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Jurnal Riset Akuntansi dan Bisnis Airlangga Vol. 9 No. 2 (2024) 120-223 ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)

Institutional Ownership, Board Diversity, And Carbon Emission Disclosure

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ABSTRACT

Global warming is a crucial issue that is being discussed today. One of the causes of global warming is the development of the industrial sector, which contributes to greenhouse gas emissions. This condition requires public companies to disclose carbon emissions. This study explores the role of institutional ownership and board diversity in carbon emission disclosure (CED) in Indonesia. Board diversity refers to the female and foreign director variables. The study was conducted on manufacturing companies over three years and data analysis using moderated regression analysis. The study results revealed that institutional ownership increased CED. Nevertheless, board diversity testing as a moderation variable provides inconsistent results. The results of the interaction test revealed that the existence of female directors was able to moderate the relationship between institutional ownership and CED. Conversely, foreign directors cannot moderate the relationship between institutional ownership and CED.

ARTICLE INFO

***Article History*:**

Received xxx

Accepted xxx

Available online xxx

Keywords: **Board of directors, carbon emission disclosure, female director, foreign director**

ABSTRAK

Pemanasan global merupakan isu krusial yang sedang hangat dibicarakan saat ini. Salah satu penyebab terjadinya pemanasan global adalah perkembangan sektor industri yang berkontribusi terhadap emisi gas rumah kaca. Kondisi ini mengharuskan perusahaan publik untuk mengungkapkan emisi karbon. Penelitian ini mengeksplorasi peran kepemilikan institusional dan keberagaman dewan direksi dalam pengungkapan emisi karbon di Indonesia. Keberagaman dewan direksi mengacu pada variabel direktur perempuan dan direktur asing. Penelitian dilakukan pada perusahaan manufaktur selama tiga tahun dan analisis data menggunakan analisis regresi moderasi. Hasil penelitian menunjukkan bahwa kepemilikan institusional meningkatkan pengungkapan emisi karbon. Meskipun demikian, pengujian keberagaman dewan direksi sebagai variabel moderasi memberikan hasil yang tidak konsisten. Hasil uji interaksi menunjukkan bahwa keberadaan direktur perempuan mampu memoderasi hubungan antara kepemilikan institusional dan pengungkapan emisi karbon. Sebaliknya, direktur asing tidak mampu memoderasi hubungan antara kepemilikan institusional dan pengungkapan emisi karbon.

Kata Kunci: **Dewan direksi, pengungkapan emisi karbon, direktur perempuan, direktur asing**

Introduction

Global warming is a problem for the natural environment. This condition is due to increased greenhouse gases (GHG) in the atmosphere, which cause the warming temperature (Kılıç & Kuzey, 2019). Carbon dioxide is the main trigger for GHG, especially human activity (Rehman et al., 2020). The Global Carbon Project data shows that carbon emissions reached the highest record in 2023. Moreover, Indonesia became one of the world's highest carbon dioxide emission-producing countries (Detik.com, 2024), as shown in Figure 1.

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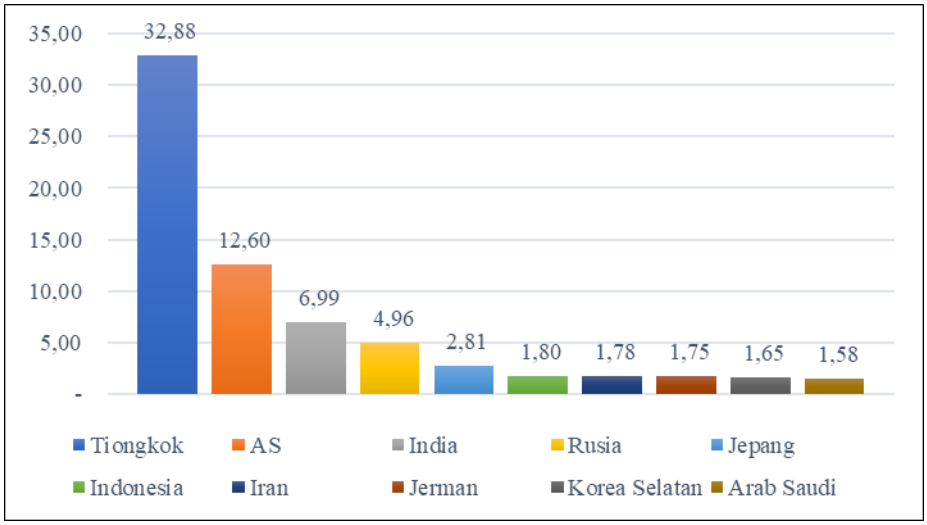
DOI: https://doi.org/10.20473/jraba.v9i2.62591

