“The effect of environmental performance and corporate governance structure on the quality of environmental disclosure”

AUTHORS	Kuat Waluyo Jati Fitrarena Widhi Rizkyana Richatul Jannah Risanda Alirastra Budiantoro Annafi Firdaus Safitri Ardian Widiarto

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Kuat Waluyo Jati, Master, Lecturer, Faculty of Economics and Business, Universitas Negeri Semarang [State University of Semarang], Indonesia. (Corresponding author)

Fitrarena Widhi Rizkyana, Master, Lecturer, Faculty of Economics and Business, Universitas Negeri Semarang [State University of Semarang], Indonesia.

Richatul Jannah, Master, Lecturer, Faculty of Economics and Business, Universitas Negeri Semarang [State University of Semarang], Indonesia.

Risanda Alirastra Budiantoro, Master, Lecturer, Faculty of Economics and Business, Universitas Negeri Semarang [State University of Semarang], Indonesia.

Annafi Firdaus Safitri, Bachelor of Science, Faculty of Economics and Business, Universitas Negeri Semarang [State University of Semarang], Indonesia.

Ardian Widiarto, Master, Lecturer, Accounting Department, Politeknik Negeri Semarang, Indonesia.

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Kuat Waluyo Jati (Indonesia), **Fitrarena Widhi Rizkyana** (Indonesia), **Richatul Jannah** (Indonesia), **Risanda Alirastra Budiantoro** (Indonesia), **Annafi Firdaus Safitri** (Indonesia), **Ardian Widiarto** (Indonesia)

THE EFFECT OF ENVIRONMENTAL PERFORMANCE AND CORPORATE GOVERNANCE STRUCTURE ON THE QUALITY OF ENVIRONMENTAL DISCLOSURE

Abstract

Ensuring high-quality environmental disclosure has become a strategic concern for companies amid increasing public scrutiny and ongoing environmental degradation. This paper aims to examine the effect of environmental performance and corporate governance structure on the quality of environmental disclosure of manufacturing companies in Indonesia. Observations were made on 52 manufacturing companies that submitted annual and sustainability reports from 2020 to 2022. Panel data were analyzed using regression techniques. The empirical findings indicate that environmental performance, board size, board meeting frequency, multiple directorships, and the age of the youngest director have a positive and statistically significant impact on the quality of environmental disclosure. Specifically, environmental performance demonstrated a coefficient of 6.58 ($p < 0.01$), the age of the youngest director – 0.30 ($p < 0.10$), multiple directorships – 1.42 ($p < 0.05$), board size – 1.28 ($p < 0.05$), and board meeting frequency – 0.19 ($p < 0.10$). Conversely, director tenure exhibited a negative effect of 0.53 ($p < 0.05$). This study concludes that environmental performance and corporate governance are critical determinants of the quality of environmental disclosure in the context of Indonesian manufacturing companies. Overall, the study offers practical implications for regulators and corporate decision-makers seeking to improve environmental accountability and strengthen long-term stakeholder trust.

Keywords environmental disclosure quality, environmental performance, corporate governance, manufacturing companies, Indonesia

JEL Classification Q56, G34, L60

INTRODUCTION

Protecting and maintaining environmental sustainability is critical because good environmental quality is a vital element that directly guarantees the survival of all stakeholders. However, the rapid development of the industry has led to significant environmental degradation. Environmental degradation due to rapid industrial developments, such as gas emissions, and the impact of global warming due to the excessive use of non-renewable energy sources, is a significant concern for the public globally (Ifada & Saleh, 2022).

The World Air Quality Report in 2022 provides an alarming picture of environmental challenges in Indonesia (IQAir, 2023). The report shows Indonesia ranks 26th as the most polluted country out of 131. As for Jakarta, it ranks 20th among 116 cities worldwide for pollution. In Southeast Asia, Indonesia ranked first in the most

polluted region in 2022, specifically its Pasar Kemis area. The report explains that air pollution in Indonesia is caused by coal-fired power plants, forest fires, peatland degradation, and vehicle emissions (IQAir, 2023).

Environmental problems in Indonesia are increasingly uncertain. The consequences of this problem significantly impact the environmental ecosystem, biodiversity, and the welfare of the community. Moreover, compared to developed countries, most developing countries have paid less attention to environmental issues for many years (Welbeck et al., 2017). Manufacturing companies in Indonesia have made environmental disclosures through sustainability reports and annual company reports. Paradoxically, these companies continue to do environmental damage and face demands from the public.

For example, environmental damage done by the manufacturing company, even though it has disclosed that the environment is the "Carbon Major" case, where one of the companies produced more than seven billion tons of carbon dioxide from 1995 to 2021 (Walhi, 2023). Greenpeace Indonesia (2022) reported that rivers and beaches in Indonesia are increasingly polluted with waste from the company's operations. World Bank Group (2021) noted that Indonesia produces around 7.8 million tons of plastic waste yearly, with an estimated 346.5 thousand tons of plastic waste dumped into Indonesian sea waters. Ecoton (2022) highlights that one of the major manufacturing companies in Indonesia is consistently ranked in the top three environmentally polluting companies in several major cities. This impact is detrimental to the community and endangers the ecosystem of living things in Indonesia.

