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DOES BOARD COMMISSIONERS' DIVERSITY MATTER IN WATER DISCLOSURE? EVIDENCE FROM INDONESIA STATE-OWNED ENTERPRISES

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Abstract

This study examines whether board commissioners' diversity—specifically gender, educational level, and age—matters in disclosing water-related information within Indonesian state-owned enterprises during the 2019–2023 period. Utilizing panel data multiple regression analysis, the research aims to determine whether diverse board characteristics influence the extent of corporate water disclosure. The results reveal that age diversity among commissioners significantly improves water disclosure, while gender diversity and educational level do not exhibit a statistically significant impact. These findings partially support agency theory, stakeholder theory, and upper echelon theory, suggesting that older commissioners may drive greater transparency due to increased compliance awareness and concern for organizational reputation. On the other hand, the absence of significant effects from gender and educational diversity highlights the possibility that regulatory compliance and corporate priorities may outweigh the influence of individual board traits. The study contributes to the ongoing discourse on corporate governance and sustainability by offering practical implications for companies seeking to enhance their environmental reporting, as well as for investors evaluating environmental and social governance (ESG) factors. Future research is recommended to classify firms based on their water-related risk exposure and to explore alternative indicators for measuring board diversity more effectively.

INTRODUCTION

Water is an essential element that underpins human survival and societal advancement. According to the The World Bank (2012), water access is integral to reducing poverty and fostering economic development. Likewise, the International Water Association regards water as a fundamental component of human civilization (Juuti et al., 2020). This view is echoed by the World Health Organization, (2023) which stresses the importance of clean and accessible water for promoting public health and supporting economic productivity. In essence, water serves as a vital foundation for life, social welfare, and national development.

Despite its significance, issues related to water access and quality continue to pose global challenges. Environmental pressures such as industrial expansion, rapid urbanization, and improper waste management have increasingly compromised water ecosystems (UN

WWAP, 2003). The United Nations Environment Programme (2023) reveals that more than 80% of wastewater worldwide is discharged without adequate treatment, endangering both biodiversity and the availability of clean freshwater. Indonesia, although endowed with abundant natural water resources, faces persistent water-related challenges, including widespread pollution and insufficient access to potable water (Matsumoto et al., 2020; UNEP, 2023). These concerns underscore the need for improved water management strategies, particularly from the corporate sector.

In response to these challenges, corporate water disclosure has emerged as a vital mechanism to enhance transparency and accountability in water usage and management. The growing global emphasis on environmental sustainability has brought attention to the role of corporations in addressing water-related risks. This was particularly evident during the 10th World Water Forum, which underscored the necessity for integrated water resource management, cross-sector collaboration, and sustainable investment (CNN, 2024). In Indonesia, environmental damage caused by industrial activity—such as mercury contamination in Kalimantan's rivers—demonstrates the urgency for companies to publicly report their environmental impact (Bernhardt & Gysi, 2013). Furthermore, government regulations have mandated that companies disclose their sustainability practices, including those related to water, as stipulated in Law No. 40/2007 on Limited Liability Companies (Indonesia Government, 2007). These mandates reinforce the expectation that businesses, especially state-owned enterprises, play a critical role in achieving environmental goals.

The focus of this study is on state-owned enterprises (SOEs) in Indonesia, which hold a unique position in the national economy and environmental governance. As government-owned entities, SOEs are expected to set an example in complying with environmental policies, including comprehensive water disclosure practices (Arhan et al., 2022). Beyond regulatory compliance, these enterprises contribute significantly to Indonesia's gross domestic product (GDP), public revenues, and infrastructure development, including water resource management. Their operations and reporting standards thus serve as a reflection of the government's broader environmental commitments. In addition, because SOEs are often instrumental in shaping and implementing public policy, their practices in water disclosure can be a meaningful measure of policy effectiveness and governance quality (Ferdiana & Sugiyarto, 2022).

