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TRANSPARENCY, ACCOUNTABILITY, AND GREENWASHING IN INDONESIA'S EXTRACTIVE INDUSTRY

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Abstract
This study analyzes the complex relationship between corporate transparency, Environmental, Social, and Governance (ESG) performance, and greenwashing practices within the context of Indonesia's extractive industry. Employing a quantitative approach using Partial Least Squares Structural Equation Modeling (PLS-SEM), the research tests a path model that positions the three pillars of ESG performance Environmental (Z1), Social (Z2), and Governance (Z3) as mediating variables between transparency (X1) and greenwashing (Y). Primary data were collected from extractive companies located in East and West Java. The analysis reveals that transparency has a significant and negative influence on greenwashing, both directly and indirectly through the mediation of ESG performance. Authentic and substantive ESG performance is proven to be the most effective deterrent against disinformation practices. Specifically, social performance (Z2) demonstrates the largest effect size (F^2 of 0.464) in mitigating greenwashing, indicating that social issues, which are more readily verifiable by the public, play a crucial role. This model exhibits a very strong explanatory power (R^2 of 0.632) in predicting the variation of greenwashing, although its predictive capability for ESG performance is relatively limited. These findings offer a theoretical contribution by explaining the dual mechanism through which transparency operates and provide clear strategic guidance for stakeholders seeking to foster genuine accountability in the extractive industry.

Keywords: Corporate Transparency; ESG Performance; Greenwashing; Extractive Industry.

INTRODUCTION

In the modern business landscape, there is a growing demand for sustainable and responsible corporate practices from investors, consumers, and regulators. The heightened public awareness of environmental and social issues has positioned Environmental, Social, and Governance (ESG) performance as a fundamental benchmark for corporate credibility and reputation. On one hand, a commitment to ESG is viewed as a positive step that can enhance firm value and promote the sustainable management of natural resources (In & Schumacher, 2021). On the other hand, the phenomenon of greenwashing has emerged as a serious challenge. Greenwashing is the deliberate practice of disinformation by an organization to present an environmentally friendly or socially responsible image when this is not the case. This practice, defined as a strategic decision to mislead stakeholders for reputational and financial gain, can erode consumer trust and harm the reputation of companies that are genuinely committed to sustainability (Liu, Qian, Shi, Zhang, et al., 2024).

This issue is particularly relevant and pressing in the context of Indonesia's extractive industry. The mining, oil, and forestry sectors inherently have a significant impact on the environment and local communities, and as such, companies in these sectors face intense scrutiny (Liu, Qian, Shi, Yuan, et al., 2024). Amidst efforts to meet increasingly stringent environmental and social standards, the risk of engaging in greenwashing is exceptionally high (Baldi & Pandimiglio, 2022). Companies may issue sustainability reports or *green bonds* that are not aligned with substantial improvements in environmental performance, or they may construct a short-term *Corporate Social Responsibility* (CSR) image that generates public skepticism. This practice can undermine consumer trust in environmentally friendly products and services, thereby damaging the brand reputation of genuinely sustainable companies

(Boncinelli et al., 2023). One form of greenwashing strategy is the issuance of *green bonds* that do not demonstrate an increase in corporate environmental performance and have no real beneficial impact on the environment (García et al., 2023). Companies that build their image through CSR must also be cautious, as the benefits are only realized in the long term. When undertaken as a short-term practice, it can lead to consumer skepticism who perceive the company as engaging in greenwashing due to hidden motives and a performance that does not align with reality (Nyilasy et al., 2014). Furthermore, investor skepticism can also arise toward companies proven to have exaggerated their reports (Blazkova et al., 2023).

Although previous literature has extensively discussed greenwashing in various industries, such as automotive (Siano et al., 2017), finance (Wang & Sarkis, 2017), hospitality (Rahman et al., 2015), education and electronics (Millar et al., 2012), a significant research gap remains, particularly concerning greenwashing behavior in the extractive industry sector. While studies on the causes, taxonomy, and consequences of greenwashing in different industries exist, very few have focused on the extractive industry, especially in developing countries. To the best of our knowledge, there has been no quantitative research investigating the relationship between greenwashing and environmental governance in the extractive industry (SHOLIKIN, 2023) that integrates the mediating role of environmental skepticism and the moderating role of information and knowledge (Sholikin, 2025). Almost all prior research has been conducted in Western countries, predominantly the United States or Europe. Therefore, our study represents an effort to partially fill this gap.

