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The Corporate Biodiversity Paradox: Evidence of Biodiversity Disclosure and ESG Performance in Indonesia

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ABSTRACT

This study aims to analyze the effect of biodiversity disclosure on ESG performance in manufacturing companies listed on the Indonesia Stock Exchange, as well as to examine the moderating role of board gender diversity and firm size in this relationship. The background of this research is driven by the increasing urgency to integrate biodiversity issues into the global sustainability framework and the paradox of low biodiversity disclosure in Indonesia, despite a significant increase in the issuance rate of corporate sustainability reports. Using purposive sampling, this study utilizes data from companies included in the IDX30 index for the 2020–2025 period.

The results of this study demonstrate that biodiversity disclosure has a positive and significant effect on ESG performance. Board gender diversity is proven to negatively moderate this relationship, indicating that board gender diversity actually weakens the positive influence of biodiversity disclosure on ESG performance. Conversely, firm size moderates the relationship positively and significantly, showing that larger companies are able to strengthen the positive impact of biodiversity disclosure on ESG performance. These findings reinforce that biodiversity disclosure is a crucial factor in enhancing ESG performance, but its effectiveness is influenced by governance characteristics and corporate capacity.

The results are expected to provide theoretical contributions to the development of stakeholder theory and legitimacy theory within the context of biodiversity, as well as practical contributions for companies, regulators, and investors in designing effective biodiversity disclosure strategies to improve ESG performance and strengthen corporate legitimacy in emerging markets like Indonesia.

Keywords: biodiversity disclosure, ESG performance, board gender diversity, firm size.

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INTRODUCTION

In the modern era, environmental sustainability has become one of the most critical strategic issues in the global business and financial world. Climate change, ecosystem degradation, and biodiversity loss are no longer viewed merely as environmental issues; instead, they have transformed into material financial risks for companies and investors (Finance for Biodiversity Foundation, 2025). Based on the 2025 Biodiversity Finance Trends data, there is a global biodiversity funding gap of US$700 billion per year

until 2030, underscoring the urgency of integrating biodiversity into corporate financial frameworks (UK Government, 2025).

The Environmental, Social, and Governance (ESG) framework has become the de facto standard for measuring corporate sustainability performance. However, to date, the biodiversity aspect remains the least attended component within the Environmental (E) pillar of ESG compared to carbon emissions or water usage (Moses & Yahaya, 2024). Recent research indicates that in 2023, only 7% of companies in Indonesia treated biodiversity as a material topic in their sustainability reporting, even though the proportion of companies publishing sustainability reports increased significantly from 56.7% in 2019 to 96.7% in 2023 (Senanayake et al., 2026).

This phenomenon creates a paradox: on one hand, awareness of the importance of biodiversity is rising globally with the launch of the Taskforce on Nature-related Financial Disclosures (TNFD) in September 2023 and the Kunming-Montreal Global Biodiversity Framework (KMGBF), which targets the mobilization of US$200 billion per year for biodiversity from all sources by 2030 (The Nature Conservancy, 2025). On the other hand, corporate practices regarding biodiversity disclosure are still highly limited and have not been comprehensively integrated into the ESG reporting system.

Indonesia, as a megadiverse country possessing more than 17% of the world's species, holds a strategic position but also bears a massive responsibility in global biodiversity conservation. The Indonesian manufacturing sector, which contributes significantly to the national GDP, leaves a substantial ecological footprint through natural resource extraction, pollution, and land-use change. Therefore, understanding how biodiversity disclosure affects the ESG performance of manufacturing companies in Indonesia becomes highly relevant from both academic and practical perspectives.

Empirical research shows a positive relationship between biodiversity disclosure and ESG performance. A study conducted on energy and mining companies in Indonesia for the 2018-2022 period found that companies with comprehensive biodiversity disclosure practices exhibited 35.4% higher ESG performance scores and 12.3% higher Return on Assets (ROA) (Rizki & Perdana, 2024). Similar findings were identified in the context of publicly listed companies in China for the 2010-2022 period, showing that biodiversity disclosure enhances ESG performance through mechanisms that reduce information asymmetry and increase stakeholder trust (Wang et al., 2026a).

