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Anggun Aniah
Faculty of Economics and Business, Universitas Negeri Semarang, Indonesia

Maylia Pramono Sari
Faculty of Economics and Business, Universitas Negeri Semarang, Indonesia

Nur Anita*
Faculty of Economics and Business, Universitas Negeri Semarang, Indonesia

** Corresponding Author: nuranita@mail.unnes.ac.id*

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Anggun Aniah
Faculty of Economics and Business, Universitas Negeri Semarang, Indonesia

Maylia Pramono Sari
Faculty of Economics and Business, Universitas Negeri Semarang, Indonesia

Nur Anita*
Faculty of Economics and Business, Universitas Negeri Semarang, Indonesia

* Corresponding Author: nuranita@mail.unnes.ac.id

Abstract
This research explores how media coverage, company size, and board composition influence the disclosure of carbon emissions, considering environmental performance as a moderating factor. The study focuses on 28 mining firms listed on the Indonesia Stock Exchange from 2018 to 2022, selected through purposive sampling, yielding 140 observations. The data were processed using Moderated Regression Analysis (MRA) via SPSS version 26. The analysis reveals that both firm size and board size contribute positively to carbon emission reporting, whereas media exposure does not exhibit a significant impact. Additionally, strong environmental performance amplifies the positive link between firm size and emission disclosure but does not alter the effects of media exposure or board size. These results suggest that larger firms and those with more board members tend to be more transparent in reporting carbon emissions, particularly when they also demonstrate strong environmental stewardship. The study provides useful implications for policymakers and stakeholders aiming to encourage environmental accountability through corporate attributes and sustainability performance.

Keywords
Media Exposure, Firm Size, Board Size, Carbon Emission Disclosure, Environmental Performance

INTRODUCTION

The rapid advancement of industrialization has brought both economic benefits and serious environmental drawbacks, one of the most alarming being climate change. This global issue, primarily caused by emissions of greenhouse gases from industrial operations, has led to a significant rise in Earth's temperature. The Intergovernmental Panel on Climate Change (IPCC) indicated that the planet's surface temperature has increased by approximately 1.6°C, mainly due to the accumulation of greenhouse gases in the atmosphere (IPCC, 2022). Among these gases, carbon dioxide plays the most significant role in intensifying global warming. According to the International Energy Agency (IEA), carbon dioxide emissions stemming from industrial production and energy use reached 36.8 gigatons in 2022—a 0.9% increase—mainly due to the greater reliance on coal and petroleum products during the economic recovery following the COVID-19 pandemic (IEA, 2023).

In light of the urgent need to address climate-related risks, the Paris Agreement was introduced under the United Nations Framework Convention on Climate Change (UNFCCC) as a global commitment to lowering greenhouse gas emissions. This international treaty, endorsed by 195 countries including Indonesia, aims to limit global temperature rise. Indonesia ratified the agreement through Law No. 16 of 2016, thereby pledging to cut carbon emissions by 29% independently and by up to 41% with international collaboration by 2030. To meet these ambitious goals, the government has taken steps to promote clean energy initiatives and implement development strategies that reduce carbon output (Matheus *et al*., 2022). Additionally, businesses are urged to support emission reduction efforts by increasing their transparency in environmental practices, particularly through reporting their carbon emissions (Ulupui *et al*., 2020).

Carbon emission disclosure involves voluntarily including information about greenhouse gas emissions in corporate annual or sustainability reports (Meiryani *et al*., 2023). Despite its relevance to environmental accountability, such disclosure in Indonesia remains voluntary rather than mandatory. As a result, many companies still fall short of environmentally responsible practices, with limited regulatory enforcement to ensure proper reporting.

One notable case involves PT Medco E&P Melaka, which caused air pollution through improper waste management, adversely affecting the local community's health (Detik.com, 2023). Another violation occurred in West Aceh, where coal mining activities by PT Mifa Bersaudara led to the pollution of nearby rivers, rendering the water turbid and acidic and causing significant air pollution from coal dust, which has particularly harmed the health of children and toddlers (Tvonenews.com, 2023). Additionally, PT Vale Indonesia Tbk was implicated in environmental violations due to dust emissions from nickel mining, resulting in water and air pollution. The local community, especially women and children, has been severely impacted, and the situation will likely worsen if not addressed promptly (Rakyatsulsel.co.id, 2023).