Jurnal Riset Akuntansi dan Bisnis Airlangga Vol. 9, No. 2 (2024) 210-223
ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)



Source: Detik.com (2024)

Figure 1. The ten highest carbon dioxide emissions-producing countries

Figure 1 reveals that Indonesia ranks sixth among the ten countries that produce the highest carbon dioxide emissions in the world. One cause of global warming is the mass development of the industrial sector, which increases the amount of carbon over time. This phenomenon indicates the importance of companies measuring and disclosing carbon emissions produced. Companies need to make the board's role more effective in reviewing the company's carbon emission reduction efforts (Benlemlih et al., 2023; Choi et al., 2013).

This study focuses on the role of institutional ownership that encourages companies to reduce carbon emissions in response to national and international regulatory pressures (Benlemlih et al., 2023). Institutional shareholders believe that climate change performance affects a company's reputation, and they need to identify environmental issues that are detrimental to the company (Bedi & Singh, 2024a). Previous studies have found that institutional ownership positively affects carbon emission disclosure (CED) (Amaliyah & Solikhah, 2019; Bedi & Singh, 2024a; Jaggi et al., 2017). Conversely, other studies have found a negative relationship between institutional ownership and CED (Mackenzie et al., 2016). Meanwhile, other studies have shown that institutional ownership does not significantly affect CED (Hermawan et al., 2018; Pratama, 2021). This study needs to be re-analyzed because there are still inconsistencies results.

The board of directors is the party responsible for every decision-making process in the company. Gender diversity determines decision-making in the company. The presence of female directors will strengthen governance and communication effectiveness with stakeholders (Gonenc & Krasnikova, 2022). They also encourage the company's concern for environmental issues and climate change mitigation efforts. Likewise, foreign directors are seen as having more insight and experience to meet stakeholder demands to report non-financial information, such as carbon emissions. Nevertheless, few empirical studies have examined the role of gender directors on CED (Gonenc & Krasnikova, 2022). Studies on the role of foreign directors in encouraging CED are also relatively

DOI: https://doi.org/10.20473/jraba.v9i2.62591

Jurnal Riset Akuntansi dan Bisnis Airlangga Vol. 9. No. 2 (2024) 974-991
ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)

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limited (Mardini & Lahyani, 2021). This study uses director diversity as a moderator variable in the relationship between institutional ownership and CED.

This study aims to explore the role of institutional ownership and board diversity in CED. The results close the research gap using the stakeholder theory lens while providing empirical evidence related to the role of corporate governance elements in CED. This study provides practical contributions to companies' efforts to pay attention to environmental issues, considering that Indonesia produces significant carbon emissions. These findings provide insight to all stakeholders that institutional share ownership and board diversity contribute positively to mitigating climate change.

Literature review

Stakeholder theory

Stakeholder theory is widely used in discussions related to sustainability aspects. This theory emphasizes that a company's existence is not only to fulfill its interests but also to provide benefits to stakeholders (Bedi & Singh, 2024b). Stakeholders are individuals or groups that can support an organization's existence (McGrath & Whitty, 2017), such as achieving organizational goals. Stakeholders such as creditors, suppliers, consumers, society, government, and others have a vital role in maintaining sustainability.

