WATER DISCLOSURE IN INDONESIAN MINING COMPANIES: THE ROLE OF SIZE, LEVERAGE, MARKET VALUE, AND GROWTH

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Abstract

This study investigates the primary drivers behind Corporate Water Disclosure (CWD) within the Indonesian mining sector, analyzing data from 16 IDX-listed companies spanning 2018–2023. Prompted by growing scrutiny over water resource management and corporate sustainability, this research employs a quantitative approach using Eviews13 with panel data regression (Fixed Effect Model) to assess the impact of firm size, leverage, market value, company growth, firm age, and CEO expertise. The analysis determines that all variables, excluding company growth, significantly influence CWD levels. These outcomes support Stakeholder and Signaling theories, highlighting CWD as a vital strategic tool for gaining legitimacy, ensuring regulatory compliance, and building essential stakeholder trust.

Keywords: Corporate Water Disclosure, Firm Characteristics, CEO Expertise, Sustainability Reporting, GRI 303, Mining Industry.

INTRODUCTION

The global water crisis is increasingly recognized as one of the most critical challenges of the twenty-first century, with far-reaching implications for economic development, social well-being, and environmental sustainability. Despite the fact that water covers approximately 71% of the Earth's surface, only around 2.5% of total global water resources consist of freshwater. Moreover, a significant proportion of this freshwater is stored in glaciers or deep underground aquifers, rendering it largely inaccessible for direct human use. As a result, the volume of freshwater available for domestic, agricultural, and industrial activities is highly constrained. This limited

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availability is further intensified by population growth, urban expansion, industrial development, and climate change, all of which simultaneously increase water demand and deteriorate water quality (Gude, 2017).

Climate change has substantially amplified water stress across different regions of the world. Changes in precipitation patterns and rising temperatures have disrupted the hydrological cycle, leading to instability in soil moisture levels and surface water availability (Chairunnisa et al., 2021). Unpredictable rainfall, extended drought periods, and declining river discharges have undermined the reliability of freshwater supplies in many areas (Greve et al., 2018). Furthermore, higher global temperatures accelerate evaporation from terrestrial surfaces and water bodies, exacerbating water scarcity, particularly in regions that are already vulnerable (Biswas et al., 2025). If these conditions persist, global freshwater demand is expected to surpass supply by nearly 40% by 2030, while over 40% of the global population is already experiencing water stress for part of the year (Greve et al., 2018).

Water scarcity presents serious challenges for major economic sectors. Agriculture, which consumes nearly 70% of global freshwater withdrawals, is especially susceptible to water shortages, posing threats to global food security and the livelihoods of millions of farmers (Biswas et al., 2025). Industrial sectors, including manufacturing, mining, and energy production, also rely heavily on water for essential processes such as cooling, processing, and waste management. Insufficient water supply can interrupt industrial operations, lower productivity, and increase operational costs, particularly for industries with high water intensity (Cole et al., 2023).

In addition to water availability, declining water quality has become an equally pressing issue. Contamination from industrial discharges, agricultural runoff, and domestic waste has significantly reduced the supply of clean water for human consumption and ecosystem sustainability. Increased concentrations of nutrients, heavy metals, and organic pollutants have triggered eutrophication and ecosystem degradation, posing serious risks to biodiversity and public health (Biswas et al., 2025). Consequently, addressing water-related challenges requires an integrated management approach that simultaneously considers water quantity and water quality.

Indonesia faces considerable challenges related to both water scarcity and water pollution. Rapid economic expansion, population growth, and the intensification of industrial and mining activities have significantly increased demand for clean water. At the same time, climate change has disrupted hydrological patterns and reduced water availability in several region (Wahyuningrum et al., 2023). Water balance assessments in Java and Bali indicate that provinces such as DKI Jakarta, East Java, and Bali are experiencing severe water stress, where water demand exceeds available supply, leading to substantial economic losses (Chairunnisa et al., 2021). These conditions not only endanger public health through sanitation-related diseases but also reduce agricultural output and heighten the risk of social conflict arising from competition over limited water resources (Herzanita et al., 2024).

Water pollution remains a persistent environmental concern in Indonesia. In 2021, industrial activities generated approximately 60 million tons of hazardous waste, with manufacturing and extractive industries contributing the largest share (Wahyuningrum et al., 2023). Mining operations, in particular, pose significant risks to water resources due to the discharge of wastewater containing heavy metals and hazardous substances. Several documented cases demonstrate the severity of this issue, including chromium contamination in the Oko-Oko River in Southeast Sulawesi and nickel waste pollution in the waters of East Halmahera, North Maluku, both of which have threatened aquatic ecosystems and the livelihoods of local communities (Bhawono, 2023; Ichi, 2024). Empirical studies further confirm that mining activities significantly increase levels of water pollution, underscoring the urgent need for more effective environmental management in this sector (Nurfatimah, 2023).