Another violation occurred in South Sumatra, involving PT RMK Energy Tbk, which caused significant air and environmental pollution due to coal stockpiling activities. This pollution has led to adverse health effects, including coughing, skin irritation, and acute respiratory infections. In addition to PT RMK Energy, several other coal companies have also been reported for committing various environmental infractions (Nusantara, 2023). These numerous cases of environmental violations highlight the low level of corporate awareness regarding environmental responsibility. Implementing carbon emission disclosure can serve as a means for companies to gain legitimacy within the community and create added value in the eyes of stakeholders. As entities that operate within and impact community environments, companies have a fundamental responsibility to address the environmental consequences of their activities.

The growing importance of carbon emission transparency has encouraged scholars to examine the various elements that drive companies to disclose such information. Florencia & Handoko (2021) demonstrated that media visibility has a positive relationship with carbon emission disclosure. Their study implies that heightened attention from media outlets compels companies to be more open about their environmental performance. Similar conclusions were drawn by Ulupui *et al*. (2020); Hidayat *et al*. (2022) and Kiswanto *et al*. (2023), who found that greater media exposure tends to increase the likelihood of firms reporting their carbon emissions. In contrast, findings from other researchers, including Probosari & Kawedar (2019); Laksani *et al*. (2020) and Putri *et al*. (2023), suggest that media coverage does not significantly influence a company's decision to disclose carbon emission

data.

Furthermore, Sari *et al*. (2023) found a positive association between firm size and the extent of carbon emission disclosure. Their study suggests that larger corporations, often under greater public scrutiny, are more inclined to report their environmental impacts. This tendency is attributed to the broader and more complex nature of large-scale business operations compared to smaller enterprises. The findings of Sari et al. are in line with those of Widiastutik & Khafid (2021) as well as Wahyuningrum *et al*. (2022), both of which support the view that firm size plays a significant role in environmental transparency. On the other hand, contrasting evidence is presented in the studies by Septriyawati & Anisah (2019); Wahyuningrum *et al*. (2019) and Ulupui *et al*. (2020), which argue that company size does not significantly influence whether a firm discloses its carbon emissions.

Nasih *et al*. (2019) proposed that firms with a larger number of board members tend to be more capable of addressing environmental concerns effectively. Their research emphasizes that having a broader board can contribute to a more diverse and strategic viewpoint, particularly regarding the advantages of disclosing carbon emissions. This conclusion is reinforced by findings from Arifah & Haryono (2021) as well as Setiawan & Iswati (2019), who also observed a positive correlation between board size and carbon emission transparency. In contrast, studies by Kılıç & Kuzey (2019) and Purnayudha & Hadiprajitno (2022) reported conflicting outcomes, indicating that the size of a company's board may not significantly affect disclosure behavior.

Due to these mixed findings in the literature, the present study aims to reassess the determinants of carbon emission disclosure. Unlike prior research that primarily investigated direct influences, this study introduces environmental performance as a moderating factor in the relationship between firm characteristics—namely firm size, board size, and media exposure—and disclosure of carbon emissions. Focusing on mining companies listed in Indonesia, this research offers a unique contribution by analyzing how environmental performance may strengthen or weaken these relationships. The choice of the mining sector adds meaningful context, given the industry's substantial environmental footprint and the intense public attention it receives regarding sustainability issues.

LITERATURE REVIEW

Legitimacy Theory

Legitimacy theory posits that companies seek to align their activities with the prevailing social values and norms of the communities in which they operate. When a company's values are congruent with societal norms, it gains legitimacy in the eyes of the public. Conversely, a misalignment between corporate values and societal expectations can threaten a company's legitimacy (Dowling & Pfeffer, 1975). Suchman (1995) defines legitimacy as the congruence between societal perceptions of a company's activities and the broader societal beliefs, values, and norms. Similarly, Lindblom (1994) and Gray *et al*. (1995) describe legitimacy as a condition wherein a company's values are consistent with the overarching social values of the society it belongs to. Legitimacy theory emphasizes that companies must reassure the local community that their operations comply with existing regulations. Companies must strive to harmonize their internal social values with the broader societal norms to ensure their continued existence. This alignment is critical because a company's survival is closely related to its relationship with the communities in which it operates.