In sustainability, companies must balance three aspects: economic, social, and environmental (Budanti & Rustiarini, 2024). This principle reminds companies not only to focus on economic achievements but also to pay attention to the influence of company activities on the natural environment. The bigger the company, the more significant the influence of operational activities on the environment (Primadona & Rustiarini, 2024). Stakeholders expect companies to convey the negative consequences of operational activities transparently. CED is a communication instrument to report climate company operations for stakeholders (Bedi & Singh, 2024a). CED is a company strategy to reduce information ambiguity and align company goals with stakeholder expectations (Al-Amosh & Mansor, 2020).

Carbon emission disclosure

GHG is an essential topic because of the increasing amount of GHG. Natural and human activities generally produce GHG, but human activities currently produce most. The increase in GHG is mainly caused by carbon dioxide, methane, nitrous oxide, and fluorinated gases (Pratama, 2021). These emissions are estimated to increase until 2030, along with the increase in consumption of oil, natural gas, and coal (Lindungihutan.com, 2023).

GHG has become a global issue in various countries, including Indonesia. Ironically, Indonesia is one of the largest GHG emitters in the world. Several activities that trigger an increase in emissions are deforestation, land conversion, peatland degradation, and industrial growth. Several corporate sectors also contribute to GHG emissions in Indonesia, such as energy, industry, transportation, and agriculture (Lindungihutan.com, 2023). The Government of the Republic of Indonesia has issued several regulations to regulate and monitor

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ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)

carbon emissions to address climate change. Therefore, public companies must comply with these provisions through CED in annual or sustainability reports.

Institutional ownership and carbon emission disclosure

Institutional ownership is the ownership of shares by financial institutions, such as banks, insurance, financing, or others. This ownership is assumses more potent than individual ownership (Bedi & Singh, 2024a). Institutional investors generally have significant share ownership and are more incentivized to closely monitor the corporate's activities (Rustiarini et al., 2021; Vizandra & Mustikasari, 2021). In a sustainability context, institutional shareholders encourage companies to optimize financial and non-financial performance. Therefore, companies need to report this performance to stakeholders, one of which is through CED.

Institutional ownership is a stakeholder by institutions or institutions, so it is seen as being able to pressure companies to disclose carbon emissions (Bedi & Singh, 2024a). The ownership leads companies to care about environmental issues and implement strategies to reduce carbon emissions. Institutional investors tend to invest in green stocks and sell shares of companies with high GHG emissions. They encourage companies to reduce GHG emissions (Benlemlih et al., 2023). High institutional ownership encourages companies to be transparent and accountable in disclosing environmental performance through CED (Krisnawanto & Solikhah, 2019; Tia et al., 2024). Several empirical studies have found that institutional ownership positively affects CED (Amaliyah & Solikhah, 2019; Bedi & Singh, 2024a; Jaggi et al., 2017). The first hypothesis is formulated as follows:
H1: Institutional ownership positively affects CED.

Board diversity as a moderating variable

Board diversity also determines CED. Gender is one of the director's characteristics widely studied in accounting. Gender diversity will increase knowledge, ideas, and insights (Rustiarini et al., 2023), primarily related to company sustainability practices. However, there have been few empirical studies examining the impact of the gender diversity of directors on CED (Gonenc & Krasnikova, 2022). Previous studies report the role of female directors in CSR disclosure (Cullinan et al., 2019; Khidmat et al., 2022; Ren et al., 2024).

Referring to feminist theory, the presence of women in management impacts corporate decisions (Tanujaya & Anggreany, 2021), including in handling environmental issues. Female directors are more interested in social and environmental actions and are more responsible for disclosing environmental information (Gonenc & Krasnikova, 2022). A study by Lim and Chung (2021) reported that female directors have more prosocial traits than male directors. Other studies document the positive effect of board diversity on voluntary GHG information (Carvajal et al., 2022; Tingbani et al., 2020). In the sustainability context, female directors and institutional shareholders increase the carbon information disclosure. Gender diversity significantly impacts the relationship between institutional ownership and CED. Benlemlih et al. (2023) revealed that gender diversity moderates the relationship between institutional ownership and GHG emissions. The hypothesis is formulated:

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Jurnal Riset Akuntansi dan Bisnis Airlangga Vol. 9. No. 2 (2024) 974-991
ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)

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H2a: Female directors strengthen the positive relationship between institutional ownership and CED.

