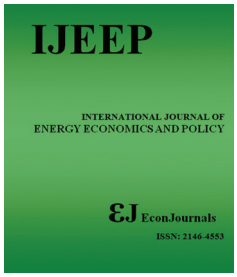

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The Influence of Corporate Governance Dimensions on Carbon Emission Disclosure: The Mediating Role of Financial Performance

Kiswanto Kiswanto[1]*, Ufi Dalilati[1], Caraka Hadi[1], Ain Hajawiyah[1], Atta Putra Harjanto[1], M. Fathur Rahman[2]

[1]Accounting Study Program, Faculty of Economics and Business, Universitas Negeri Semarang, Semarang, Indonesia, [2]Economic Education Study Program, Faculty of Economics and Business, Universitas Negeri Semarang, Semarang, Indonesia.
*Email: kiswanto@mail.unnes.ac.id

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ABSTRACT

This study aims to investigate how corporate governance dimensions (board size, board nationality diversity, and institutional ownership affect carbon emission disclosure (CED) among publicly listed firms. Additionally, this research examines the mediating role of financial performance, measured by return on assets (ROA), in the relationship between corporate governance mechanisms and the level of carbon emission disclosure. The population of this study consists of energy sector companies that are listed on the IDX from 2020 to 2024. The analysis method used was panel data regression analysis with the help of Eviews-12 software. The results are expected to show that effective corporate governance, characterized by larger board size, higher nationality diversity, and greater institutional ownership-positively influences the extent of carbon emission disclosure. Financial performance (ROA) is anticipated to mediate this relationship partially, indicating that well-governed firms achieve superior profitability, which in turn enhances transparency in environmental reporting. This study integrates the corporate governance mechanism and financial performance pathway into a unified framework to explain firms' carbon transparency behaviour. This research provides new empirical evidence from an emerging market context, highlighting how corporate governance dimensions drive voluntary carbon disclosure through financial outcomes. The study extends legitimacy and stakeholder theory by revealing that profitability serves as both a performance signal and a legitimacy tool in environmental communication. The findings contribute to global discourse on ESG integration and governance-driven sustainability disclosure.

Keywords: Corporate Governance, Carbon Emission Disclosure, Institutional Ownership, Financial Performance
JEL Classifications: G32, G34, L25

1. INTRODUCTION

Climate change is a global threat with widespread impacts on the environment and the sustainability of human life. Climate change has led to increased global temperatures and fossil-fuel-based industrial activity (Umair et al., 2024; van Asselt et al., 2024; Zhang et al., 2024). This situation requires the business world to pay attention to social and environmental sustainability (Elkington and Fennell, 1998). Indonesia is among the most significant contributors to carbon emissions, with the energy sector accounting for the majority due to its reliance on fossil fuels (Erfian et al., 2025). The government is committed to achieving net zero emissions (NZE) by 2060 through promoting transparency and carbon emission disclosure (Kiswanto et al., 2023). However, the level of carbon emission disclosure remains very low, underscoring the need for stronger corporate governance aligned with legitimacy theory (Dowling and Pfeffer, 1975; Xu et al., 2024). On the other hand, there is a gap between stakeholder demands and corporate carbon emission reporting practices. This gap is important to examine because carbon emission information not only reflects

compliance with regulations and social legitimacy, but also serves as an indicator of a company's ability to manage climate risk and maintain its long-term sustainability.

This study uses a corporate governance approach as a monitoring and control mechanism that influences disclosure behaviour (Dike and Tuffour, 2024). Furthermore, this study examines the causes of variation in carbon emissions disclosure via corporate governance (Kurnia et al., 2025; Nguyen et al., 2025). Good governance is believed to promote transparency, accountability, and more effective risk management, including environmental risks. The dimensions of corporate governance used include board size, board nationality diversity, and institutional ownership (Amin et al., 2025; Dike and Tuffour, 2024; Kurnia et al., 2025). These three dimensions represent important aspects of corporate structure and oversight that influence the extent to which environmental information is disclosed to the public.

In addition, this study introduces financial performance, measured by Return on Assets (ROA), as a mediating variable (Hadi et al., 2025). This approach aims to explore the mechanism by which effective governance can increase profitability, thereby strengthening the company's ability to invest in environmentally friendly practices (Kiswanto and Setiawan, 2022; Rahmawati et al., 2024). Furthermore, it affects broader corporate disclosure. Thus, assessing the direct influence of governance on carbon emissions disclosure and explaining the indirect path via financial performance as a form of problem-solving mechanism for low corporate environmental transparency.

Based on these issues and approaches, this study aims to analyse the effect of corporate governance dimensions (board size, board nationality diversity, and institutional ownership) on carbon emissions disclosure (Kiswanto et al., 2023; Rahmawati et al., 2024). Furthermore, it examines the mediating role of financial performance in the relationship between corporate governance and carbon emissions disclosure. Finally, it provides empirical insights into the mechanisms by which corporate governance and financial performance enhance corporate environmental transparency in developing countries.