Literature suggests that the effectiveness of sustainability practices is heavily influenced by contingency factors such as board composition and firm characteristics. Board gender diversity has been proven to enhance ESG performance by bringing more diverse perspectives, focusing on risk management, and paying greater attention to sustainability issues (Rahman et al., 2024; Zhu & Chen, 2025). Research on S&P 500 companies shows that firms with boards consisting of three or more female directors scored 2-3 times higher on ESG metrics compared to less diverse boards (Banahan & Hasson, 2018). Meanwhile, firm size influences a company's capacity to implement ESG practices and allocate resources for sustainability disclosure.

Despite empirical evidence demonstrating the importance of biodiversity disclosure, research integrating the moderating variables of board gender diversity and firm size within the context of the biodiversity disclosure–ESG performance relationship remains very limited, particularly in emerging markets like Indonesia. Most studies still focus on the direct relationship between ESG and financial performance, or on more traditional environmental components such as carbon emissions and energy efficiency. Research on biodiversity disclosure among Indonesian companies listed on the SRI-KEHATI index for the 2018-2020 period found that the size of the board of commissioners positively influenced biodiversity disclosure, but the proportion of independent commissioners and the proportion of women on the board of commissioners were not proven to have a significant effect (Hambali & Adhariani, 2022). These findings indicate the need for further investigation into the specific conditions under which gender diversity can moderate the effectiveness of biodiversity disclosure.

This research gap creates an urgency to develop a more comprehensive understanding of how biodiversity disclosure contributes to ESG performance, and how governance mechanisms and firm

characteristics moderate this relationship. This study is expected to provide theoretical contributions to the development of legitimacy theory and stakeholder theory in the context of biodiversity, as well as practical contributions for companies, regulators, and investors in designing more effective sustainability strategies.

LITERATURE REVIEW

Stakeholder theory, developed by Freeman (1984), states that a company has responsibilities not only to its shareholders but also to various interested parties (stakeholders), including employees, customers, suppliers, local communities, and the environment. In the context of biodiversity, this theory is highly relevant because biodiversity degradation impacts various stakeholders, from local communities dependent on regional ecosystems to investors facing reputational and regulatory risks. Biodiversity disclosure can be viewed as a corporate communication mechanism to stakeholders to demonstrate a commitment to nature conservation and environmental impact management. Research indicates that stakeholders increasingly demand transparency regarding business impacts on biodiversity, and companies that respond to these demands tend to possess stronger legitimacy and better ESG performance (Capitals Coalition, 2021).

Biodiversity disclosure refers to corporate practices in disclosing information related to their impacts, dependencies, risks, and efforts regarding biodiversity in annual reports, sustainability reports, or dedicated disclosures. This disclosure can include: identification of operational impacts on biodiversity, operational locations near ecologically sensitive areas, biodiversity conservation policies and strategies, ecosystem restoration programs, metrics and targets, and governance structures for biodiversity risk management. Relevant frameworks include the Global Reporting Initiative (GRI) 304: Biodiversity, TNFD, and ESRS E4 (Global Reporting Initiative & TNFD, 2024).

ESG performance refers to a company's performance across three sustainability dimensions: Environmental (E), Social (S), and Governance (G). It can be measured using various rating and scoring systems such as MSCI ESG Ratings, Sustainalytics ESG Risk Rating, Bloomberg ESG Disclosure Score, or local ESG indices developed by national stock exchanges.

Board gender diversity refers to the representation of women on the board of commissioners and board of directors of a company. It can be measured through the proportion of female directors, the presence of at least one female director (critical mass theory), or the Blau Index for heterogeneity. Research indicates that board gender diversity brings diverse perspectives, strengthens risk management, and enhances attention toward sustainability issues, including biodiversity disclosure (Banahan & Hasson, 2018; Rahman et al., 2024; Zhu & Chen, 2025).

Firm size is a company characteristic reflecting operational scale and resource capacity, commonly proxied by total assets, total revenue, market capitalization, or number of employees. In the ESG context, firm size influences a company's capacity to allocate resources for sustainability practices, stakeholder visibility, operational complexity, and environmental impact.

Hypothesis Development

Prior studies demonstrate a consistent positive relationship between biodiversity disclosure and ESG performance. For instance, research on Indonesian energy and mining companies (2018-2022) found that corporate biodiversity disclosure significantly improves ESG performance scores (Rizki & Perdana, 2024). This positive effect operates through several mechanisms: transparency and accountability, legitimacy enhancement, risk management, and proactive stakeholder engagement.

