigatons in 2019, accounting for 36% of global GHGs. Developing countries, including Indonesia, show rising emissions trends in this sector (Low Carbon Development, 2020).

Second, this study uses board demographic variables—age, nationality, and education—as explanatory factors for carbon disclosure. Unlike previous studies that emphasized financial aspects, this research takes a non-financial governance perspective, focusing on board composition and its role in environmental accountability.

Third, this study addresses research gaps, such as inconsistencies in prior findings regarding the effect of demographic variables on carbon disclosure. These inconsistencies may stem from sample size, study period, analytical techniques, or measurement approaches. This study uses average values instead of proportions to better represent demographic characteristics.

Finally, this study introduces two control variables—firm size and firm age—whereas previous studies mostly examined the influence of independent variables alone.

2. METHOD

This study employs a quantitative approach with a causal associative research design to examine the influence of board of directors' age, nationality, and education on carbon emission disclosure among energy companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period. Firm size and firm age are included as control variables. Data were collected through purposive sampling, resulting in 117 observations, and were analyzed using multiple linear regression, which incorporated classical assumption tests as well as coefficient of determination (R^2), F-test, and t-test to evaluate the research hypotheses. Variable measurement was conducted through analysis of annual and sustainability reports using a content analysis approach based on the GRI 305: Emissions (2021) standard, formulated into a Carbon Emission Disclosure Index (GRI, 2021; Sugiyono, 2019; Syabilla et al., 2021).

The study focuses on energy companies that were consistently listed on the IDX throughout the 2021–2023 period, selected due to the significance of this timeframe as a post-COVID-19 phase in the implementation of sustainability strategies and energy transition efforts in Indonesia. This period also reflects heightened national and global attention to environmental issues, including Indonesia's commitment to achieving Net Zero Emissions by 2060 and the adoption of Environmental, Social, and Governance (ESG) principles. Quantitative data were obtained from official reports downloaded from the IDX and company websites, and processed through non-participant observation without direct researcher involvement in company operations (Sugiyono, 2016; Dani & Harto, 2022; Sekarini & Setiadi, 2022).

The data analysis techniques employed include descriptive statistics and multiple linear regression to assess the significance of the independent variables' influence on the dependent variable. Classical assumption tests—including normality, multicollinearity, heteroscedasticity, and autocorrelation—were performed to ensure model adequacy. The F-test was used to evaluate the overall model fit, while the t-test assessed the partial effects of each independent variable. All data processing was carried out using the latest version of SPSS software to ensure the accuracy and validity of the statistical models (Ghozali, 2018; Bahri, 2018; Sugiyono, 2019).

3. RESULTS AND DISCUSSION

Research Data Analysis Results

Classical Assumption Test

1) Normality Test.

Table 1. Normality Test Results

	Unstandardized Residual
N	117
Test Statistics	0.055
Asymp. Sig. (2-tailed)	0.200

Source: Processed data, 2025

Based on Table 1, the results of the Normality Test with the Kolmogorov-Smirnov statistical test show that the probability value of significance or the Asymp. Sig. (2-tailed) coefficient is 0.200, which is greater than 0.05, so it can be concluded that the residual data used in this study is normally distributed.

2) Multicollinearity Test

Table 2. Multicollinearity Test Results

Variables	*Collinearity Statistics*	
	Tolerance	VIF
Age	0,977	1,024
Nationality	0,908	1,101
Education	0,972	1,028
Company Size	0,797	1,254
Company Age	0,855	1,169

Source: Processed data, 2025

Based on Table 2, the results of the multicollinearity test show that the tolerance values are as follows: age = 0.977, nationality = 0.908, education = 0.972, company size = 0.797, and company age = 0.855. All independent variables have tolerance values greater than 0.10. Table 2 also shows the VIF (Variance Inflation Factor) values: age = 1.024, nationality = 1.101, education = 1.028, company size = 1.254, and company age = 1.169. All independent variables have VIF values less than 10. Therefore, it can be concluded that there are no indications of multicollinearity in the regression model used in this study.