Stakeholder Theory

According to Freeman (1984), as cited in Khatami & Raharjo (2023), stakeholders are groups or individuals who influence and are influenced by a company's processes as it strives to achieve its goals. Donaldson and Preston (1995) on Freeman & Phillips (2002)describe stakeholder theory as a managerial concept that integrates strategy and ethics within a company. The central tenet of this theory is the strategic approach a company employs to cultivate fair and sustainable relationships with its stakeholders, thereby enhancing its value (Bridoux & Stoelhorst, 2022). Stakeholder theory elucidates the dynamic relationship between a company and its stakeholders, asserting that stakeholders can access information regarding the company's operations, which they may use to inform their decision-making processes. Stakeholders may engage actively with this information or play a direct role within the company (Saputra, 2020). Stakeholders are thus viewed as entities that can both influence and be influenced by the company, directly or indirectly. As a result, a company's survival largely depends on its stakeholders' support. Stakeholder theory posits that companies operate not only to serve their interests but also to fulfil the interests of their stakeholders (Putri et al., 2022).

Hypothesis Development

Media exposure refers to disseminating information regarding a company's social responsibilities toward employees, customers, stakeholders, and the public through various media channels (Harmoni, 2011, as cited in Ulfa & Ermaya, 2019). According to legitimacy theory, companies must disclose their environmental activities to appear legitimate in the eyes of the public. The media plays a crucial role in encouraging companies to enhance the transparency of their disclosures to secure public legitimacy. Increased media scrutiny often leads to more comprehensive disclosure of a company's carbon emissions. Previous studies by Ulupui *et al*. (2020); Florencia & Handoko (2021); Aini *et al*. (2022); Hidayat *et al*. (2022) dan Kiswanto *et al*. (2023) have demonstrated that media exposure positively influences carbon emission disclosure.

H1: There is a positive relationship between media exposure and carbon emission disclosure

Company size is a metric that categorizes companies based on market capitalization, total assets, and total sales (Sari *et al*., 2022). According to legitimacy theory, larger companies face more significant societal pressure to disclose their non-financial activities, as their operations are generally more complex than those of smaller companies. This theory also suggests that large companies possess more resources to address public demands. Consequently, larger companies tend to disclose more comprehensive information about their carbon emissions to maintain legitimacy and mitigate potential societal disconnects. The notion that larger company size leads to more thorough carbon emission disclosures is supported by research findings from Widiastutik & Khafid (2021); Wahyuningrum *et al*. (2022) and Sari *et al*. (2023), which all indicate a positive relationship between company size and carbon emission disclosure.

H2: There is a positive relationship between company size and carbon emission disclosure

Board size refers to the number of board members within a company, including the board of commissioners and directors, who have vested interests in the company's operations (Arifah & Haryono, 2021). According to stakeholder theory, companies operate not only to pursue their interests but also to meet the needs of their stakeholders. One way to address stakeholder concerns is through the disclosure of carbon emissions. Companies with larger boards are generally more adept at formulating policies that guide the company's actions in carbon emission disclosure. These boards are thought to possess broader perspectives and

deeper insights, enabling them to provide greater transparency regarding environmental activities to stakeholders. Companies with larger boards will likely engage in more extensive carbon emission disclosures. This assertion is supported by research conducted by Setiawan & Iswati (2019); Nasih *et al*. (2019) and Arifah & Haryono (2021), which found a significant positive relationship between board size and carbon emission disclosure.

H3: There is a positive relationship between board size and carbon emission disclosure

The media is crucial in disseminating information regarding company activities to the public. The more rigorously the media monitors a company's actions, the more comprehensive the company's disclosure of carbon emissions tends to be. Environmental performance refers to a company's ability to foster a clean and sustainable environment (Amaliyah & Solikhah, 2019). According to legitimacy theory, companies disclose their environmental performance, particularly efforts to reduce carbon emissions, to gain public legitimacy. Companies with strong environmental performance are more likely to disclose their environmental activities to secure public approval voluntarily.

Conversely, companies with poor environmental performance may limit their environmental disclosures to avoid negative public perception. Companies that excel in environmental performance are generally more transparent in sharing information about their carbon emission reduction initiatives with the media. Therefore, it can be concluded that companies with superior environmental performance are more likely to provide extensive information about their carbon emission reduction efforts to the media.