H1: *Biodiversity disclosure has a positive effect on ESG performance.*

Literature generally supports a positive moderating effect of board gender diversity on the sustainability-performance nexus (Zhu & Chen, 2025; Banahan & Hasson, 2018). Female directors are theorized to bring diverse perspectives, emphasize long-term public value, and exhibit higher sensitivity to stakeholder needs. However, the Indonesian context has shown mixed results, necessitating further structural investigation (Hambali & Adhariani, 2022).

H2: *Board gender diversity positively moderates the relationship between biodiversity disclosure and ESG performance, such that the relationship is stronger when board gender diversity is higher.*

The role of firm size as a moderator remains complex and ambiguous, with competing theoretical views: positive moderation due to resource capacity and stakeholder visibility (Zengin, 2025) versus negative moderation due to bureaucratic inertia and coordination challenges (Sitepu & Yani, 2025)

H3: *Firm size positively moderates the relationship between biodiversity disclosure and ESG performance.*

Control variables included in this study are: ROA, Leverage, and Firm Age

METHOD

This study adopts a quantitative approach with an explanatory research design. The analysis utilizes panel data regression with Moderated Regression Analysis (MRA). Population: All companies listed on the Indonesia Stock Exchange, focusing on the manufacturing sector due to its high ecological footprint and dependency on ecosystem services. Sample: Selected using purposive sampling with the criteria: companies listed in the IDX30 index during 2020–2024, consistently publishing annual or sustainability reports, and possessing complete data for all variables.

Model 1: Direct Effect (Main Effect)

$$ESG_{it} = \beta_0 + \beta_1 BDI_{it} + \beta_2 SIZE_{it} + \sum \beta_k Controls_{it} + \epsilon_{it}$$

Model 2: Moderation Effect of Board Gender Diversity

$$ESG_{it} = \beta_0 + \beta_1 BDI_{it} + \beta_2 BGD_{it} + \beta_3 (BDI_{it} \times BGD_{it}) + \beta_4 SIZE_{it} + \sum \beta_k Controls_{it} + \epsilon_{it}$$

Model 3: Moderation Effect of Firm Size

$$ESG_{it} = \beta_0 + \beta_1 BDI_{it} + \beta_2 SIZE_{it} + \beta_3 (BDI_{it} \times SIZE_{it}) + \beta_4 BGD_{it} + \sum \beta_k Controls_{it} + \epsilon_{it}$$

Model 4: Full Model dengan Dual Moderation

$$ESG_{it} = \beta_0 + \beta_1 BDI_{it} + \beta_2 BGD_{it} + \beta_3 SIZE_{it} + \beta_4 (BDI_{it} \times BGD_{it}) + \beta_5 (BDI_{it} \times SIZE_{it}) + \sum \beta_k Controls_{it} + \epsilon_{it}$$

RESULTS

Panel Data Model Selection

To identify the most appropriate panel regression model among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), Chow, Hausman, and Lagrange Multiplier (LM) tests were conducted.

Table 1. Models

Regression Model	Test Name	Statistical Value	p-Value	Conclusion (Best Model)
Model 1 (Main Effect)	Chow Test	Cross-section F = 97.0564	0.0000	Reject CEM, proceed to FEM vs REM
	Hausman Test	Chi-Sq = 8.1315	0.2286	p > 0.05 ⇒ Choose Random Effect Model
	LM Test	Breusch-Pagan = 151.7027	0.0000	p < 0.05 ⇒ REM is better than CEM
Model 2 (BGD Moderation)	Chow Test	Cross-section F = 109.3436	0.0000	Reject CEM, proceed to FEM vs REM
	Hausman Test	Chi-Sq = 3.4025	0.7569	p > 0.05 ⇒ Choose Random Effect Model
	LM Test	Breusch-Pagan = 161.5881	0.0000	p < 0.05 ⇒ REM is better than CEM
Model 3 (SIZE Moderation)	Chow Test	Cross-section F = 97.7050	0.0000	Reject CEM, proceed to FEM vs REM
	Hausman Test	Chi-Sq = 7.5105	0.2762	p > 0.05 ⇒ Choose Random Effect Model
	LM Test	Breusch-Pagan = 149.8536	0.0000	p < 0.05 ⇒ REM is better than CEM