The novelty of this study lies in integrating governance mechanisms and financial performance pathways to explain carbon emission disclosure behaviour (Kiswanto et al., 2023; Nguyen et al., 2025; Rahmawati et al., 2024). Most previous studies have examined only the direct relationship between governance and environmental disclosure, without considering financial performance as an intervening variable (Kiswanto et al., 2023; Kiswanto and Setiawan, 2022; Rahmawati et al., 2024). This mediating approach provides a new understanding: effective governance not only serves as a supervisory tool but can also create economic value that encourages broader environmental disclosure (Hadi et al., 2025; Lei et al., 2025; Sun et al., 2025; van Asselt et al., 2024). Furthermore, this research was conducted in the context of emerging markets, which still have different governance and sustainability reporting regulations compared to developed countries. Thus, the findings of this study have the potential to enrich the global literature on corporate governance and carbon disclosure by providing empirical evidence from diverse institutional contexts.

Theoretically, this study extends the application of legitimacy theory and stakeholder theory by incorporating financial performance as a transmission mechanism between corporate governance and carbon emission disclosure practices (Dowling and Pfeffer, 1975; Zhu et al., 2025). This model contributes conceptually that companies disclose information not only to meet social demands, but also because of economic incentives generated by strong financial performance resulting from effective governance. In practical terms, the results of this study are expected to provide recommendations for company management to strengthen the board's structure and composition and increase institutional investors' involvement, thereby encouraging more transparent disclosure practices. For regulators and policymakers, this research provides an empirical basis for designing more integrated governance and sustainability reporting policies, thereby enhancing the credibility of environmental information in the capital market. Finally, for investors and the public, this research can serve as a reference for assessing the extent to which corporate governance and financial performance reflect a commitment to environmental responsibility and sustainability.

2. LITERATURE REVIEW AND HYPOTHESIS

2.1. Stakeholder Theory

Stakeholder theory holds that companies are responsible to all parties with an interest in their activities (Freeman et al., 2010). This theory asserts that a company's sustainability depends on its ability to meet the needs and expectations of various stakeholder groups, including employees, the government, the community, investors, and the environment. In the context of carbon emissions disclosure, stakeholder theory states that companies must provide transparent information about their environmental impact as a form of accountability and response to increasing social pressure (Kurnia et al., 2025; Liao et al., 2024; Mahajan et al., 2023). This disclosure is a form of social responsibility that aims to build trust and maintain the company's reputation. The greater the pressure from stakeholders on environmental issues, the greater the incentive for companies to improve their carbon emissions disclosure practices.

Stakeholder theory also explains that corporate governance plays an important role in directing companies to meet stakeholder expectations. Board size, board nationality diversity, and institutional ownership are governance dimensions that influence corporate transparency (Kiswanto and Setiawan, 2022; Mansour et al., 2025). A larger, more diverse board can improve oversight effectiveness and broaden perspectives in strategic decision-making related to environmental issues. Meanwhile, institutional ownership can encourage management to improve reporting quality because institutional investors tend to demand greater accountability and social responsibility (Amin et al., 2025; Kiswanto et al., 2023). Furthermore, companies with strong financial performance are better able to meet

stakeholder demands by investing in sustainability practices and carbon emissions reporting (Liao et al., 2024; Mahajan et al., 2023). Thus, stakeholder theory provides a theoretical basis for the idea that good governance mechanisms and financial performance encourage companies to increase transparency and meet stakeholder expectations by broadening carbon emissions disclosure.

2.2. Legitimacy Theory

Legitimacy Theory holds that companies need to obtain and maintain acceptance or approval from the community to continue operating sustainably (Dowling and Pfeffer, 1975). A company is considered legitimate when its activities align with prevailing social values, norms, and expectations. To maintain this legitimacy, companies strive to demonstrate that their operations are not only profit-oriented but also consider social and environmental impacts (Dowling and Pfeffer, 1975; Zhu et al., 2025). One way companies gain legitimacy is by disclosing environmental information, such as carbon emission reports. Through this disclosure, companies seek to build a positive image and demonstrate their commitment to social responsibility and environmental sustainability (Harits and Mutasowifin, 2024; Kiswanto et al., 2023). Companies that are transparent in reporting their environmental impact tend to be more trusted by the public, investors, and regulators. Thus, legitimacy theory helps explain why companies are driven to disclose their carbon emissions to maintain public trust and support long-term sustainability.