3) Autocorrelation Test

Table 3. Autocorrelation Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0,780	0,608	0,591	0,17273	1,929

Source: Processed data, 2025

Based on Table 3, the results of the autocorrelation test show that the Durbin-Watson value of the regression model is 1.929. At a 5% significance level, with a sample size (n) of 117 and five independent variables (k), the Durbin-Watson table value (dU) is 1.7883. Therefore, the Durbin-Watson statistic for this regression model falls between dU and 4 – dU, or $1.7883 < 1.929 < 2.2117$. This result indicates that there is no autocorrelation in the residuals.

4) Heteroscedasticity Test

The heteroscedasticity test aims to test whether in the regression model there is inequality of variance from the residual of one observation to another. A good regression model is a homoscedasticity regression model or there is no heteroscedasticity. This heteroscedasticity test uses the white test. This test can be carried out with the provision that if c2 count < c2 table, then the alternative hypothesis of heteroscedasticity in the model is rejected.

Given: C2 table = 142.138160

C2 count = n x R2 , C2 count = 117 x 0.608 = 71.136

So, the calculated c2 value < c2 table, namely 71.136 < 142.138160. Thus, it can be concluded that there are no symptoms of heteroscedasticity.

Multiple Linear Regression Analysis

Table 4. Results of Multiple Linear Regression Analysis

Model		Unstandardized Coeficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	-3,360	0,352		-9,540	<0,001
	Usia	0,002	0,003	0,036	0,606	0,546
	Kebangsaan	0,080	0,120	0,042	0,667	0,506
	Pendidikan	0,034	0,054	0,038	0,628	0,531
	Ukuran Perusahaan	0,121	0,012	0,675	10,142	<0,001
	Umur Perusahaan	0,004	0,001	0,171	2,670	0,009

Source: Processed data, 2025

Based on Table 4: Results of the Multiple Linear Regression Analysis, the constant (α) is -3.360, while the regression coefficients are as follows: age (β_1) = 0.002, nationality (β_2) = 0.080, education (β_3) = 0.034, firm size (β_4) = 0.121, and firm age (β_5) = 0.004. Based on these values, the multiple linear regression equation is formulated as follows:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4(\text{Control}) + \beta_5(\text{Control}) + \varepsilon \quad \text{.....(1)}$$

$$Y = -3.360 + 0.002X_1 + 0.080X_2 + 0.034X_3 + 0.121(\text{Control}) + 0.004(\text{Control}) + \varepsilon \quad \text{..... (1)}$$

Description:

Y = Carbon Emission Disclosure

α = Constant

β = Regression Coefficient

X_1 = Age

X_2 = Nationality

X_3 = Education

Control = Firm Size and Firm Age

ε = Error Term

Explanation of the regression equation is as follows:

1. The constant value of -3.360 indicates that if age, nationality, education, firm size, and firm age are all zero, then the carbon emission disclosure decreases by 3.360 units.
2. The regression coefficient for board age is 0.002, indicating that for each one-unit increase in board age, assuming other variables remain constant, carbon emission disclosure increases by 0.002 units.
3. The regression coefficient for board nationality is 0.080, meaning that a one-unit increase in board nationality—under the assumption that other variables remain constant—will increase carbon emission disclosure by 0.080 units.
4. The regression coefficient for board education is 0.034, indicating that a one-unit increase in board education—ceteris paribus—leads to a 0.034-unit increase in carbon emission disclosure.
5. The regression coefficient for firm size is 0.121, meaning that for each additional unit of firm size, assuming other variables remain constant, carbon emission disclosure increases by 0.121 units.
6. The regression coefficient for firm age is 0.004, suggesting that a one-unit increase in firm age, holding other variables constant, increases carbon emission disclosure by 0.004 units.