Source: *Processed secondary data, 2026.*

Note: ** significant at 10%, ** significant at 5%, *** significant at 1%.*

Panel Data Model Selection

Table 2. Random Effect

Variable	Model 1: Main Effect		Model 2: Moderasi BGD		Model 3: Moderasi SIZE	
	Koef.	Sig.	Koef.	Sig.	Koef.	Sig.
BDI	2.1164**	0.0045	7.4952***	0.0000	1.4540*	0.0511
BGD	-14.3512	0.3532	9.5832	0.5500	–	–
SIZE	-0.0327	0.3083	–	–	-0.0567***	0.0041
BDI × BGD	–	–	-31.7017***	0.0001	–	–
BDI × SIZE	–	–	–	–	0.0205***	0.0036
ROA	-0.0481	0.4410	-0.0484	0.4006	-0.0473	0.2890
LEV	-0.4584	0.3620	-1.4729***	0.0027	-0.5923*	0.0977
AGE	0.1105	0.3273	-0.0342	0.7496	0.0979	0.1859
Constant	28.6562***	0.0000	30.0111***	0.0000	27.9887***	0.0000
F count	2.650	0.021	5.690	0.000	2.810	0.015
R-squared	0.160		0.290		0.170	

Source: *Data, 2026.*

Note: *** Signifikan pada level 5%, ***Signifikan pada level 1%*

The estimation results for Model 1 (Main Effect) indicate that only the Biodiversity Disclosure Index (BDI) has a significant effect on ESG performance. The BDI coefficient of 2.1164 with a significance value of 0.0045 (p < 0.01) implies that companies disclosing biodiversity data have statistically higher ESG scores

than those that do not, after controlling for other variables. Consequently, the first research hypothesis, which states that "Biodiversity disclosure has a positive effect on ESG performance," is supported and accepted in Model 1. Conversely, other variables in the main model namely Board Gender Diversity (BGD), SIZE, ROA, LEV, and AGE do not exhibit significant effects on ESG, as all their p-values exceed 0.05. This suggests that variations in the proportion of women on the board, firm size, profitability levels, leverage, and firm age are not statistically robust enough to explain variations in ESG scores within this primary model. In other words, within the context of the research sample and period, variations in ESG performance are predominantly explained by the presence or absence of biodiversity disclosure (BDI), whereas other factors do not contribute significantly to Model 1.

$$ESG_{it} = 28.6562 + 2.1164BDI_{it} - 14.3512BGD_{it} - 0.0327SIZE_{it} - 0.0481ROA_{it} - 0.4584LEV_{it} + 0.1105AGE_{it} + \varepsilon_{it}$$

The F-test result for Model 1 yields an F-statistic of 2.650 with a significance value of 0.021 (R2 < 0.05). This finding indicates that, simultaneously, the variables in the model—BDI, BGD, SIZE, ROA, LEV, and AGE collectively have a significant effect on ESG performance. That is, despite the lack of individual significance for certain coefficients, the combination of all explanatory variables in Model 1 is collectively capable of explaining ESG variations at a 5% significance level.The coefficient of determination (R^2) for Model 1 is 0.160, indicating that approximately 16% of the variation in ESG performance can be explained by the BDI, BGD, SIZE, ROA, LEV, and AGE variables included in the model. Meanwhile, the remaining 84% is explained by other factors outside the model, such as more specific governance characteristics, stakeholder pressure, sectoral regulations, or other unobserved sustainability practices.

In the second regression model, the regression equation can be written as follows:

$$ESG_{it} = 30{,}0111 + 7{,}4952BDI_{it} + 9{,}5832BGD_{it} - 31{,}7017\ (BDI_{it} \times BGD_{it}) - 0{,}0484ROA_{it} - 1{,}4729LEV_{it} - 0.0342AGE_{it+\varepsilon_{it}}$$