The environmental damage caused by these companies has drawn concern from multiple stakeholders, including the public and the Indonesian government (Solikhah & Maulina, 2021). From 2007 to 2021, Indonesia has issued various policies governing companies regarding social and environmental responsibility and sustainability reporting. These policies are reflected in several important regulations, such as the Limited Liability Company Law (Law of the Republic of Indonesia No. 40 of 2007), capital market regulations (Decree of the Chairman of Bapepam and LK Number: KEP-431/BL/2012), and provisions from the Financial Services Authority (OJK) regarding sustainable finance and annual reporting (OJK Regulation Number 51/POJK.03/2017 and OJK Circular Letter Number 16/SEOJK.04/2021). These regulations require companies to implement social and environmental responsibilities and prepare sustainability reports actively.

A contradiction exists between the company's environmental disclosures, its regulatory compliance, and its ongoing damaging practices. Therefore, it is interesting to examine the environmental disclosures the company has made and to assess their quality. Quality environmental disclosure signifies the company's commitment to environmental responsibility.

1. LITERATURE REVIEW AND HYPOTHESES

The quality of environmental disclosure reflects how well a company provides information about its environmental efforts and impacts. This analysis is conducted to assess the transparency of the company's information to the public. This information is typically presented through various reports, such as annual, sustainability, or social responsibility reports. Additionally, companies can use other media, such as their websites, to communicate environmental issues. In general, the disclosure quality indicates a company's level of transparency in managing its environmental responsibilities.

Studies consistently show that environmental disclosure quality (EDQ) in Indonesia is lagging compared to other emerging markets. For instance, Solikhah and Maulina (2021) report disclosure levels of only 9.31% for environmentally sensitive industries (2012–2016), while Sari et al. (2019) find 6.74% for manufacturing firms (2013–2017). These results are considerably lower than China, where Agyemang et al. (2020) document EDQ

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levels averaging 21% for mining companies, or India, where sensitive industries disclose around 35–40% (Kumari et al., 2022). In Africa, Ghanaian firms disclose only 12% (Welbeck et al., 2017), while South Africa averages 45–50% (Ofoegbu et al., 2018). In contrast, European countries such as France report EDQ above 75% (Baalouch et al., 2019). This highlights Indonesia's disclosure performance as higher than that of some African peers but substantially lower than that of China, India, and Europe.

Research gaps also emerge:

i. few Indonesian studies examine specific board attributes such as the age of the youngest director or multiple directorships;

ii. board size shows positive effects in India (Kumari et al., 2022) but mixed results in Indonesia (Solikhah & Maulina, 2021); director tenure is associated with more disclosure in China (Khan et al., 2021) but the opposite is found in Indonesia;

iii. this study advances the literature by showing how these governance characteristics operate in Indonesia's two-tier system, offering contrasts with one-tier systems in China, India, and Europe.

Previous research has explored various factors shaping environmental disclosure quality, though the empirical evidence remains somewhat mixed. This is particularly evident in studies focusing on corporate governance and firm characteristics. Agyemang et al. (2020), Ananzeh et al. (2023), Baalouch et al. (2019), Kilincarslan et al. (2020), and Safitri et al. (2022) continue to report inconsistent results. The variables examined in these studies include environmental audit, gender diversity, board independence, environmental performance, environmental committee, corporate pollution, industry classification, firm size, firm age, institutional ownership, managerial ownership, audit committee, board of commissioners size, quality of corporate governance, CEO duality, board size of directors, frequency of board meetings, presence of foreign employees, total annual remuneration, and board shareholding.

Reviewing previous research, this study adopts an agency theory perspective by focusing on top-level corporate governance. The novelty of this study is the greater focus on boards in Indonesian companies, highlighting their role in the corporate governance system, which impacts decision-making regarding environmental disclosure. Examining boards in Indonesian companies are important because Indonesia adheres to a two-tier board system. These two levels of boards have their respective functions and roles, as regulated by Indonesian regulations, and are referred to as the board of directors and the board of commissioners. Therefore, this study offers a different perspective on research in countries with a single-tier board system, which naturally affects environmental disclosure differently.

The two-tier board system in Indonesia, comprising the board of directors (responsible for management) and the board of commissioners (responsible for supervision), offers a governance structure distinct from the more commonly studied one-tier systems in global literature, which often conflate managerial and supervisory roles (Law No. 40/2007 and POJK regulation). This structure allows for a more defined separation of oversight and decision-making responsibilities, enhancing the potential for strong monitoring of environmental practices and disclosure. Prior Indonesian studies, however, have largely focused on board attributes such as size, independence, or gender without fully exploiting how the dual-board setup affects environmental disclosure (Kusumastati et al., 2022). By incorporating the two-tier system explicitly as part of the research design, this paper contributes uniquely by investigating how differential roles shape the quantity and quality of environmental disclosure in Indonesian manufacturing firms, something less feasible in single-tier governance settings (Wijayanti & Setiawan, 2024).