This research aims to address some of this gap by providing an in-depth empirical analysis of the causal relationship between transparency, ESG accountability, and greenwashing within the Indonesian extractive industry. The contributions of this study to the existing literature are twofold. First, it tackles a conceptual and empirical gap by specifically focusing on the unique challenges and dynamics of the extractive sector in a developing country context. Unlike previous studies that often analyze different industries in isolation, this study provides a specific and detailed examination of a high-risk sector. Second, this research offers a methodological advancement by using a PLS-SEM approach to build a comprehensive model that not only verifies direct relationships but also explores the mediating role of the three ESG pillars simultaneously. This structural approach provides a more nuanced understanding of complex causal pathways, moving beyond simple correlational studies. The findings will provide a strategic framework for stakeholders, including regulators and investors, to more effectively identify and mitigate greenwashing risks by focusing on verifiable ESG performance and mandated transparency. This represents a significant step forward in promoting genuine corporate accountability in a high-risk sector.

Based on the background outlined, this study has two main research problems. First, it aims to investigate the direct relationship between information transparency and greenwashing practices in Indonesian extractive companies. This relationship is analyzed to understand the extent to which a company's information openness can influence its tendency to engage in misleading environmental marketing practices. Second, this research will identify the mediating role of the three ESG performance dimensions (Environmental, Social, and Governance) in explaining the relationship between transparency and these greenwashing practices. This mediating role is crucial for examining whether solid ESG performance can serve as a bridge or mechanism that reduces the risk of greenwashing despite varying levels of transparency.

The primary objective of this study is to test and validate a structural model that can explain the causality mechanisms behind the relationships between variables. This model will not only verify direct and mediating relationships but also measure the statistical significance of each hypothesized path. Beyond presenting statistical findings, the research will interpret

the substantive meaning of the analysis results. This interpretation is crucial for identifying relevant theoretical and practical implications for regulators, investors, and the public. Furthermore, this study will provide a clear direction for future research, paving the way for further exploration in the field of corporate sustainability.

2. Literature Review and Theoretical Framework

2.1. Concepts of Transparency and Accountability

Transparency serves as the cornerstone of corporate accountability. Within this context, transparency refers to the availability, clarity, and accessibility of relevant information, particularly concerning a company's environmental, social, and governance impacts. With transparency, stakeholders such as governments, civil society, and local communities can comprehend the true impact of a company's activities and effectively monitor its performance. Transparency encompasses not only the reporting of financial data but also the disclosure of non-financial data, such as sustainability reports that include environmental metrics, social programs, and governance structures. A transparent company tends to be more credible because its claims can be verified by external parties, thereby reducing the opportunity for manipulative practices.

2.2. The Phenomenon of Greenwashing

Greenwashing is a corporate strategy aimed at building an environmentally friendly or sustainable image without a corresponding commitment or performance. The literature has identified several forms of greenwashing, such as The Sin of the Hidden Trade-Off, The Sin of Vagueness, or The Sin of No Proof. The motivation behind this practice is often economic, such as gaining investor trust and increasing profits. However, the resulting impact is the opposite; greenwashing can lead to consumer skepticism, damage brand reputation, and even cause long-term financial losses for a company. Therefore, efforts to curb greenwashing must be a priority for all stakeholders concerned with genuine sustainability.

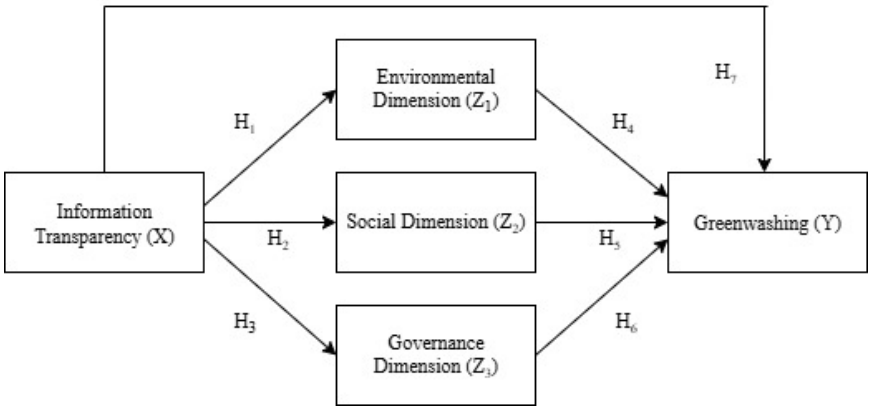
2.3. The Role of ESG Performance (Environmental, Social, and Governance)

The ESG framework provides a comprehensive lens for evaluating a company's sustainability performance. The Environmental pillar (Z1) covers aspects such as pollution prevention, energy efficiency, and climate change mitigation. The Social pillar (Z2) focuses on relationships with employees, communities, and other external parties, including labor issues, human rights, and community engagement. The Governance pillar (Z3) pertains to leadership structure, risk and control, and transparency in decision-making. Substantial and measurable ESG performance is not merely a commitment on paper but also a reflection of genuine internal practices. Companies with strong ESG performance tend to have a lower risk of greenwashing because their actions speak louder than their marketing claims.