Another director characteristic that affects the company's performance is board nationality. Foreign directors determine the board decisions to support climate change mitigation activities (Song et al., 2020; Zaid et al., 2020). Foreign directors intensify the corporate's involvement in environmental issues and increase the legitimacy of sustainability activities (Al-Amosh & Mansor, 2020). Foreign directors have several advantages, such as knowledge, experience, and international networks, thus encouraging companies to comply with policies related to environmental issues (Baker et al., 2020; Khatib et al., 2021). Institutional investors and foreign directors encourage higher carbon information disclosure to mitigate climate change activity to reduce potential environmental risks. The interaction between institutional investors and foreign directors positively influences CED. The hypothesis is formulated:

H2b: Foreign directors strengthen the positive relationship between institutional ownership and CED.

The research model is shown in Figure 2.

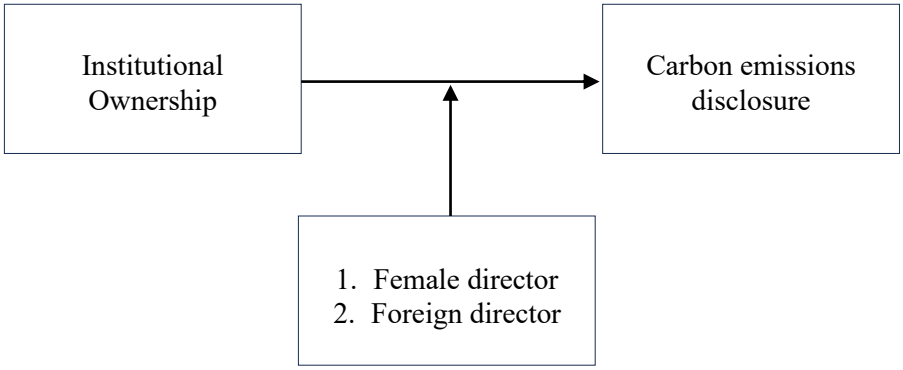

Figure 2. Research model

Research Method

This study was conducted on manufacturing companies in the Indonesian stock exchange. Manufacturing companies take raw materials from nature, and their management processes produce waste that negatively impacts environmental sustainability. The sampling method is purposive sampling, which resulted in 162 companies. There were 486 companies for the observation period of three years, 2020-2022.

This study uses CED as the dependent variable. Performance measurement uses the CED index, which refers to Choi et al.'s (2013) researchs. The index contains five categories of 18 items (checklist) of carbon information the company must disclose. It is calculated by comparing the number of items disclosed with the total number of items that should be disclosed (18 items). The source of carbon emission information is annual or sustainability reports.

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The independent variable is institutional ownership, measured using the percentage of share ownership by financial institutions, such as banks, insurance, financing, or others (Rustiarini et al., 2021; Tia et al., 2024). The moderating variable uses board diversity, reviewed from a gender and nationality perspective. Female director refers to women on the board of directors, while foreign director refers to foreign directors (non-Indonesian citizens) on the board. Both variables are measured using dummy variables, given a value of 1; if the company has female and foreign directors, otherwise given a value of zero. This study also uses four control variables, namely, profitability (return on assets), liquidity (current ratio), leverage (debt to asset ratio), and firm size (logarithm of total assets). The data analysis technique uses moderated regression analysis.

Result and Discussion

This study obtained 486 data for a three-year observation period based on purposive sampling. The descriptive statistical results showed that the average level of CED of companies was still below the average, which was 36.75. This index suggests that few manufacturing companies have disclosed carbon emissions to the maximum. The average share ownership by institutional investors was 76.81 percent. This result shows that the percentage of share ownership by financial institutions is relatively large because it has an average of more than 50 percent. The average number of female and foreign directors is still low, at 0.44 and 0.39. Meanwhile, the average value for the control variables for profitability (2.72), liquidity (510.54), leverage (52.44), and firm size (28.61).