Coefficient of Determination Test (R2)

Table 5. Results of the Determination Coefficient Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,780	0,608	0,591	0,17273

Source: Processed data, 2025

Based on Table 5, the Results of the Coefficient of Determination Test show that the Adjusted R Squared value is 0.591. This indicates that 59.1 percent of the variation in carbon emission disclosure is influenced by the age, education, and nationality of the board of directors, as well as by firm size and firm age. The remaining 40.9 percent is influenced by other variables outside the regression model used in this study.

Model Feasibility Test (F Test)

Table 6. Model Feasibility Test Results

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	5,146	5	1,029	32,498	<0,001
	Residual	3,312	111	0,030		
	Total	8,458	116			

Source: Processed data, 2025

Based on Table 6, the Results of the Model Feasibility Test show a significance value of <0.001, which is less than 0.05. This indicates that the variables age, nationality, and education of the board of directors (along with the control variables of firm size and firm age) jointly have a significant effect on carbon emission disclosure.

Hypothesis Testing (t-Test)

The t-test was conducted to examine the partial effect of each independent variable (profitability and perception of environmental reputation) on the dependent variable (carbon emission disclosure). In this study, the results of the t-test can be found in Table 4.

Based on Table 4, the independent variable age has a significance value of 0.546 — greater than 0.05. Therefore, age does not have a statistically significant effect on carbon emission disclosure at the 90%, 95%, or 99% confidence levels. The independent variable nationality has a significance value of 0.506 — also greater than 0.05. Thus, nationality does not significantly affect carbon emission disclosure at the 90%, 95%, or 99% confidence levels. The independent variable education has a significance value of 0.531 — which is greater than 0.05. Hence, education does not significantly influence carbon emission disclosure at any of the examined confidence levels (90%, 95%, or 99%).

Table 4 also shows that the control variable firm size has a significance value of <0.001, indicating a statistically significant effect on carbon emission disclosure at the 99% confidence level. Meanwhile, the control variable firm age has a significance value of 0.009, meaning it significantly affects carbon emission disclosure at the 99% confidence level.

Discussion of Research Findings

The Influence of Age on Carbon Emission Disclosure

Based on the statistical test results, the age of the board of directors has a positive effect on carbon emission disclosure. This finding indicates that Hypothesis H1 is accepted. This result is consistent with the studies by Rahma et al. (2024) and Rashid & Barokah (2024), which state that the age of the board of directors positively influences carbon emission disclosure. The positive effect of the board's age suggests that the older the average age of the board of directors, the greater the extent of carbon emission disclosure by the company. Senior board members are more capable of making accurate and strategic decisions based on their experience.

However, the significance level of the age variable on carbon emission disclosure is 0.546, which implies that the effect is not statistically significant at the 90%, 95%, or 99% confidence levels. This is in line with the findings of Firza et al. (2023), Damanik & Dewayanto (2021), and Rahma et al. (2024), who also found that the age of board members has no significant impact on carbon emission disclosure. A possible explanation for this insignificance is the occurrence of board turnover during the observation period. Over the three-year period across 40 companies, the composition of the board changed in most firms, with new members either replacing or augmenting the existing directors. Data shows that 25 out of 40 companies experienced changes in board composition during the study period. These changes may have shifted the board's focus, potentially altering previously established policies. Additionally, new directors may lack sufficient familiarity with the company, limiting their ability to optimize decision-making, including on environmental matters. This is

presumed to be the reason why the influence of age on carbon emission disclosure was not statistically significant.

The Influence of Nationality on Carbon Emission Disclosure

The statistical analysis reveals a positive effect of the board of directors' nationality on carbon emission disclosure. This supports Hypothesis H2. The result aligns with studies by Damanik & Dewayanto (2021), Armono & Santosa (2024), Syabilla et al. (2021), Khairunnisa et al. (2024), and Chika & Widianingsih (2024), which all found a positive relationship between foreign board members and carbon emission disclosure. The positive influence indicates that the more foreign directors present on a board, the higher the level of carbon emission disclosure. Foreign directors often bring broader perspectives, especially on global environmental issues such as emissions reporting.