2.3. Corporate Governance and Carbon Emissions Disclosures

Corporate governance (CG) is seen as a supervisory mechanism that determines the level of corporate transparency, including the disclosure of environmental information such as carbon emissions (Dike and Tuffour, 2024; Kurnia et al., 2025; Zhu et al., 2025). Empirical studies show that governance attributes influence environmental reporting practices: board structure, board diversity, and ownership patterns can increase internal and external pressure to disclose environmental information (Kiswanto and Setiawan, 2022; Lei et al., 2025). Legitimacy theory and stakeholder theory are often used to explain companies' motivations for disclosure. Companies disclose information to maintain social legitimacy and meet stakeholder demands (Dowling and Pfeffer, 1975; Liao et al., 2024; Zhu et al., 2025). Guided by legitimacy and stakeholder theories, firms engage in environmental disclosure not only to comply with regulations but also to strengthen their legitimacy, build stakeholder trust, and ensure long-term sustainability in an increasingly environmentally conscious business landscape.

2.4. Board Size

Board size is an indicator of board structure that influences oversight capacity, availability of expertise, and decision-making processes. Positive aspects: larger boards provide diversity of skills and resources (resource advantage) that can strengthen governance and promote transparency in environmental reporting. Negative side: an overly large board can lead to poor coordination and inefficiency (free-riding). Therefore, the influence of board size on emissions disclosure can be positive if board size remains within the effective range (Alfi et al., 2024; Chakraborty and Dey, 2023). A larger board provides more expertise and oversight capacity, thereby facilitating ESG policies and disclosure. However, this effect is assumed to be positive within the commonly observed effective size range for public companies.

H_1: Board size has a positive effect on the level of carbon emission disclosure.

2.5. Board Nationality Diversity

National diversity reflects a diversity of perspectives, international experience, and exposure to international governance practices and regulations (Chen et al., 2025; Torchia and Solarino, 2025). Boards with members of different nationalities tend to be more sensitive to global issues such as climate change and more open to comprehensive reporting practices. This diversity can enrich the deliberation process and encourage the adoption of higher disclosure standards (Wahyuningrum et al., 2025). Board members with international experience bring governance practices and sensitivity to climate change issues that encourage broader disclosure.

H_2: Board nationality diversity has a positive effect on the level of carbon emission disclosure.

2.6. Institutional Ownership

Institutional investors typically have longer-term interests and better monitoring capabilities than individual shareholders. They can encourage management to implement ESG practices and improve reporting quality because institutions have access to information and the ability to exert governance pressure (Dike and Tuffour, 2024; Kiswanto and Setiawan, 2022). Therefore, institutional ownership is often associated with increased environmental transparency. Institutional ownership tends to encourage management to improve transparency and ESG practices due to their long-term interests and monitoring capacity.

H_3: Institutional ownership has a positive effect on the level of carbon emission disclosure.

2.7. Financial Performance and Carbon Emission Disclosure

Financial performance influences a company's ability to allocate resources to environmental initiatives and to report on them (Hadi et al., 2025; Harits and Mutasowifin, 2024; Rahmawati et al., 2024). Financial performance reflects a company's efficiency in utilizing resources and achieving profitability, which in turn determines its ability to support sustainability and environmental reporting activities. A strong financial position allows firms to invest in emission measurement systems, third-party assurance, and the preparation of transparent sustainability disclosures (Mansour et al., 2025; Nguyen et al., 2025). In contrast, firms with weaker financial performance may lack sufficient resources to engage in such initiatives. Therefore, factors within corporate governance, such as board structure and ownership composition, are expected to play an important role in influencing financial outcomes that enable these environmental commitments.

Board size contributes to financial performance by improving the firm's ability to manage diverse stakeholder expectations and oversee management decisions effectively (Kiswanto and Setiawan, 2022). Board nationality diversity enhances cross-cultural understanding and strategic adaptability, which can lead to better responses to stakeholder pressures from global markets and investors (Chen et al., 2025). Meanwhile, institutional ownership ensures that powerful stakeholders such as investment institutions exert pressure for transparent reporting and prudent financial management, promoting both profitability and legitimacy (Amin et al., 2025; Kiswanto et al., 2023). Thus, from the legitimacy and stakeholder perspectives, board characteristics and ownership structure are essential in aligning corporate financial performance with broader social accountability and stakeholder confidence.

H_4a: Board size has a significant impact on financial performance
H_4b: Board nationality diversity has a significant effect on financial performance
H_4c: Institutional ownership has a significant effect on financial performance.

2.8. Mechanism Pathway of Financial Performance

Good corporate governance strengthens a firm's financial performance by enhancing monitoring effectiveness, optimizing decision-making, and minimizing agency conflicts. Through these mechanisms, governance attributes such as board structure, diversity, and ownership composition contribute to more efficient resource utilization and strategic alignment (Chakraborty and Dey, 2023; Kurnia et al., 2025; Sun et al., 2025). Improved financial performance provides firms with the necessary resources to implement environmental management systems, measure emissions, and conduct transparent sustainability reporting. As a result, companies with higher profitability are more capable of fulfilling stakeholder expectations and maintaining legitimacy through enhanced environmental disclosure. Therefore, financial performance is expected to have a positive direct effect on the level of carbon emission disclosure.

H_5: Financial performance has a positive effect on the level of carbon emission disclosure.

