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SYMBOLIC OR SUBSTANTIVE? CARBON DISCLOSURE AND EARNINGS QUALITY: THE MODERATING ROLE OF CORPORATE GOVERNANCE MECHANISMS

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ABSTRAK

Penelitian ini mengkaji apakah pengungkapan karbon di Indonesia mencerminkan upaya simbolis untuk menampilkan tanggung jawab lingkungan atau komitmen substansial yang meningkatkan kualitas laba. Berlandaskan teori pemangku kepentingan dan teori agensi, penelitian ini menyelidiki efek langsung pengungkapan karbon dan tata kelola perusahaan terhadap manajemen laba, serta peran moderasi tata kelola dalam hubungan tersebut. Menggunakan Partial Least Squares Structural Equation Modeling (PLS-SEM). Studi ini menemukan bahwa pengungkapan karbon memiliki efek positif dan signifikan terhadap manajemen laba, menunjukkan bahwa pengungkapan karbon dapat digunakan secara strategis sebagai alat simbolis untuk menyembunyikan perilaku oportunistik. Di sisi lain, tata kelola memiliki dampak negatif dan signifikan terhadap manajemen laba, mendukung perannya sebagai mekanisme untuk membatasi oportunisme manajerial dan meningkatkan kualitas laba. Sementara itu interaksi tata kelola dan pengungkapan karbon juga negatif dan signifikan, menunjukkan bahwa tata kelola yang kuat dapat mengurangi penggunaan simbolis pengungkapan karbon. Penelitian ini memberikan kontribusi dengan menggunakan indeks tata kelola perusahaan yang spesifik untuk Indonesia, sehingga memungkinkan penilaian yang lebih komprehensif terhadap efektivitas tata kelola dalam memoderasi hubungan antara pengungkapan karbon dan manajemen laba dalam konteks negara berkembang.

Kata kunci: simbolis, substansial, pengungkapan karbon, tata kelola perusahaan, manajemen laba

ABSTRACT

This study examines whether carbon disclosure in Indonesia reflects a symbolic effort to demonstrate environmental responsibility or a substantive commitment that enhances earnings quality. Based on stakeholder theory and agency theory, this research investigates the direct effects of carbon disclosure and corporate governance on earnings management, as well as the moderating role of governance in this relationship. Using Partial Least Squares Structural Equation Modelling (PLS-SEM), the study finds that carbon disclosure has a positive and significant effect on earnings management. It suggests that it can be strategically used as a symbolic tool to conceal opportunistic behaviors. On the other hand, governance has a negative and significant impact on earnings management, supporting its role as a mechanism to restrict managerial opportunism and improve earnings quality. Meanwhile, the interaction between governance and carbon disclosure is also negative and significant, so that strong governance can reduce the symbolic use of carbon disclosure. This study contributes using a corporate governance index specific to Indonesia, allowing for a more comprehensive assessment of the effectiveness of governance in moderating a relationship between carbon disclosure and earnings management in a developing country context.

Key words: symbolic, substantive, carbon disclosure, corporate governance, earnings management

INTRODUCTION

This study investigates whether carbon disclosure signals actual environmental responsibility or is merely symbolic. Global warming and climate change are largely caused by rising CO_2 emissions from industry. International frameworks such as the UNFCCC, the Kyoto Protocol, and the Paris Agreement address these issues. The Kyoto Protocol asks industrialized countries to reduce emissions by 5% from 1990 levels (Kuppan & Chavali, 2019). Human activity produces about 76% of global CO_2 emissions, making it a central environmental challenge (Sylvia & Sunitoyoso, 2022). Indonesia faces obstacles to reducing emissions, as it relies heavily on fossil fuels linked to economic growth. The energy sector contributes up to 44% of national emissions (Cholil et al., 2022).

Carbon accounting addresses concerns about greenhouse gas emissions and is supported by international agreements. Firms systematically recognize, measure, and disclose carbon emissions in financial and sustainability reports (Kuppan & Chavali, 2019). Carbon disclosure aims to enhance transparency, reduce information asymmetry, and constrain opportunistic reporting (Luo & Tang, 2021). Evidence suggests that firms that voluntarily disclose and provide assurance on carbon information often exhibit lower earnings management and better reporting quality (Bui et al., 2021).

Carbon disclosure (CD) reflects ethical and social accountability to stakeholder expectations shaped by prevailing societal norms. As environmental awareness intensifies, CD becomes essential for monitoring firms' contributions to national climate mitigation targets, since limited transparency impedes stakeholders' ability to assess genuine climate commitment. Ardhaoui et al. (2024) found that firms disclosing carbon emission information exhibit higher financial reporting quality, reflected in lower absolute discretionary accruals, indicating a reduced likelihood of earnings manipulation.

Agency theory suggests that conflicts of interest between managers and investors, driven by information asymmetry, can foster opportunistic behaviors such as earnings management, for compromising financial reporting quality. Consequently, disclosure may be strategically employed to symbolically improve corporate image, rather than reflect genuine environmental responsibility. Dissanayake et al. (2023) demonstrate that CSR disclosures may deter managerial opportunism. Houqe et al. (2024) identify that increased carbon disclosure correlates with greater real earnings management (REM). It highlights the need to closely examine managerial motives to preserve reporting integrity. According to agency theory, effective corporate governance (CG) mitigates principal–agent conflicts through strong oversight and internal controls. Therefore, this study positions CG as a moderator between carbon disclosure and earnings management, constraining opportunism and differentiating substantive from symbolic disclosure (Ali et al., 2024).