In response to these challenges, the Indonesian government has implemented various regulations to strengthen environmental protection and promote sustainable water management. One of the most recent policies is the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 5 of 2022, which requires mining companies to treat wastewater using constructed wetland methods prior to discharge. This regulation aims to reduce pollutant loads and prevent further degradation of water resources (Peraturan Menteri Lingkungan Hidup Dan Kehutanan

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Republik Indonesia Nomor 5 Tahun 2022 Tentang Pengolahan Air Limbah Bagi Usaha Dan/Atau Kegiatan Pertambangan Dengan Menggunakan Metode Lahan Basah Buatan, 2022). These efforts are reinforced by Law No. 32 of 2009 on Environmental Protection and Management and Government Regulation No. 22 of 2021, both of which emphasize precautionary principles, environmental responsibility, and mandatory environmental monitoring and reporting.

Despite these regulatory advancements, significant challenges remain in ensuring corporate accountability and transparency, particularly with regard to water-related disclosures. Water disclosure refers to the provision of information concerning water use, water management practices, and water-related risks faced by companies. Transparent water disclosure is essential for strengthening corporate accountability, mitigating environmental and social risks, and maintaining stakeholder confidence. Nevertheless, empirical evidence indicates that water disclosure practices among Indonesian companies remain relatively limited when compared to international frameworks such as the Global Reporting Initiative (GRI) (Adhariani, 2021).

Previous empirical studies indicate that enhanced water disclosure can improve corporate reputation and firm value. Research conducted in Vietnam reveals that higher levels of water disclosure are positively associated with financial performance indicators, including return on assets (ROA) and return on equity (ROE), suggesting increased investor confidence and stronger stakeholder relationships (Khuong et al., 2022). From the perspectives of legitimacy theory and stakeholder theory, transparent water-related disclosures enable firms to align their activities with societal expectations and regulatory requirements, thereby strengthening corporate legitimacy and long-term sustainability (Khuong et al., 2022).

The mining industry provides a particularly relevant context for examining water disclosure practices due to its intensive water usage and high environmental risk profile. Although the number of mining companies listed on the Indonesia Stock Exchange (IDX) has increased, their commitment to transparent water disclosure varies considerably across firms and over time. Most prior studies have focused on general environmental disclosures or carbon emissions, with relatively limited attention given to water-specific disclosures in the mining sector using recent data. This limitation highlights the need for

further empirical investigation into the determinants of water disclosure among Indonesian mining companies.

This study investigates several firm-specific characteristics that are expected to influence water disclosure practices, including firm size, leverage, market value, and company growth. Larger firms are generally anticipated to provide more extensive environmental disclosures due to greater resource availability and stronger stakeholder scrutiny (Hasibuan & Ismail, 2024). Leverage reflects a firm's reliance on external financing and may affect disclosure decisions due to creditor monitoring and risk considerations, although prior findings on this relationship remain inconclusive (Panggabean, 2023). Market value represents investor perceptions and reputational concerns, which may incentivize firms to enhance transparency. Company growth reflects future prospects and resource capacity, which may also influence disclosure behavior, although empirical evidence on this relationship is mixed (Mudi Susilo et al., 2022; Rini et al., 2021).

In addition, this study incorporates control variables such as firm age, water risk sensitivity, and CEO financial expertise to provide a more comprehensive analysis of the factors affecting water disclosure. Older firms are likely to have more established reporting systems, while firms operating in areas with high water-related risks may face stronger pressure to disclose water management information as part of risk mitigation efforts (Farooq et al., 2025). Furthermore, CEOs with strong financial expertise may be more aware of the importance of transparent reporting for investor decision-making, leading to higher-quality disclosures (Hasibuan & Ismail, 2024).

By focusing on mining companies listed on the Indonesia Stock Exchange during the 2018–2023 period, this study aims to generate updated and context-specific empirical evidence on the determinants of water disclosure in Indonesia. The findings are expected to contribute to the sustainability reporting literature and provide practical insights for regulators, policymakers, and corporate managers in strengthening water governance and disclosure practices within the mining sector.

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LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

THEORETICAL FRAMEWORK

This study is grounded in Agency Theory, Stakeholder Theory, and Signaling Theory to explain corporate water disclosure practices. Agency Theory highlights the existence of information asymmetry between managers and shareholders, particularly regarding environmental risks and resource management. Environmental disclosure, including water disclosure, serves as a mechanism to reduce agency costs by improving transparency and monitoring (Cormier et al., 2010; Jensen & Meckling, 1976).

Stakeholder Theory emphasizes that companies are accountable to a wide range of stakeholders beyond shareholders, such as regulators, local communities, creditors, and environmental groups. Mining companies face substantial stakeholder pressure due to their intensive use of water resources and potential environmental impacts. Consequently, transparent water disclosure becomes a tool to demonstrate accountability and fulfill stakeholder expectations (Deegan, 2002; Freeman, 1984). Signaling Theory suggests that voluntary disclosure is used by firms to signal superior quality, effective governance, and long-term sustainability orientation to the market. Water disclosure can reduce uncertainty for investors and enhance corporate reputation, particularly in environmentally sensitive industries (Cormier & Magnan, 2015; Spence, 1973).