This study extends beyond an agency theory perspective, which focuses on the monitoring functions of boards in Indonesian companies, by integrating stakeholder and resource dependence theories to offer a more comprehensive framework for understanding environmental disclosure. Stakeholder theory underscores directors' responsibility to address the interests of diverse stakeholder groups. In contrast, resource dependence

theory highlights how directors leverage their expertise, experience, and inter-organizational networks to facilitate strategic decision-making related to sustainability. By synthesizing these theoretical perspectives, this study investigates the influence of environmental performance, age of the youngest director, multiple directorships, board tenure, board size, and board meetings on the quality of environmental disclosure within Indonesia's two-tier board system.

Environmental performance refers to a company's ability to reduce the negative impacts of its business activities while strengthening environmental protection (Karjono, 2021). It reflects the extent to which environmental aspects are integrated into corporate operations and is not limited to the final outcomes, but also encompasses the processes and practices undertaken to safeguard the environment. Firms with strong environmental performance tend to disclose environmental information as a form of accountability to the public (Hadiningtiyas & Mahmud, 2017; Ali et al., 2024) and are more likely to provide high-quality disclosures (Al-Tuwaijri et al., 2004; Wahyuningrum et al., 2020), thereby enhancing their reputation and strengthening stakeholder relationships. From an agency theory perspective, improved environmental performance reduces information asymmetry by signaling corporate social responsibility (Healy & Palepu, 2001). This motivates managers to disclose environmental information to help shareholders understand the firm's strategic advantages (Iatridis, 2013) and reduces the perceived need for external monitoring, as management is seen to be aligned with sustainability values. High-quality reporting also promotes transparency, mitigates information gaps, and allows stakeholders to assess the company's positive contributions. Complementing this view, stakeholder theory suggests that good environmental performance reflects directors' accountability to a broad set of stakeholders beyond shareholders (Jizi et al., 2014). Within this framework, high-quality environmental disclosure serves as a strategic mechanism to communicate environmental achievements, respond to stakeholder expectations, and secure social legitimacy (Wakaisuka-Isingoma et al., 2016). Accordingly, directors attentive to sustainability issues are motivated to enhance disclosure quality as part of their accountability to regulators, customers, employees, and local communities. Consistent with these arguments, empirical evidence shows that firms with higher environmental performance are more likely to disclose comprehensive information to align with stakeholder interests and strengthen transparency (Baalouch et al., 2019; Safitri et al., 2022; Portella & Borba, 2020; Chithambo et al., 2022; Huang & Kung, 2010; Ye et al., 2023).

The age of a young director represents a new generation of leadership that brings progressive views on sustainability and green technologies, encouraging firms to adopt innovative practices, comply with disclosure standards, and exceed stakeholder expectations through greater transparency (Giannarakis et al., 2019). Younger individuals are generally more concerned about environmental issues (Forte, 2004; Diamantopoulos et al., 2003) than older people, who tend to be more risk-averse (Post et al., 2011; Fransson & Gärling, 1999). Consequently, younger and more diverse boards are less conservative and show stronger awareness of sustainability concerns (Xia et al., 2022). From the agency theory perspective, their presence reduces agency conflicts by aligning management decisions with shareholders' long-term interests and environmental goals, while bridging information gaps with stakeholders (Giannarakis et al., 2019). Prior studies confirm that younger directors positively influence environmental disclosure (Ibrahim & Hanefah, 2016; Qa'dan & Suwaidan, 2019; Hoang et al., 2021), as generational differences shape board members' attention and sensitivity toward sustainability (Cosma et al., 2021; Gardiner, 2024; He et al., 2023). Complementing this view, stakeholder theory further emphasizes that non-financial reporting, including sustainability disclosure, is essential to provide sufficient information for stakeholders, thereby facilitating effective decision-making (Mitchell et al., 2016) and ensuring that reporting standards align with stakeholder priorities (Harrison & van der Laan Smith, 2015). Accordingly, the presence of younger directors plays a crucial role in enhancing environmental disclosure quality, as their progressive orientation toward sustainability aligns both with shareholder interests and broader stakeholder demands.

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Multiple directors, who hold positions on several boards, bring diverse knowledge, perspectives, and best practices from different industries, thereby enhancing their ability to address environmental issues (Solikhah & Winarsih, 2016; Che-Adam et al., 2019). Serving on multiple boards allows directors to demonstrate expertise, gain knowledge through cross-company interactions, and promote the breadth and depth of environmental disclosure (Xu et al., 2025). From the perspective of resource dependence theory (RDT), such directors provide critical human and social capital that enables them to advise on strategy and strengthen corporate initiatives in support of effective governance (Pfeffer & Salancik, 1978; Pugliese et al., 2009; Piñeiro-Chousa et al., 2025). Their ability to acquire resources and adapt to the external environment suggests that boards with members holding multiple directorships can leverage a broader array of resources for organizational advantage (Wang & Sun, 2022; Dobija et al., 2023). Additionally, from the stakeholder theory viewpoint, these directors are better equipped to recognize and respond to the interests of various stakeholders, including shareholders, employees, communities, and the environment, promoting more transparent and comprehensive environmental disclosures (Freeman & McVea, 2005). The combination of wide-ranging experience and heightened stakeholder awareness enhances directors' monitoring capacity, helps anticipate conflicts of interest, and supports the implementation of effective environmental strategies, ultimately improving the quality of corporate environmental disclosure (Solikhah & Winarsih, 2016; Xu et al., 2025).