Prior studies have examined the moderating role of governance in the relationship between disclosure and earnings management. Astari et al., (2020) found that carbon disclosure moderates the association between carbon emission disclosure and earnings management in Indonesian firms. However, their analysis relies on individual governance mechanisms that may only partially capture governance effectiveness. The corporate governance moderates the link between environmental disclosure and earnings management (Gerged et al., 2023). Yet their governance measures focus mainly on conventional board and committee structures and overlook institutional and cultural features of emerging economies. The limitations indicate that existing research has not fully explained how comprehensive governance systems function as a filter between

substantive and symbolic disclosures used to mask earnings management.

Empirical evidence on the effectiveness of corporate governance in constraining earnings management remains mixed. The specific governance attributes, such as larger board size, reduce earnings management (Li et al., 2025). Others report that specific board structures are associated with higher real earnings management (Shahwan, 2021). While, evidence from Indonesia is similarly mixed: board independence, audit quality, and audit committee competence are found to have no significant effect on earnings management (Goza Rahmat & Istianingsih, 2019; Karina & Alfarizi, 2021; Natasya, 2022). Whereas the diversity among directors, commissioners, and nominating committees reduce accrual earnings management (Putra & Setiawan, 2025). The inconsistencies indicate that governance measures based on isolated mechanisms may provide an incomplete and potentially misleading assessment. This underscores the need for a comprehensive governance framework to evaluate whether corporate governance effectively constrains earnings management. It also ensures that carbon disclosure reflects substantive transparency rather than symbolic compliance.

Firm-specific financial characteristics also influence earnings management. Liquidity, leverage, market valuation, and firm size influence earnings management by shaping managerial incentives and external scrutiny. Therefore, the variables are as controls to isolate the effects of carbon disclosure and corporate governance on earnings management.

To address this need, this study utilizes the Corporate Governance Index developed by Tanjung (2020), which reflects corporate governance in Indonesia and integrates complementary indicators to curb earnings management and promote substantive carbon disclosure. The index includes strategic measures such as a Code of Ethics, Anti-Corruption policies, and insider trading prevention to limit managerial opportunism; major shareholder ownership and adequate free float to enhance market oversight; and shared employee ownership to align interests. Additional indicators CSR implementation, whistleblowing systems, strict sanctions, Big 4 auditors, and disclosure of ultimate beneficiaries strengthen accountability and reporting credibility. Independent directors and commissioners, along with proportional board size, ensure effective oversight. Together, these elements create a multi-layered governance system that mitigates earnings management and enhances reported earnings quality.

This study contributes to the earnings quality–carbon disclosure literature by integrating agency and stakeholder perspectives. It shows that carbon disclosure may serve a symbolic role in masking managerial opportunism, while stakeholder pressure can promote more substantive disclosure. The study further demonstrates the moderating role of corporate governance in constraining earnings management amid rising demands for transparency and environmental accountability. Practically, the findings help regulators, investors, and firms distinguish substantively from symbolic carbon disclosure and strengthen governance to enhance reporting credibility.

THEORETICAL REVIEW

Stakeholder Theory

The theory in relation to carbon disclosure is stakeholder theory (Freeman, 1998) that companies must be accountable to all stakeholders. They are all parties who have an interest in the company. Stakeholders include investors, creditors, the government, employees, suppliers, and the community.

Companies must engage with all stakeholders by disclosing their sustainability activities (Dissanayake et al., 2023). Such disclosures are intended to demonstrate firms' responsiveness to stakeholder expectations and to support the development of long-term relationships with stakeholders (Monjed et al.,

2025). An important component of sustainability reporting is carbon disclosure

Agency Theory

Agency theory provides a strong theoretical foundation for understanding the relationship between carbon disclosure and earnings quality in the context of corporate governance. Within this framework, there is a conflict of interest between managers (agents) and company owners (principals). The managers have more information and incentives to act in their own interests rather than in shareholders' interests (Jensen & Meckling, 1976). In the context of disclosure, managers tend to use environmental disclosures. They are primarily symbolic to satisfy market or regulatory expectations, masking opportunistic behaviors rather than reflecting substantive sustainability commitments (Dissanayake et al., 2023), reducing earnings quality. The corporate governance mechanisms on board independence, audit committee effectiveness, and institutional shareholders' views are important in controlling managerial behavior (Ali et al., 2024). The mechanisms act as oversight tools to promote transparency and accountability. They increase more substantive carbon disclosures and improve the quality of financial reporting. Thus, the agency explains that the strength of corporate governance acts as a moderating variable, weakening management's earnings management.

Earnings Management

Earnings management is a central issue in accounting as it reflects managerial manipulation of financial reports through accrual-based and real activities (Priscilla & Siregar, 2020). Accrual-based earnings management (ABEM) is conducted through managerial discretion in accounting policies and estimates that formally comply with accounting standards, making it difficult to detect (Mamatzakis & Boahen, 2025). This practice involves non-operational account adjustments and typically reverses in subsequent periods, potentially misleading financial statement users.