In the context of corporate governance, the composition of a company's board of commissioners is considered a key factor influencing environmental and sustainability practices. Board diversity, encompassing variations in gender, education, and age, has been shown to contribute to improved decision-making and accountability in corporate operations (Coffey et al., 2014; Ferreira, 2010). Prior research has suggested that a diverse board may have a positive impact on the level and quality of corporate environmental disclosures, including those concerning water use and sustainability (Hoang et al., 2018; Kusuma, 2024; Zahid et al., 2020). Diverse backgrounds may lead to more inclusive perspectives, fostering more thorough sustainability practices and more transparent environmental reporting.

This research aims to explore the extent to which board diversity—measured through gender, educational attainment, and age—affects corporate water disclosure in Indonesian SOEs during the period from 2019 to 2023. By focusing on these governance characteristics, the study seeks to understand whether variations in board composition influence the transparency and quality of environmental reporting. The central research question is whether diversity among board commissioners can serve as a predictor of improved water disclosure performance in companies that are both publicly accountable and government-controlled.

The contribution of this study lies in addressing a specific research gap within the literature on corporate environmental disclosure. While there is a growing body of work examining the influence of board diversity on general sustainability practices, limited empirical research has specifically focused on the relationship between board characteristics and water disclosure, particularly within the context of Indonesian state-owned enterprises. Furthermore, much of the prior research has emphasized private or multinational corporations, leaving a notable gap in understanding the governance dynamics within SOEs. By narrowing the scope to state-owned enterprises in Indonesia—a country facing severe water challenges—this research provides nuanced insights into the governance mechanisms that may enhance or hinder water-related transparency.

In conclusion, this study not only advances the literature on environmental disclosure and corporate governance but also offers practical implications for regulators, policymakers, and corporate stakeholders. By shedding light on how board diversity impacts water disclosure, the findings may inform governance reforms and support the design of more effective environmental policies. Ultimately, the research seeks to contribute to the broader discourse on sustainability by highlighting the importance of inclusive leadership in driving environmental accountability.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Agency Theory

Agency theory explains the contractual relationship where principals delegate decision-making authority to agents, potentially leading to agency costs due to differing interest (Jensen & Meckling, 1976). These costs as monitoring, bonding, and residual losses arise from managerial perquisites, reduced effort and oversight mechanisms (Jensen & Meckling, 1976).

The theory provides insight into risk, incentives, and information asymmetry, particularly when combined with other perspectives (Eisenhardt, 1989). It highlights formal control mechanisms, such as budgeting and board oversight, to curb agent opportunism while acknowledging the role of outcome uncertainty in corporate performance (Eisenhardt, 1989; Ross, 1973).

Over time, agency theory has expanded withing corporate governance, advocating for mechanisms like performance-based pay, board oversight, and market discipline to align managerial and shareholder interests (Daily et al., 2003; Eisenhardt, 1989). While strong governance is expected to enhance shareholder value, empirical findings suggest that board independent and CEO-chair separation do not always correlate with financial performance (Dalton et al., 1998).

Stakeholder Theory

Stakeholder theory asserts that managerial success depends on balancing relationships with key groups such as customers, employees, suppliers, financiers to achieve organizational objectives (Freeman, 1984, 1994, 2001). This theory justified by its descriptive accuracy, instrumental power, and normative validity, emphasizes that organizations must integrate stakeholder interests to ensure long-term success (Donaldson & Preston, 1995; Freeman, 1994). Effective stakeholder management involves transparent communication, ethical decision-making, and proactive strategies that enhance productivity, risk management, and corporate reputation, ultimately improving financial and operational performance (Donaldson & Preston, 1995; Freeman, 2001).

Upper Echelon Theory

Upper echelon theory, introduced by Hambrick & Mason 1984), posits that top executives' characteristics, shaped by their experiences, values, and personalities, influence organizational outcomes, including strategy and performance (Carpenter et al., 2004; Hambrick & Mason, 1984). This theory emphasizes the role of managerial demographics such as gender, education, and age as indicators of cognitive and psychological attributes that drive decision-making (Hambrick & Mason, 1984).