2.4. Relationships Between Variables and Hypothesis Development

Based on the literature review, the theoretical framework of this study is built to test the causality between transparency, ESG performance, and greenwashing. The research model is visually depicted in Figure 1.

Figure 1. Theoretical Framework of Variable Relationships



This theoretical framework generates a series of hypotheses to be empirically tested:

- H1: There is a positive and significant effect of information transparency (X1) on the environmental dimension of performance (Z1). Rationale: Transparency compels companies to accurately measure and report their environmental performance, which in turn drives actual improvements.
- H2: There is a positive and significant effect of information transparency (X1) on the social dimension of performance (Z2). Rationale: Openness on social issues, such as worker rights and community engagement, motivates companies to improve their practices.
- H3: There is a positive and significant effect of information transparency (X1) on the governance dimension of performance (Z3). Rationale: Transparency in governance includes honest reporting, which directly contributes to better governance.
- H4: There is a negative and significant effect of the environmental dimension of performance (Z1) on greenwashing (Y). Rationale: Companies with strong environmental performance do not need to engage in deceptive practices because their actions are authentic.
- H5: There is a negative and significant effect of the social dimension of performance (Z2) on greenwashing (Y). Rationale: Substantial social performance reduces a company's need to make false claims in this area.
- H6: There is a negative and significant effect of the governance dimension of performance (Z3) on greenwashing (Y). Rationale: Good governance ensures accountability and reduces the incentive for unethical practices.
- H7: There is a negative and significant effect of information transparency (X1) on greenwashing (Y). Rationale: Transparency directly makes it more difficult for companies to hide false claims from public scrutiny.

3. Research Methodology

This study adopts a quantitative approach using a variance-based Structural Equation Modeling (SEM) method, specifically Partial Least Squares (PLS). This method was selected for its robust capability to test complex causal relationships and model latent variables predictively, even with relatively small sample sizes. Data analysis was performed using SmartPLS version 4.0.9.5 software. The key latent variables in this model are Transparency (X1), Greenwashing (Y), and the three mediating variables representing the ESG pillars: Environmental (Z1), Social (Z2), and Governance (Z3). Data were collected through a

structured survey of a sample of extractive industry companies located in the East Java and West Java regions. The measurement of each variable was based on a set of valid and reliable indicators.

The data analysis was conducted in two main stages, in accordance with the PLS-SEM guidelines: (1) evaluation of the measurement model (outer model), and (2) evaluation of the structural model (inner model). The outer model evaluation included tests for convergent validity, discriminant validity, and construct reliability. Meanwhile, the inner model evaluation involved assessing multicollinearity, explanatory power (R^2), predictive relevance (Q^2), and effect size (f^2). The final stage of the analysis was the hypothesis testing, which examined both direct and indirect effects to validate the hypothesized causal relationships.

4. Results and Data Analysis

4.1. Measurement Model (Outer Model) Evaluation

Evaluating the outer model is a crucial step to ensure the research instruments have strong metric qualities. This is assessed through convergent validity and discriminant validity.

4.1.1. Convergent Validity and Indicator Reliability

Convergent validity was assessed using outer loadings and Average Variance Extracted (AVE). The analysis showed that all indicators had outer loading values above the recommended threshold of 0.70. The lowest value was 0.705 (indicator X1.1), and the highest was 0.833 (indicator Z2.7), consistently exceeding the minimum. These results indicate that each indicator strongly measures its respective latent variable. Furthermore, the AVE values for all latent variables also met the minimum criterion of being greater than 0.50. AVE values ranged from 0.559 (Z1 Environment) to 0.581 (Z3 Governance). This shows that each latent variable can explain more than 50% of the variance of its indicators, confirming adequate convergence.

The high outer loading values, such as 0.800 for indicator X1.2 (Information Accessibility) and 0.833 for indicator Z2.7 (Employment and Working Environment), demonstrate that each question significantly contributes to the measurement of its respective latent variable. This provides assurance that the collected data genuinely reflects the theoretical concepts designed in the study. The consistent AVE values above 0.50 provide further evidence of data convergence. For example, the AVE value of 0.566 for Transparency (X1) and 0.572 for Greenwashing (Y) indicates that the variability in these indicators is largely explained by the latent construct they measure. Overall, these findings confirm that no indicators need to be removed and that the measurement model has a solid metric quality, forming a robust foundation for subsequent analysis.