Corporate Water Disclosure

Corporate Water Disclosure refers to the disclosure of qualitative and quantitative information related to water withdrawal, consumption, discharge, recycling, and water risk management. The Global Reporting Initiative (GRI) 303: Water and Effluents is the most widely adopted international guideline for water disclosure. Higher levels of water disclosure have been associated with improved environmental governance, stronger stakeholder trust, and enhanced corporate reputation (Barkemeyer et al., 2015; Farooq et al., 2025).

In the Indonesian context, sustainability disclosure has been strengthened by the adoption of IFRS Sustainability Disclosure Standards through Pernyataan Standar Pengungkapan Keberlanjutan (PSPK) 1 and PSPK 2. Although the initial focus is climate-related disclosure, water-related risks are increasingly recognized as financially

material, particularly for mining companies that operate in high water-risk environments.

Determinants of Water Disclosure

Water disclosure practices are influenced by various firm-specific characteristics that reflect differences in resources, risk exposure, and stakeholder pressure. In environmentally sensitive industries such as mining, these characteristics play a crucial role in shaping corporate responses to increasing demands for transparency and accountability.

Firm Size

Firm size is commonly associated with the extent of environmental disclosure. Larger firms tend to have more complex operations, greater environmental impacts, and higher public visibility. As a result, they face stronger scrutiny from regulators, investors, and society. From an agency perspective, large firms disclose more environmental information to reduce information asymmetry and agency costs. Stakeholder theory further suggests that large firms respond to broader stakeholder demands by providing more comprehensive disclosures. Empirical studies consistently document a positive relationship between firm size and water or environmental disclosure, particularly in high-risk sectors (Clarkson et al., 2008; Hasibuan & Ismail, 2024; Wahyuningrum et al., 2023).

Leverage

Leverage reflects the extent of a firm's reliance on external debt financing. Highly leveraged firms are subject to closer monitoring by creditors, which may incentivize greater transparency to assure lenders about the firm's risk management practices, including environmental and water-related risks. From an agency theory standpoint, increased disclosure can help reduce creditor concerns and borrowing costs. However, some studies argue that firms with high leverage may strategically limit voluntary disclosure to avoid highlighting potential environmental liabilities. Consequently, empirical findings on the relationship between leverage and water disclosure remain mixed, indicating that the effect may depend on institutional context and industry characteristics (Lu & Abeysekera, 2014; Panggabean, 2023).

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Market Value

Represents investors' perceptions of a firm's future prospects and overall risk profile. Firms with higher market value have stronger incentives to maintain legitimacy and investor confidence through transparent disclosure practices. According to signaling theory, voluntary environmental disclosure, including water-related information, serves as a positive signal of effective governance, sustainability orientation, and long-term value creation. Prior research shows that firms with higher market valuation tend to engage more actively in sustainability reporting to protect reputational capital and reduce market uncertainty (Cormier et al., 2010; Hummel & Schlick, 2016).

Company Growth

Indicates the firm's expansion in operations and financial performance, often measured through revenue growth. Growing firms may have greater resources and future-oriented strategies that support sustainability initiatives and disclosure practices. At the same time, rapidly expanding firms may prioritize operational growth over environmental reporting, particularly in emerging markets where disclosure enforcement is still developing. As a result, prior empirical evidence on the effect of company growth on environmental and water disclosure remains inconclusive, highlighting the need for further investigation in specific industrial contexts such as mining (Mudi Susilo et al., 2022; Rini et al., 2021).

HYPOTHESIS DEVELOPMENT

This study formulates its hypotheses by synthesizing established theoretical frameworks with prior empirical evidence to explain differences in corporate water disclosure practices among mining companies.

Firm Size and Corporate Water Disclosure

Firm size is widely acknowledged as a critical factor influencing environmental and social disclosure. Under Stakeholder Theory, larger firms engage with a broader and more diverse group of stakeholders, including regulators, investors, and local communities, who demand transparent and reliable information regarding corporate water management. From the standpoint of Agency Theory, larger organizations tend to experience greater information asymmetry due to more complex ownership and

operational structures, prompting management to increase voluntary disclosure as a mechanism to reduce agency costs.

Moreover, larger firms are more publicly visible and subject to stronger regulatory oversight and societal expectations, which intensifies pressure to maintain legitimacy through responsible environmental practices. Their superior financial capacity and organizational sophistication also allow them to implement advanced sustainability reporting frameworks, such as GRI 303. Empirical evidence supports this argument. Studies by Wicaksono et al., (2022) and Wahyuningrum et al., (2023) in the Indonesian context show that firm size is positively associated with the extent of water-related disclosure. Similarly, Rohma, (2021) and Miklosik & Evans, (2021) document that company size significantly influences the intensity of water disclosure in the mining sector. Based on these theoretical and empirical considerations, the following hypothesis is proposed:

H1: Firm size has a positive effect on corporate water disclosure.