Nonetheless, the significance level for nationality is 0.506, which means the effect is not statistically significant at the 90%, 95%, or 99% confidence levels. This is consistent with the findings of Armono & Santosa (2024) and Firza et al. (2023). A plausible explanation is that the majority of the 117 observations (from 40 companies) had predominantly domestic board members. The data shows that only 35 of the 117 observations involved foreign board members, while the rest were entirely composed of Indonesian directors. Consequently, the learning and influence expected from foreign directors concerning environmental issues may have been limited. This may explain why nationality had no significant effect on carbon emission disclosure during the study period.

The Influence of Education on Carbon Emission Disclosure

The statistical results also show that the education level of the board of directors positively influences carbon emission disclosure. This supports Hypothesis H3. The finding is consistent with previous studies by Firza et al. (2023) and Armono & Santosa (2024), which found a positive relationship between education level and carbon emission disclosure. This indicates that higher educational attainment among board members corresponds with a greater extent of carbon disclosure. A more educated board is better equipped to understand complex sustainability issues, including environmental reporting.

However, the significance level for education is 0.531, which is greater than 0.05, indicating no statistically significant effect at the 90%, 95%, or 99% confidence levels. This result is in line with Armono & Santosa (2024), who also found no significant effect of education on carbon emission disclosure. A contributing factor may be the relatively unchanged education level of the board over the three-year observation period. Only 7 out of 40 companies experienced improvements in the education level of their board members. This suggests that limited educational changes resulted in a suboptimal impact on decision-making, thereby explaining the insignificant influence of education on disclosure practices.

4. CONCLUSION

1. The age of the board of directors has a positive influence on carbon emission disclosure. The findings indicate that a higher average age among board members is associated with greater carbon disclosure. Older directors tend to have more experience, which benefits strategic decision-making, including environmental disclosure. However, in this study, the effect was not statistically significant, likely due to high board turnover from 2021 to 2023, which disrupted the continuity and focus necessary for impactful disclosure.
2. The nationality of the board of directors also has a positive, though not statistically significant, influence on carbon emission disclosure. An increasing number of foreign directors in a company tends to enhance global and environmental perspectives, which may lead to improved disclosure. However, due to the predominance of domestic directors in the observed companies, this positive influence was limited.
3. The education level of the board of directors positively influences carbon emission disclosure, albeit insignificantly. Higher education levels among board members typically contribute to broader perspectives on corporate social and environmental responsibilities. Nonetheless, limited improvements in board education levels during the observation period likely contributed to the lack of statistical significance in this relationship.

REFERENCES

[1]. Al-Qahtani, M., & Elgharbawy, A. (2020). The effect of board diversity on disclosure and management of greenhouse gas information: evidence from the United Kingdom. Journal of Enterprise Information Management, 33(6), 1557–1579. https://doi.org/10.1108/JEIM-08-2019-0247

[2]. Armono, D., & Santosa, A. A. (2024). Pengaruh Direktur Asing, Tingkat Pendidikan Komisaris, Sistem Manajemen Lingkungan, dan Kinerja Lingkungan Terhadap Pengungkapan Emisi Karbon. Jurnal Aplikasi Bisnis, 540–552.

[3]. Asmeri, R., Anggraini, M. D., & Amidah, N. O. (2022). Pengaruh Profitabilitas, Umur Perusahaan Dan Debt To Equity Ratio Terhadap Pengungkapan Emisi Karbon Pada Perusahaan Manufaktur Yang Terdaftar Di Bei Dari Tahun 2017-2018. Pareso Jurnal, 4(4), 881–898.