In contrast, real earnings management (REM) is executed through changes in operational, investing, and financing decisions that directly affect cash flows and may harm long-term firm value, such as sales acceleration or cost reductions (Priscilla & Siregar, 2020). Although both ABEM and REM generally remain within GAAP, they represent alternative forms of earnings manipulation that impair financial reporting quality. Accordingly, accrual-based and real earnings management as complementary manifestations of declining earnings quality driven by managerial discretion (Dokas et al., 2025).

Research Model

Figure 1 depicts the research model linking carbon disclosure to earnings quality, with corporate governance acting as both an independent driver and a moderating mechanism. Drawing on agency and stakeholder theories, the model posits that carbon disclosure enhances earnings quality by increasing managerial accountability (Path 1). While, corporate governance directly limits opportunistic reporting behaviour (Path 2). Crucially, corporate governance moderates the carbon disclosure–earnings quality relationship by distinguishing substantive disclosure from symbolic reporting (Path 3). Liquidity (CR), leverage (LEV), market-to-book value (MKTB), and firm size (SIZE) are included as control variables.

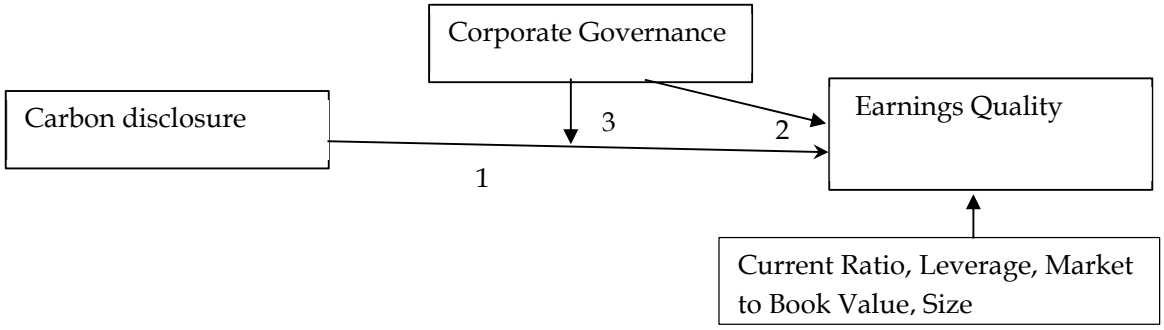

Figure 1 Research Model
Source: Authors' conceptual framework, 2025

Hypothesis Development

Carbon Disclosure and Earnings Quality

Stakeholder theory posits that firms are accountable to a broad set of stakeholders beyond shareholders. The management is expected to undertake social responsibility initiatives, including carbon disclosure, to meet stakeholder expectations. In this context, carbon disclosure represents a voluntary reporting practice aimed at reducing information asymmetry between management and financial statement users. (Ghadhab et al., 2025). By providing comprehensive and transparent information on carbon emissions, investors and other external parties can gain a clearer understanding of a company's risks and strategies. It improves earnings quality, as reflected in a reduction in earnings management practices. The relationship aligns with previous research that greater environmental disclosure is associated with improved earnings quality (Mayapada & Lyu, 2025).

However, in the context of agency theory, carbon disclosure may be merely a symbolic strategy by management (the agent) to gain legitimacy from stakeholders without reflecting actual environmental performance. Such symbolic disclosure does not reflect true transparency and can be used to mask earnings management activities. In other words, carbon disclosure may be cosmetic, worsening earnings quality and leading to increased earnings management. Consistent with Houqe et al. (2024), carbon disclosure has a positive effect on real earnings management.

Based on these different perspectives, the direction of the influence of carbon disclosure on earnings quality can be symbolic or substantive. So that two alternative hypotheses are proposed:

H_{1a}: Carbon disclosure has a positive effect on earnings quality, which is characterised by high earnings management.

H_{1b}: Carbon disclosure has a negative impact on earnings quality, characterised by low earnings management.

Corporate Governance and Earnings Quality

Corporate governance (CG) is a set of oversight mechanisms to limit opportunistic management behaviour. It ensures that managers act in the interests of owners (principals). In the context of agency theory (Jensen & Meckling, 1976), the separation of ownership and control creates conflicts of interest between managers and owners. Managers, as agents, have an incentive to engage in earnings management to obtain bonuses, maintain their reputation, or conceal poor financial performance (Xu et al., 2007). To reduce earnings management is to strengthen corporate governance mechanisms. CG mechanisms, such as an independent board of commissioners, optimal board size, audit committee effectiveness, and institutional ownership, have been shown to play a significant role in monitoring management and enhancing transparency in financial

reporting. Tessema and Abou-El-Sood (2025) found that board size, commissioner independence, and oversight structures negatively impact earnings management. Constantatos et al. (2025) also suggest that improvements in formal corporate governance regulations can effectively constrain earnings management.

Based on this description, the hypothesis is proposed:

H_2: Corporate governance has a positive effect on earnings quality, as indicated by a lower level of earnings management.

The Moderating Role of Corporate Governance

From an agency theory perspective, voluntary carbon disclosure enables symbolic reporting that projects an environmentally responsible image. Allowing managers pursue self-interest through earnings management to meet compensation targets or market pressures, necessitating effective corporate governance as a monitoring mechanism (Jensen & Meckling, 1976). Specifically, managers may use carbon disclosure symbolically to enhance corporate image and pursue personal interests, such as higher compensation or meeting market expectations through earnings management. Accordingly, agency theory posits corporate governance as a monitoring mechanism that constrains managerial opportunism. Liao et al. (2024) state that reforming or strengthening corporate governance mechanisms can limit managers' flexibility in using discretionary accounting policies, directly reducing the likelihood of earnings management. Good governance mechanisms are expected to strengthen the integrity of carbon disclosures and weaken the positive relationship between carbon disclosure and earnings management. Several CG components reduce accrual earnings management (Li et al., 2025; Putra & Setiawan, 2025). Based on the explanation, the research hypothesis is as follow:

H_3: Corporate governance weakens the positive influence of carbon disclosure on earnings quality.