Hypothesis testing uses moderated regression analysis, previously tested using classical assumptions. The normality test results using Kolmogorov Smirnov showed a significance value of 0.09, indicating that the data distribution is normal. Multicollinearity testing produces a tolerance value of more than 0.10 and a variance inflation factor of less than 10. The regression model is also not heteroscedastic. This model also passes the autocorrelation test. Meanwhile, the model feasibility test results produce an adjusted R-Square value of 0.160, is means that the influence of institutional ownership and board diversity variables on CED is only 16 percent. The next test is a hypothesis test, presented in Table 1.

Table 1. Moderated regression test result

Variable	Prediction	Coef	Std. Error	Sig.
Inst_Own	H1 (+)	0.105	0.041	0.011
Ins_Own*Fem_Dir	H2a (+)	0.056	0.028	0.044
Ins_Own*For_Dir	H2b (+)	0.006	0.078	0.935
Prof	+	0.164	0.075	0.030
Liq	+	0.000	0.000	0.209
Lev	-	-0.027	0.024	0.254
Size	+	1.118	0.705	0.114
N	486			
Adjusted R-Square	0.160			
Probability (F-statistic)	0.001			

Source: Processed data (2024)

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Jurnal Riset Akuntansi dan Bisnis Airlangga Vol. 9. No. 2 (2024) 974-991
ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)

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This study examines the role of institutional ownership on CED. The test results show a significance value of 0.011, thus supporting H1. Meanwhile, the moderation test results showed different results. The interaction between institutional ownership and female directors significantly affects CED. Conversely, the results of the interaction test between institutional ownership and foreign directors did not show any significant relationship. Thus, this study supports H2a but does not support H2b. The four control variables' test results prove that all control variables did not affect CED.

The first hypothesis states that institutional ownership positively affects CED; it supports the formulated hypothesis. Based on stakeholder theory, companies should align the company's interests and stakeholders, including caring about environmental issues. One external party that emphasizes this is institutional shareholders. Pressure from institutional investors forces company management to disclose information about the company's concern for environmental issues. Institutional shareholders are essential in implementing ethical and responsible practices in the company (Krisnawanto & Solikhah, 2019). CED is a form of corporate accountability to stakeholders for the company's negative environmental impact. Therefore, the more significant institutional shareholding, the higher investor pressure on management to disclose carbon emissions (Amaliyah & Solikhah, 2019; Bedi & Singh, 2024a; Jaggi et al., 2017; Tia et al., 2024). This study also aligns with previous studies, which reported that companies with high institutional ownership pressure companies to pay more attention to climate change issues and encourage companies to reduce GHG emissions (Benlemlih et al., 2023).

The results of the second hypothesis test revealed that the interaction between institutional ownership and female directors significantly increased CED. Female directors moderate the relationship between institutional ownership and CED. Based on the lens of stakeholder theory, institutional shareholders and gender diversity on the board of directors will strengthen corporate governance. Institutional investors encourage companies to reduce carbon emissions in response to regulatory pressure (Benlemlih et al., 2023). This is consistent with the character of female directors, who tend to have a higher interest in social and environmental goals, thus emphasizing efforts to handle environmental issues adequately (Hollindale et al., 2019). Additionally, the presence of women on the board strengthens the relationship between the company and its stakeholders. They will interact more with stakeholders to fulfill social and environmental responsibilities. Therefore, institutional investors and female directors increase the company's responsibility in climate change mitigation efforts by disclosing carbon emission information. This study supports research (Benlemlih et al., 2023), which reports that gender diversity moderates the relationship between institutional ownership and GHG emissions.