4.1.2. Discriminant Validity (Heterotrait-Monotrait - HTMT)

Discriminant validity measures the extent to which a construct is distinct from other constructs. This was tested using the Heterotrait-Monotrait (HTMT) method, where an HTMT value of less than 0.90 indicates strong discriminant validity. The analysis results show that all HTMT values between the latent variables were below the 0.90 threshold. For example, the HTMT value between Greenwashing (Y) and Transparency (X1) was 0.797, and between Social (Z2) and Environment (Z1) was 0.138. These findings confirm that each latent variable in the model indeed measures a different and separate concept, ensuring that the relationships to be analyzed in the structural model are substantive and not an artifact of measurement overlap.

Table 1. Heterotrait-Monotrait (HTMT)

Latent Variables	X1 Transparency	Y Green-Washing	Z1 Environment	Z2 Social	Z3 Governance
X1 Transparency					
Y Green-Washing	0.797				
Z1 Environment	0.441	0.475			
Z2 Social	0.372	0.592	0.138		
Z3 Governance	0.508	0.411	0.110	0.121	

Source: Research data processed using SmartPLS 4.0.9.5 software in 2025.

4. Results and Data Analysis

4.1. Measurement Model (Outer Model) Evaluation

4.1.1. Construct Reliability (Cronbach's Alpha and Composite Reliability)

Construct reliability was evaluated using Composite Reliability and Cronbach's Alpha, with a minimum threshold of 0.70. All latent variables in this model had values well above this threshold. For instance, the Composite Reliability for Transparency (X1) was 0.839, and its Cronbach's Alpha was 0.744. For Greenwashing (Y), the Composite Reliability was 0.889 and the Cronbach's Alpha was 0.850. These high values confirm the excellent internal consistency of the indicators, meaning the measurement results are highly reliable.

The analysis confirms that the measurement instruments possess strong internal consistency. The high Composite Reliability (rho_c) values, ranging from 0.839 to 0.911, validate that the set of indicators used to measure each latent variable is collectively reliable. Notably, the Composite Reliability value of 0.911 for the Social variable (Z2) indicates an exceptionally strong level of consistency among its indicators, suggesting that respondents consistently understood and responded to the questions measuring this dimension. Similarly, the Cronbach's Alpha values, which were also all above 0.70 with the highest value of 0.888 for the Social variable (Z2) further support these reliability findings. This strong and consistent metric quality proves that the findings from the subsequent hypothesis testing are not only theoretically valid but also empirically reliable, providing a solid foundation for the study's conclusions.

4.2. Structural Model (Inner Model) Evaluation

After the measurement model was confirmed to be valid and reliable, the next step was to evaluate the structural model to measure the relationships among the latent variables.

4.2.1. Multicollinearity Assessment (VIF)

Multicollinearity was assessed using the Variance Inflation Factor (VIF), with a required value of less than 5.0 to avoid distortion in path coefficient estimations. All VIF values in the model were below 5.0. For example, the VIF for the X1 to Y path was 1.618, and for the Z2 to Y path, it was 1.189. These values confirm the absence of significant multicollinearity, ensuring that the path coefficients can be interpreted accurately.

Specifically, the low VIF values for all relationships in the model, such as 1.618 for the path from Transparency (X1) to Greenwashing (Y) and 1.189 for the path from Social (Z2) to Greenwashing (Y), definitively indicate that there is no excessive correlation among the predictor variables. This finding is crucial because it ensures that each latent variable (Transparency, Environmental, Social, and Governance) makes a unique and non-overlapping

contribution to the prediction of Greenwashing. With no significant multicollinearity, the estimated path coefficients are trustworthy and not distorted by interactions between predictors, thereby strengthening the internal validity of the research model.

4.2.2. Assessment of Model Explanatory Power (R^2) and Predictive Relevance (Q^2)

The coefficient of determination (R^2) measures the proportion of variance in the endogenous variables that can be explained by the predictor variables. The R^2 value for Greenwashing (Y) was 0.632, which is categorized as "Substantial." This indicates that the combination of the Transparency variable and the three ESG dimensions collectively explains 63.2% of the variance in the Greenwashing phenomenon. This substantial proportion suggests that the proposed model is highly effective at explaining the level of Greenwashing.

Conversely, the R^2 values for the ESG performance variables were relatively small: 0.130 (Environmental), 0.095 (Social), and 0.154 (Governance). These values are categorized as "Weak," indicating that while Transparency (X1) has a positive and significant effect on all three ESG dimensions, its explanatory power for the overall variance in ESG performance is very limited. This finding implies that Transparency is not the sole, or even the dominant, factor influencing ESG performance. Other variables outside the model, such as regulatory pressure, leadership commitment, or organizational culture, likely play a much more substantial role in driving authentic ESG performance.