The term of office of the board of directors refers to the average number of years that directors have served on the board (Al-qahtani & Elgharbawy, 2020), reflecting stability and continuity in leadership that is essential for shaping strategic decision-making. Longer tenures allow directors to accumulate greater experience and deeper knowledge of the firm's operations, values, and long-term objectives, enabling them to engage more effectively with emerging environmental issues and align managerial decisions with shareholders' interests in sustainable growth from an agency theory perspective (Khan et al., 2021). With their stronger understanding of sustainability goals, long-tenured directors are also more attuned to external developments such as regulatory changes, industry standards, and evolving sustainability practices, which equips them to respond proactively to environmental challenges and reduce information asymmetry between management and stakeholders (Gallego-Álvarez & Rodriguez-Dominguez, 2025). Their accumulated expertise enhances the ability to anticipate risks, seize opportunities, and strengthen transparency and accountability through more comprehensive environmental disclosure. Furthermore, long-tenured directors play a crucial role in creating sustainable value, particularly in innovative firms where knowledge continuity and strategic foresight are vital (Piñeiro-Chousa et al., 2025). Empirical evidence shows that board tenure tends to positively influence ESG practices, as longer-serving directors develop a stronger commitment to the firm and its sustainability initiatives (Fayyaz et al., 2023; Harjoto et al., 2015; L. Nguyen & P. Nguyen, 2023).

Board size, defined as the number of directors, including internal and independent members, is crucial in enhancing environmental disclosure (Khaireddine et al., 2020). Larger boards bring diverse experience, knowledge, and skills, which strengthen oversight, strategic decision-making, and the company's reputation, while providing more resources to discuss and monitor environmental issues in depth (Shahab & Ye, 2018; Agyemang et al., 2020; Fernandes et al., 2019). According to agency theory, the board of directors is responsible for formulating environmental disclosure plans and ensuring the reporting of environmental activities to meet stakeholder requirements and fulfill social contracts, serving as a governance mechanism to reduce opportunism and increase information transparency (Aly et al., 2024; De Villiers & Van Staden, 2011; Coles et al., 2006). From the stakeholder theory perspective, larger boards facilitate the representation of diverse stakeholder interests and provide the benefits of diversified expertise among members, which broadens perspectives in strategic environmental decision-making and encourages higher-quality disclosure (Sun et al., 2010; Allegrini & Greco, 2013). Empirical evidence confirms a positive relationship between board size and environmental disclosure, indicating that larger boards are more likely to promote comprehensive and transparent reporting (Agyemang et al., 2020; Nuskiya et al., 2021).

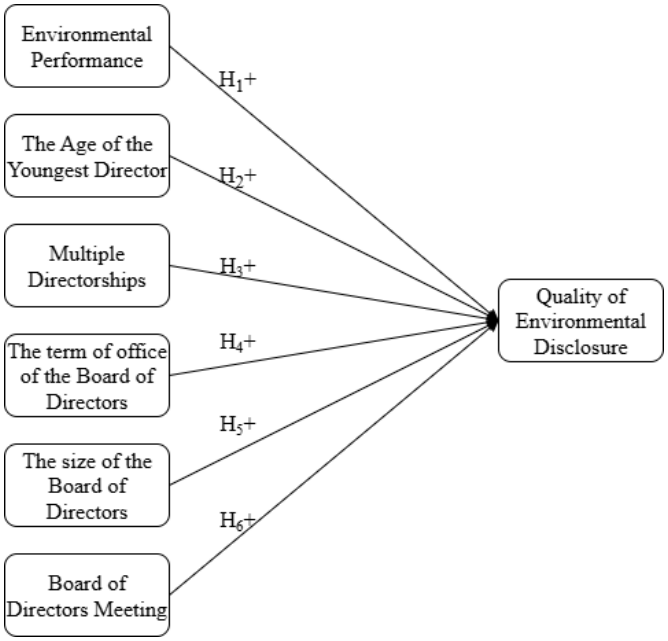

Figure 1. Conceptual model

Board of directors' meetings, measured by the number of meetings held annually, are a key mechanism of management oversight (Aliyu, 2019). The frequency of these meetings reflects the board's commitment to achieving company goals and policies and strengthens oversight, supporting improved environmental disclosure (Aliyu, 2019; Alshbili et al., 2020). Regular meetings provide a platform for discussing environmental issues, evaluating company strategy, and assessing social and environmental responsibilities, which enhances decision-making and the quality of disclosures (Setyawan & Kamilla, 2015; Altawalbeh, 2020). According to agency theory, frequent board meetings mitigate agency problems, reduce opportunistic managerial behavior, and increase transparency by facilitating information flow and communication among board members (Xie et al., 2003; Chou et al., 2013). Empirical studies confirm that higher meeting frequency positively affects environmental disclosure, indicating that regular and well-structured board meetings can improve both the comprehensiveness and quality of reporting (Agyemang et al., 2020; Kumari et al., 2022; Aly et al., 2024).

