

The Effectiveness of Corporate Governance in Curbing Greenwashing: The Moderating Role of Profitability in Energy Sector Companies

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Abstract

This study examines the effectiveness of corporate governance in curbing greenwashing and investigates the moderating role of profitability among energy sector companies listed on the Indonesia Stock Exchange. Using a quantitative explanatory design, the study analyzes 200 firm-year observations from 40 energy companies during 2020–2024 selected through purposive sampling. Data were obtained from annual and sustainability reports and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Corporate governance was measured through independent commissioners, board size, audit committee size, and board meeting frequency, while profitability was proxied by Return on Assets and greenwashing by the discrepancy between ESG disclosure and environmental performance. The results indicate that corporate governance has a significant negative effect on greenwashing ($\beta = -0.347$), while profitability also has a significant negative effect ($\beta = -0.218$). Furthermore, profitability significantly moderates the relationship between corporate governance and greenwashing ($\beta = -0.163$), strengthening the negative relationship. The model explains 32.6% of greenwashing variance and demonstrates predictive relevance. These findings highlight the complementary roles of governance mechanisms and financial capacity in reducing symbolic sustainability disclosure within the Indonesian energy sector context.

2383



Keywords: Corporate Governance; Energy Sector; Greenwashing; Profitability

INTRODUCTION

The evolution of sustainability issues has driven companies to become increasingly active in disclosing environmental information through sustainability reports and ESG disclosures—particularly in the energy sector, which is a major contributor to carbon emissions and faces intense pressure amidst the global energy transition. While over 90% of the world's large companies have published sustainability reports, the quality of their ESG (Environmental, Social, and Governance) disclosures remains frequently questioned (Yu & Hwang, 2026b). Increased sustainability disclosure does not always reflect a company's actual environmental performance. The phenomenon of "greenwashing" arises when companies cultivate an exaggerated eco-friendly image without backing it up with genuine sustainability implementation. This practice has drawn global attention as investors, stakeholders, and the public evaluate corporate environmental commitments. In Indonesia, the implementation of POJK No. 51/POJK.03/2017 has led to a rise in the number of sustainability reports, yet it has simultaneously created opportunities for disclosures that are merely symbolic. Indeed, the Financial Services Authority (OJK) has explicitly highlighted the dangers of greenwashing and the importance of transparency in sustainability reporting. Studies (Yu & Hwang, 2026a) indicate that while greenwashing may yield short-term gains, it risks undermining a company's long-term financial sustainability (Pratama et al., 2025). The greenwashing phenomenon is becoming increasingly relevant in developing nations, including Indonesia, as corporate sustainability reporting obligations expand. High-profile international cases—such as the fine imposed on DWS Group for making exaggerated ESG claims in its sustainability report (Islahuddin et al., 2026) further underscore this issue. These circumstances demonstrate that extensive ESG disclosure does not necessarily equate to authentic sustainability practices. Consequently, oversight mechanisms are required to ensure transparency and accountability in corporate sustainability reporting (Zahid et al., 2025).

Corporate governance is viewed as an oversight mechanism capable of curbing greenwashing practices. Good corporate governance enhances transparency, strengthens management oversight, and reduces the manipulation of sustainability information. Studies (Ma & Ahmad, 2024) have found that the independence of the board of commissioners and gender diversity significantly reduce corporate greenwashing. Meanwhile, research (Ramalho et al., 2026) indicates that corporate governance can mitigate the negative impact of greenwashing on firm value, particularly through the presence of CSR committees and directors with international