RESEARCH METHOD

This study employs an exploratory research design using secondary data from firms listed on the Indonesia Stock Exchange (IDX) over the period 2018–2023. An exploratory approach is appropriate given the evolving nature of carbon disclosure practices in Indonesia and the limited empirical evidence on the interaction between carbon disclosure, corporate governance, and earnings management.

The sample was selected using purposive sampling, focusing on energy sector firms that consistently published sustainability reports with complete data during the observation period. The detailed sample selection process is presented in Table 1. The observation period begins in 2018, following the implementation of Financial Services Authority Regulation (POJK) No. 51/POJK.03/2017, on sustainable finance obligations incorporating environmental, social, and governance considerations. However, mandatory sustainability reporting was only fully enforced from 2021 onward. Prior studies suggest that sustainability reporting was initially voluntary in many jurisdictions and entailed significant financial, organizational, and human resource commitments, including the development of data systems and cross-functional coordination (Buallay, 2019). Consequently, a large number of listed firms (377 companies) were excluded due to the absence of sustainability reports, particularly in the earlier years of the observation period. After applying the selection criteria, the final sample consists of 41 energy sector firms, yielding a balanced panel of 246 firm-year observations.

Table 1
Sample Selection Criteria

Criteria	
The Indonesian Stock Exchange listed all energy businesses between 2018 and 2023	418
Companies that did not publish sustainability reports consecutively during the research year	(377)
Number of samples	41
Total observations (41 x 6)	**246**

Source: Authors' calculation based on IDX data, 2018–2023

Earnings Quality (EQ) Variable

Earnings quality in this study is measured as a reflective construct that captures the intensity of a company's earnings management (EM) practices. EM is operated through two main approaches: accrual earnings management (AEM) and real earnings management (REM). AEM is measured using the discretionary accruals model (Kothari et al., 2005) as a proxy for accrual-based manipulation. While REM is estimated using the accrual-based manipulation approach. Roychowdhury (2006) identifies three forms of real activity manipulation: abnormal cash flow from operations, abnormal production costs, and abnormal discretionary expenses. In calculating each REM component, this study constructs a total REM (RM) measure and two derived indices (RM1 and RM2), adapted from Priscilla & Siregar (2020), to capture the intensity of real activity manipulation in aggregate.

According to Dokas et al. (2025) and Priscilla and Siregar (2020), RM is a composite score derived from the abnormal levels of cash flow from operations (CFO), discretionary expenses (DISX), and production costs (PROD). RM_1 is calculated by multiplying abnormal discretionary expenses by–1 and adding abnormal production costs, representing expense cuts and overproduction strategies. RM_2 is formed by multiplying both abnormal CFO and abnormal discretionary expenses by–1, reflecting strategies to cash flow manipulation and discretionary expense reductions. This approach is in line with Dokas et al. (2025) and Priscilla & Siregar (2020) that EM can involve both discretionary accruals and real activity manipulation as managerial strategies to present financial statements that suit specific interests. By combining AEM and REM, this measure provides a more comprehensive picture of earnings quality, where the higher the AEM and REM values, the lower the quality of the company's earnings.

Carbon Disclosure

Carbon disclosure is measured using the Carbon Disclosure Index (CDI) that is developed by Bae Choi et al., (2013). It consists of five sub-indices related to climate change and carbon emissions: climate change risks and opportunities (CC), greenhouse gas emissions accounting (GHG), energy consumption accounting (EC), greenhouse gas reduction strategies and costs (RC), and carbon cost and emissions accountability (ACC). These sub-indices comprise 18 disclosure items, covering CC1–CC2; GHG1–GHG7 (emission measurement, verification, scope, source, facility/segment, and intertemporal comparisons); EC1–EC3 (total, renewable, and segmented energy consumption); RC1–RC4 (reduction plans, targets, achievements, costs, and future carbon cost considerations); and ACC1–ACC2 (board or executive responsibility and monitoring mechanisms). Carbon disclosure is measured using a content analysis approach, in which each of the 18 disclosure items is scored 1 if disclosed and 0 otherwise. The total score is then summed up and

divided by the number of items to produce a normalized carbon disclosure index.

Corporate Governance

The OECD developed the CG index consists of 15 indicators: code of ethics, free float, anti-corruption, shared ownership by employees, insider trading, the largest shareholder, CSR, whistleblowing, sanctions, big 4 auditors, disclosure of the ultimate beneficiary shareholders, independent director, independent commissioner, the number of board directors, and Board of Commissioners' size (Tanjung, 2020). The CG index is constructed using a binary scoring approach. Each indicator is assigned a value of 1 if the firm discloses or complies with the indicator and 0 otherwise. The individual scores are summed and divided by the total number of indicators (15) to obtain a normalized CG index ranging from 0 to 1.

Accordingly, the CG index is measured on an interval scale, where higher values indicate stronger corporate governance practices.