The estimation results for Model 2 (BGD Moderation) indicate that the only variable with a significant effect on ESG performance is the interaction term (BDI×BGD), representing the moderating effect of Board Gender Diversity. The interaction coefficient of -31.7017 with a significance value of 0.0001 (p<0.01) demonstrates that Board Gender Diversity negatively moderates the relationship between biodiversity disclosure and ESG performance. This implies that at higher levels of board gender diversity, the positive effect of BDI on ESG performance is attenuated (weakened). Consequently, the second research hypothesis, which states *that "Board gender diversity positively moderates the relationship between Biodiversity disclosure and ESG performance,"* is not supported, as the direction of the discovered moderating coefficient is opposite (negative) to the hypothesized direction. Meanwhile, the main coefficients for BDI and BGD, alongside the control variables ROA, LEV, and AGE, are statistically insignificant in Model 2, with their respective p-values exceeding 0.05. This indicates that, partially, changes in the level of biodiversity disclosure (BDI) or board gender diversity (BGD) are not robust enough to influence ESG performance without considering their interaction effect. Similarly, variations in profitability (ROA), leverage (LEV), and firm age (AGE) show no meaningful effect on ESG performance within this moderation model. In other words, in Model 2, the dynamics of ESG performance are predominantly determined by how the combination of biodiversity disclosure and board gender diversity interacts, rather than by each variable individually. In Model 2 (BGD Moderation), the F-test yields an F-statistic of 5.690 with a significance value of 0.000 (p<0.01). This indicates that, simultaneously, all variables in the model—BDI, BGD, the BDI×BGD interaction, and the control variables ROA, LEV, and AGE—collectively exert a significant effect on ESG performance. In other words, despite the lack of individual significance for certain coefficients, the combination of the main and moderating variables used in Model 2 is collectively capable of explaining variations in ESG at a strong significance level (1%). The coefficient of determination (R^2) for Model 2 is 0.290, indicating that approximately 29% of the variation in ESG performance can be explained by the variables included in the model, including the moderating effect of Board Gender Diversity. This figure is higher than that of Model 1, suggesting

that the addition of the BDI×BGD interaction term enhances the model's explanatory power regarding ESG variations. However, approximately 71% of the variation in ESG is still influenced by other factors outside the model, such as specific governance quality, regulatory and stakeholder pressures, or other dimensions of sustainability practices that have not been included, thereby leaving room for future research to enrich the model's specification.

Based on the results of Model 3 (SIZE Moderation) summarized in the table, the regression equation can be written as follows (Random Effect Model):

$$ESG_{it} = 27{,}9887 + 1{,}4540BDI_{it} - 0{,}0567SIZE_{it} + 0{,}0205(BDI_{it} \times SIZE_{it}) - 0{,}0473ROA_{it} - 0{,}5923LEV_{it} + 0{,}0979AGE_{it+\varepsilon_{it}}$$

The estimation results for Model 3 (SIZE Moderation) indicate that the only variable with a significant effect on ESG performance is the interaction term (BDI×SIZE), which represents the moderating effect of firm size. The interaction coefficient of 0.0205 with a significance value of 0.0036 ($p<0.01$) demonstrates that firm size positively moderates (strengthens) the positive effect of biodiversity disclosure on ESG performance. Consequently, as firm size (SIZE) increases, the impact of BDI on ESG scores becomes progressively greater. Thus, the third research hypothesis, which states that "Firm size positively moderates the relationship between Biodiversity disclosure and ESG performance," is supported and accepted in Model 3. Conversely, the main coefficient of BDI (1.4540; p=0.0511) is only marginally significant at the 10% level and insignificant at the 5% level, meaning that under conservative standards, it cannot be considered statistically robust within this moderation model. The SIZE variable itself has a negative and significant coefficient (–0.0567; p=0.0041), indicating that at very low levels of BDI, larger firms tend to have lower ESG scores; however, this effect reverses direction when the interaction with BDI is factored in, as the positive moderation term dominates at higher levels of BDI. Meanwhile, the control variables ROA, LEV, and AGE do not significantly affect ESG performance (all p-values >0.05). Therefore, partially, these three variables fail to explain variations in ESG performance in Model 3, and the primary role in ESG dynamics is predominantly determined by the combination of biodiversity disclosure and firm size through the moderating effect.

Discussion

The results confirm that biodiversity disclosure (BDI) has a positive and significant effect on ESG performance (Model 1 coefficient = 2.1164, p = 0.0045). This supports Hypothesis 1. Logically, comprehensive reporting on nature-related impacts mitigates information asymmetry, signalling superior environmental risk management to rating agencies and investors, which translates to a higher ESG score. This aligns with legitimacy and stakeholder theories, showing that disclosure acts as an essential vehicle to maintain social contract and secure stakeholders' trust (Rizki & Perdana, 2024; Nurmala & Pratama, 2025).