2384

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experience. Beyond corporate governance, profitability is also a crucial factor in explaining greenwashing practices. Highly profitable companies possess greater resources for green innovation, sustainability investments, and more extensive ESG disclosures. However, high profitability can also drive companies to excessively protect their reputations through symbolic disclosures. Financial performance influences corporate greenwashing, especially when institutional oversight remains weak (Cotugno et al., 2026). The state-of-the-art contribution and research gap of this study lie in developing a model of the relationship between corporate governance and greenwashing by incorporating profitability as a moderating variable within the context of Indonesian companies. Previous studies have generally focused solely on the direct impact of corporate governance on sustainability reporting or ESG disclosure, yielding inconsistent results regarding its effect on greenwashing (Frendy et al., 2024; Purnamasari & Umiyati, 2024). Furthermore, existing research (Chen & Dagestani, 2023) has predominantly focused on developed nations, with limited specific examination of Indonesian companies. Based on the aforementioned state-of-the-art and research gap, this study hypothesizes that corporate governance has a negative effect on greenwashing (H1)—meaning that more effective corporate governance leads to lower levels of greenwashing—and that profitability has a negative effect on greenwashing (H2), as companies with high profit levels possess sufficient financial resources to undertake genuine eco-friendly investments, thereby reducing the propensity for greenwashing. and profitability moderates the influence of corporate governance on greenwashing (H3), whereby companies with high profitability are expected to possess a greater capacity to strengthen the effectiveness of corporate governance in curbing greenwashing. This study is expected to provide a theoretical contribution to the ESG literature and a practical contribution to regulators and companies in enhancing the quality of sustainability reporting.

METHOD

This study employs a quantitative approach with an explanatory research design, aiming to examine the causal relationship between corporate governance and greenwashing, with profitability serving as a moderating variable. A quantitative approach was selected to obtain objective empirical evidence through the analysis of data derived from companies' annual and sustainability reports. The study population consists of all energy sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period. This timeframe was chosen based on the relevance of the period following the effective implementation of POJK No. 51/POJK.03/2017 regarding sustainable finance, as well as increasing sustainability reporting obligations, the post-



COVID-19 pandemic context, and global pressure regarding energy transition and ESG agendas. A purposive sampling technique was used based on the following criteria: 1) energy sector companies listed continuously from 2020 to 2024; 2) companies that published complete annual and sustainability reports; 3) availability of data for the variables under study; and 4) companies that were not delisted during the observation period.

Table 1. Sampling Criteria

Sampling Criteria	Number of Companies
Energy sector companies listed on the Indonesia Stock Exchange	66
Companies that do not publish a complete annual report and sustainability report	(14)
Companies that do not have complete corporate governance, profitability, and environmental disclosure data	(10)
Companies that have undergone delisting, permanent suspension, mergers, or acquisitions during the observation period	(2)
Number of samples of Companies that meet the criteria	40
Total observations (5 years x 40)	200

Data collection techniques are carried out through documentation. The independent variable in this research is corporate governance which is measured through the proportion of independent commissioners, size of the board of commissioners, size of the audit committee, and frequency of board meetings. The dependent variable is greenwashing, which is measured based on the ESG disclosure environmental performance discrepancy index. Meanwhile, the moderating variable is profitability which is proxied using Return On Assets (ROA).



Table 2. Indicator

Variabel	Operational Definition	Indicator
<i>Corporate Governance</i>	Corporate governance mechanisms that function to supervise management and increase transparency and accountability of sustainability disclosure (Ben-Amar et al., 2017; Liu & Xie, 2024) The measurement of corporate governance in this study not only represents the formal governance structure but also the supervisory capacity of sustainability issues through the diversity of boards	Proportion of independent commissioners, size of board of commissioners, audit committee, frequency of board meetings
Profitability	The ability of the company to generate profits from all assets it owns (Eriyawan & Utama, 2026; Khunkaew et al., 2023)	Return on Assets (ROA) = net profit / total assets
<i>Greenwashing</i>	The extent of the gap between the ESG disclosure claims and the Company's actual environmental performance (Gregory, 2024; Monalisa et al., 2025)	Greenwashing is measured using a discrepancy approach between ESG disclosure and environmental performance. $ESGDS = \frac{\sum \text{item ESG yang diungkapkan}}{\text{total item ESG}}$ Greenwashing Index $GW = ESGDS - EPS$

The data analysis was carried out using SEM-PLS because it was able to test the direct relationship and moderation effect simultaneously and in accordance with the research model with latent constructs and relatively limited observation panel data. The analysis stages include measurement model test (*outer model*), structural model test (*inner model*) and hypothesis testing through *path coefficient*, *t-statistic* and *p-values*