A key element of the theory is the composition of the top management team (TMT) and its impact on organizational success. Diverse TMTs provide varied perspectives that enhance problem-solving and innovation, particularly in dynamic environments where board expertise helps navigate complexity (Carpenter et al., 2004; Nielsen & Nielsen, 2013). By examining leadership demographics, organizations can assess how executive traits shape strategic choices and performance (Boivie et al., 2012; Hambrick, 2007). Ensuring alignment between TMT characteristics and the company's strategic context is crucial for effectively responding to external challenges and driving organizational success.

Hypothesis Development

Gender Diversity on Corporate Water Disclosure

Agency theory argues that a female leadership style might foster the disclosure of CSR issues and, consequently, female directors may be good drivers of CSR matters. As in stakeholder theory, gender diverse boards are more likely to consider the interest of a broader range of stakeholders, including communities and environmental groups, which may push for more robust water disclosure practices to meet the expectations of socially responsible stakeholders (Bear et al., 2010). Upper echelon theory describes that women on boards often bring a more socially responsible and sustainability-focused mindset, which can lead to stronger corporate water disclosure practices (Hambrick & Mason, 1984).

Prior studies describe that gender as diversity in board is positively associated with CSR reporting. Specifically, the inclusion of female on board leads to better social performance of the firm. Additionally, it is a crucial aspect that companies should take into account when making strategic decision such as CSR reporting (Hussain et al., 2018; Issa et al., 2022; Kusuma, 2024; Martinez & Alvarez, 2019; Zahid et al., 2020).

Based on previous analysis, the first hypothesis is formulated as follows:

H_1: Board commissioners' gender diversity significantly influences corporate water disclosure.

Educational Levels on Corporate Water Disclosure

In agency theory, board members with higher educational backgrounds may possess superior analytical and strategic skills, improving their capacity to oversee management's decisions (Jensen & Meckling, 1976). As well as, educated board members are more likely to understand the evolving expectations of shareholders regarding sustainability issues. Their knowledge equips them to recognize the long-term benefits of water disclosure in maintaining good stakeholder relations (Freeman, 1984). Studies aligned with upper echelon theory indicate that board of commissioners' educational backgrounds positively affect their cognitive and decision-making capabilities.

Prior studies highlight the boards cognitive and decision-making abilities are improved along with higher educational levels. Education enhances information processing and cognitive skills, and well-educated and diverse board are able to support corporate social responsibility initiatives (Beji et al., 2021; Hoang et al., 2018; Hsu et al., 2013; Issa et al., 2022; Kagzi & Guha, 2018; Katmon et al., 2019; Khan et al., 2019; Kusuma, 2024).

Based on previous analysis, the second hypothesis is formulated as follows:

H_2: Board of commissioners' educational levels significantly influences corporate water disclosure.

Age Diversity on Corporate Water Disclosure

Age diversity brings a mixture of risk tolerance and risk aversion, which can balance decision making processes, particularly in disclosing corporate water. Younger members may push for more innovation in sustainability, while older members might focus on preserving firm reputation through transparency (Fama & Jensen, 2019). This diversity also ensures that the firm addresses the expectations of wide range of stakeholders with varying concerns about corporate water practices (Donaldson & Preston, 1995). Upper echelon theory emphasizes the importance of managerial characteristics, suggesting that demographic characteristics such as age, tenure, education, and functional background can serve as indicators of the cognitive and psychological attributes that drive decision-making processes (Hambrick & Mason, 1984).

Prior studies indicates that age diversity is positively associated with CSR performance, especially in corporate governance, human resources, human rights, and environmental issue (Beji et al., 2021; Hoang et al., 2018; Kusuma, 2024). This study suggest that the older directors display higher moral reasoning and sensitivity to societal issues.

Based on previous analysis, the third hypothesis is formulated as follows:

H_3: Board of commissioners' age diversity significantly influences corporate water disclosure.

RESEARCH METHOD

Sample Criteria

This study uses all public state-owned enterprises listed on Indonesian Stock Exchange (IDX) from 2019 to 2023 as sample. The initial sample is 27 companies. After eliminating companies with unavailable sustainability report and financial data to public, it is obtained a total sample 18 companies or 90 firm-years observation. All corporate water disclosure, board diversity, and financial data is collected manually (hand collected) from sustainability report, annual report, and financial statement through company's website or IDX website (www.idx.co.id).