Table 1: Sample selection criteria

Sample criteria	Sample criteria				
	2020	2021	2022	2023	2024
Energy sector companies listed on the Indonesia Stock Exchange (IDX) during 2020-2024	66	73	79	87	90
Energy sector companies that did not publish annual reports or sustainability reports during 2020-2024	4	4	4	6	13
Companies that did not disclose at least one carbon emission item in their annual or sustainability reports during 2020-2024	43	19	15	12	7
Total units of analysis	19	50	60	69	70
Total			268		
Outliers			18		
Final units of analysis			250		

Furthermore, financial performance may act as a mediating mechanism that links corporate governance attributes to carbon disclosure. Larger, more diverse boards of directors, supported by strong institutional ownership, result in better financial performance. Optimal financial performance can lead to greater investment in sustainability initiatives and more comprehensive disclosure practices (Harits and Mutasowifin, 2024; Rahmawati et al., 2024). This means governance mechanisms affect disclosure directly through oversight and accountability, and indirectly through financial performance (Kurnia et al., 2025; Zhu et al., 2025). Thus, financial performance mediates the effects of board size, board diversity, and institutional ownership on carbon emission disclosure.

H_6a: Financial performance mediates the relationship between board size and carbon emission disclosure
H_6b: Financial performance mediates the relationship between board diversity and carbon emissions disclosure
H_6c: Financial Performance mediates the relationship between institutional ownership and carbon emission disclosure.

3. METHODS

Based on Figure 1, this study uses quantitative panel data regression (Baltagi, 1998). This study uses secondary data from annual and sustainability reports of energy sector companies listed on the Indonesia Stock Exchange (IDX) for 2020-2024. The data were obtained from the official website of the Indonesia Stock Exchange (www.idx.co.id) and the official websites of the relevant companies. The population of this study comprises energy companies listed on the Indonesia Stock Exchange (IDX) from 2020 to 2024, totalling 74 companies. The researcher used purposive sampling, a nonprobability sampling technique. This method was used to obtain samples that met the predetermined criteria. The sample criteria in this study are presented in Table 1 below:

This study uses carbon emission disclosure as the dependent variable and the independent variables used are board size, board diversity, and institutional ownership. Profitability is used as a control variable in this study. The operational definitions of each variable are presented in Table 2.

This study utilised documentary techniques in data collection. Data analysis techniques included descriptive and inferential statistical analyses. Descriptive analysis techniques were used to characterise each research variable (Yulianti and Waworuntu, 2025). Inferential analysis techniques were then used to test the formulated hypotheses. The data analysis was carried out using Stata. The regression equation in this study can be formulated as follows.

MODEL I

$$CED = \alpha+\beta_1 BSIZE_{it}+\beta_2 BND_{it}+\beta_3 IO_{it}+\beta_4 SIZE_{it}+e \quad (1)$$

MODEL II

Table 2: Operational definitions of variables

No.	Variable	Definition	Measurement
1.	Carbon emission disclosure	Carbon emission disclosure is a report containing information related to the company's operational activities that impact climate change, including the amount of emissions produced, the company's strategies to reduce emissions, and the identification of related risks and opportunities (Abbas et al., 2024).	CED=(Total items disclosed)/(Total maximum items) (Cai et al., 2024)
2.	Board size	Board size refers to the total number of directors involved in making strategic decisions and monitoring company performance (Alfi et al., 2024).	Board size=Total number of board members (Chakraborty and Dey, 2023)
3.	Board nationality diversity	Board nationality diversity represents the proportion of foreign board members within the company's governance structure (Wahyuningrum et al., 2025)	Board nationality diversity=(Number of foreign board members)/(Total number of board members and commissioners) (Wahyuningrum et al., 2025)
4.	Institutional ownership	Institutional ownership refers to the proportion of a company's outstanding shares owned by institutional investors (Kiswanto et al., 2023).	Institutional ownership=(Number of shares owned by institutions)/(Total outstanding shares) (Kiswanto et al., 2023)
5.	Profitability	Profitability is a ratio used to measure a company's ability to generate profit and assess its financial stability (Wahyuningrum et al., 2025),	Return on assets (ROA)=(Net Income)/(Total Assets) (Hadi et al., 2025; Rahmawati et al., 2024)
6.	Firm size	Firm size is measured by the natural logarithm of total company assets (Hadi et al., 2025).	Firm size=LN (Total Assets) (Chen et al., 2025; Hadi et al., 2025)

Source: Processed data

$$ROA = \alpha+\beta_1 BSIZE_{it}+\beta_2 BND_{it}+\beta_3 IO_{it}+\beta_4 SIZE_{it}+e \quad (2)$$