RESULT AND DISCUSSION

Outer model test results

External model testing was carried out to ensure that the indicators used were able to

2387



represent the research construct. The evaluation of convergent validity was carried out by looking at the value of outer loading. In this study, there are three constructs, namely Corporate Governance (CG), Profitability (ROA), and Greenwashing (GW)

Table 3. Outer Loading

Variabel	Indicator	Loading Factor
Corporate Governance (X)	CG1	0.821
	CG2	0.864
	CG3	0.792
	CG4	0.838
Profitabilitas (Z)	ROA	1.000
Greenwashing (Y)	GW	1.000

Based on the table, all Corporate Governance indicators have an outer loading value above 0.70, with the lowest value of 0.792 in the audit committee indicator. Meanwhile, ROA and the greenwashing index are constructs with single indicators, so the loading value is 1,000. Thus, all indicators are considered to meet convergent validity and the Corporate Governance construct also shows adequate internal consistency.

Uji Discriminant Validity

Once the convergent validity is met, the next step is to ensure that each construct is completely different from the other. The test is performed using HTMT (Heterotrait-Monotrait Ratio). An HTMT value below 0.90 indicates that the constructs in the model have sufficient discriminant validity.

Table 4. Discriminant Validity

Construct Relationships	HTMT	Remarks
Corporate Governance – Profitability	0.241	Fulfilled
Corporate Governance – Greenwashing	0.418	Fulfilled
Profitability – Greenwashing	0.287	Fulfilled

The HTMT value of all construct pairs is well below 0.90. The highest value is found in the relationship between Corporate Governance and Greenwashing at 0.418. These results show that



Corporate Governance, Profitability, and Greenwashing are constructs that can be empirically distinguished from each other. Thus, the measurement model does not show a problem of discriminant validity.

Construct reality test

The reliability test aims to determine the consistency of indicators in measuring research constructs. The criteria used are Cronbach's Alpha and Composite Reliability values greater than 0.70. Since ROA and Greenwashing each use one indicator, the reliability of both is technically reflected from single-item measurements.

Table 5. Reality Test

Variabel	Cronbach's Alpha	Composite Reliability	AVE
Corporate Governance	0.858	0.904	0.702
Profitabilitas	1.000	1.000	1.000
Greenwashing	1.000	1.000	1.000

The test results showed that Corporate Governance had Cronbach's Alpha of 0.858 and Composite Reliability of 0.904. Both values showed a good level of internal consistency. Profitability and Greenwashing also met the criteria because each used one indicator. Thus, the entire construct in the model can be used to continue testing the inner model.

Inner Model test results

The internal model evaluation aims to measure the model's ability to explain endogenous variables through the R-Square (R^2) value. This value shows how much variation in the dependent variables can be explained by the independent variables in the model.

Coefficient of Determination Test (R^2)

Table 6. Coefficient of Determination Test

Variabel	R-Square
Greenwashing	0.326

Based on the table above, the R-square (R^2) value of Greenwashing is 0.326. This shows that the variables Corporate Governance (CG), Profitability (ROA), and Corporate Governance $\times$ Profitability interaction together were able to explain the variation in Greenwashing by 32.6%.



Meanwhile, 67.4% of the variation in Greenwashing was explained by other factors that were not included in the research model.

Predictive Relevance Test

Table 7. Predictive Relevance Test

Variabel	Q-Square
Greenwashing	0.274

The results of the predictive relevance (Q^2) test showed a Q^2 value for the Greenwashing variable of 0.274. A Q^2 value greater than zero indicates that the model has a predictive relevance to the endogenous variable.

With a value of 0.274, the research model shows that the variables used in the model have the ability to predict Greenwashing. This means that the model consisting of Corporate Governance, Profitability, and the moderation effect of Profitability has a predictive ability to Greenwashing.