Regression Design

To test the hypothesis, we develop a model to test the effect of the board commissioners' diversity on corporate water disclosure with the following regression model.

$CWD_{it} = \beta_{0i} + \beta_1 Gender_{it} + \beta_2 Edu_{it} + \beta_3 Age_{it} + \beta_4 ROA_{it} + \beta_5 LEV_{it} + \beta_6 SIZE_{it} + \beta_7 SALES_{it} + \mu_{it}$ The variables are defined as follows:

CWD = corporate water disclosure, measured by GRI indicator 1 to 5.
GENDER = inclusion of both men and women, blau index, 1 if the company has equal gender representation; 0 otherwise.
EDU = formal academic qualifications and degrees, blau index, 1 if the company has diverse educational level; 0 otherwise.
AGE = commissioners' age, variable dummy, 1 if company's median age is above overall median age of all companies; 0 otherwise.
ROA = return on assets, measured by net income divided by total assets.
LEV = leverage, measured by total debt divided by total assets.
SIZE = firm size, as measured by the natural logarithm of assets.
SALES = sales growth, measured by sales divided by sales from previous year.

RESEARCH RESULTS AND DISCUSSION

Descriptive Statistics

Based on the sample criteria, there are 18 companies with 5 (five) years of observation so that 90 observation companies obtained. Table 1 presents descriptive statistics results for board commissioners' diversity on corporate water disclosure.

Table 1
Descriptive Statistic Analysis

Panel A : Dummy Variable					
	N	Value 1		Value 0	
GENDER	90	25	28%	65	72%
AGE	90	45	50%	45	50%

Panel B : Continuous Variable						
	N	Minimum	Maximum	Mean	Median	Std. Dev.
CWD	90	0.000000	1.000000	0.466667	0.400000	0.394057
GENDER	90	0.000000	0.420000	0.091634	0.000000	0.151349
EDU	90	0.000000	0.666667	0.501552	0.560000	0.144670
AGE	90	48.00000	64.00000	57.35000	57.75000	3.371601
ROA	90	-622.6644	6.657149	-7.794601	-0.205789	65.81076
LEV	90	0.272702	1.403734	0.677662	0.740688	0.226492
SIZE	90	15.73317	32.43986	23.50790	22.34187	5.739690
SALES	90	-0.999163	0.976519	0.005656	0.021908	0.293312

Source: Data processing using Eviews, 2025

The descriptive statistics for corporate water disclosure reveal significant variation. The mean of 0.4667 suggest that, on average, companies disclose only 46.67% of the expected information, while the median of 0.40 highlights that more than half disclose less than 50%. A standard deviation of 0.3943 indicates moderate variation, reflecting inconsistencies in disclosure, possibly due to regulatory enforcement gaps, stakeholder pressure, or corporate priorities.

A minimum value and median of gender diversity are 0 indicate that more than half of the companies only have male board members, while the maximum of 0.42 shows that even the most diverse boards still lack balance, the mean of 0.0916 confirms that gender diversity remains very low, further supported by the gender dummy variable, which shows that only 25% out of 90 companies have female board members. These findings suggest that gender diversity is not yet a priority in corporate governance.

Educational level diversity varies moderately, with a minimum of 0 indicating uniform educational level and a maximum of 0.667 showing well-balanced boards with bachelor's, master's, and doctoral degrees. The mean of 0.5016 and median of 0.56 suggest that most companies have above average diversity, recognizing the value of mixed academic qualifications, though some still favor uniform educational level, potentially limiting diverse perspective in governance.

Board age statistics indicate that corporate boards are dominated by senior professionals, with a minimum median age of 48 and a maximum of 64. The mean of 57.37 and median of 57.75 confirms that over half of the companies have boards with a median age above this level, reflecting limited representation of younger professionals in governance.

Control variables show significant variations. ROA ranges from -622.66 to 6.66 with a mean of -7.79, indicating that some companies experience substantial losses while others remain profitable. Leverage has a mean of 0.68, reflecting a reliance on debt financing. Firm size varies widely, with a mean of 23.51, representing both small and large firms. Sales growth fluctuates from -0.99 to 0.98, with a near-zero mean of 0.006, highlighting both negative and positive growth trends. These variations emphasize the financial and operational diversity of the sampled companies.