Variable Control

This study controls several firm-specific characteristics that may influence the dependent variable. Liquidity is measured using the Current Ratio (CR), which is the ratio of current assets to current liabilities. Leverage (LEV) is measured as the ratio of total debt to total assets, reflecting a firm's reliance on debt financing. In contrast, profitability is measured by return on assets (ROA). The inclusion of firm size (SIZE), leverage, and profitability follows prior studies such as Priscilla & Siregar (2020) that firm size, capital structure, and performance systematically influence managerial incentives in financial reporting.

Market performance is captured by the market-to-book ratio (MKTB), which is the ratio of the market value of equity to its book value. Consistent with prior earnings management literature (Roychowdhury, 2006), MKTB is included to control for market valuation and growth opportunities that may exert external pressure on managers and affect earnings management behavior.

Data Analysis Methods

This study employs Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine the hypothesized relationships among the research variables. PLS-SEM is particularly appropriate for analyzing complex models involving latent constructs, interaction effects, and measurement error, allowing the simultaneous estimation of measurement and structural models (Hair, 2021). In this study, earnings management is modelled as a reflective latent construct to capture its unobservable, multidimensional nature, providing a more accurate representation than single-proxy measures. Following Priscilla and Siregar (2020), earnings management is measured using four indicators: discretionary accruals (ABEM) and three real earnings management proxies (RM, RM_1, and RM_2). They reflect the intensity of managerial earnings manipulation.

In contrast, carbon disclosure and corporate governance are modelled as observed variables measured by aggregate indices, while control variables are represented by financial ratios. This approach enhances model parsimony and measurement consistency. So these constructs are well established and commonly operationalized through composite scores (Rose et al., 2019). PLS-SEM accommodates the mixed measurement specification, as it is justified conceptually and applied consistently (Hair, 2021). Moreover, PLS-SEM is well suited for exploratory and predictive research in emerging markets due to its minimal distributional assumptions, robustness with small to moderate samples, and ability to test moderating effects at the construct level. Thus, it is appropriate for examining the moderating role of corporate governance in the relationship between carbon disclosure and earnings management, thereby strengthening the reliability and validity of the empirical findings.

The following is the model in this study:

$$EQ = \beta_0 + \beta_1 CD + \beta_2 CG + \beta_3 (CD \times CG) + \beta_4 CR + \beta_5 LEV + \beta_6 MKTB + \beta_7 SIZE + \varepsilon$$

ANALYSIS AND DISCUSSION

Table 2 presents the descriptive statistics of all variables used in this study. CD scores range from 0.056 to 0.944, with an average of 0.303 and a standard deviation of 0.201. It suggests moderate but varied levels of carbon-related transparency across firms. CG scores range from 0.000 to 0.933, with a mean of 0.599 and a standard deviation of 0.165, indicating generally strong governance practices, though with some variation among firms. Earnings quality is measured using both real earnings management and accrual-based earnings management proxies. Real earnings management is captured by three indicators: RM, RM1, and RM2. The first has a minimum value of −2.378 and a maximum value of 2.471, with a mean value close to zero (0.000) and a standard deviation of 0.409. RM1 ranges from −2.409 to 2.467, with a mean of 0.000 and a standard deviation of 0.406. RM2 shows a narrower distribution, with values ranging from −1.052 to 0.765, a mean of 0.000, and a standard deviation of 0.239. The near-zero mean values across all real earnings management measures are consistent with prior studies using residual-based estimation models, indicating that these measures do not exhibit an aggregate tendency in a particular direction. Accrual-based earnings management is measured using ABEM. As reported in Table 3, ABEM ranges from −1.136 to 30.569, with a mean of 0.079 and a standard deviation of 19.339. The relatively wide dispersion of ABEM values indicates substantial heterogeneity in accrual-based earnings management practices among firms in the energy sector.

Regarding control variables, liquidity, measured by the CR, ranges from 0.400 to 118.200, with a mean of 2.344 and a standard deviation of 7.728. It indicates significant differences in short-term liquidity positions. LEV ranges from 0.086 to 34.056, with an average of 0.905 and a standard deviation of 4.293. This suggests that firms in the energy sector rely heavily on debt financing. MKTB, ranges from 0.001 to 0.852, with a mean of 0.113 and a standard deviation of 0.128. SIZE, measured as the natural logarithm of total assets. It has a minimum value of 0.130, a maximum value of 33.182, and a mean of 27.072, with a standard deviation of 5.034, indicating considerable variation in firm scale.

Table 2
Descriptive Statistics

Variable	Minimum	Maximum	Mean	Standard Deviation
CD	0.0556	0.9444	0.3033	0.2014
CG	0.0000	0.9333	0.5992	0.1648
EQ (RM)	-2.3778	2,4708	0.00000053	0.4086
EQ (RM1)	-2.4090	2.4665	0.00000053	0.4061
EQ (RM2)	-1.0515	0.7651	0.00000020	0.2394
EQ (ABEM)	-1,1359	30,5691	0.0786	19,3388
CR	0.400	118,2000	2,3443	7,7276
LEV	,0864	34,0556	0.9050	4,2934
MKTB	0.0006	0.8519	0.1131	0.1282
SIZE	0.1300	33,1824	27,0724	5,0342

Notes: EQ = earnings quality; RM = real earnings management; ABEM = accrual-based earnings management; CD = carbon disclosure; CG = corporate governance; CR = current ratio; LEV = leverage; MKTB = market-to-book ratio; SIZE = firm size.