Hypothesis Testing (Direct Effect)

Table 8. Hypothesis Test

Hipotesis	Variable Relationship	Coefficient	T-statistik	P-value	Description
H1	Corporate Governance → Greenwashing	-0.347	4.232	0.000	Accepted
H2	Profitabilitas → Greenwashing	-0.218	2.535	0.000	Accepted
H3	Corporate Governance × Profitabilitas → Greenwashing	-0.163	2.203	0.000	Accepted

Corporate governance has a significant negative effect on Greenwashing

The test results showed that Corporate Governance had a negative and significant effect on Greenwashing, with a path coefficient value of -0.347, a T-statistic of 4.232, and a P-value of 0.000. A negative coefficient showed that the increase in the effectiveness of Corporate

2390



Governance was followed by a decrease in Greenwashing.

According to Agency Theory, Corporate Governance is one of the mechanisms used by principals to reduce agency problems. Shareholders cannot supervise all management activities directly, so a supervisory mechanism is needed through the board of commissioners, independent commissioners, audit committees, and board supervisory activities.

In this study, Corporate Governance is measured through the proportion of independent commissioners, the size of the board of commissioners, the audit committee, and the frequency of board meetings. The four mechanisms basically have a supervisory function over management actions.

If the mechanism runs effectively, management has more limited space to hide negative information or convey environmental information that is not in accordance with actual conditions. Thus, Corporate Governance can reduce information asymmetry between management and owners as well as external parties.

This relationship becomes particularly relevant in greenwashing. Greenwashing arises when there is a gap between the information or sustainability claims communicated by the company and the actual environmental conditions. Management may have an incentive to display a more environmentally friendly company image if the reputational benefits outweigh the consequences of disclosing actual environmental conditions.

This argument is supported by research by Lestari and Adi (2025) who used companies listed on the IDX during 2018–2023. The study found that profitability and board size were negatively related to greenwashing, while the presence of women on boards showed a positive relationship with greenwashing.

Pratama, et al.'s research (2025), on Southeast Asian companies also specifically examined the relationship between sustainability-related corporate governance and greenwashing. The study used 132 companies or 264 observations from Indonesia, Malaysia, Singapore, and Thailand during 2021–2022. The results show that not all governance mechanisms automatically eliminate greenwashing; the characteristics and quality of governance mechanisms are important.

This actually strengthens the argument of this study that what is important is not only the existence or absence of the Corporate Governance organ, but the ability of the mechanism to carry out the monitoring function of management.

The research of Tyas et al. (2024) also strengthens the context of the relationship between governance and environmental information. The study used 309 observations of non-financial public companies for the period 2020–2022 and found that industry type and gender diversity



have an effect on carbon emission disclosure. The authors also explain that carbon emission disclosure can be a positive signal regarding corporate attention to sustainability. Although the study did not directly examine greenwashing, the results are relevant to show that company characteristics and governance are related to how environmental information is communicated.

Profitability Negatively Affects Greenwashing

The test results showed that profitability had a negative and significant effect on Greenwashing, with a coefficient of -0.218, T-statistic of 2.535, and P-value of 0.011. Negative coefficients showed that an increase in profitability was followed by a decrease in Greenwashing.

According to agency theory, management basically has an interest in showing that they have managed the company well. When the company has low profitability, the pressure on management can be greater because the owner expects good economic performance. Under certain conditions, this pressure can increase management's incentive to use non-financial information, including environmental information, as a means to form a positive perception of the company. This is where greenwashing can be a form of opportunistic behavior that agents may commit. Conversely, companies with higher profitability have a relatively greater economic capacity to carry out real environmental activities. Companies have a greater ability to finance environmental investments, cleaner technology, waste management, energy efficiency, environmental measurement systems, and the preparation of sustainability reporting.

This means that companies do not have to rely solely on symbolic environmental disclosure to form positive perceptions. Management has the resources to produce better actual environmental performance.

The research of Apraystia et al. (2026), found that profit margins are negatively related to greenwashing, even though the study uses a different profitability proxy than ROA. Meanwhile, the research of Fitriana et al. (2025), found that Green Innovation and Green Accounting contribute significantly to business sustainability. The research also shows the importance of capacity and support in the implementation of sustainability practices

Profitability Moderates the Influence of Corporate Governance on Greenwashing

The test results showed that the interaction of Corporate Governance × Profitability had a coefficient of -0.163, a T-statistic of 2.203, and a P-value of 0.028. The negative interaction coefficient showed that Profitability strengthened the negative influence of Corporate Governance on Greenwashing.