Model III

$$CED = \alpha+\beta_1 ROA_{it}+\beta_2 SIZE_{it}+e \quad (3)$$

$$ROA = \alpha+\beta_1 SIZE_{it}+\beta_2 SIZE_{it}+e \quad (4)$$

$$ROA = \alpha+\beta_1 BND_{it}+\beta_2 SIZE_{it}+e \quad (5)$$

$$ROA = \alpha+\beta_1 IO_{it}+\beta_2 SIZE_{it}+e \quad (6)$$

$$CED = \alpha+\beta_1 \widehat{ROA}_{it}+\beta_2 SIZE_{it}+e \quad (7)$$

Notes:
CED = Carbon emission disclosure
α = Constanta
β = Regress coefficient
BS = Board size
BND = Board national diversity
IO = Institutional ownership
ROA = Financial performance
SIZE = Company size (control variable)
$\widehat{ROA}$ = Financial performance (predict)
i = Company
t = Time
e = Error

4. RESULTS

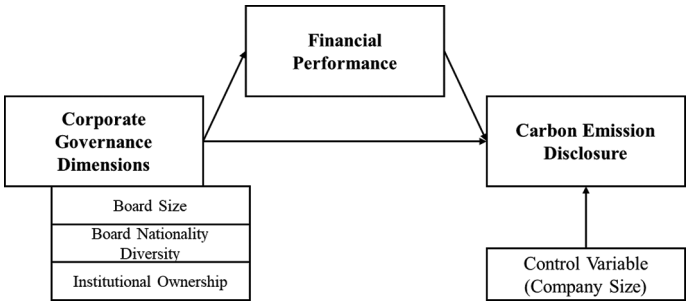
Based on the descriptive analysis of 250 observations in Table 3, the Carbon Emission Disclosure (CED) variable has an average of 0.4515 and a standard deviation of 0.2190, indicating a fairly varied level of carbon emission disclosure across companies. The Board Size (BS) variable has an average of 4.2440 and a standard deviation of 1.8864, indicating a relatively small board size with considerable variation between 2 and 11 members. The Nationality Board Diversity (NBD) variable has a low average of 0.0980, with a minimum value of 0.0000 and a maximum of 0.7500, indicating that most companies still have boards with high nationality homogeneity. Furthermore, Institutional Ownership (IO) has an average of 0.7529 and a standard deviation of 0.2299, indicating its dominance. Finally, the Firm Performance (FP) variable has an average of 0.0972 and a standard deviation of 0.1468, with a minimum value of −0.384 and a maximum of 0.6163, indicating that the financial performance of companies in the sample varies considerably from negative to positive.

Table 3: Results of descriptive statistical analysis

Variable	Mean	Median	Max	Min	Std. Dev.
CED	0.4515	0.4444	0.9444	0.0556	0.2190
BS	4.2440	4.0000	11.0000	2.0000	1.8864
NBD	0.0980	0.0000	0.7500	0.0000	0.1498
IO	0.7529	0.8151	1.0000	0.0000	0.2299
FP	0.0972	0.0746	0.6163	−0.384	0.1468

n: 250

Figure 1: Conceptual framework of research



The results of the regression analysis are shown in Table 4, where Model I show that Board Size (BS), Nationality Board Diversity (NBD), and Institutional Ownership (IO) have a positive and significant effect on Carbon Emission Disclosure (CED). The respective coefficient values of 0.0355, 0.1779, and 0.1370, with

Table 4: Results of regression analysis

Causalities	Hyp	Model I		Model II		Model III	
		Coef.	T-stat (Sig)	Coef.	T-stat (Sig)	Coef.	T-stat (Sig)
BS→CED	H1(+)	0.0354658	4.72***				
NBD→CED	H2(+)	0.1778794	7.72***				
IO→CED	H3(+)	0.1369608	2.64***				
BS→ROA	H4a(+)			0.0229842	4.96***		
NBD→ROA	H4b(+)			0.0072242	0.51(NS)		
IO→ROA	H4c(+)			0.0693934	2.17**		
ROA→CED	H5(+)					0.2714198	2.18**
BS→ROA→CED	H6a(+)					0.0305457	2.03**
NBD→ROA→CED	H6b(+)					0.0519327	1.59*
IO→ROA→CED	H6c(+)					0.0144214	1.63*
R2		0.4407		0.1339		0.0650	
AdjR2		0.4316		0.1198		0.0574	
F-stat		48.26		9.47		8.59	
Prob > F		0.0000		0.0000		0.0002	
Root MSE		0.186		0.1147		0.23951	

BS: Board size, NBD: National board diversity, IO: Institutional ownership, FP: Financial performance, CED: Carbon emission disclosure. Significant level 1%(***); 5%(**); 10%(*). n: 250

a significance level of 1%, indicate that the larger the board of directors, the greater the national diversity of board members, and the greater the institutional ownership, the higher the level of corporate carbon emission disclosure. The R^2 value of 0.4407 indicates that approximately 44.07% of the variation in CED is explained by these three independent variables, with the remaining variation accounted for by factors outside the Model. These findings emphasise the importance of corporate governance in promoting environmental transparency and sustainability practices.