The Q^2 value, which measures predictive relevance, also supports these findings. The Q^2 for Greenwashing (Y) was 0.346, categorized as "Moderate" and approaching "Substantial," confirming that the model has significant predictive capability. In contrast, the Q^2 values for the ESG variables were weak: 0.066 (Environmental), 0.050 (Social), and 0.080 (Governance). This confirms that the model's ability to predict ESG performance is relatively weak, consistent with the low R^2 values.

Table 2. Collinearity Assessment VIF

Latent Variables	VIF	Multikoleniaritas
X1 Transparency -> Y Green-Washing	1.618	No
X1 Transparency -> Z1 Environment	1.000	No
X1 Transparency -> Z2 Social	1.000	No
X1 Transparency -> Z3 Governance	1.000	No
Z1 Environment -> Y Green-Washing	1.233	No
Z2 Social -> Y Green-Washing	1.189	No
Z3 Governance -> Y Green-Washing	1.224	No

Source: Research data processed using SmartPLS 4.0.9.5 software in 2025.

Based on the table above, the following information can be derived:

- The VIF value for each construct variable is less than 5.0 (<5.0).
- Based on the VIF calculation results, all variables are free from multicollinearity and can be used in further analysis.

This finding is crucial as it ensures that each predictor variable contributes uniquely to the model and that the path coefficients are not distorted by excessive correlations between them.

4.2.3. Coefficient of Determination (R^2)

The coefficient of determination (R^2) is used to measure prediction accuracy. Generally, an R^2 value of 0.75 is considered to have high predictive accuracy, an R^2 of 0.50 is considered to have moderate accuracy, and an R^2 of 0.25 indicates a low level of predictive accuracy (J. Joseph F. Hair, G. T. M. Hult, C. M. Ringle, 2022). The results of the coefficient of determination values are shown in the following table.

Table. 3. Coefficient of Determination (R^2)

Latent Variables	R-square	R-square adjusted	Description
Y Green-Washing	0.632	0.621	Large
Z1 Environment	0.130	0.124	Small
Z2 Social	0.095	0.089	Small
Z3 Governance	0.154	0.148	Small

Source: Research data processed using SmartPLS 4.0.9.5 software in 2025.

Based on the provided table, the following information can be derived:

- Y Green-Washing Model: The predictive accuracy of this model is 0.632, which is considered large. This indicates that the variables X1 Transparency, Z1 Environment, Z2 Social, and Z3 Governance collectively influence the model by 31.3%, with the remaining 68.7% being influenced by other factors outside the scope of this study.
- Z1 Environment Model: The predictive accuracy is 0.130, which is considered small. This suggests that X1 Transparency influences the model by 13.0%, while the remaining 87.0% is influenced by external factors not included in the research model.
- Z2 Social Model: With a predictive accuracy of 0.095, this model's accuracy is considered small. This implies that X1 Transparency accounts for 9.5% of the influence, with 90.5% being attributed to other factors outside the research model.
- Z3 Governance Model: The predictive accuracy is 0.154, which is considered small. This indicates that X1 Transparency influences the model by 15.4%, and the remaining 84.6% is influenced by other factors not within the research model.

4.2.4. Predictive Relevance (Q^2)

In addition to evaluating the R^2 value as a criterion for predictive accuracy, researchers can use the Stone-Geisser Q^2 value. The Q^2 value is obtained using a blindfolding procedure. As a relative measure of predictive relevance, a Q^2 value of 0.02 is considered to have small predictive relevance, 0.15 indicates medium predictive relevance, and 0.35 signifies large predictive relevance (J. Joseph F. Hair, G. T. M. Hult, C. M. Ringle, 2022).

Table.4. Predictive relevance (Q^2)

Latent Variables	SSO	SSE	Q^2 (=1-SSE/SSO)
X1 Transparency	580	580	0
Y Green-Washing	870	569.137	0.346
Z1 Environment	1015	948.223	0.066
Z2 Social	1160	1102.221	0.05
Z3 Governance	580	533.313	0.08

Source: Research data processed using SmartPLS 4.0.9.5 software in 2025.

Based on the test results from the table, the following information can be obtained:

- For the Y Green-Washing model, which is influenced by X1 Transparency, Z1 Environment, Z2 Social, and Z3 Governance, the Q^2 value is 0.346. This value falls within the medium predictive relevance category.
- For the Z1 Environment model, influenced by X1 Transparency, the Q^2 value is 0.066, which indicates small predictive relevance.
- For the Z2 Social model, influenced by X1 Transparency, the Q^2 value is 0.05, also categorized as having small predictive relevance.
- For the Z3 Governance model, influenced by X1 Transparency, the Q^2 value is 0.08, which is classified as having small predictive relevance.