Panel Data Regression Analysis Results

The classical assumption tests were conducted to ensure the regression model. The normality test result, using the Jarque-Bera statistic, shows that the data is normally distributed. In addition, the data indicates there is no significant multicollinearity problem as all pair wise correlation coefficient between the predictor variables are all below 0.9. Furthermore, heteroscedasticity test was conducted using the Glejser test. The result suggests no strong evidence of heteroscedasticity in the data.

After conducting chow test, hausman test, and langrage multiplier test, the appropriate panel data regression model is fixed effect model (FEM). Table 2 presents the result of the multiple regression analysis for board commissioners' diversity on corporate water disclosure. the coefficient of determination for corporate water disclosure shows that the Adj R square is 46.2%, which indicates that board commissioners' diversity explains 46.2% of the variation in corporate water disclosure. the remaining 53.8% is influenced by other factors not included in the model. Furthermore, the results of the F statistical test show that the f-statistic value of 0.000002 with a significant level of 1%. It can be said that gender, educational level, age, ROA, leverage, firm size, and sales growth jointly affect corporate water disclosure.

Table 2
Board Commissioners' Diversity on Corporate Water Disclosure

Variable	Coefficient	T	Sig	Conclusion
(Constant)	-1.099	-0.687	0.4945	
GENDER	-0.050	-0.135	0.8929	Not Significant
EDU	0.519	1.303	0.1972	Not Significant
AGE	0.041	2.531	0.0138**	Significant
ROA	-0.001	-1.943	0.0564*	Significant
LEV	-0.542	-1.503	0.1376	Not Significant
SIZE	-0.030	-0.620	0.5372	Not Significant
SALES	-0.027	-0.239	0.8121	Not Significant
F-Statistics				0.000002
Adj. R Square				0.462263
Number of Observations				90

***, **, * indicate the significance at the 1%, 5%, and 10%, respectively.
The definitions and measurements of the variables are presented in Chapter III of the operational definitions of the variables

Source: Data processing using Eviews, 2025

Discussion

This study explores the question of whether board commissioners' diversity significantly influences corporate water disclosure, focusing on Indonesian state-owned enterprises (SOEs). Board diversity is measured through three attributes: gender, educational background, and age. These dimensions are considered relevant in the context of corporate governance, particularly in shaping decisions related to sustainability and transparency. The empirical results reveal that only age diversity among board commissioners significantly affects the extent of water disclosure. In contrast, gender diversity and educational background show no statistically significant impact. This suggests that not all aspects of board diversity equally influence sustainability-related transparency.

The positive relationship between age diversity and water disclosure supports the notion that boards with a wider age range may possess a broader set of experiences, perspectives, and sensitivities toward environmental issues. Older board members are more likely to be familiar with environmental regulations, societal expectations, and reputational risks. This demographic group may prioritize long-term sustainability goals over short-term financial gains, encouraging the organization to enhance its disclosure practices related to water usage and management.

This finding aligns with agency theory, which emphasizes the monitoring role of boards, as well as stakeholder theory, which underlines the importance of addressing stakeholder interests through transparent reporting. Upper echelon theory also finds partial support here, as it posits that the characteristics of top executives—including board members—influence strategic choices and organizational outcomes.

On the other hand, the non-significant role of gender diversity may reflect structural and cultural barriers within corporate governance in Indonesia which suggests that the mere presence of female commissioners on the board may not be sufficient to drive significant change in environmental reporting. This could be attributed to the limited proportion of women in leadership roles, which may hinder their influence on strategic decisions. The marginalization of female voices in corporate governance may weaken their ability to advocate for more responsible and inclusive reporting practices. Moreover, cultural and structural barriers in Indonesia may further restrict their participation in sustainability discourse at the board level.