Contrarily, with two previous hypotheses, the interaction test of institutional ownership and foreign directors did not significantly affect CED. Thus, foreign directors cannot moderate the relationship between institutional ownership and CED. Based on the stakeholder theory perspective, foreign directors on the board of directors will intensify the company's involvement in

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environmental issues and increase the legitimacy of disclosing sustainability activities (Al-Amosh & Mansor, 2020). The presence of foreign directors is seen as having several advantages, such as knowledge and international experience, so they can bring new perspectives that encourage companies to adopt policies related to environmental issues (Baker et al., 2020; Khatib et al., 2021). However, the empirical results revealed conflicting results caused by several conditions. First, there are differences in the legal system, bureaucracy, and culture between Indonesia and other countries. The legal system and bureaucracy in Indonesia are often considered more complex than those in the countries of origin of foreign directors. Foreign directors must still gain adequate knowledge and information regarding local environmental responsibility regulations and CED in Indonesia. Also, Indonesia's business culture and approach to the environment have unique characteristics and differ from those in other countries. These cultural differences make the process of understanding regulations more complicated and can be an obstacle to implementing sustainable practices. Second, foreign directors have responsibilities that are outside of CED. Foreign directors may be responsible for other roles, such as market development or international business strategy. In some cases, foreign directors may prioritize short-term achievements (such as financial targets) over long-term goals (such as compliance with environmental regulations). Therefore, the presence of foreign directors does not moderate the relationship between institutional ownership and CED.

This study also examines the four control variables, profitability, liquidity, leverage, and firm size, on CED. The results of statistical tests show that only the profitability variable has a significant effect on increasing CED. CED requires investment in technology and experts and is supported by good corporate governance. Companies with high profitability ratios generally have more adequate resources to make these investments to measure, monitor, and report carbon emissions (Meiryani et al., 2023). Additionally, profitable companies often receive more attention and pressure from stakeholders to be more transparent and accountable, one of which is through CED (Saraswati et al., 2021).

Meanwhile, three other control variables, liquidity, leverage, and firm size, do not affect CED. This finding is due to several conditions. Companies with high liquidity primarily focus on profit growth and business development, prioritizing something other than CED. Likewise, companies with high leverage tend to focus on debt payments and increasing profits in the short term (Widianto & Sari, 2020) instead of being used for environmental performance disclosure. The firm size variable also does not affect CED, in line with the results (Kholmi et al., 2020). This phenomenon is because each company has a different strategy. Large companies may focus on growth and expansion, while small companies focus on business continuity. This strategy determines the priority of the company's resource allocation, including CED.

Sensitivity Analysis

This study conducted a sensitivity analysis to test the robustness model. This study used the same model as the primary model test, but the foreign director variable used different indicators. In the primary model test, the foreign director measurement used a dummy

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Jurnal Riset Akuntansi dan Bisnis Airlangga Vol. 9. No. 2 (2024) 974-991
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variable, while the sensitivity analysis used the proportion of foreign directors to total directors. The results of the sensitivity analysis test are presented in Table 2.

Table 2. Sensitivity analysis test result

Variable	Prediction	Coef	Std. Error	Sig.
Inst_Own	H1 (+)	0.339	0.133	0.012
Ins_Own*Fem_Dir	H2a (+)	0.521	0.197	0.009
Ins_Own*For_Dir	H2b (+)	0.323	0.532	0.545
Prof	+	0.011	0.008	0.175
Liq	-	0.010	0.007	0.128
Lev	-	-0.043	0.035	0.216
Size	-	0.348	1.214	0.775
N	192			
Adjusted R-Square	0.480			
Probabilitas (F-statistic)	0.034			

Source: Processed data (2024)

Table 2 shows that the results of the independent and moderation variable tests in the sensitivity analysis present relatively similar results to the primary result. The institutional ownership variable positively affects CED. Nevertheless, the moderation test results show varying results. The interaction between institutional ownership and female directors effectively encourages companies to disclose carbon emissions. Still, it contrasts with the interaction test results between institutional ownership and foreign directors. Therefore, foreign directors have yet to be proven to increase company accountability in CED.