[4]. Astiti, N. N. W., & Wirama, D. G. (2020). Faktor-Faktor yang Memengaruhi Pengungkapan Emisi Karbon pada Perusahaan yang Terdaftar di Bursa Efek Indonesia. E-Jurnal Akuntansi, 30(7), 1796. https://doi.org/10.24843/eja.2020.v30.i07.p14

[5]. Asyifa, D. A., & Burhany, D. I. (2022). Carbon Emission Disclosure and Environmental Performance Effect on Firm Value. Carbon, 5(7).

[6]. Bahri, S. (2018). Metodologi Penelitian Bisnis Lengkap dengan teknik Pengolahan Data SPSS. Yogyakarta: CV Andi Offset.

[7]. Chika, J., & Widianingsih, L. P. (2024). Effect Of Board Characteristics On Carbon Emission Disclosure In Energy And Agricultural Sector Companies. Berkala Akuntansi Dan Keuangan Indonesia, 9(1), 1–17. https://doi.org/10.20473/baki.v9i1.45808

[8]. Choi, B. 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

[9]. Damanik, G. M., & Dewayanto, T. (2021). Analisis Pengaruh Diversitas Dewan Komisaris Terhadap Corporate Social Responsibility Disclosure (Studi Empiris Pada Perusahaan Manufaktur yang Terdaftar di Bursa Efek Indonesia Tahun 2015-2018). Diponegoro Journal Of Accounting, 10(1), 1–14. http://ejournal-s1.undip.ac.id/index.php/accounting

[10]. Dani, I. M., & Harto, P. (2022). Pengaruh Kinerja Lingkungan Dan Green Investment Terhadap Pengungkapan Emisi Karbon. Diponegoro Journal of Accounting, 11(4).

[11]. Dewayani, N. P. E., & Ratnadi, N. M. D. (2021). Pengaruh Kinerja Lingkungan, Ukuran Perusahaan, Profitabilitas dan Pengungkapan Emisi Karbon. E-Jurnal Akuntansi, 31(4). https://doi.org/10.24843/eja.2021.v31.i04.p04

[12]. Dwinanda, I. M., & Kawedar, W. (2019). Pengaruh Belanja Modal, Umur Perusahaan, Pertumbuhan, Dan Rasio Utang Terhadap Pengungkapan Emisi Karbon Dan Reaksi Saham. Diponegoro Journal of Accounting, 8(4).

[13]. Firmansyah, A., Jadi, P. H., Febrian, W., & Sismanyudi, D. (2021). Pengaruh Tata Kelola Perusahaan dan Ukuran Perusahaan Terhadap Pengungkapan Emisi Karbon di Indonesia. Jurnal Informasi, Perpajakan, Akuntansi, Dan Keuangan Publik, 16(2), 303–320. https://doi.org/10.25105/jipak.v16i2.9420

[14]. Firza, E., Widya Oktarini, K., & Febrianti, D. (2023). Pengaruh Board Diversity Terhadap Pengungkapan Emisi Karbon: Studi Pada Perusahaan Perhotelan Di Indonesia (Vol. 6, Issue 2).

[15]. Florencia, V., & Handoko, J. (2021). Uji Pengaruh Profitabilitas, Leverage, Media Exposure Terhadap Pengungkapan Emisi Karbon Dengan Pemoderasi. Jurnal Riset Akuntansi Dan Keuangan, 9(3), 583–598. https://doi.org/10.17509/jrak.v9i3.32412

[16]. Ghozali, I. (2018). Aplikasi Analisis Multivariate Dengan Program IBM SPSS 25 (9th ed.). Badan Penerbit-Undip.

[17]. Gultom, J. (2024). Learning Theory (Teori Pembelajaran). https://doi.org/10.13140/RG.2.2.25825.31848

[18]. Hapsoro, D., & Falih, Z. N. (2020). The Effect of Firm Size, Profitability, and Liquidity on The Firm Value Moderated by Carbon Emission Disclosure. Journal of Accounting and Investment, 21(2). https://doi.org/10.18196/jai.2102147

[19]. Hosny, K., & Elgharbawy, A. (2022). Board diversity and financial performance: empirical evidence from the United Kingdom. Accounting Research Journal, 35(4), 561–580.