Source: Authors' calculations using PLS-SEM, 2025

Evaluation of Data Quality and Model Assumptions: Convergent Validity, Discriminant Validity, and Reliability

Data quality in the PLS-SEM analysis was assessed through the measurement model to evaluate construct validity and reliability. The structural model in this study is shown in Figure 2. Convergent validity was confirmed as all indicators exhibited outer loadings above 0.70 with p-values below 0.05, supported by an Average Variance Extracted (AVE) of 0.965 for the earnings quality construct, exceeding the 0.50 threshold. Construct reliability was established with Composite Reliability (CR = 0.991) and Cronbach's Alpha (CA = 0.988), indicating very high internal consistency.

Discriminant validity was confirmed using the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT). The square root of AVE exceeded inter-construct correlations and all HTMT values were below 0.90. Convergent validity results using outer loading indicator are reported in Table 3, reliability statistics in Table 4, and discriminant validity results in Tables 5 and 6.

Table 3
Convergent Validity Testing
Based on Outer Loading

	CD	CG	CR	EQ	LEV	MKTB	Size
CD	1,000						
CG		1,000					
EQ (RM)				0.988			
EQ (RM1)				0.966			
EQ (RM2)				0.987			
EQ (EM)				0.987			
CR			1,000				
LEV					1,000		
MKTB						1,000	
SIZE							1,000

Source : Authors' calculations using PLS-SEM

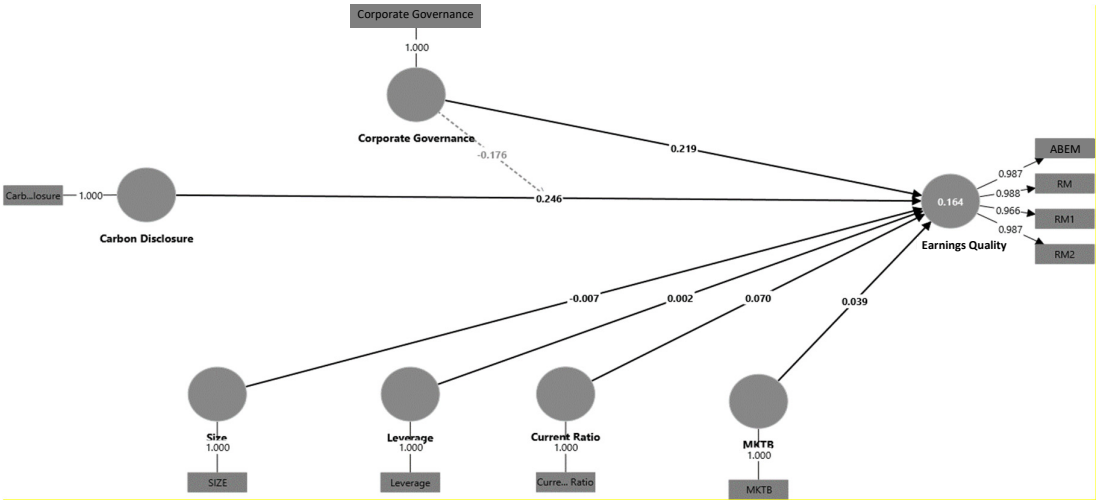

Figure 2 Structural Model Results
Source : Authors' calculations using PLS-SEM

Table 4
Reliability based on Cronbach's Alpha (CA) and Composite Reliability (CR); validity testing based on Average Variance Extracted (AVE)

	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
EQ	0.988	0.991	0.965

Source: Authors' calculations using PLS-SEM, 2025

Table 5
Discriminant Validity Testing: Fornell & Larcker

	CD	CG	EQ	CR	LEV	MKTB	Size
CD	1,000						
CG	0.168	1,000					
EQ	0.261	0.303	0.982				
CR	-0.089	-0.125	0.009	1,000			
LEV	0.201	0.203	0.004	0.123	1,000		
MKTB	-0.211	-0.121	0.060	-0.044	-0.041	1,000	
Size	0.183	0.156	-0.209	0.049	0.074	-0.283	1,000

Source : Authors' calculations using PLS-SEM, 2025

Table 6
Discriminant Validity Test: HTMT

	CD	CG	EQ	EQ	LEV	MKTB
CG	0.168					
EQ	0.259	0.304				
CR	0.089	0.125	0.009			
LEV	0.201	0.203	0.124	0.004		
MKTB	0.211	0.121	0.043	0.060	0.041	
Size	0.183	0.156	0.209	0.051	0.074	0.283

Source : Authors' calculations using PLS-SEM, 2025

Results

The structural model demonstrates adequate explanatory and predictive power (R^2 = 0.164; Q^2 = 0.144) and exhibits good overall model fit, as indicated by an SRMR value of 0.017, as the recommended threshold (Table 7).

As in Table 7, carbon disclosure exerts a positive and significant effect on earnings management (O = 0.246; t = 3.145; p = 0.002). The earnings management is used as an inverse proxy for earnings quality. The result suggests that increased carbon disclosure is linked to lower earnings quality. Corporate governance negatively affects earnings management (O = –0.219; t = 3.126; p = 0.002). So the stronger governance reduces earnings management and improves earnings quality (Table 7). The CG × CD interaction negatively affects earnings management (O = –0.176; t = 2.009; p = 0.045; Table 7), indicating strong governance curbs opportunistic reporting and promotes substantive carbon disclosure.