Research on environmental disclosure is crucial because it affects the survival of companies and the surrounding communities. In the Indonesian context, environmental performance assessment is suitably carried out using the PROPER index issued by the Indonesian Ministry of Environment, as Indonesians more widely understand it. Furthermore, corporate governance is expected to play a role in supporting quality environmental disclosure. Regarding the role of directors within a company, it is interesting to observe the role of the youngest directors on the board. Therefore, this study aims to explain the quality of environmental disclosure in terms of environmental performance and corporate governance structure in manufacturing companies in Indonesia (Figure 1). According to the literature review, the study's hypotheses are:

H1: Environmental performance positively affects the quality of environmental disclosure.

H2: The age of the youngest director positively affects the quality of environmental disclosure.

H3: Multiple directorships positively affect the quality of environmental disclosure.

H4: The term of office of the board of directors positively affects the quality of environmental disclosure.

H5: The size of the board of directors positively affects the quality of environmental disclosure.

H6: Board of directors meeting positively affects the quality of environmental disclosure.

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2. METHOD

This study uses data from sustainability reports and annual reports published by companies on the Indonesia Stock Exchange, as well as the websites of the companies that are the objects of the research, covering a total of 169 companies. Data were obtained using purposive sampling, observing companies for three years, from 2020 to 2022. The observation period was set to 2020–2022 because the former Indonesian Stock Exchange index, JASICA, was still in use. In 2021, the Exchange announced that the IDX Industrial Classification (IDX-IC) would replace JASICA, significantly restructuring its sectors. Complete JASICA sector data are only available through 2022. The sampling resulted in 52 companies with 156 analysis units. The sampling criteria are specified in Table 1.

The indicators and measurement variables used in this study, namely environmental disclosure quality measurement, were measured by Wiseman's assessment (46 disclosure items in 9 categories). Considering the Indonesian context, where not all companies adopt GRI reporting comprehensively, Wiseman's index provides a more practical and consistent tool to assess disclosures. Wiseman (1982) scoring procedure to examine disclosure, the highest score on Wiseman (1982) measure is 3. This study follows Fatima et al. (2015) and Yao et al. (2023). The variable was measured by assigning a score of four (4) if the disclosed information is both quantitative and monetary, a score of three (3) if the disclosed information is quantitative but non-monetary, a score of two (2) if the information is disclosed in specific detail but non-quantitative, a score of one (1) if the information is disclosed generally, and a score of zero (0) if the item is not disclosed.

Environmental performance is measured using the PROPER framework, which assesses a company's efforts to protect the environment and reduce its operational impact (Karjono, 2021). The age of the youngest director is measured by the youngest age of the board of directors (Giannarakis et al., 2019). Multiple directorships were assessed by counting the number of commissioners who simultaneously hold a board of commissioners position in other companies (Solikhah & Winarsih, 2016). The term of office of the board of directors describes the average length of office of a board member, which is measured between the number of years a board member has served and the number of board members (Al-qahtani & Elgharbawy, 2020). The size of the board of directors reflects the total number of directors on the board, including both internal and external members (Khaireddine et al., 2020; Ofoegbu et al., 2018). The board of directors meeting refers to the frequency of board meetings held annually as a means of management oversight (Aliyu, 2019).

The analysis units were processed using descriptive statistics and inferential analysis (panel data regression). Data processing was performed using EViews software. Before testing the hypotheses, it is necessary to select the most appropriate model, whether using the Common Effect Model (CEM), Fixed Effect Model (FEM), or Random Effect Model (REM), by conducting Chow, Hausman, and Lagrange Multiplier tests.

3. RESULTS

The standard deviation value of this study is smaller than the average for each variable, which indicates a relatively uniform data distribution between variables (Table 2). In 2022, PT Semen

Table 1. Sampling process

No.	Criterion	Not Compliant	Compliant
1.	Manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2022 period		169
2.	Manufacturing companies that publish and present annual reports and corporate sustainability reports during the period 2020–2022	(93)	76
3.	Manufacturing companies that participated in PROPER during the 2020–2022 period	(24)	52
Number of sample companies (a)			52
Years of observation (b)			3
Number of units of analysis (a*b)			156

Table 2. Descriptive statistics

Variable	EDQ	EP	AGE	MD	TEN	BS	BM
Mean	58.50	3.03	45.22	1.82	5.960	5.871	16.75
Median	59.00	3.00	47.00	1.00	4.250	5.00	12.00
Maximum	100.00	5.00	60.00	8.00	27.60	15.00	60.00
Minimum	15.00	2.00	27.00	0.00	0.00	2.00	6.00
Std. Dev.	15.340	0.493	6.930	1.757	5.399	2.373	10.22
Observations	156	156	156	156	156	156	156

Indonesia Tbk (SMGR) achieved the highest (maximum) environmental disclosure quality (EDQ) score of 100. In 2020, PT Siantar Top Tbk (STTP) achieved the lowest EDQ score of 15. Meanwhile, the average EDQ score was 58.50, compared to Malaysia's 25.6% (Wahyuningrum et al., 2022). Indonesia's EDQ is better, but can still be optimized. Therefore, this paper is crucial to encourage accountable and transparent environmental reporting to improve corporate sustainability practices and ensure long-term sustainability.