[20]. Khairunnisa, A., Astuti, C. D., & Hussein, M. A. (2024). The influence of board diversity and environmental committees on carbon emission disclosures in Southeast Asian corporations. J. Green Econ. Low-Carbon Dev, 3(1), 26–35.

[21]. Konadu, R., Ahinful, G. S., Boakye, D. J., & Elbardan, H. (2022). Board gender diversity, environmental innovation and corporate carbon emissions. Technological Forecasting and Social Change, 174, 121279.

[22]. Mardini, G. H., & Lahyani, E. F. (2022). Impact of foreign directors on carbon emissions performance and disclosure: empirical evidence from France. Sustainability Accounting, Management and Policy Journal, 13(1), 221–246.

[23]. Muhammad, R., & Pribadi, P. (2020). Pengaruh Kompensasi Bonus, Pendidikan dan Komposisi Gender Dewan Direksi Terhadap Manajamen Laba pada Bank Syariah di Indonesia. Jurnal Ilmiah Ekonomi Islam, 6(1). https://doi.org/10.29040/jiei.v6i1.601

[24]. Rahma, S. F., Abunawas, A., & Ramadhan, R. R. (2024). Pengaruh Diversity Gender, Kebangsaan Asing, Dan Usia Dewan Direksi Terhadap Kinerja Keuangan Perusahaan Real Estate Dan Infrastruktur Yang Terdaftar di BEI Tahun 2015-2022. Jurnal Ilmiah Mahasiswa Merdeka EMBA, 3(2), 946–962.

[25]. Rashid, M. A. H., & Barokah, Z. (2024). Board Diversity and Environmental Disclosures: A Study of Indonesian Listed Companies. The Indonesian Journal of Accounting Research, 27(1), 65–98.

[26]. Saputra, W. S. (2019). Pengaruh diversitas dewan direksi terhadap nilai perusahaan. Jurnal Riset Manajemen Dan Bisnis (JRMB) Fakultas Ekonomi UNIAT, 4(3), 503–510.

[27]. Sekarini, L. A., & Setiadi, I. (2022). Pengaruh Leverage, Profitabilitas, Ukuran Perusahaan Dan Kinerja Lingkungan Terhadap Pengungkapan Emisi Karbon Perusahaan (Stusi Empiris Pada Perusahaan Pertambangan Yang Terdaftar Di Bursa Efek Indonesia Periode 2014-2018). Kompartemen: Jurnal Ilmiah Akuntansi, 19(2), 203–212.

[28]. Septriyawati, S., & Anisah, N. (2019). Pengaruh Media Exposure, Ukuran Perusahaan, Profitabilitas dan Leverage terhadap pengungkapan emisi karbon pada perusahaan manufaktur yang terdaftar di bursa efek indonesia periode 2014-2018. SNEB: Seminar Nasional Ekonomi Dan Bisnis Dewantara, 1(1), 103–114.

[29]. Sugiyono. (2019). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Alfabeta Bandung.

[30]. Syabilla, D., Wijayanti, A., & Fahria, R. (2021). Pengaruh investasi hijau dan keragaman dewan direksi terhadap pengungkapan emisi karbon. Konferensi Riset Nasional Ekonomi Manajemen Dan Akuntansi, 2(1), 1171–1186.

[31]. Ummah, Y. R., & Setiawan, D. (2021). Do Board of Commissioners Characteristic and International Environmental Certification Affect Carbon Disclosure? Evidence from Indonesia. Jurnal Dinamika Akuntansi Dan Bisnis, 8(2), 215–228. https://doi.org/10.24815/jdab.v8i2.21332