Model II, the results show that BS and IO have a positive and significant effect on Return on Assets (ROA), with coefficient values of 0.02298 ($P < 0.01$) and 0.06939 ($P < 0.05$), respectively. In contrast, NBD has no significant effect on ROA. This indicates that board size and institutional ownership can improve a company's financial performance, whereas board diversity has not had a significant impact. Model III shows that ROA has a significant positive effect on CED (coefficient 0.2714; $P < 0.05$), and the ROA variable mediates part of the relationship between BS, NBD, and IO on CED. This mediating effect is significant at the 5% level for BS and at the 10% level for NBD and IO, indicating that financial performance plays an important role in strengthening the relationship between corporate governance and carbon emission disclosure practices.

5. DISCUSSION

The results in Model I show that Board Size (BS), Nationality Board Diversity (NBD), and Institutional Ownership (IO) have a significant positive effect on Carbon Emission Disclosure (CED) (Abdelrahman Adam Abdalla et al., 2024; Adam et al., 2025; Mansour et al., 2025). These findings indicate that the larger the number of board members, the more diverse their nationalities, and the greater the proportion of institutional ownership, the higher the level of corporate carbon emission disclosure (Cai et al., 2024; Xu et al., 2024; Yulianti and Waworuntu, 2025). Theoretically, these results support stakeholder theory, which hold that a strong governance structure will increase corporate environmental accountability and transparency. Alkurdi et al. (2023) found that larger board size is positively associated with carbon emission disclosure, due to greater oversight capabilities. Furthermore, Mansour et al. (2025) in Environmental Science and Pollution Research also emphasised that board effectiveness plays an important role in promoting ESG information disclosure in ASEAN countries. Thus, Model I shows that corporate governance is a determining factor in carbon emission disclosure practices.

On the other hand, in Model II testing the relationship between governance mechanisms and financial performance (ROA) shows that BS and IO have a positive effect on ROA (Abedin et al., 2022; Handriani et al., 2019), whereas NBD does not (EmadEldeen et al., 2021; Khan et al., 2023). This means that national diversity on the board has not directly increased company profitability. This study argues that NBD's influence is long-term or occurs through a more complex decision-making process (Khan et al., 2023). These results indicate that a larger board structure provides added value for performance improvement through more effective control and decision-making (Abedin et al., 2022; Handriani et al., 2019; Torchia and Solarino, 2025). Therefore, companies need to ensure that diversity in the board structure is not only symbolic but also effectively integrated into management and business strategy processes to impact the company's financial performance and future sustainability positively.

The results of Model III show that ROA has a significant positive effect on CED, and that ROA partially mediates the relationships between BS, NBD, and IO and CED. This finding confirms that companies with better financial performance have greater resources to implement and disclose environmental initiatives. According to (Zhang and Su, 2023), high financial performance allows companies to allocate funds for sustainability practices and enhance their green image. Interestingly, although NBD is not significant for ROA, the indirect effect of NBD on CED through ROA becomes significant in the mediation model (Alfi

et al., 2024; Kiswanto et al., 2023; Nguyen et al., 2025). This condition indicates that national diversity on the board positively affects carbon disclosure by improving financial performance as an intermediary. In other words, this diversity has a real benefit for environmental transparency, supporting more optimal financial performance.

Furthermore, optimal financial performance is crucial for companies to support broader and more transparent carbon emissions disclosure (Harits and Mutasowifin, 2024; Rahmawati et al., 2024). Companies with strong financial conditions have a greater capacity to invest in sustainability initiatives. Furthermore, optimal financial performance supports improvements in environmental reporting systems and social responsibility (Liao et al., 2024). Therefore, when board diversity can drive improvements in strategic effectiveness that strengthen ROA, the ultimate impact is reflected in improved environmental disclosure (Abedin et al., 2022; Liao et al., 2024; Rahmawati et al., 2024). In other words, board diversity does not directly increase transparency, but rather does so through the intermediary of financial performance, which enables companies to be more responsive to environmental issues and stakeholder demands (Liao et al., 2024; Mahajan et al., 2023). Thus, these findings confirm that the corporate governance dimension plays a strategic role in improving corporate sustainability practices. Sustainability practices through financial performance serve as a link between governance and environmental transparency.

6. CONCLUSION

This study empirically demonstrates that corporate governance mechanisms play a strategic role in improving corporate environmental transparency. Board size, nationality board diversity, and institutional ownership have been proven to increase carbon emissions disclosure. Increased carbon emissions disclosure indicates that an effective governance structure encourages corporate accountability in environmental reporting. In addition, board size and institutional ownership contribute to improved financial performance, which in turn strengthens disclosure practices. Nationality board diversity, as measured by return on assets (ROA), has been shown to trigger increased carbon emissions disclosure. This mechanism indicates that a diverse board contributes to sustainability performance when supported by strong financial conditions. These findings confirm that financial performance is an important pathway linking governance quality to environmental transparency. Thus, financial performance plays a crucial role in improving carbon emissions disclosure, thereby supporting environmental sustainability goals.