4.2.5. Effect Size (f^2) Assessment

Effect size (f^2) measures the relative impact of each predictor variable on an endogenous variable. An f^2 value of 0.02 is considered a small effect, 0.15 a medium effect, and 0.35 a large effect. The f^2 analysis reveals a very significant finding: the Z2 to Y

relationship (Social Performance to Green-Washing) has an f^2 value of 0.464, which is categorized as large. This represents the largest effect size within the model, indicating that an improvement in social performance has the strongest impact on reducing Green-Washing, even surpassing the effects of environmental and governance performance.

The Z1 to Y relationship (Environmental Performance to Green-Washing) with an f^2 value of 0.250 and the X1 to Y relationship (Transparency to Green-Washing) with an f^2 value of 0.155 are both categorized as having a medium effect size. All other relationships in the model show a small effect size. This f^2 analysis provides a sharper interpretation of the unique contribution of each variable. The most significant finding is that Social Performance (Z2) has a large effect size ($f^2 = 0.464$), suggesting that among all predictor variables, the social dimension has the most substantial impact in curbing Green-Washing practices. This indicates that improvements in areas like workers' rights, community involvement, and fair compensation have a much stronger influence on building company credibility than claims in other areas.

Conversely, Environmental Performance (Z1) has a medium effect size ($f^2 = 0.250$), while Governance Performance (Z3) has only a small effect size ($f^2 = 0.079$) on Green-Washing. This disparity underscores the importance of the social dimension as the strongest bulwark against deceptive practices. The clarity and visibility of social issues to the public make it difficult for companies to hide dishonest practices, forcing them to make genuine improvements rather than merely making false claims.

4.2.6. Hypothesis Testing

Hypothesis testing was conducted to validate the hypothesized causal relationships. The decision to accept or reject a hypothesis is based on the p-value, which must be less than 0.05 to be considered significant. The results of the direct influence hypothesis testing table show that all seven hypotheses proposed in the model are accepted (p-value = 0.000).

- H1, H2, H3: Transparency (X1) has a positive and significant influence on Environmental Performance (Z1), Social Performance (Z2), and Governance Performance (Z3). This indicates that when a company increases its transparency, it promotes substantive improvements across all ESG pillars.
- H4, H5, H6: The three dimensions of ESG Performance have a negative and significant influence on Green-Washing (Y). The strongest path coefficient is from Social Performance (beta = -0.451), followed by Environmental Performance (beta = -0.337), and Governance Performance (beta = -0.189). This finding strongly supports the argument that authentic ESG performance is the most effective antidote to disinformation practices.
- H7: Transparency (X1) has a direct, negative, and significant influence on Green-Washing (Y) with a path coefficient of beta = -0.304. This shows that transparency plays a direct role in reducing a company's tendency to engage in deceptive practices, even without the mediation of ESG performance.

Structural model coefficient analysis is used to test hypotheses by identifying which relationships are significant. If the p-value < α (0.05), the relationship is significant; conversely, if the p-value > α (0.05), the relationship is not significant.

Table 5. Hypothesis Testing for Direct Effects in the Research Model

Hypothesis	Path Coefficient	Original Sample (O)	T Statistics (O/STDEV)	P Values	Description
H1	X1 transparency -> Z1 Environment	0.360	4.066	0.000	Accepted
H2	X1 transparency -> Z2 Social	0.309	4.015	0.000	Accepted

H3	X1 transparency -> Z3 Governance	0.392	4.746	0.000	Accepted
H4	Z1 Environment -> Y Green-Washing	-0.337	5.978	0.000	Accepted
H5	Z2 Social -> Y Green-Washing	-0.451	8.936	0.000	Accepted
H6	Z3 Governance -> Y Green-Washing	-0.189	3.595	0.000	Accepted
H7	X1 transparency -> Y Green-Washing	-0.304	4.899	0.000	Accepted

Source: Research data processed using SmartPLS 4.0.9.5 software in 2025.

4.2.7. Indirect Effects (Mediation)

The presence of a significant direct effect (X1 to Y) and significant indirect effects (X1 to Z to Y) indicates the presence of partial mediation. This finding reveals a dual mechanism through which transparency operates to suppress Green-Washing.

- The indirect effect via Z1 Environment is -0.121 (p-value = 0.001).
- The indirect effect via Z2 Social is -0.139 (p-value = 0.000).
- The indirect effect via Z3 Governance is -0.074 (p-value = 0.006).