H4: Environmental performance moderates by strengthening the influence of media exposure on carbon emission disclosure

Large companies often attract greater public scrutiny because their operations are perceived to impact the environment substantially. Consequently, these companies utilize their resources to align with community values and secure legitimacy. Environmental performance, defined as a company's ability to maintain a clean and sustainable environment (Amaliyah & Solikhah, 2019), plays a crucial role in this process. According to legitimacy theory, companies disclose their environmental performance, particularly in areas like carbon emission reduction, to gain public approval. For large companies, strong environmental performance is essential for ensuring their comprehensive and well-received carbon emission disclosures. Companies with high environmental performance are more likely to extensively share information about their carbon reduction efforts to reinforce their legitimacy. Therefore, large companies with strong environmental performance will more widely disclose their carbon emissions.

H5: Environmental performance moderates by strengthening the influence of company size on carbon emission disclosure

Companies with larger boards will likely disclose their carbon emission reductions more extensively to meet stakeholder expectations. These boards are believed to possess broader perspectives and deeper insights, enabling them to be more transparent about their environmental activities. Environmental performance, defined as a company's ability to maintain a clean and sustainable environment (Amaliyah & Solikhah, 2019), plays a significant role. According to stakeholder theory, companies must address the needs and expectations of stakeholders to maintain strong relationships. One way to achieve this is by disclosing their environmental performance to stakeholders. Environmental solid performance can significantly influence the policies set by board members concerning

carbon emission disclosure. Therefore, it can be concluded that companies with larger boards and solid environmental performance are more likely to engage in extensive carbon emission disclosure to satisfy stakeholder demands.

H6: Environmental performance moderates by strengthening the influence of board size on carbon emission disclosure

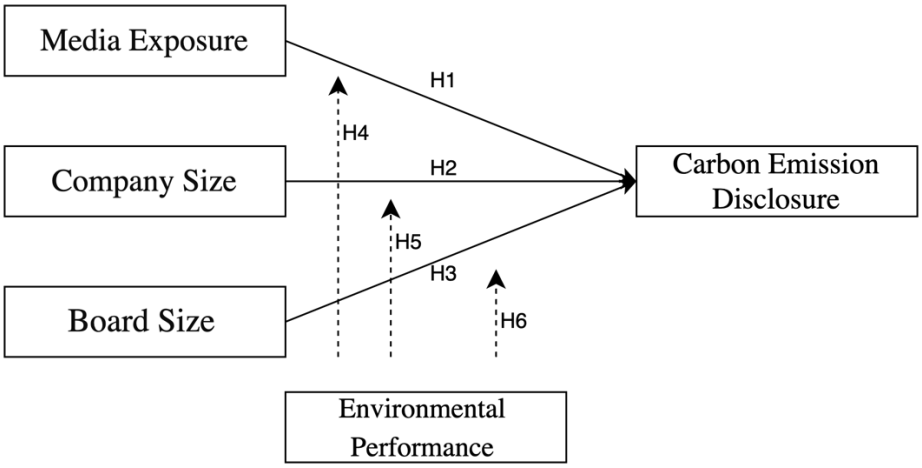

Figure 1. Conceptual Framework

RESEARCH METHOD

This research relies on secondary data sourced from the official portal of the Indonesia Stock Exchange (IDX), corporate websites, online media outlets, and the Ministry of Environment and Forestry. The data set includes annual and sustainability reports, along with environmental performance records—specifically PROPER ratings—for mining firms listed on the IDX between 2018 and 2022. In addition, this study utilizes online articles related to carbon emission reduction published on platforms such as Kompas.com, Detik.com, Tribunnews, and other credible news sources. The population comprises 62 mining companies, from which 28 were selected through purposive sampling, yielding a total of 140 observations.

The purposive sampling was based on the following criteria: (1) firms must be listed under the mining sector on the IDX during the 2018–2022 period; (2) firms must have consistently published annual and/or sustainability reports within the observation window; (3) firms must disclose information regarding carbon emissions, environmental performance (such as PROPER scores), board composition, and media coverage in their reports; (4) firms must participate in the PROPER program, as its rating system serves as a proxy for environmental performance; and (5) firms must have complete and accessible data for all relevant variables in this research, including media exposure, company size, board size, carbon emission disclosure, and environmental performance.

The data gathered were analyzed using both descriptive and inferential statistics. The dependent variable, carbon emission disclosure, is evaluated using 18 reporting indicators grouped into five categories. Media exposure, the first independent variable, is measured as

a dummy variable, where a value of 1 indicates the presence of carbon-related news coverage in online media. Company size is determined using the natural logarithm of total assets, while board size is based on the number of individuals serving as directors and commissioners. Lastly, environmental performance acts as a moderating variable and is assessed using each firm's PROPER rating.