Similarly, the lack of a significant association between educational background and water disclosure suggests that formal education, while potentially enhancing environmental awareness, may not be a driving force in disclosure practices. Companies may not fully leverage the academic qualifications of their board members in shaping sustainability-related disclosures. It is also possible that the influence of education is overshadowed by other factors such as corporate culture, regulatory pressure, or the prioritization of financial performance. In some cases, companies may regard sustainability reporting as a compliance activity rather than a strategic concern, thereby limiting the influence of board expertise.

As for control variables, return on assets (ROA) has a small but significant negative relationship with water disclosure, indicating that more profitable firms may place less emphasis on environmental transparency. Similarly, leverage exhibits a strong and statistically significant negative relationship with corporate water disclosure. This implies that firms with higher debt levels tend to report less on water-related matters. High leverage often leads to financial constraints and a heightened focus on meeting debt obligations, which may limit the resources and attention allocated to non-financial reporting activities.

Regarding firm size, the results show a negative but statistically insignificant relationship with corporate water disclosure. This suggests that, contrary to expectations, larger firms do not necessarily engage more in water-related transparency. One possible interpretation is that larger companies, despite having more resources, may face greater complexity in gathering, managing, and disclosing environmental data across various operational units. Sales growth is also negatively related to corporate water disclosure although the effect is not statistically significant. This finding indicates that as firms experience increased sales, there is a slight decline in their disclosure related to water management.

Taken together, the findings indicate that while **age diversity** does matter, other forms of diversity on their own may not be sufficient to drive greater transparency in water disclosure. Moreover, financial considerations appear to exert a stronger influence, underscoring the need for a multi-faceted approach that combines governance reform with regulatory and institutional support.

CONCLUSION

This study is conducted to examine the extent to which board commissioners' diversity matters in the disclosure of water-related information among Indonesian state-owned enterprises during the 2019 to 2023 period. Employing a panel data regression model, the study aimed to identify whether variations in board composition are significant determinants of corporate environmental transparency, particularly in the area of water disclosure. The analysis revealed that among the three diversity indicators, only age diversity among board members has a statistically significant positive relationship with the level of corporate water disclosure.

Gender diversity and educational attainment, on the other hand, do not appear to have a meaningful impact.

The findings contribute to the ongoing discourse in corporate governance and sustainability by partially supporting the propositions of agency theory, stakeholder theory, and upper echelon theory. Specifically, the positive association between age diversity and corporate water disclosure reinforces the relevance of valuable experience, institutional knowledge, and heightened awareness of environmental compliance, which in turn encourages better disclosure practices. Their sensitivity to regulatory requirements and potential reputational risks may drive more comprehensive water-related reporting as part of fulfilling the company's corporate social responsibility (CSR) obligations.

On the other hand, the lack of significant influence from gender diversity and educational background indicates that board composition alone may not be a decisive factor in environmental disclosure practices. These results suggest that external elements may exert a stronger impact on sustainability reporting behavior than individual characteristics alone. This insight challenges the assumption that merely diversifying board composition will lead to improved sustainability disclosures. Therefore, it emphasizes the importance of developing a holistic framework that integrates governance reforms with broader institutional and policy mechanisms to support sustainability objectives more effectively.

From a practical standpoint, these findings can be useful for companies seeking to enhance their CSR performance through improved transparency and environmental accountability. Understanding that age diversity within the board can positively influence water-related disclosures, companies may consider promoting intergenerational diversity as part of their board recruitment and succession planning strategies. Furthermore, the study provides insights for investors who use CSR disclosures as a basis for decision-making. By recognizing which aspects of board diversity are more likely to influence environmental transparency, investors can better assess a company's governance quality and commitment to sustainability.

This research specifically focuses on state-owned enterprises, which are often subject to direct government oversight and hold strategic roles in national economic development. As such, their performance in environmental disclosure carries broader implications for public accountability and sustainable governance. Future research is encouraged to expand on these findings by differentiating between water-sensitive and non-water-sensitive industries to capture sector-specific disclosure behaviors. Additionally, alternative metrics such as the proportional representation of diverse board members may offer a more nuanced understanding of how diversity influences corporate practices. Exploring other governance factors such as tenure, independence, or board engagement in sustainability committees could also further enrich the analysis.

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