Current Ratio has a significant negative effect on earnings management (O = –0.070; t = 1.554; p = 0.021). This indicates that higher liquidity is associated with lower earnings management and, consequently, higher earnings quality. Meanwhile, Leverage, Market-to-Book Value (MKTB), and Size

show a significant negative effect on earnings management (p > 0.05), so their contribution to earnings quality is not statistically significant.

Table 7
Results of inner model data processing

Relationship between variables	Coefficient (O)	T statistic	p-value	R Square	Q Square	SRMR	Status
CD → EQ	0.246	3,145	0.002**				H_1 accepted
CD → EQ	-0.219	3,126	0.002**				H_2 accepted
CG × CD → EQ	-0.176	2,009	0.045*				H_3 accepted
CR → EQ	-0.070	1,554	0.021*				Control variables (significant)
LEV → EQ	0.002	0.021	0.983	0,164	0,144	0,017	Control variables (not significant)
MKTB → EQ	0.039	0.658	0.511				Control variables (not significant)
SIZE → EQ	-0.007	0.127	0.899				Control variables (not significant)

Notes : *p < 0.05; **p < 0.01
Source: Authors' calculations using PLS-SEM, 2025

Discussion

The Effect of Carbon Disclosure on Earnings Management

Hypothesis 1 is supported, indicating CD has a positive and significant effect on EM. This finding indicates that increased carbon disclosure is associated with higher levels of earnings management. The descriptive statistics indicate substantial heterogeneity in both carbon disclosure practices and earnings management behavior among energy sector firms. Carbon disclosure is unevenly adopted, varying levels of transparency and commitment across firms. Similarly, earnings management measures both real and accrual as exhibit wide dispersion. So the firms differ markedly to which they engage in opportunistic financial reporting. This variability indicates that higher disclosure does not consistently coincide with disciplined earnings practices. Within the framework of agency theory (Jensen & Meckling, 1976), this result suggests that management may utilize carbon disclosure as a strategy to mitigate monitoring pressure from capital owners and stakeholders. While it simultaneously engages in opportunistic financial reporting practices. Consequently, carbon disclosure does not necessarily reflect a substantive environmental commitment but may be strategically employed alongside earnings management activities.

This finding is consistent with Houqe et al. (2024) that higher levels of environmental disclosure can coexist with increased earnings manipulation. Their results indicate that management may use voluntary environmental disclosure as a complementary tool in opportunistic financial reporting strategies.

From a stakeholder theory perspective, corporate disclosure is intended to meet stakeholders' information needs and enhance managerial accountability. However, this study suggest that a stakeholder-oriented disclosure approach does not automatically lead to improved earnings quality. When stakeholder demands are primarily focused on meeting nonfinancial expectations, firms tend to emphasize narrative-based disclosures. The earnings management practices persist to achieve specific financial performance targets. Under such conditions, carbon disclosure serves as a mechanism to respond to stakeholder demands without accompanying improvements in the quality of financial reporting.

In contrast, Ardhaoui et al. (2024) report a negative association between environmental disclosure and earnings management. They suggest that the effect of carbon disclosure on earnings quality is context-dependent. In Indonesia, where carbon disclosure remains voluntary and weakly regulated, managers retain substantial discretion over disclosure scope and depth. In the energy sector, stakeholder pressure encourages greater carbon disclosure, yet this pressure is not necessarily matched by stronger demands for high-quality earnings reporting.

The Effect of Corporate Governance on Earnings Management

Hypothesis 2 is supported that CG has a negative and significant effect on EM**.** This finding suggests that stronger corporate governance mechanisms are associated with lower earnings management, thereby enhancing earnings quality. Consistent with this finding, the descriptive statistics show generally high corporate governance scores among energy sector firms, reflecting the formal adoption of governance mechanisms. At the same time, earnings management measures remain widely dispersed, indicating heterogeneity in reporting practices across firms. Taken together, these results indicate widespread adoption of governance mechanisms, alongside considerable heterogeneity in earnings management practices across firms.

This result supports agency theory, which emphasizes the role of monitoring mechanisms in aligning the interests of principals and agents and constraining opportunistic managerial behavior. In this study, corporate governance is measured using an OECD-based governance index adapted to the Indonesian context, encompassing 15 indicators, including anti-corruption policies, code of ethics, insider trading prevention, ownership by the largest shareholder, corporate social responsibility (CSR), free float proportion, shared ownership by employees, whistleblowing mechanisms, sanctions, engagement of big 4 auditors, disclosure of ultimate beneficiary shareholders, independent directors, independent commissioners, and the size of the board of directors and the board of commissioners. These indicators collectively form an interrelated and multi-layered monitoring system that plays a crucial role in curbing earnings management practices. For instance, the implementation of codes of ethics, anti-corruption policies, and insider trading prevention limits management's ability to manipulate earnings for personal gain. Ownership concentration through a largest shareholder, combined with an adequate Free Float proportion, increases market discipline and external monitoring. In contrast, employee shared ownership helps align employee interests with those of shareholders, thereby encouraging more transparent financial reporting.