Leverage and Corporate Water Disclosure

The association between leverage and corporate water disclosure can be explained primarily through Agency Theory. Firms with higher leverage are subject to closer monitoring by creditors who are increasingly attentive to both financial and environmental risks. To alleviate creditor concerns and reduce agency conflicts between managers and debt holders, firms may enhance transparency by providing more comprehensive water-related disclosures. Such disclosures function as a signal that the firm is effectively managing water-related risks, thereby supporting creditor confidence and access to external financing.

Although high leverage may limit resources available for voluntary reporting, empirical findings provide support for a significant relationship between leverage and water disclosure. Hasibuan & Ismail, (2024) find that leverage significantly influences water disclosure practices among Indonesian mining companies. In addition, Wicaksono et al., (2022) report that leverage contributes positively to disclosure levels in water-

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intensive industries. Therefore, this study proposes the following hypothesis:

H2: Leverage has a significant effect on corporate water disclosure.

Market Value and Corporate Water Disclosure

From a Signaling Theory perspective, firms with higher market value are incentivized to disclose environmental information to communicate superior performance, effective risk management, and long-term sustainability to investors. Market value reflects a firm's reputational capital, which managers seek to protect and enhance through transparent reporting practices. Detailed water disclosure signals that water-related risks have been strategically integrated into corporate decision-making, thereby reducing information uncertainty in the capital market.

Empirical evidence supports this reasoning. Hasibuan & Ismail (2024) show that mining firms with higher market value have stronger incentives to maintain investor trust through transparent disclosure. Furthermore, Khuong et al., (2022) demonstrate that water disclosure contributes positively to firm value, suggesting a reciprocal relationship in which transparency enhances corporate reputation and investor confidence. Accordingly, the following hypothesis is formulated:

H3: Market value has a positive effect on corporate water disclosure.

Company Growth and Corporate Water Disclosure

Drawing on Legitimacy Theory and Accountability Theory, firm growth is expected to intensify stakeholder expectations and increase future operational risks related to water consumption and environmental impact. Expanding firms may therefore be encouraged to improve transparency to demonstrate that growth is being managed responsibly. Growth may also provide additional resources to support sustainability initiatives and disclosure practices.

However, prior empirical studies indicate mixed results. While Rini et al., (2021) suggest that growth can motivate greater engagement in sustainable practices, other

studies argue that rapidly growing firms often prioritize short-term expansion and financial performance over long-term sustainability reporting. Given these competing arguments and the need for further investigation within the mining sector, this study proposes the following hypothesis:

H4: Company growth has a significant effect on corporate water disclosure.

RESEARCH METHOD

This study comprises all mining companies listed on the Indonesia Stock Exchange (IDX) over the 2018–2023 period. The mining sector is selected as the research population due to its distinct industry characteristics, substantial environmental impacts, and strong relevance to issues of water use and water disclosure.

This study applies a purposive sampling technique, which involves selecting samples based on predetermined criteria aligned with the research objectives (Sekaran & Bougie, 2016). This approach ensures that only mining companies providing complete and relevant data on water disclosure throughout the observation period are included in the analysis, thereby enhancing the validity and reliability of the empirical results.

The following criteria will be applied to determine the eligibility of samples for inclusion in this research:

1. Mining firms listed in Indonesia Stock Exchange for the period between 2018 and 2023.
2. Mining firms who did not delisting from Indonesia Stock Exchange for the period between 2018 and 2023.
3. Mining firms that have made their sustainability reports for the 2018 - 2023 period available to the public.
4. Mining firms that have not disclose sustainability report to public will be eliminated.
5. Mining firms with unavailable financial statement will be eliminated.

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The present study is a quantitative investigation that utilizes data measured on a numerical scale. This study relies on secondary information, specifically the annual reports, financial statements, and sustainability documents of mining firms listed on the Indonesia Stock Exchange (IDX) from 2018 to 2023. Secondary data refers to information collected by someone else, accessed through intermediaries or other entities. The current data for this research is sourced directly from the website of the Indonesian Stock Exchange www.idx.co.id.

Based on the previous explanation, the data collection process will follow the formulas used in the variable measurement as below:

Table 1
Variable Measurement

Variable	Abbreviation	Indicator
Dependent Variable		
Corporate Water Disclosure (Y)	CWD	Index based on GRI 303: Water and Effluents; score 1 if disclosed, 0 if not; normalized into (%)
Independent Variables		
- Firm Size (X1)	FS	$FS = Ln\ (Total\ Asset)$
- Leverage (X2)	LEV	$LEV = \dfrac{Total\ Debt}{Total\ Equity}$
- Market Value (X3)	MV	$MV = \dfrac{Market\ Value\ of\ Equity}{Book\ Value\ of\ Equity}$
- Company Growth (X4)	CG	$CG = \dfrac{Revenue\ t - Revenue\ t - 1}{Revenue\ t - 1}$
Control Variables		
- Firm Age	FAG	$Firm\ age: Current\ year - Establishment\ year$
- CEO Expertise	CEO	1 = CEO has sustainability-related experience or education; 0 = Otherwise

Furthermore, this study will employ data analysis procedures using the EViews statistical software, a tool commonly applied in econometric and time-series research. Beyond data analysis, several classical assumption tests will be conducted to assess the validity and robustness of the regression model. These tests include normality testing, multicollinearity testing, and heteroscedasticity testing.