Table 1. Variable Information

Variable	Abbreviation	Measurement Method	Reference
Carbon Emission Disclosure	CED	$\text{CED} = \frac{\text{total items disclosed}}{18}$	(Choi et al., 2013)
Media Exposure	ME	Score 1= the company discloses or publishes through news. Score 0= the company does not disclose or publish through news.	(Ulupui et al., 2020)
Company Size	CSIZE	FSIZE = Ln (Total Assets)	(Sari et al., 2023)
Board Size	BOARD	Board = ∑ directors and commissioners	(Natalia & Arni Rudiawarni, 2022)
Environmental Performance	EP	PROPER ratings obtained by the company: 1 = black (very-very bad) 2 = red (very bad) 3 = blue (good) 4 = green (very good) 5 = gold (very-very good)	(Meiryani et al., 2023)

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Descriptive statistics were utilized to provide a general overview and detailed summary of each variable examined in this research. This includes measures such as the mean, standard deviation, variance, minimum and maximum values, total, range, skewness, and kurtosis, as suggested by (Ghozali, 2018:19). However, in the context of this study, the descriptive analysis focuses specifically on the maximum, minimum, average (mean), and standard deviation values for each variable: carbon emission disclosure, media exposure, firm size, board size, and environmental performance. A summary of the descriptive statistical results is presented in Table 2 below.

Table 2. Descriptive Statistical Analysis Results

	N	Minimum	Maximum	Mean	Std. Deviation
ME	140	0,00	1,00	0,6757	0,47132
CSIZE	140	22,96	32,76	30,4293	1,57270
BOARD	140	4,00	20,00	10,7838	3,42141
EP	140	2,00	5,00	3,6351	0,86917
CED	140	0,06	0,89	0,4422	0,18397
Valid N (listwise)	140				

Source: Output SPSS 26, 2024

Classical Assumption Test

This study conducted several classical assumption tests to ensure the validity of the regression model, including evaluations of normality, multicollinearity, heteroscedasticity, and autocorrelation. The normality test employed the one-sample Kolmogorov–Smirnov method, which produced a significance level of 0.179—exceeding the 0.05 threshold—indicating that the data followed a normal distribution. To assess multicollinearity, tolerance and Variance Inflation Factor (VIF) values were examined. All tolerance values were above 0.10, and VIF values were below 10, suggesting that multicollinearity was not present among the independent variables. The Glejser test was used to detect heteroscedasticity, and the results showed that each variable had a significance value greater than 0.05, implying that the assumption of homoscedasticity was met. Lastly, the Durbin–Watson statistic was applied to evaluate autocorrelation. The runs test yielded an asymptotic two-tailed significance value of 0.815, which exceeds the 0.05 threshold and confirms that the data are free from autocorrelation issues.

Regression Analysis

Linear regression analysis was employed to examine the influence of independent variables on the dependent variable, including the role of a moderating variable. The statistical analysis was conducted using SPSS version 26. The outcomes of the hypothesis testing are summarized in Table 3 below.

Table 3. Moderated Regression Analysis Results

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0,423	0,039		10,708	0,000
ME	0,030	0,021	0,165	1,446	0,153
CSIZE	0,066	0,022	0,360	2,970	0,004
BOARD	0,060	0,020	0,327	2,971	0,004
EP_ME	-0,033	0,030	-0,122	-1,089	0,280
EP_CSIZE	0,070	0,036	0,250	1,937	0,057
EP_BOARD	-0,001	0,030	-0,003	-0,023	0,982

Source: Output SPSS 26, 2024

Information

CED : Carbon Emission Disclosure
ME : Media Exposure
CZISE : Company Size
BOARD : Board Size
EP_ME : Interaction between environmental performance and media exposure
EP_CSIZE : Interaction between environmental performance and company size
EP_BOARD : Interaction between environmental performance and board size

The Influence of Media Exposure on Carbon Emission Disclosure

The analysis reveals that media exposure does not exert a statistically significant positive influence on carbon emission disclosure. This conclusion is based on the results in Table 3,

which report a p-value of 0.153—above the commonly accepted significance threshold of 0.05. Although the regression coefficient stands at 0.030, suggesting a positive relationship, it lacks statistical support. As a result, the first hypothesis, which proposes that media exposure has a significant and positive impact on carbon emission disclosure, cannot be validated.