Conclusion

Global warming is a crucial issue being discussed today. This condition occurs due to increased GHG that impacts the natural environment. One of the causes of global warming is the industrial sector's development, so companies need to disclose the carbon emissions produced. This study investigates the influence of institutional ownership and board diversity on CED. Institutional ownership encourages companies to reduce carbon emissions. Meanwhile, institutional ownership has a positive effect on CED. Pressure from institutional investors forces company management to disclose carbon emissions information. The results of the interaction test show that female directors can moderate the relationship between institutional ownership and CED. However, institutional ownership and foreign directors' interaction results do not significantly affect CED. Thus, foreign directors are not proven to be a moderating variable.

Limitation

This study has limitations. First, it investigates the influence of foreign directors in CED, but the findings do not support the hypothesis. Second, the test results show an Adjusted R-square value of 0.160. This figure suggests that institutional ownership and board diversity variables influence 16 percent of CED, and other factors influence the rest.

Suggestion

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ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)

Further research could examine cultural factors to enhance the model's explanatory power. Additionally, future studies could analyze other board characteristics or types of ownership as independent or moderator variables.

Implication

The findings imply that CED is crucial in climate change mitigation efforts. To realize sustainable corporate governance, institutional investors and female directors play an essential role in decision-making for sustainable projects that reduce carbon emissions. Additionally, boards of directors and institutional investors must integrate environmental performance with sustainable financial performance, such as the task force on climate-related financial disclosures. This study also recommends that regulators develop a comprehensive carbon emission reporting framework for international standards. Regulators must also establish regulations for public companies to disclose carbon emissions transparently and periodically yearly, where an independent institution has verified the disclosure. Also, regulators must provide fiscal incentives for companies that successfully reduce carbon emissions and increase transparency.

Acknowledgment

The research team would like to thank the Ministry of Education, Culture, Research, and Technology for funding this Postgraduate Research through Master Contract No. 110/E5/PG.02.00.PL/2024, Derivative Contracts No. 2927/LL8/AL.04/2024, and K.1213/B.07.01/Unmas/VI/2024.

Ethical approval: Not applicable

Disclosure statement: The authors declare that there is no conflict of interest.

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ISSN 2548-1401 (Print) ISSN 2548-4346 (Online)

Appendix

Carbon Disclosure Checklist

No	Category	Code	Criteria
1	Climate change: risks and opportunities	CC1	Assessment/description of the risks (regulatory, physical, or general) relating to climate change and actions taken or to be taken to manage the risks.
		CC2	Assessment/description of current (and future) financial implications, business implications, and opportunities of climate change.
2	GHG emissions accounting	GHG1	Description of the methodology used to calculate GHG emissions (e.g., GHG protocol or ISO).
		GHG2	The existence of external verification of the quantity of GHG emission – if so, by whom and on what basis.
		GHG3	Total GHG emissions – metric tonnes CO 2-e emitted.
		GHG4	Disclosure of Scopes 1 and 2, or Scope 3 direct GHG emissions.
		GHG5	Disclosure of GHG emissions by sources (e.g., coal, electricity, etc.).
		GHG6	Disclosure of GHG emissions by facility or segment level.
		GHG7	Comparison of GHG emissions with previous years.
3	Energy consumption accounting	EC1	Total energy consumed (e.g., tera-joules or peta-joules).
		EC2	Quantification of energy used from renewable sources.
		EC3	Disclosure by type, facility, or segment.
4	GHG reduction and cost	RC1	Detail of plans or strategies to reduce GHG emissions.
		RC2	Specification of GHG emissions reduction target level and target year.
		RC3	Emissions reductions and associated costs or savings achieved to date as a result of the reduction plan.
		RC4	Cost of future emissions factored into capital expenditure planning.
5	Carbon emission accountability	ACC1	Indication of which board committee (or other executive body) has overall responsibility for actions related to climate change.

DOI: https://doi.org/10.20473/jraba.v9i2.62591