RESULTS AND DISCUSSION

The data used in this study were derived from annual reports, financial statements, and sustainability reports obtained from the Indonesia Stock Exchange (IDX) and the official websites of the sampled firms. The research sample consists of agricultural companies listed on the IDX during the period 2018–2023. A purposive sampling method was employed, resulting in 96 observations, with 16 firms selected annually based on the established research criteria.

Table 2 reports the results of the descriptive statistical analysis, which is divided into two panels. Panel A presents the distribution of dummy variables, while Panel B reports descriptive statistics for the continuous variables. Panel A summarizes the frequency distribution of Corporate Water Disclosure (CWD) and CEO Experience (CEOEXP).

The Corporate Water Disclosure (CWD) variable indicates that the majority of firms in the sample have disclosed water-related information. Of the 96 observations, 63 firms (66%) report a value of 1, indicating the presence of water disclosure, while 33 firms (34%) report a value of 0, indicating the absence of such disclosure. This finding suggests that corporate water disclosure has been widely implemented among the sampled firms, although a substantial proportion of companies have not yet adopted this practice.

The CEO Experience (CEOEXP) variable shows a highly unbalanced distribution. Only 15 firms (16%) are managed by CEOs with the specified experience, whereas 81 firms (84%) are led by CEOs without such experience. This indicates that the CEO experience examined in this study is relatively uncommon within the sample, which may have implications for variability in subsequent regression analyses.

Panel B presents measures of central tendency, including the mean and median, as well as dispersion measures such as the minimum, maximum, and standard deviation for the continuous dependent and independent variables. The Corporate Water Disclosure (CWD) variable, measured as an index or proportion, records a mean value

of 0.6583 and a median of 0.8000, with values ranging from 0.0000 to 1.0000. The standard deviation of 0.3433 indicates a moderate level of dispersion. The median exceeding the mean suggests a negatively skewed distribution, implying that most firms exhibit relatively high levels of water disclosure.

Firm Size (FSIZE), measured using the natural logarithm of total assets, has a mean of 16.7347 and a median of 16.8650. The standard deviation of 1.0613 indicates relatively low variability, with firm size values ranging from 14.2800 to 18.5500. The close proximity between the mean and median suggests a relatively symmetrical distribution of firm size within the sample.

Leverage (LEV), proxied by the debt-to-asset ratio, shows an average value of 0.4609, indicating that approximately 46.09% of firm assets are financed by debt. The median value of 0.4750 is close to the mean, suggesting a relatively balanced distribution. Leverage values range from 0.0500 to 0.9600, with a standard deviation of 0.1987, reflecting considerable variation in firms' capital structures.

Market Value (MV) records a mean of 1.3064 and a median of 1.0450. The difference between these values, along with a wide range from 0.3400 to 8.0200, indicates a positively skewed distribution. The relatively high standard deviation of 1.1042 further confirms the substantial variability in market values, likely driven by a small number of firms with exceptionally high valuations.

Company Growth (CG) has a mean value of 0.2775 and a median of 0.1827. The variable exhibits a wide range, from −0.3601 to 6.7400, accompanied by a large standard deviation of 0.7913. The disparity between the mean and median indicates a strongly right-skewed distribution, suggesting the presence of firms with unusually high growth rates.

Firm Age (FAGE) shows an average of 43.3750 years and a median of 42.0000 years. Firm age ranges from 6 to 164 years, with a standard deviation of 34.8704. This substantial dispersion highlights the heterogeneity of firm maturity within the sample, encompassing both relatively young and long-established companies.

Table 2
Descriptive Statistic Analysis

Panel A: Dummy Variable

	N	Value 1		Value 0	
CEOEXP	96	15	16%	81	84%

Panel B: Continue Variable

	N	Mean	Median	Maximum	Minimum	Std. Dev.
CWD (Y)	96	0.6583	0.8000	1.0000	0.0000	0.3433
FSIZE (X1)	96	16.7347	16.8650	18.5500	14.2800	1.0613
LEV (X2)	96	0.4609	0.4750	0.9600	0.0500	0.1987
MV (X3)	96	1.3064	1.0450	8.0200	0.3400	1.1042
CG (X4)	96	0.2775	0.1827	6.7400	-0.3601	0.7913
FAGE (C1)	96	43.3750	42.0000	164.0000	6.0000	34.8704

Source: Data Proceed (2025)
Note: CWD = Corporate Water Disclosure; FSIZE = Firm Size; LEV = Leverage; MV = Market Value; CG = Company Growth; FAGE= Firm Age.