This study has limitations in several aspects. First, the research sample is limited to energy sector companies listed on the Indonesia Stock Exchange during the period 2020-2024. Second, the use of secondary data from annual and sustainability reports can introduce reporting bias, as it depends on the level of corporate disclosure. Third, this study measures financial performance. Therefore, future research should expand the scope of the sector and observation period, using other financial variables such as ROE or Tobin's Q. Furthermore, future researchers need to consider non-financial variables such as green innovation, regulatory pressure, or organizational culture as moderating factors to provide a more comprehensive understanding of the relationship between corporate governance, financial performance, and carbon emissions disclosure. Finally, future research needs to innovate by using experimental approaches to understand corporate behaviour in carbon emissions disclosure.

REFERENCES

Abbas, Q., HongXing, Y., Ramzan, M., Fatima, S. (2024), Carbon reduction through renewable energy and digitalization in emerging economies: Moderating role of public debt. Environmental Science and Pollution Research, 31(30), 43096-43116.

Abdelrahman Adam Abdalla, A., Salleh, Z., Hashim, H.A., Wan Zakaria, W.Z., Al-Ahdal, W.M. (2024), The effect of board of directors attributes, environmental committee and institutional ownership on carbon disclosure quality. Business Strategy and Development, 7(4), e70023.

Abedin, S.H., Haque, H., Shahjahan, T., Kabir, M.N. (2022), Institutional ownership and firm performance: Evidence from an emerging economy. Journal of Risk and Financial Management, 15(12), 567.

Adam, A.A., Salleh, Z., Alahdal, W.M., Hussien, A.M., Bajaher, M., Baatwah, S.R. (2025), The effect of the board of directors, audit committee, and institutional ownership on carbon disclosure quality: The moderating effect of environmental committee. Corporate Social Responsibility and Environmental Management, 32(2), 2254-2270.

Alfi, C.F., Mohamad, M., Hussainey, K. (2024), Unveiling the hidden symphony: Board dynamics and carbon emission disclosure – a meta-analysis study in the realm of developed markets. Journal of Accounting Literature, 47(2), 404-432.

Alkurdi, A., Al Amosh, H., Khatib, S.F.A. (2023), The mediating role of carbon emissions in the relationship between the board attributes and ESG performance: European evidence. EuroMed Journal of Business, 19(4), 1016-1041.

Amin, H.M.G., Mohamed, E.K.A., Abdallah, A.S., Elamer, A.A. (2025), National culture, formal institutions and structure of board of directors: Theory and empirical evidence. Journal of Financial Reporting and Accounting, 23(1), 1-33.

Baltagi, B.H. (1998), Panel data methods. In: Handbook of Applied Economic Statistics. United States: CRC Press.

Cai, W., Bai, M., Davey, H. (2024), Mandatory environmental disclosure policy in the largest carbon emission country. Pacific Accounting Review, 36(5), 527-560.

Chakraborty, R., Dey, S.K. (2023), The effects of corporate governance mechanisms on voluntary corporate carbon disclosures: Evidence from the emerging economy. Journal of Economic and Administrative Sciences, 41(3), 1020-1041.

Chen, J., Dedman, E., Kim, J.R., Metwally, T., Stark, A.W. (2025), Board nationality diversity and firm value. British Journal of Management, 36(2), 762-780.

Dike, V.O., Tuffour, J.K. (2024), Corporate governance practices and banks' performance: Does the moderating role of foreign representation matter? Management Research Review, 48(2), 307-321.

Dowling, J., Pfeffer, J. (1975), Organizational legitimacy: Social values and organizational behavior. Pacific Sociological Review, 18(1), 122-136.

Elkington, J., Fennell, S. (1998), Partners for sustainability. Greener Management International, 24, 48-60.

EmadEldeen, R., Elbayoumi, A.F., Basuony, M.A.K., Mohamed, E.K.A. (2021), The effect of the board diversity on firm performance: An