Surprisingly, the interaction term BDI × BGD is negative and highly significant (coefficient = -31.7017, p = 0.0001). This indicates that board gender diversity weakens the positive effect of biodiversity disclosure on ESG performance, thus rejecting Hypothesis 2. This negative effect can be explained by the concepts of *"tokenism"* and *"formalism"* in corporate governance: when female representation remains below a critical mass, their presence may be symbolic rather than structurally empowered to guide effective integration of biodiversity strategy into core ESG systems (Sondakh et al., 2026).

The interaction term BDI × SIZE is positive and statistically significant (coefficient = 0.0205, p = 0.0036). This demonstrates that larger firm size strengthens the positive impact of biodiversity disclosure on ESG performance, supporting Hypothesis 3a. Larger firms leverage superior financial, technological, and human resource capacities to implement highly credible biodiversity monitoring, maximizing visibility and legitimacy among external stakeholders (Zengin, 2025).

CONCLUSION

Based on the empirical findings and discussions presented in the preceding chapters, the primary conclusions of this study are formulated as follows:

1. Biodiversity disclosure exerts a positive and significant effect on the ESG performance of manufacturing companies listed on the IDX30 index of the Indonesia Stock Exchange. This indicates that a higher level of biodiversity disclosure leads to an increase in a company's ESG score.
2. Board gender diversity significantly moderates the relationship between biodiversity disclosure and ESG performance, albeit in a negative direction. Within the context of this study, board gender diversity attenuates (weakens) the positive impact of biodiversity disclosure on ESG performance; thus, the positive moderation hypothesis is not supported.
3. Firm size positively and significantly moderates the relationship between biodiversity disclosure and ESG performance. This demonstrates that for larger enterprises, an increase in biodiversity disclosure yields a more pronounced enhancement in ESG performance compared to smaller firms.

Recommendations

Enhancing Commitment to Biodiversity Disclosure: Manufacturing companies are strongly encouraged to improve both the quantity and quality of biodiversity-related information in their sustainability reports. Given that empirical evidence demonstrates a positive and significant effect of biodiversity disclosure on ESG performance scores, this practice should be utilized as a strategic instrument to strengthen corporate legitimacy in the eyes of investors and stakeholders. Avoiding Gender Tokenism within Board Structures: Since board gender diversity was found to negatively moderate (attenuate) the relationship between biodiversity disclosure and ESG performance, corporations must ensure that the placement of women on corporate boards is not merely a symbolic gesture to fulfill institutional quotas (tokenism). Companies should grant adequate structural space, authority, and professional oversight to female directors, enabling them to effectively drive the sustainability agenda and manage material environmental disclosures. Optimizing Resource Capabilities in Larger Firms: Large-scale enterprises should leverage their vast resource capacities to build comprehensive ecological monitoring and reporting systems. This is critical because firm size has been shown to amplify the positive impact of biodiversity disclosure on collective ESG performance.

Formulating Standardized Biodiversity Disclosure Guidelines: As global frameworks shift toward more stringent requirements (such as the TNFD and GRI 304 standards), Indonesian regulators (e.g., OJK and the Indonesia Stock Exchange) are advised to establish specific technical guidelines or standardizations regarding biodiversity disclosures for public companies. This initiative is vital to assist developing markets like Indonesia in reducing environmental information asymmetry. Fostering an Inclusive Corporate Governance Ecosystem: Regulators are encouraged to move beyond policies that focus solely on the numerical representation of gender on corporate boards. Instead, they should construct reporting ecosystems that promote active, collective engagement among all board members in overseeing macro-environmental and sustainability practices.

Utilizing Alternative Measurement Proxies: Future research could employ alternative proxies for board gender diversity, such as a Critical Mass Dummy (e.g., a minimum threshold of three female directors) or evaluate the ecological and educational background of board members. This would help determine whether the negative moderating effect persists when board capabilities are assessed through more specific dimensions.

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REFERENCES

Banahan, C., & Hasson, G. (2018, August 6). Across the Board Improvements: Gender Diversity and ESG Performance. Https://Corpgov.Law.Harvard.Edu/2018/09/06/across-the-Board-Improvements-Gender-Diversity-and-Esg-Performance/.

Barroso, R., Duan, T., & Kowalewsk, O. (2024, August). Female directors boost sustainability. Https://Abmagazine.Accaglobal.Com/Global/Articles/2024/Aug/Business/Female-Directors-Boost-Sustainability.Html.