Table 3 presents the results of the normality test performed on the standardized residuals (N = 96) derived from the estimated regression model for the period 2018–2023. This test is conducted to examine whether the residuals satisfy the classical assumption of normality. The normality assessment employs the Jarque–Bera (JB) test, which evaluates departures from a normal distribution based on skewness and kurtosis measures.

The test results indicate a Jarque–Bera statistic of 0.843868 with an associated probability value of 0.655777. Under the Jarque–Bera framework, the null hypothesis (H_0) states that the residuals are normally distributed. Since the probability value exceeds the significance level of 5% (0.655777 > 0.05), the null hypothesis cannot be rejected. This finding indicates that the standardized residuals follow a normal distribution.

This conclusion is further supported by the descriptive statistics of the residuals. The skewness value of 0.188295, which is close to zero, suggests a relatively symmetric distribution, while the kurtosis value of 2.737041, which is close to three, indicates a distribution consistent with normal peakness. Accordingly, the normality assumption is satisfied, supporting the reliability of the regression estimates and the validity of subsequent statistical inferences.

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Table 3
Normality Test

N	Minimum	Maximum	Mean	Median	Std. Deviation
96	−0.219431	0.165204	1.62e 10-17	0.004260	0.082936

Jarque-Bera	0.843868
Probability	0.655777

Source: Processed Data using EViews 13, 2025

Table 4 shows that the regression model does not suffer from multicollinearity. The highest Variance Inflation Factor (VIF) value is observed for variable X1 at 1.638746, followed by Firm Age at 1.502563. The remaining variables, including X2, X3, X4, and CEO_EXP, exhibit relatively low VIF values, ranging from 1.030824 to 1.147446. As all centered VIF values are below the commonly accepted threshold of 10, and even below 2, it can be concluded that multicollinearity is not a concern in this model. Therefore, the estimated regression coefficients are considered stable and can be interpreted reliably without significant bias arising from high correlations among the independent variables.

Table 4
Multicollinearity Test

Variable	Coefficient Variance	Uncenterd VIF	Centered VIF
FSIZE(X1)	0.001146	413.3563	1.638746
LEV(X2)	0.022899	7.386788	1.147446
MV(X3)	0.000712	2.660236	1.101791
CG(X4)	0.001370	1.223594	1.088321
FIRM_AGE	9.74E-07	3.851907	1.502563
CEO_EXP	0.006097	1.221718	1.030824
C	0.273261	350.4379	NA

Source: Processed Data using EViews 13 (2025)

Based on the results of the Breusch–Pagan–Godfrey (BPG) test, table 5 shows that the null hypothesis (H₀), which assumes homoskedasticity or constant error variance, is evaluated. The test produces an Obs*R-squared value of 9.661118 with an associated probability value of 0.1397. Since this probability value exceeds the 5% significance level (0.1397 > 0.05), the null hypothesis cannot be rejected. This finding indicates that the regression model does not exhibit heteroskedasticity, thereby confirming that the assumption of homoskedasticity is satisfied. As a result, the estimated standard errors and subsequent statistical inferences, including the t-test and F-test, are considered reliable and efficient.

Table 5
Heteroscedasticity Test

F-statistic	1.659815	Prob. F(6,89)	0.1402
Obs*R-squared	9.661118	Prob. Chi-Square(6)	0.1397
Scaled explained SS	9.547679	Prob. Chi-Square(6)	0.1450

Source: Processed Data using EViews 13 (2025)

Table 6 presents the Durbin–Watson statistic, which is used to assess the presence of serial correlation in the regression residuals. The Durbin–Watson value obtained from the weighted statistics is 1.635471. As a Durbin–Watson value close to 2.0 indicates the absence of both positive and negative autocorrelation, the result suggests that serial correlation is not a serious concern in the model. The proximity of the DW value to 2.0 implies that the residuals are relatively independent, thereby supporting the validity and efficiency of the estimated regression coefficients for subsequent analysis.

Table 6
Autocorrelation Test

R-squared	0.975787	Mean dependent var	0.728380
Adjusted R-squared	0.968916	S.D. dependent var	0.420452
S.E. of regression	0.092533	Sum squared resid	0.633614
F-statistic	142.0104	Durbin-Watson stat	1.635471
Prob(F-statistic)	0.000000		

Source: Processed Data using EViews 13 (2025)

Hypothesis Testing Result

This study employs panel data regression analysis that integrates cross-sectional and time-series data to test the proposed hypotheses. Prior to estimating the regression model, model selection tests were conducted to determine the most appropriate panel data specification. The Chow test results show a Cross-section F statistic of 45.365629 with a probability value of 0.0000, indicating significant differences in intercepts across firms and leading to the rejection of the Common Effect Model (CEM). Furthermore, the Hausman test yields a Chi-square statistic of 75.066976 with a probability value of 0.0000, providing strong evidence against the Random Effect Model (REM). Accordingly, the Fixed Effect Model (FEM) is selected as the most appropriate and reliable specification for panel data regression estimation in this study, as it ensures

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consistent parameter estimates and valid statistical inference.