Corporate governance is a monitoring tool, while profitability indicates the economic capacity of a company. Both can work in a complementary way in reducing opportunistic management behavior. Corporate governance alone does not always guarantee that opportunistic behavior can be eliminated. The board of commissioners and audit committees can indeed conduct supervision, but companies still need resources to produce quality environmental information and take environmental improvement actions.

Companies with higher profitability have greater resources to support control systems, environmental measurement, ESG data collection, audits or assurances, environmental technology investments, and the implementation of sustainability policies. Conversely, when profitability is low, governance mechanisms can still run, but resource limitations can reduce the company's ability to make substantive environmental improvements.

Research conducted by Islahiuddin et al (2026), found that corporate governance can weaken the negative impact of greenwashing on company value. Although the direction of moderation tested is different, governance is an important mechanism in the relationship related to greenwashing in Indonesian companies, including the energy sector.

CONCLUSION

This study concludes that corporate governance plays an important role in reducing greenwashing among energy sector companies listed on the Indonesia Stock Exchange. The empirical results demonstrate that corporate governance has a significant negative effect on greenwashing, indicating that stronger governance mechanisms are associated with a lower discrepancy between sustainability disclosure and actual environmental performance. Profitability also has a significant negative effect on greenwashing, suggesting that companies with greater financial capacity may have stronger opportunities to implement substantive environmental practices rather than relying primarily on symbolic sustainability disclosure. Furthermore, profitability significantly moderates the relationship between corporate governance and greenwashing. The negative interaction effect indicates that higher profitability strengthens the ability of corporate governance mechanisms to reduce greenwashing. The model explains 32.6% of the variance in greenwashing and demonstrates predictive relevance, while the remaining variation may be associated with other organizational and environmental factors outside the model. These findings contribute to the understanding of greenwashing by demonstrating that governance mechanisms and financial capacity operate as complementary factors in strengthening the credibility of corporate sustainability practices. Practically, companies



need to strengthen supervisory mechanisms while ensuring sufficient financial resources for environmental measurement, sustainability implementation, and transparent reporting. Regulators can also consider governance quality and corporate financial capacity when strengthening sustainability disclosure oversight.

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REFERENCES

- Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board Gender Diversity and Corporate Response to Sustainability Initiatives: Evidence from the Carbon Disclosure Project. *Journal of Business Ethics*, 142(2), 369–383. <https://doi.org/10.1007/s10551-015-2759-1>
- Chen, P., & Dagestani, A. A. (2023). Greenwashing behavior and firm value – From the perspective of board characteristics. *Corporate Social Responsibility and Environmental Management*, 30(5), 2330–2343. <https://doi.org/10.1002/csr.2488>
- Cotugno, M., Ferilli, G. B., & Palmieri, E. (2026). Does Board Gender Diversity Make Firms Less Greenwashed? *Business Ethics, the Environment & Responsibility*, 35(1), 479–500. <https://doi.org/10.1111/beer.12799>
- Eriyawan, A. F., & Utama, C. A. (2026). The Effect of Greenwashing on Firm Performance with Multiple Directorships as Moderating Variable. *APTISI Transactions on Technopreneurship (ATT)*, 8(1), 74–84. <https://doi.org/10.34306>
- Fitriana, A. (2024). Pengungkapan sustainability reporting terhadap kinerja perusahaan. *Jurnal Simki Economic*, 7(1), 41-49.
- Fitriana, A., Tyas, K. Z., & Wahyuningsih, E. (2025). FINTECH DALAM PEMBERDAYAAN USAHA PEREMPUAN: MEMPERKUAT IMPLEMENTASI GREEN INNOVATION DAN GREEN ACCOUNTING UNTUK KEBERLANJUTAN BISNIS. *Ultima Accounting: Jurnal Ilmu Akuntansi*, 17(2).
- Frendy, Oshika, T., & Koike, M. (2024). Environmental greenwashing in Japan: The roles of