These results demonstrate that transparency not only reduces Green-Washing by making false claims more difficult to conceal, but also by promoting authentic improvements in ESG performance. It is this enhanced ESG performance that, in turn, significantly diminishes a company's need or motivation to engage in deceptive practices.

5. Discussion and Implications

5.1. Discussion of Key Findings

The findings of this study provide a deep and reflective understanding of the complex mechanisms connecting transparency with Green-Washing in the extractive sector. This relationship is not singular but operates through a multi-layered, dual mechanism that functions as both a barrier and a catalyst. *Firstly*, the direct path from transparency to Green-Washing shows that information disclosure serves as a powerful and direct barrier and disincentive. When companies are required to openly report on their data and practices, the risk of unsubstantiated claims becomes too high. This mechanism compels companies to be more cautious in their sustainability communications, not because they have fundamentally changed, but out of fear of being exposed. This represents the first layer of accountability: preventing deceit by increasing the risk of exposure.

Secondly, the mediation path through ESG performance demonstrates that transparency acts as a catalyst for authentic internal behavioral change. Open disclosure encourages companies to genuinely improve their performance across all three ESG pillars. This real performance improvement ultimately eliminates the need for Green-Washing, as the company's substantive actions speak louder than its marketing claims. In other words, transparency not only deters deceptive practices but also propels companies toward fundamental improvements that remove the motivation to deceive.

The most significant and substantial finding is that social performance (Z2) has an exceptionally large effect size in suppressing Green-Washing ($f^2 = 0.464$). In the context of Indonesia's extractive industry, social issues such as relationships with local communities, workers' rights, and fair compensation are often more verifiable and visible to the public than complex and difficult-to-interpret technical environmental claims or governance reports. Companies that fail to meet high social standards are more vulnerable to accusations of dishonesty, which ultimately pressures them to be more authentic. Therefore, social performance becomes the strongest line of defense against accusations of misinformation, as it is the dimension most susceptible to direct public scrutiny.

Nevertheless, it is crucial to note that the explanatory power of the model for the ESG variables is relatively small (R^2 values range from 0.095 to 0.154). This reflective finding implies that while transparency is significant, it is not the sole, or even the dominant, factor influencing authentic ESG performance. Other antecedent variables not included in the model, such as executive leadership commitment, a strong organizational culture, or stricter regulatory pressure, likely play a far more substantial role in driving ESG performance improvements. Therefore, this model successfully explains how transparency influences Green-Washing, but it does not comprehensively explain why companies achieve genuine ESG performance.

A review of international literature indexed in Scopus and data from credible institutions indicates that these findings align with the concept of Social License to Operate (SLO). SLO is a de facto (not de jure) requirement for the success of mining projects, referring to the continuous acceptance and support from local communities and other stakeholders (Heffron et al., 2021). Unlike strict regulatory compliance, which is often difficult for the general public to understand, social issues in the extractive industry such as community impact, human rights, and working conditions are much easier for the public to directly comprehend and evaluate (Bao et al., 2024). A lack of trust or a failure to maintain SLO can trigger protests and even operational shutdowns, which have significant financial implications. Consequently, companies in Indonesia, as one of the world's largest coal producers, are highly motivated to authentically improve their social performance to retain this unwritten license. Authentic social performance becomes an action that speaks louder than misleading marketing claims, making it the strongest deterrent against Green-Washing.

Furthermore, the low R^2 values for the ESG variables invite deep reflection on the drivers of sustainability performance. Other research indicates that besides transparency, factors such as peer effects (the behavior of imitating other companies), institutional pressure (such as investor demands and ESG ratings), and internal company characteristics (such as corporate reputation and market competition) play a crucial role in driving credible ESG disclosure and performance. In an environment where formal regulations are still weak or evolving, companies often mimic practices considered successful by competitors to gain legitimacy and reduce risk a dynamic known as mimetic pressure. Therefore, to effectively drive ESG improvements in the extractive industry, a holistic approach must be considered that focuses not only on transparency but also on establishing industry norms, strengthening organizational culture, and building internal competencies that support sustainability (Litvinenko et al., 2022).

In the digital era, the phenomenon of Greenwashing has become increasingly sophisticated, giving rise to a new term: digital greenwashing. Research shows that technology, which is supposed to enhance transparency through real-time data, can also be misused to spread deliberate misinformation about sustainability efforts. Tools such as social media algorithms, data visualization platforms, and even AI-driven ESG ratings can be manipulated to create an ecofriendly image that is not supported by substantive impact (Elhady & Shohieb, 2025). This paradox highlights new challenges for regulators and civil society. As green claims become more nebulous and difficult to verify, it is essential to focus on authentic digital transparency and hold companies accountable, ensuring claims are backed by verified scientific data, not just empty promises.