The results of this study contradict the legitimacy theory, which posits that companies are expected to disclose information about their environmental responsibilities through various media channels to garner public legitimacy. Media presence should theoretically motivate companies to enhance their carbon emission disclosures to achieve legitimacy. However, the information must often focus on the company's carbon reduction efforts. Companies frequently prefer to share information unrelated to carbon emissions reduction and tend to be cautious about disclosing their environmental activities. This caution arises because suboptimal environmental performance could lead to negative public perceptions.

These findings align with prior research by Probosari & Kawedar (2019); Laksani *et al*. (2020) and Putri *et al*. (2023), which also found no significant influence of media exposure on carbon emission disclosure. Media exposure alone does not necessarily drive companies to disclose information about their carbon emissions. When deciding to publish information, companies must weigh potential risks, such as plagiarism or reputational damage.

The Influence of Company Size on Carbon Emission Disclosure

Firm size demonstrates a statistically significant and positive effect on carbon emission disclosure. As presented in Table 3, the p-value associated with firm size is 0.004—well below the 0.05 threshold—while the regression coefficient is 0.066, indicating a positive relationship. Accordingly, the second hypothesis, which suggests that firm size significantly and positively influences carbon emission disclosure, is supported by the data.

These results align with legitimacy theory, which posits that larger companies are more capable of disclosing their carbon emissions extensively due to their greater resource availability. Larger firms use their resources to support environmental disclosure activities, including reporting carbon emissions. In contrast, smaller companies often limit their carbon emission disclosures due to constrained resources, which must be increased for comprehensive environmental reporting.

This study's findings corroborate previous research by Nasih *et al*. (2019); Abdullah *et al*. (2020); Ratmono *et al*. (2021); Saraswati *et al*. (2021); Sekarini & Setiadi (2021); Desai (2022); Wahyuningrum *et al*. (2022) and Sari *et al*. (2023), all of which indicate a positive and significant relationship between company size and carbon emission disclosure. Nasih *et al*. (2019) noted that larger companies are more likely to disclose their carbon emissions to achieve public legitimacy widely. This perspective is further supported by Ratmono *et al*. (2021), who observed that large companies expand their carbon emission disclosures to bridge societal gaps and enhance their legitimacy.

The Influence of Board Size on Carbon Emission Disclosure

The size of the board of directors shows a significant and positive influence on carbon emission disclosure. According to the data in Table 3, the p-value for board size is 0.004—lower than the 0.05 significance threshold—accompanied by a regression coefficient of 0.060, indicating a positive association. Hence, the third hypothesis, which proposes that board size significantly and positively affects carbon emission disclosure, is empirically supported.

These findings are consistent with stakeholder theory, which posits that companies operate for their own benefit and to serve stakeholders' interests. According to stakeholder theory, board members are crucial in addressing stakeholder interests. The board is instrumental in formulating policies related to environmental disclosure, including carbon emission reporting, to meet stakeholder expectations and enhance the company's value. Companies with a more giant board are better positioned to generate effective strategies for reducing carbon emissions. Consequently, a more giant board facilitates more comprehensive carbon emission disclosures.

This study's results align with previous research by Nasih *et al*. (2019); Setiawan & Iswati (2019) and Arifah & Haryono (2021), which provides empirical evidence of a significant positive effect of board size on carbon emission disclosure. Nasih *et al*. (2019) argue that companies with larger boards are more capable of achieving transparency in their operational activities, including carbon emissions, due to their broader perspectives. The board's role is critical in shaping company policies, particularly concerning environmental issues like carbon emission disclosure.

Environmental performance moderates by strengthening the influence of media exposure on carbon emission disclosure

Environmental performance does not serve as an effective moderator in the relationship between media exposure and carbon emission disclosure. Table 3 reveals that the interaction term between media exposure and environmental performance produces a regression coefficient of -0.033 with a p-value of 0.280, which exceeds the 0.05 significance level. Prior to introducing the interaction effect, media exposure alone had a regression coefficient of 0.030 with a p-value of 0.153—also statistically insignificant. These findings suggest a potential inverse relationship, and the absence of statistical significance following the addition of the interaction term implies that environmental performance does not moderate the link. Therefore, the fourth hypothesis, which proposes that environmental performance enhances the impact of media exposure on carbon emission disclosure, is not supported.