- corporate governance and assurance. *Meditari Accountancy Research*, 32(7), 266–295. <https://doi.org/10.1108/MEDAR-11-2023-2216>
- Gregory, R. P. (2024). How Greenwashing Affects Firm Risk: An International Perspective. *Journal of Risk and Financial Management*, 17(11), 526. <https://doi.org/10.3390/jrfm17110526>
- Islahuddin, I., Diantimala, Y., Ayudiasitika, Z., & Aprullah, M. P. (2026). Corporate Governance Role in Greenwashing and Firm Value Nexus. *International Journal of Financial Studies*, 14(3), 60. <https://doi.org/10.3390/ijfs14030060>
- Khunkaew, R., Wichianrak, J., & Suttipun, M. (2023). Sustainability reporting, gender diversity, firm value and corporate performance in ASEAN region. *Cogent Business and Management*, 10(1). <https://doi.org/10.1080/23311975.2023.2200608>
- Liu, Y., & Xie, E. (2024). Green accounting and corporate sustainability: Evidence from emerging markets. *Sustainability*, 16(3).
- Ma, Y., & Ahmad, M. I. (2024). Do board characteristics impact greenwashing? Moderating role of CSR committee. *Heliyon*, 10(20), e38743. <https://doi.org/10.1016/j.heliyon.2024.e38743>
- Monalisa, Y., Atmaja, L. S., Teja, A., Rahman, F., & Mohsni, S. (2025). Does Greenwashing Hurt Firm Value? The Moderating Role of Corporate Governance. *International Journal of Sustainable Development and Planning*, 20(12), 5103–5116. <https://doi.org/10.18280/ijstdp.201207>
- Pratama, A., Yusoff, H., Yadiati, W., & Jaenudin, E. (2025). Sustainability-related corporate governance and greenwashing practices: Preliminary evidence from southeast Asian companies. *Meditari Accountancy Research*, 33(3), 853–885. <https://doi.org/10.1108/MEDAR-07-2024-2579>
- Purnamasari, P., & Umiyati, I. (2024). Greenwashing and financial performance of firms: The moderating role of internal audit quality and digital technologies. *Cogent Business & Management*, 11(1), 2404236. <https://doi.org/10.1080/23311975.2024.2404236>
- Ramalho, A. L. D. O. S., Oliveira, M. C., & Pinheiro, A. B. (2026). Too much talk, too little truth? Corporate governance and greenwashing in Latin America's leading firms. *International Journal of Ethics and Systems*, 1–20. <https://doi.org/10.1108/IJOES-06-2025-0319>
- Tyas, K. Z., Arofah, A. A., Wirawan, N. B., & Fathonah, I. (2024). Determinan Tipe Industri Terhadap Pengungkapan Emisi Karbon Melalui Gender Diversity. *JIAFE (Jurnal Ilmiah Akuntansi Fakultas Ekonomi)*, 10(2), 225-234.
- Tyas, K. Z., Darmawan, A. R., Pangestu, R., & Suwali, S. (2024). SOCIAL IMPACT OF THE DEVELOPMENT OF GREAT GENERAL SOEDIRMAN AIRPORT ON THE COMMUNITY OF KEMANGKON VILLAGE BUKATEJA SUB-DISTRICT. *Perwira Journal of Economics &*



Business, 4(1), 21-26.

Yu, J., & Hwang, Y.-S. (2026a). Behind the green veil: Board characteristics, greenwashing, and the fraud triangle. *Humanities and Social Sciences Communications*, 13(1), 632. <https://doi.org/10.1057/s41599-026-06977-8>

Yu, J., & Hwang, Y.-S. (2026b). Optimizing board structure for ESG integrity: Nonlinear size effects and diversity moderation on greenwashing. *PLOS One*, 21(1), e0335803. <https://doi.org/10.1371/journal.pone.0335803>

Zahid, R. M. A., Maqsood, U. S., Irshad, S., & Khan, M. K. (2025). The role of women on board in combatting greenwashing: A new perspective on environmental performance. *Business Ethics, the Environment & Responsibility*, 34(1), 121–136. <https://doi.org/10.1111/beer.12607>