Furthermore, governance mechanisms such as CSR implementation, effective whistleblowing systems, and the enforcement of strict sanctions foster an organisational climate that prioritises accountability. The engagement of reputable auditors (big 4 auditors) and transparency in ultimate ownership through the disclosure of ultimate beneficiary shareholders enhances the credibility and reliability of financial reports. In addition, the presence of independent

directors and independent commissioners provides objective oversight. While an appropriate board size ensures effective coordination and monitoring. The integration of these governance mechanisms strengthens oversight and can transform corporate practices—including carbon disclosure—from symbolic compliance into more substantive and credible actions (Tessema & Abou-El-Sood, 2025).

This evidence is consistent with prior studies in emerging markets that the robust governance mechanisms reduce earnings management by strengthening oversight and accountability structures (Tessema & Abou-El-Sood, 2025; Tessema et al., 2024). However, this finding is not universally supported, as Khan et al. (2025) that corporate governance mechanisms may fail to constrain earnings management in firms affiliated with business groups. They concentrated ownership and dominant controlling shareholders weaken the effectiveness of formal governance structures.

The Moderating Role of Corporate Governance on the Relationship between Carbon Disclosure and Earnings Management

Hypothesis 3 is supported, as the interaction between corporate governance and carbon disclosure (CG × CD) has a negative and significant effect on earnings management. Consistent with the descriptive evidence, many energy sector firms have adopted formal governance mechanisms, as reflected in relatively high governance scores. In such settings, governance constrains managerial discretion, reducing the scope for opportunistic carbon disclosure and shifting it toward more substantive accountability. From an agency theory perspective, carbon disclosure may give managers greater discretion to shape external perceptions when monitoring mechanisms are weak. Prior studies show that voluntary environmental disclosures can coexist with higher earnings management under such conditions, enabling impression management through narrative reporting (Houqe et al., 2024). However, the present findings demonstrate that the effectiveness of carbon disclosure in influencing earnings management is conditional on the strength of corporate governance mechanisms. Specifically, strong governance structures—such as independent commissioners, whistleblowing systems, reputable auditors, ethical codes, and transparency of ownership—limit managerial discretion over both financial reporting and discretionary disclosures. Under these conditions, carbon disclosure becomes less susceptible to opportunistic use and is more likely to function as a substantive governance signal rather than a symbolic communication tool.

This finding extends governance research by showing that corporate governance not only functions as a monitoring mechanism but also shapes the consequences of voluntary disclosure. Its moderating role is particularly salient in high-emission industries, such as the energy sector, where disclosure incentives are strong and the risk of symbolic reporting is high. Although Khan et al. (2025) argue that governance mechanisms may lose effectiveness in business group–affiliated firms. This study's results suggest that when governance mechanisms are effectively enforced, they can significantly constrain the opportunistic use of carbon disclosure and enhance earnings quality.

Discussion of Control Variables

The results indicate that the CR has a negative and significant effect on earnings management, suggesting that firms with stronger liquidity engage in less earnings manipulation due to reduced short-term financial pressure. In contrast, LEV, MKTB, and SIZE do not exhibit significant effects on earnings management. The insignificance of leverage reflects the energy sector's reliance on long-term asset structures and stable cash flows, while the non-significant MKTB result suggests limited influence of market valuation pressures on reporting behavior.

Similarly, the absence of a SIZE effect indicates comparable earnings management opportunities across firms of different sizes.

CONCLUSION, LIMITATIONS, AND SUGGESTIONS

This study investigates the role of carbon disclosure and corporate governance in shaping earnings quality in the Indonesian energy sector. The findings suggest that in a largely voluntary reporting environment, carbon disclosure may function as symbolic communication rather than substantive environmental accountability, allowing managers to combine disclosure practices with opportunistic financial reporting, as predicted by agency theory.

In contrast, corporate governance plays a critical role in constraining managerial opportunism and enhancing earnings quality. Effective governance—reflected in ethical standards, oversight, ownership transparency, and audit credibility—limits managerial discretion and strengthens financial reporting credibility. Importantly, corporate governance also conditions the role of carbon disclosure by reducing its potential misuse, ensuring that disclosure reflects substantive rather than symbolic reporting practices.

Overall, the findings highlight corporate governance as a key boundary condition determining whether carbon disclosure exacerbates or mitigates earnings management. This insight is particularly relevant for high-emission industries such as the energy sector, where carbon disclosure remains largely voluntary and incentives for symbolic reporting are strong.

This study has three key limitations. First, carbon disclosure and corporate governance are measured using aggregate indices, which enhance parsimony but may conceal the effects of specific indicators. The future studies should employ indicator- or dimension-level analyses. Second, potential endogeneity and reverse causality are not explicitly addressed. The future research may apply dynamic panel or instrumental variable techniques to strengthen causal inference. Third, as carbon disclosure in Indonesia remains largely voluntary, variation in disclosure quality and credibility is not fully captured. The future studies should incorporate measures of disclosure substance, verifiability, and consistency.

Based on the findings and limitations, this study recommends that regulators mandate standardized carbon disclosure to reduce opportunistic reporting. The firms should also strengthen governance mechanisms particularly independent commissioners, audit committees, ownership transparency, and whistleblowing systems to ensure that carbon disclosure reflects substantive environmental performance rather than symbolic compliance. Future research should disaggregate corporate governance indicators and carbon disclosure dimensions, broaden sectoral and geographical coverage, and integrate quantitative and qualitative methods to better capture managerial motivations and the governance role in mitigating earnings management.

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