The appropriate model is selected in panel data regression by conducting the Chow, Hausman, and Lagrange Multiplier tests. The Chow test yields a p-value of 0.0002 for the Cross-section Chi-square, indicating that the Fixed Effect Model (FEM) is selected. Furthermore, the Hausman test yielded a p-value of 0.5659 for the Cross-section Chi-square, indicating that the Random Effect Model (REM) is selected. Finally, the Lagrange Multiplier test obtained a Breusch-Pagan cross-section sig value of 0.0695, which means that the most appropriate model for this panel data regression is the Common Effect Model (CEM).

The Breusch-Pagan-Godfrey test results (Table 3) show that Obs*R-squared Chi-square value of 0.308 is greater than 0.05, indicating that the model does not suffer from heteroskedasticity. Therefore, the regression estimates are efficient and robust against variance disturbances. The absence of heteroscedasticity problems indicates that the regression estimates are efficient and unbiased, strengthening the robustness and reliability of the empirical findings.

The results of hypotheses tests are presented in Table 4. Among the six variables tested, five showed a positive and statistically significant effect: environmental performance (β = 6.577809; p = 0.0053), age of the youngest director (β =

Table 3. Heteroscedasticity results

Components	Statistical Values	Probability	
F-statistic	1.192	Prob. F(6,149)	0.314
Obs*R-squared	7.144	Prob. Chi-Square(6)	0.308
Scaled explained SS	7.139	Prob. Chi-Square(6)	0.308

Table 4. Hypotheses results

Hypothesis	Regression Model	Regression Coefficients	sig-value	Result
H1	Environmental performance positively affects the quality of environmental disclosure	6.577809	0.0053***	Accepted
H2	The age of the youngest director positively affects the quality of environmental disclosure	0.296577	0.0933*	Accepted
H3	Multiple directorships positively affect the quality of environmental disclosure	1.425295	0.0305**	Accepted
H4	The term of office of the board of directors positively affects the quality of environmental disclosure	–0.527357	0.0167**	Rejected
H5	The size of the board of directors positively affects the quality of environmental disclosure	1.284170	0.0132**	Accepted
H6	Board of directors meeting positively affects the quality of environmental disclosure	0.193513	0.0911*	Accepted

Note: ***: Significance 1%; **: Significance 5%; *: 10% significance.

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0.296577; p = 0.0933), multiple directorships (β = 1.425295; p = 0.0305), board size (β = 1.284170; p = 0.0132), and board meetings (β = 0.193513; p = 0.0911). One variable, tenure of the board of directors, showed a negative regression coefficient (β = –0.527357) and was statistically significant (p = 0.0167). According to Miao et al. (2023) and Trianaputri and Djakman (2019), the significance levels used were 1%, 5%, and 10%. In social science and accounting research, a 10% threshold is often accepted as indicative of a potentially relevant relationship, but we advise cautious interpretation. While some journals had lower rates of reporting statistical trends than did other journals, all of the journals did allow occasional reporting of statistical trends (p < .10) in some of their articles (Schumm et al., 2013).

4. DISCUSSION

Environmental performance exerts a positive effect on the quality of environmental disclosure, indicating that firms with robust environmental management communicate their strategies, achievements, and future initiatives with greater transparency. From an agency theory perspective, superior environmental performance mitigates information asymmetry between management and shareholders by demonstrating corporate social responsibility and signaling that managerial decisions align with long-term value creation (Healy & Palepu, 2001; Iatridis, 2013). Concurrently, drawing on stakeholder theory, high environmental performance reflects directors' accountability to a wide array of stakeholders, enhancing legitimacy, reputation, and stakeholder trust (Jizi et al., 2014). Empirical studies corroborate these relationships, showing that firms with stronger environmental performance provide more comprehensive, reliable, and high-quality disclosures, thereby reinforcing transparency, accountability, and sustainable corporate value (Baalouch et al., 2019; Safitri et al., 2022; Hadiningtiyas & Mahmud, 2017; Karjono, 2021). Unlike in Europe, where disclosure is mainly enforced through EU directives (Baalouch et al., 2019), in Indonesia, disclosure improvements are driven more by reputational concerns linked to PROPER scores.

The age of the younger directors in a company contributes positively to the quality of environmental disclosure. The younger directors can better absorb and respond to new ideas, enabling them to better understand the multifaceted nature of environmental issues facing the company. This study emphasizes the role of the youngest directors as part of Indonesia's two-tier governance system. Younger board members often bring fresh perspectives, digital literacy, and stronger environmental awareness, which can enrich disclosure practices (Almaqtari et al., 2023). However, prior Indonesian studies rarely address generational aspects of boards, focusing instead on size, independence, or gender.