empirical study on the UK. Corporate Ownership and Control, 18(3 Special Issue), 337-347.
Erfian, A., Syafei, A.D., Zuki, F.M., Hermana, J., Assomadi, A.F., Susanto, A.P.Y., Lazuardi, D.J. (2025), Determining carbon dioxide emission factors of Indonesia coal-fired power plants with CEMS measurement data. Aerosol and Air Quality Research, 25(1), 3.
Freeman, R.E., Harrison, J.S., Wicks, A.C., Parmar, B.L., De Colle, S. (2010), Stakeholder Theory: The State of the Art. England: Cambridge University Press.
Hadi, C., Saputra, D., Tunggal, J.R., Fadila, S.N., Rakhmatullah, A. (2025), The impacts of environmental score, financial performance, and firm value in ASEAN. E3S Web of Conferences, 650, 02027.
Handriani, E., Robiyanto, R., Handriani, E., Robiyanto, R. (2019), Institutional ownership, independent board, the board size, and firm performance: Evidence from Indonesia. Contaduría y Administración, 64(3), 1849.
Harits, M.R., Mutasowifin, A. (2024), Analysis of the influence of financial, carbon, and environmental performance on carbon emission disclosure. IOP Conference Series: Earth and Environmental Science, 1359(1), 012095.
Khan, I., Khan, I., Khan, I.U., Suleman, S., Ali, S. (2023), Board diversity on firm performance from resource-based view perspective: New evidence from Pakistan. International Journal of Productivity and Performance Management, 73(3), 649-675.
Kiswanto, K., Widhiastuti, R., Safitri, M.A. (2023), Institutional ownership in encouraging carbon emission disclosure for mining companies, basic industries and chemicals in Indonesia. Journal of Environmental Management and Tourism, 14(3), 632-644.
Kiswanto, K., Setiawan, D. (2022), The impact of characteristics of the board of directors on the timelines of corporate internet reporting index of companies in Indonesia. Indian Journal of Corporate Governance, 15(1), 70-88.
Kurnia, P., Agustia, D., Soewarno, N., Ardianto, A. (2025), The mediating role of carbon emission disclosure in the relationship between structure of corporate governance and firm performance. Journal of Applied Accounting Research, 26, 1106-1134.
Lei, X., Wang, H., Deng, F., Li, S., Chang, W. (2025), Sustainability through scrutiny: Enhancing transparency in Chinese corporations via environmental audits. Journal of the Knowledge Economy, 16(1), 2451-2520.
Liao, H., Su, L., Tang, T., Shang, Z. (2024), Green initiatives and stakeholder engagement: Unveiling the impact of green strategies and CSR on financial performance from descriptive-normative perspectives of stakeholder theory. Sustainable Development, 32(5), 4800-4811.
Mahajan, R., Lim, W.M., Sareen, M., Kumar, S., Panwar, R. (2023), Stakeholder theory. Journal of Business Research, 166, 114104.
Mansour, M., Abu-Allan, A.J., Alshdaifat, S.M., E'leimat, D.A., Saleh, M.W.A. (2025), Board effectiveness and carbon emission disclosure: Evidence from ASEAN countries. Discover Sustainability, 6(1), 604.
Nguyen, T.H., Abu Afifa, M.M., Nguyen, L.T.L., Tran, T.H.T., Dao, N.T. (2025), Sustainability report quality with moderating impact of carbon emissions index: Evidence from ASEAN region. Pacific Accounting Review, 37(1), 1-25.
Rahmawati, R., Setiawan, D., Aryani, Y.A., Kiswanto, K. (2024), Role environmental performance on effect financial performance to carbon emission disclosure. International Journal of Energy Economics and Policy, 14(1), 196-204.
Sun, J., Zheng, L., Zhan, M. (2025), New path to green transformation: Exploring the impact of corporate governance on environmental information disclosure quality of new energy companies. Journal of Environmental Management, 373, 123789.
Torchia, M., Solarino, A. (2025), Gender, ethnic and nationality board diversity and firm performance: A meta-analysis. Corporate Governance, 25(4), 1-20.
Umair, M., Yousuf, M.U., Cheema, A.R., Ul-Haq, J. (2024), Assessing the environmental consequences of fossil fuel consumption in newly industrialized countries. International Journal of Energy Sector Management, 19(4), 1027-1044.
van Asselt, H., Fragkos, P., Peterson, L., Fragkiadakis, K. (2024), The environmental and economic effects of international cooperation on restricting fossil fuel supply. International Environmental Agreements: Politics, Law and Economics, 24(1), 141-166.
Wahyuningrum, I.F.S., Budihardjo, M.A., Probohudono, A.N., Yanto, H., Oktavilia, S. (2025), An analysis of water disclosure quantities: Evidence from agricultural companies in Indonesia. Journal of Open Innovation: Technology, Market, and Complexity, 11(2), 100563.
Xu, W., Sun, Z., Ni, H. (2024), Transparency pays: How carbon emission disclosure lowers cost of capital. Economic Analysis and Policy, 83, 165-177.
Yulianti, E., Waworuntu, S.R. (2025), The effect of company size, profitability, leverage, media exposure, and liquidity on carbon emissions disclosure. Annals of Data Science, 12(4), 1285-1313.
Zhang, L., Su, W. (2023), Corporate social responsibility, internal control, and firm financial performance. Frontiers in Psychology, 13, 977996.
Zhang, W., Cuijing, J., Liu, Z., He, P., Wuhao, E. (2024), Examining the impact of tourism on carbon neutrality and environmental sustainability in China: The role of renewable energy. Energy Strategy Reviews, 56, 101579.
Zhu, G., Ong, T.S., Hassan, A.F.S. (2025), Legitimization tools or governance tools? A systematic literature review of corporate governance and carbon disclosure quality. Business Strategy and Development, 8(2), e70117.