Capitals Coalition. (2021). Integrating biodiversity into natural capital assessments. Cambridge Conservation Initiative. Https://Capitalscoalition.Org/Wp-Content/Uploads/2021/03/Why_Primer_Biodiversity-Guidance.Pdf.

Finance for Biodiversity Foundation. (2025). Impact Report: Progress on biodiversity integration in finance. Https://Www.Financeforbiodiversity.Org/Publications/Impact-Report-2025/.

Global Reporting Initiative & TNFD. (2024). GRI and TNFD make reporting on biodiversity easier: Interoperability mapping. Https://Www.Globalreporting.Org/News/News-Center/Gri-and-Tnfd-Make-Reporting-on-Biodiversity-Easier/.

Hambali, A., & Adhariani, D. (2022). BIODIVERSITY DISCLOSURE OF INDONESIAN COMPANIES AND THE ROLE OF THE BOARD OF COMMISSIONERS. Jurnal Akuntansi Dan Keuangan Indonesia, 19(1), 1–23. https://doi.org/10.21002/jaki.2022.01

Haque, F., & Jones, M. J. (2020). European firms' corporate biodiversity disclosures and board gender diversity from 2002 to 2016. British Accounting Review, 52(2). https://doi.org/10.1016/j.bar.2020.100893

Issa, A., Zaid, Mohammad., A. A., & Hanaysha, Jalal. R. (2021). Exploring the relationship between female director's profile and sustainability performance: Evidence from the Middle East. Managerial and Decision Economics, 43(6).

Moses, A., & Yahaya, A. (2024). Journal of Corporate Governance and Social Responsibility Do boards care about biodiversity-related information disclosure? Article History. https://doi.org/10.28423/2024.v10i21

Rahman1, Z. D., Eko Samiono, B., & Gemilang3, R. P. (2024). CEO Characteristics, Board Gender Diversity, and ESG Performance: Evidence from Indonesia. 12(2), 132–139. www.idx.co.id,

Rizki, T., & Perdana, H. D. (2024). BIODIVERSITY DISCLOSURE AND ESG PERFORMANCE: DOES A CHIEF SUSTAINABILITY OFFICER IMPORTANT? Jurnal Ilmu Ekonomi Dan Pembangunan, 24(2), 111. https://doi.org/10.20961/jiep.v24i2.93527

Senanayake, M., Putra, F. K. G., Gregory, R. P., Harymawan, I., Rhee, J. H., & Ok, Y. S. (2026). From biodiversity to ESG: evaluating disclosure approaches of companies operating in Indonesia. Frontiers in Sustainability, 6. https://doi.org/10.3389/frsus.2025.1668560

Sitepu, B., & Yani, H. (2025). PENGARUH PENGUNGKAPAN ESG (ENVIROMENTAL, SOCIAL, GOVERNANCE) TERHADAP KINERJA KEUANGAN DENGAN FIRM SIZE SEBAGAI VARIABEL MODERASI.

The Nature Conservancy. (2025). Biodiversity Finance Trends 2025 Report. Https://Www.Nature.Org/Content/Dam/Tnc/Nature/En/Documents/b/i/Biodiversity-Finance-Trends-2025-Report.Pdf.

UK Government. (2025). Biodiversity Finance Trends Dashboard. Https://Www.Gov.Uk/Government/Publications/Biodiversity-Finance-Trends-2025/.

Wang, A., Saqib, A., Chen, X., & Zhao, X. (2026a). How biodiversity disclosure enhances ESG performance: The role of entrepreneurship and physical climate risk. Finance Research Letters, 89. https://doi.org/10.1016/j.frl.2025.109324

Wang, A., Saqib, A., Chen, X., & Zhao, X. (2026b). How biodiversity disclosure enhances ESG performance: The role of entrepreneurship and physical climate risk. Finance Research Letters, 89. https://doi.org/10.1016/j.frl.2025.109324

Zengin, B. (2025). Does size matter? Exploring the moderating role of firm size in the ESG– profitability relationship. Gazi Journal of Economics and Business, 11(3). https://doi.org/10.30855/gjeb.2025.11.3.005

Zhu, Y., & Chen, J. (2025). How does board gender diversity shape ESG performance? Finance Research Letters, 74. https://doi.org/10.1016/j.frl.2024.106717