By examining the youngest directors, this study extends local governance literature and highlights how generational diversity influences environmental disclosure quality. Consequently, they are more likely to demonstrate sensitivity and initiative in promoting or supporting the adoption of sustainable business practices through greater openness and transparency in environmental reporting. This finding confirms the agency theory in this study, where younger leaders, with their responsiveness and initiative, will increase transparency and reduce information asymmetry between shareholders and company management, ultimately leading to better environmental disclosure. This study provides consistent results with Giannarakis et al. (2019), Hoang et al. (2021), and Qa'dan and Suwaidan (2019), who found that the presence of younger directors can prompt environmental disclosure to minimize information asymmetry regarding environmental practices that benefit sustainability. Complementing this, stakeholder theory emphasizes that non-financial reporting, including sustainability and environmental disclosure, is essential for providing stakeholders with relevant information to make informed decisions (Mitchell et al., 2016). Younger directors are more attuned to these stakeholder expectations and priorities, ensuring that environmental disclosure aligns with the informational needs of investors, regulators, employees, and the broader community (Harrison & van der Laan Smith, 2015).

The positive association between younger directors and EDQ highlights the role of generational change in Indonesian governance. Around 33% of directors in manufacturing firms listed on the Indonesia Stock Exchange are under 50 years old

(Ervandy et al., 2025), and many of them have international exposure, making them more receptive to ESG norms. This explains why younger directors are better positioned to push for transparency, consistent with Giannarakis et al. (2019) and Hoang et al. (2021). In contrast, in China, disclosure quality is largely mandated by state regulation (Yao et al., 2023), which reduces the marginal role of board age.

Multiple directorships held by commissioners positively affect the quality of environmental disclosure. This study underlines the role of multiple directorships in Indonesia's two-tier system. Evidence from Tham et al. (2025) links them to stronger carbon reduction efforts. Thus, multiple directorships offer practical value for enhancing disclosure quality in Indonesia. Directors serving on multiple boards enhance environmental disclosure by bringing diverse perspectives, cross-industry knowledge, and best practices, improving transparency and strategic management of environmental information. From a resource dependence theory (RDT) perspective, they provide critical human and social capital, enabling access to resources, strategic guidance, and strengthened governance to support effective environmental practices (Pfeffer & Salancik, 1978; Pugliese et al., 2009; Piñeiro-Chousa et al., 2025). Simultaneously, from a stakeholder theory perspective, these directors are better equipped to address the interests of diverse stakeholders, promoting comprehensive, transparent, and stakeholder-aligned disclosures (Freeman & McVea, 2005). This finding also aligns with Solikhah and Winarsih (2016). In contexts like Indonesia, where enforcement is weaker, external networks through interlocking directorships substitute for regulatory pressure and help introduce international disclosure standards.

The term of office of the board of directors shows a significant negative relationship with environmental disclosure quality. The quality of environmental disclosure decreases as the board of directors' tenure lengthens. This study shows that less environmental information is disclosed when directors serve for an extended period. Long-serving directors are often more focused on personal interests and are less motivated to disclose environmental matters transparently and be accountable. According to Ratri et al. (2021), CEOs or top executives with long tenures may lose their commitment to sustainability because they are generally more risk-averse and become increasingly satisfied with their positions. In addition, Nathaniel et al. (2021) suggest that although long-serving CEOs may seek to demonstrate positive performance, primarily through CSR activities, such efforts are often motivated by self-preservation or reputational concerns rather than genuine transparency. The performance shown is an effort by the CEO to avoid dismissal problems or other career concerns. The data also show that the more recently a director has served on a company's board, the higher the quality of their environmental disclosure efforts. The opposite is true, with the quality of environmental disclosure declining among directors with longer tenure, potentially due to conflicts of interest. This finding aligns with agency theory, suggesting that directors behave opportunistically, as the longer they serve, the more comprehensive their information about the company. At the same time, the shareholders do not, so it is a reason for them to take opportunistic actions, namely by not disclosing environmental information in an accountable and transparent manner. These findings corroborate prior studies by Khan et al. (2021) and Ratri et al. (2021), emphasizing the negative implications of prolonged leadership tenures on corporate transparency and sustainability reporting.

Board size positively affects the quality of environmental disclosure, as larger boards bring diverse expertise, skills, and perspectives that enable more informed strategic decision-making and effective management of environmental issues. From an agency theory perspective, larger boards strengthen monitoring and oversight, reducing information asymmetry between shareholders and management and enhancing the credibility of disclosures. Simultaneously, from a stakeholder theory perspective, broader boards facilitate the representation of diverse stakeholder interests, ensuring that environmental disclosures are comprehensive, transparent, and aligned with the informational needs of multiple stakeholders (Sun et al., 2010; Allegrini & Greco, 2013). Consequently, larger boards enhance both the reliability and strategic relevance of environmental reporting, reinforcing corporate legitimacy and accountability. These results confirm prior studies conducted by Agyemang et al. (2020), Fernandes et al. (2019), Nuskiya et al. (2021),

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Ofoegbu et al. (2018), and Raimo et al. (2022), who consistently found that larger boards are positively correlated with improved sustainability reporting and greater organizational accountability.