Table 7
Multiple Regression Analysis Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Conclusion
C	-2.945176	0.424178	-6.943248	0.0000***	-
FSIZE	0.077908	0.024750	3.147781	0.0024***	**Significant**
LEV	0.126664	0.062674	2.020991	0.0469**	**Significant**
MV	0.033986	0.013749	2.471959	0.0157**	**Significant**
CG	-0.003317	0.005832	-0.568740	0.5713	Not Significant
FIRM_AGE	0.051077	0.005886	8.677412	0.0000***	**Significant**
CEO_EXP	-0.112603	0.048431	-2.325042	0.0228**	**Significant**
Adj.R-Squared					0.968916
F-statistic					142.0104
Prob(F-statistic)					0.000000***
Durbin-Watson stat					1.635471

The definition and measurement of variables are presented in table 2
*Notes: ***, **, * respectively indicate significance at the 1%, 5%, and 10% levels.*
Source: Processed Data using EViews 13 (2025)

Based on the estimation results of the Fixed Effect Model shown in Table 7, the regression model exhibits a high level of explanatory capability. The adjusted R-squared value of 0.968916 indicates that approximately 96.89% of the variability in corporate water disclosure can be explained by the independent variables included in the model. Moreover, the F-test result reports an F-statistic of 142.0104 with a probability value of 0.0000, indicating that the model is statistically significant as a whole.

The empirical findings reveal that firm size has a positive and statistically significant effect on corporate water disclosure ($\beta = 0.0779$; $p < 0.01$), implying that larger firms tend to provide more extensive water-related disclosures. Leverage also shows a positive and significant relationship ($\beta = 0.1267$; $p < 0.05$), suggesting that firms with higher debt levels are more likely to increase water disclosure, potentially due to stricter oversight from creditors. In addition, market value is found to positively and significantly influence water disclosure ($\beta = 0.0340$; $p < 0.05$), indicating that firms with greater market valuation tend to enhance transparency to sustain investor trust.

In contrast, firm growth demonstrates a insignificant association with corporate water disclosure ($\beta = -0.0033$; $p > 0.05$), suggesting that growth does not substantially

affect disclosure practices. Firm age exhibits a positive and highly significant effect (β = 0.0511; $p < 0.01$), indicating that older firms are more inclined to engage in more comprehensive water disclosure, likely due to greater experience and more established reporting systems. Meanwhile, CEO financial expertise is found to have a negative and statistically significant effect on corporate water disclosure ($\beta = -0.1126$; $p < 0.05$), implying that CEOs with strong financial backgrounds may place greater emphasis on financial performance efficiency rather than extensive environmental disclosure.

Furthermore, the Durbin–Watson statistic of 1.635471 indicates the absence of serious autocorrelation issues in the model. Overall, these results confirm that the Fixed Effect Model is statistically sound and reliable, and that firm-specific characteristics and governance-related factors play an important role in explaining variations in corporate water disclosure.

Discussions

The findings of this study indicate that Corporate Water Disclosure (CWD) among Indonesian mining companies is significantly influenced by firm-specific characteristics and governance factors, particularly firm size, leverage, market value, firm age, and CEO expertise, while company growth does not exhibit a significant effect. These results suggest that water disclosure practices are more strongly driven by legitimacy concerns, stakeholder pressure, and efforts to reduce information asymmetry than by short-term growth considerations.

Firm size shows a positive and significant relationship with CWD, indicating that larger firms tend to provide more extensive water-related disclosures. This finding is consistent with Signaling Theory (Spence, 1973), which posits that firms use disclosure as a strategic signal to convey transparency and commitment to sustainable operations. In addition, Stakeholder Theory (Freeman, 1984) explains that larger firms face greater public scrutiny and stronger stakeholder demands, encouraging more comprehensive environmental reporting (Rohma, 2021; Wahyuningrum et al., 2023; Wicaksono et al., 2022). Prior empirical evidence also supports this argument, demonstrating that company size plays a central role in determining the extent of sustainability disclosure, particularly in environmentally sensitive industries (Miklosik & Evans, 2021).

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Leverage is found to have a positive and significant effect on CWD, suggesting that firms with higher debt levels tend to disclose more water-related information to mitigate information asymmetry and agency conflicts. This result aligns with Agency Theory (Jensen & Meckling, 1976), which emphasizes the role of voluntary disclosure in assuring creditors regarding risk management and financial stability. Consistent with previous studies, environmental disclosure is used as a monitoring mechanism to strengthen stakeholder trust and reduce agency costs (Burritt et al., 2016; Hasibuan & Ismail, 2024), particularly within the Indonesian mining sector.

Market value also exhibits a positive and significant influence on CWD. Firms with higher market valuations are more inclined to enhance water disclosure as a means of signaling financial strength, long-term sustainability, and corporate accountability. In line with Signaling Theory, transparent environmental reporting serves as strategic communication to maintain investor confidence and reinforce corporate reputation (Khuong et al., 2022; Mohamad et al., 2023).