These findings do not align with the legitimacy theory. It means that not all companies with solid environmental performance voluntarily disclose their carbon emissions to the media. Some companies believe further disclosure of carbon emissions is unnecessary if they have received a favourable environmental performance rating. Companies with good environmental performance may assume they already enjoy a positive public image, reducing the need for additional disclosures to gain legitimacy. Therefore, in this study, environmental performance does not moderate or enhance the influence of media exposure on carbon emission disclosure.

Environmental performance moderates by strengthening the influence of company size on carbon emission disclosure

Environmental performance is shown to moderate the relationship by amplifying the effect of company size on carbon emission disclosure. As presented in Table 3, the interaction term between company size and environmental performance yields a regression coefficient of 0.10 with a significance value of 0.057, which is below the 0.1 threshold. Prior to the inclusion of the interaction term, company size alone exhibited a regression coefficient of 0.066 with a p-value of 0.004, which is well below 0.05—indicating a significant and positive relationship in both cases. These findings suggest a consistent direction of influence, namely a positive one, and statistically significant results. Therefore, the fifth hypothesis—which posits that environmental performance moderates by strengthening the influence of company size on

carbon emission disclosure—is supported.

This result aligns with the legitimacy theory, which argues that large companies face greater public scrutiny due to the wider environmental impact of their operations. As a response, these firms are more likely to disclose carbon emission data as a means to secure societal legitimacy. Moreover, large enterprises possess greater resources and capabilities, enabling them to provide more comprehensive disclosures compared to smaller firms. Strong environmental performance further reinforces this behavior, as companies with high environmental standards tend to voluntarily disclose broader environmental information to reinforce their legitimacy. Consequently, in this study, environmental performance acts as a reinforcing moderator in the relationship between firm size and carbon emission disclosure.

Environmental performance moderates by strengthening the influence of board size on carbon emission disclosure

Environmental performance does not moderate the relationship between board size and carbon emission disclosure. Based on the data in Table 3, the interaction term between board size and environmental performance yields a regression coefficient of -0.022 with a significance value of 0.982, which is far above the 0.05 threshold, indicating no statistical significance. Prior to introducing the interaction term, board size alone demonstrated a positive regression coefficient of 0.060 with a significance value of 0.004, indicating a significant positive effect. However, the direction of the relationship changes after the interaction is included—from positive to negative—and the result becomes statistically insignificant. These findings suggest that environmental performance does not function as a moderating variable in this context. As such, the sixth hypothesis of this study is not supported.

This outcome contrasts with the assumptions of stakeholder theory. In practice, firms with larger boards and strong environmental performance may not necessarily enhance their carbon emission disclosure. Board members may perceive that robust environmental performance alone sufficiently addresses stakeholders' concerns and enhances corporate value, thereby reducing the perceived need for extensive disclosure. Rather than focusing on transparency in carbon-related data, the board might prioritize maintaining the company's existing environmental performance ratings and enhancing internal evaluations of environmental initiatives. These efforts, however, do not directly translate into more comprehensive carbon emission disclosures. Consequently, firms may focus more on the achievement and maintenance of high environmental ratings rather than on the breadth of information publicly disclosed regarding emissions. Therefore, environmental performance in this study does not strengthen the impact of board size on carbon emission disclosure.

CONCLUSION

This study concludes that both company size and board size have a significant and positive influence on carbon emission disclosure, although the effect of board size becomes statistically insignificant in certain models. Environmental performance is found to moderate the relationship between company size and carbon emission disclosure by strengthening it, but it does not moderate the effects of media exposure and board size on carbon emission disclosure.

Theoretical and practical implications arise from these findings. Practically, the results can inform companies and policymakers in making strategic decisions regarding environmental transparency. Firms are encouraged to utilize their assets to support environmental

disclosure initiatives, including carbon emission reporting. Additionally, companies may consider aligning their governance structure with best practices—such as appointing an ideal number of board members (typically seven directors and two to three commissioners)—to enhance oversight and sustainability reporting. Participation in programs like PROPER (Company Performance Rating Program in Environmental Management) is also recommended, as this study indicates that such involvement is positively associated with improved carbon disclosure practices.

This study is subject to several limitations. First, the sample size is relatively small, which may affect the generalizability of the findings. Second, environmental performance is measured solely using the PROPER rating system, despite the fact that not all companies are involved in the program. Therefore, future research is encouraged to explore alternative proxies for environmental performance, media exposure, and carbon emission disclosure. Researchers should also consider testing additional independent variables not included in this study and extending the research period to increase the sample population and improve robustness.

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