Globally, the pressure for transparency and accountability is intensifying, and this has the potential to become a significant external factor for companies in Indonesia. Global reporting standards like IFRS S1 and IFRS S2, introduced by the International Sustainability Standards Board (ISSB), aim to bridge the gap between financial and non-financial information, encouraging new levels of transparency and comparability. These standards require companies to disclose detailed climate-related risks and opportunities, including

transition strategies toward a low-carbon economy (Krivogorsky, 2024). In parallel, institutions like the World Bank are actively supporting transparency initiatives in Indonesia, such as through the Indonesia Extractive Industry Transparency Initiative (EITI) funded by the Extractives Global Programmatic Support (EGPS) program. This program aims to improve the availability and use of extractive sector data and strengthen stakeholder participation to foster inclusive policy dialogue. These developments show that the global and local regulatory landscapes are increasingly synergizing to suppress Green-Washing and encourage true accountability in the extractive sector.

5.2. Theoretical and Managerial Implications

Theoretically, this research enriches the literature by providing empirical evidence of the multi-layered mechanism behind the relationship between transparency and Green-Washing. The model challenges overly simplistic views by proving that substantive ESG performance is a vital mediating channel. This underscores that strategies to combat Green-Washing must extend beyond merely honest reporting; they must also invest in genuine internal performance improvements.

Practically, these findings offer clear strategic guidance for companies and stakeholders in the extractive industry.

- For Companies: Transparency should be viewed as a strategic investment that drives internal improvements and builds external credibility. Companies are advised to prioritize investments and communication related to social performance, as this dimension is proven to have the greatest impact in suppressing Green-Washing and building authentic trust.
- For Regulators and Investors: These findings highlight the importance of not just evaluating sustainability reports but also looking for real evidence of deep ESG performance, especially in the social domain. Public policy should focus on strengthening independent oversight mechanisms and robust enforcement against social and environmental violations.

5.3. Limitations of the Study and Suggestions for Future Research

This analysis makes a significant contribution, but several limitations must be acknowledged. The primary limitation is the low explanatory power (R2) for the ESG performance variables. This indicates that other antecedent variables, not yet included in the model, may significantly influence ESG performance. Therefore, future research is advised to:

- Conduct qualitative research, as proposed in the research proposal, to identify other potential antecedent variables for ESG performance, such as regulatory pressure, executive leadership commitment, or organizational culture.
- Conduct a comparative analysis between different industries or geographical regions in Indonesia to see if the relationships found in this study vary depending on the sector.
- Use a longitudinal research approach to observe the evolution of these relationships over time, which can provide a deeper understanding of causality.
- Develop a more complex model by considering moderating variables (e.g., firm size, ownership type) that could influence the strength of the relationships between variables.

6. Conclusion

This study has empirically demonstrated that transparency and substantive ESG performance are effective deterrents against Green-Washing practices in Indonesia's extractive industry. The key finding shows a dual mechanism in which transparency directly obstructs deceptive practices and, at the same time, indirectly drives authentic improvements in ESG performance. Social performance, in particular, is proven to be the most powerful factor in suppressing Green-Washing, underscoring the importance of investment and tangible action in the areas that are most visible and verifiable by the public.

Reflectively, the model's success in explaining a large portion of the variance in Green-Washing (R^2 = 0.632) while failing to comprehensively explain the variance in ESG performance (low R^2 values) is a crucial reminder that transparency, while essential, is only one of many factors driving genuine sustainability change. Improvements in ESG performance ultimately also depend on internal factors such as leadership commitment and organizational culture, as well as external pressures from investors and market competition.

Therefore, the conclusion of this study goes beyond simply confirming a causal relationship; it serves as a call for integrated and holistic action. To build true accountability and sustainability in this critical sector, companies must move beyond mere claims and focus on substantive actions. This means not only complying with existing reporting standards but also actively building a Social License to Operate (SLO) through meaningful community engagement, social justice, and tangible improvements in working conditions. Authentic social performance becomes the strongest line of defense, as it cannot be hidden behind complex technical reports and is highly susceptible to direct public scrutiny.

Ultimately, these findings place a greater responsibility on the entire ecosystem: companies must view transparency as a strategic investment for internal improvement, not just a regulatory obligation; regulators must design policies that not only demand transparency but also incentivize authentic ESG performance improvements; and civil society, through active oversight, can become the most effective guarantor of accountability. Only with the synergy of these factors can we hope to suppress Green-Washing and drive Indonesia's extractive industry toward truly sustainable practices.

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