Conversely, company growth does not show a significant relationship with CWD, indicating that revenue expansion does not necessarily lead to increased environmental transparency. High-growth firms may prioritize short-term financial performance and operational expansion over voluntary sustainability reporting. This finding contrasts with the expectations of Stakeholder Theory but is consistent with prior evidence suggesting mixed and inconclusive results regarding the influence of revenue growth on environmental, social, and governance disclosures (Mudi Susilo et al., 2022; Rini et al., 2021).

Regarding control variables, firm age demonstrates a strong positive and highly significant effect on CWD, implying that more mature firms are better equipped to implement comprehensive water disclosure practices. This can be explained by Stakeholder Theory, as older firms possess more established governance structures, accumulated organizational experience, and stronger institutional legitimacy in responding to sustainability standards and regulatory requirements (Adhariani, 2021; Putra et al., 2022). Compliance with frameworks such as GRI 303 (2018) and POJK No. 51/2017 further supports this relationship.

In contrast, CEO financial expertise is found to have a negative and significant effect on CWD. This result suggests that firms led by financially experienced CEOs may place greater emphasis on efficiency, cost control, and financial performance rather than on voluntary environmental disclosure. From a signaling perspective, experienced CEOs may rely more heavily on financial indicators to convey firm success, while less experienced executives may use sustainability disclosure as a legitimacy-building tool (Gul & Leung, 2004; Lu & Abeysekera, 2014).

Overall, these findings confirm that corporate water disclosure practices in Indonesian mining companies are primarily shaped by legitimacy pressures, stakeholder expectations, and governance mechanisms rather than by growth-oriented financial performance. This reinforces the explanatory relevance of Signaling Theory, Stakeholder Theory, and Agency Theory in understanding corporate water disclosure behavior in emerging market contexts.

CONCLUSIONS AND SUGGESTIONS

Conclusions

This study examines the determinants of Corporate Water Disclosure (CWD) among mining companies listed on the Indonesia Stock Exchange during the 2018–2023 period using a Fixed Effect Model approach. The findings reveal that firm-specific characteristics and governance attributes play a decisive role in shaping water disclosure practices. Firm size, leverage, market value, firm age, and CEO expertise are found to significantly influence the extent of water-related disclosure, while company growth does not exhibit a meaningful effect.

The positive influence of firm size, leverage, and market value indicates that companies with greater public visibility, higher financial obligations, and stronger market performance are more inclined to disclose water-related information. These firms tend to use environmental disclosure as a strategic instrument to enhance transparency, reduce information asymmetry, and maintain stakeholder confidence. Firm age also demonstrates a strong positive effect, suggesting that more mature companies benefit from established governance structures, accumulated organizational experience, and greater awareness of

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environmental accountability, enabling more comprehensive disclosure practices. In contrast, CEO expertise shows a significant negative relationship with CWD, implying that financially experienced executives may prioritize efficiency and financial performance over voluntary environmental transparency. Meanwhile, the insignificant effect of company growth suggests that short-term expansion does not necessarily translate into stronger commitments to environmental disclosure.

The high explanatory power of the model, reflected in an Adjusted R^2 of 0.9689, confirms the robustness of these relationships and highlights the effectiveness of the Fixed Effect Model in capturing firm-level heterogeneity. Overall, the results support the explanatory relevance of Agency Theory, Stakeholder Theory, and Signaling Theory in understanding corporate motivations for water disclosure. In addition, the findings are consistent with regulatory and institutional frameworks, including POJK No. 51/POJK.03/2017 and the GRI 303 (Water and Effluents) standard, which emphasize transparency in water resource management. From both policy and managerial perspectives, this study underscores that corporate water disclosure functions not only as a compliance requirement but also as a strategic mechanism to strengthen legitimacy, enhance investor trust, and demonstrate corporate responsibility in environmentally sensitive industries.

Limitations and Suggestions

Although this study provides comprehensive empirical evidence on the determinants of Corporate Water Disclosure, several limitations should be acknowledged. The analysis is confined to mining companies listed on the Indonesia Stock Exchange over the 2018–2023 period, which may restrict the generalizability of the findings to other sectors with different operational and environmental characteristics. In addition, the measurement of water disclosure relies on secondary data derived from annual and sustainability reports, where variations in reporting structure, depth, and narrative quality across firms may affect the consistency of the disclosure index. The observation period also overlaps with major regulatory developments in Indonesia's sustainability reporting regime, including the implementation of mandatory sustainability reporting under POJK No. 51/2017 and the transition toward GRI-based standards, potentially leading to heterogeneous disclosure practices across years.

Furthermore, while the model incorporates firm age and CEO expertise as control variables, other relevant determinants—such as environmental risk exposure, board characteristics, profitability, and ownership structure—are not examined and may offer additional explanatory power. Finally, the exclusive use of a quantitative research design limits the ability to capture managerial intentions, strategic considerations, and stakeholder pressures underlying disclosure decisions. Future studies are therefore encouraged to extend the analysis to other industries, incorporate broader governance and financial variables, and adopt mixed-method approaches to provide a more holistic understanding of corporate water disclosure behavior.

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