The frequency of board meetings positively impacts the quality of environmental disclosure. Board of directors' meetings can improve the environmental disclosures. This study demonstrates that regular meetings among directors enhance transparency by providing opportunities to consistently monitor, evaluate, and respond to the company's environmental challenges. Routine discussions allow the board to remain updated and responsive to environmental concerns that affect corporate sustainability, thereby fostering more comprehensive and accountable environmental reporting. Regular board of directors' meetings enhance the board's monitoring capacity, reducing opportunistic managerial behavior and improving information flow among members (Xie et al., 2003; Chou et al., 2013). From an agency theory perspective, these meetings strengthen oversight, enabling directors to critically review reports and ensure alignment with shareholder interests. Consequently, frequent board meetings contribute to higher-quality environmental disclosures by promoting transparency, accountability, and reduced information asymmetry between management and stakeholders. This research confirms Kumari et al. (2022), Agyemang et al. (2020), and Xie et al. (2003). Since most Indonesian companies lack dedicated sustainability committees, board meetings become the main forum for discussing ESG issues. This result aligns with findings from Nigeria (Aliyu, 2019) that frequent meetings enhance monitoring and disclosure.

However, this study has several limitations that must be acknowledged in future studies. First, the companies observed were only manufacturing companies; although this selection has been described, the research results cannot be generalized to companies in different sectors. Second, the company's disclosure may be in good condition, but the data may not reflect the actual conditions. Third is omission of the oversight role played by the board of commissioners in overseeing management, in this case, the company's board of directors. This oversight may overlook important governance mechanisms that can influence disclosure practices. Finally, this study's absence of control variables potentially introduces bias due to missing factors. Therefore, the influence of several factors in this study on the quality of environmental disclosure may be biased.

Further research can examine other sectors with the potential to damage the environment, such as mining companies. Developing other methods to assess the quality of environmental disclosure is necessary. In addition, further studies should incorporate the role of independent commissioners in evaluating their effectiveness in monitoring long-serving directors.

Based on corporate governance, independent commissioners have a role in objectively evaluating management actions so that management (the board of directors) will work in the shareholders' interests to achieve long-term corporate sustainability. Future research should consider relevant control variables to obtain more reliable results. Expanding the scope of research on the Indonesia Stock Exchange requires attention to the latest company classification system, the IDX Industrial Classification (IDX-IC), which the Indonesia Stock Exchange officially provides. Since IDX-IC implementation began in 2021 and data availability during the current study period remained limited, this classification was not adopted in the present paper. However, as IDX-IC data become more widely available and expand over time, future researchers will be able to conduct more detailed, sector-specific analyses by incorporating this new classification framework.

CONCLUSION

This study explores how companies' environmental performance and internal governance contribute to increasing the transparency of environmental information to stakeholders. The research findings indicate that environmental disclosure quality improves with increasing environmental performance, the age of the youngest director, multiple directorships on the board of commissioners, the size of the

board of directors, and board of directors' meetings. These variables indicate greater transparency and strategic attention to environmental issues. However, the quality of environmental reporting declines with longer tenure for directors, as these directors tend to become more complacent and prioritize personal agendas. In contrast, newly appointed directors are generally more motivated to demonstrate their commitment to corporate accountability, including through high-quality environmental disclosures that contribute to long-term corporate value.

This study reveals that the quality of environmental disclosure will increase when a company has good environmental performance supported by good corporate governance. These findings carry direct implications for regulators and policymakers. Encouraging board diversity and setting reasonable limits on director tenure could strengthen governance and improve responsiveness to sustainability challenges. In addition, aligning Indonesia's sustainability reporting framework with international standards such as ISSB and GRI would enhance transparency, comparability, and investor confidence. Integrating governance factors into mandatory reporting requirements is therefore essential to advancing corporate accountability and improving the quality of environmental disclosure.

AUTHOR CONTRIBUTIONS

Conceptualization: Kuat Waluyo Jati, Fitrarena Widhi Rizkyana.
Data curation: Kuat Waluyo Jati, Richatul Jannah, Annafi Firdaus Safitri.
Formal analysis: Fitrarena Widhi Rizkyana, Risanda Alirastra Budiantoro, Ardian Widiarto.
Investigation: Kuat Waluyo Jati, Richatul Jannah, Risanda Alirastra Budiantoro, Ardian Widiarto.
Methodology: Kuat Waluyo Jati, Risanda Alirastra Budiantoro, Ardian Widiarto.
Project administration: Fitrarena Widhi Rizkyana, Richatul Jannah, Annafi Firdaus Safitri.
Supervision: Kuat Waluyo Jati.
Validation: Fitrarena Widhi Rizkyana.
Visualization: Richatul Jannah, Risanda Alirastra Budiantoro, Annafi Firdaus Safitri, Ardian Widiarto.
Writing – original draft: Kuat Waluyo Jati, Fitrarena Widhi Rizkyana, Annafi Firdaus Safitri.
Writing – review & editing: Kuat Waluyo Jati, Fitrarena Widhi Rizkyana, Richatul Jannah, Risanda Alirastra Budiantoro, Ardian Widiarto.

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