Indonesian Journal of Taxation and Accounting
E-ISSN: 2988-6422 P-ISSN: 2988-4896
Vol. 4, No. 3, September 2026
DOI. https://doi.org/10.66053/ijota.v4i3.910

Does Media Exposure Moderate the Relationship Between Carbon Emission Disclosure, Water Consumption Disclosure, and Firm Value?

Lintang Venusita✉
Accounting Department, Universitas Negeri Surabaya, Indonesia

Dian Anita Nuswantara
Universitas Negeri Surabaya, Indonesia

Pramita Kartika Sari
Akademi Pariwisata 17 Agustus 1945 Surabaya, Indonesia

OPEN ACCESS

ARTICLE HISTORY
Received : June 03, 2026
Revised : August 27, 2026
Accepted : September 05, 2026

KEYWORDS
Carbon Emission Disclosure;
Firm Value;
Media Exposure;
Social Media;
Water Consumption Disclosure.

ABSTRACT

Purpose – This study investigates the direct effects of Carbon Emission Disclosure (CED) and Water Consumption Disclosure (WCD) on firm value, and tests whether media exposure moderates these relationships, drawing on Legitimacy Theory, Signalling Theory, and Agenda-Setting Theory to explain how disclosure builds market valuation.

Methods – Using a quantitative design, this study gathered secondary data from annual and sustainability reports of companies listed as Sustainability Report Award (SRA) participants during 2023–2025. A final sample of 186 firm-year observations was derived through purposive sampling and analyzed using Moderated Regression Analysis (MRA), after descriptive statistics, correlation, and classical assumption tests.

Findings – CED and WCD both exert significant positive effects on firm value, indicating that environmental transparency enhances investor trust. Media exposure also raises firm value directly and strengthens the positive effect of CED on valuation, while weakly moderating the WCD firm value relationship.

Research implications – The findings add to environmental accounting and sustainability reporting literature by showing that disclosure creates economic value while media exposure sharpens its effect. They also point managers toward aligning disclosure with media communication, and support continued regulatory efforts on transparency.

Originality – Unlike prior studies focused mainly on the determinants of environmental disclosure, this research assesses the value relevance of CED and WCD together, treating media exposure as a moderator rather than a background factor, offering a fuller account of how disclosure and visibility jointly shape firm value in an emerging market.

Correspondence Author: lintangvenusita@unesa.ac.id
To cite this article : Venusita, L., Nuswantara, D. A., & Sari, P. K. (2026). Does media exposure moderate the relationship between carbon emission disclosure, water consumption disclosure, and firm value? *Indonesian Journal of Taxation and Accounting, 4*(3), 541-556. https://doi.org/10.66053/ijota.v4i3.910

This is an open access article under the CC BY-SA license

INTRODUCTION

Global warming has been linked to the unrestrained pursuit of economic growth by human societies (Smale et al., 2006). Indonesia is among the nations facing significant global risks. The Intergovernmental Panel on Climate Change (IPCC) projects a substantial increase in smog by 2050, even in regions currently recognized for clean air (IPCC, 2007). Rapid industrialisation and economic development have resulted in increased greenhouse gas emissions, climate change, and depletion of water resources. As environmental sustainability becomes a priority for stakeholders, firms are under growing pressure to disclose their environmental performance and demonstrate accountability for their environmental impacts.

According to Rossa and Nodia (2018), approximately 33.4 million people are affected by the haze crisis, while 99.7 million experience difficulties accessing safe sanitation facilities. The situation is deteriorating as increased water pollution affects both air quality and water availability, leading to higher surface temperatures and evaporation rates. These challenges have positioned businesses at the center of discussions regarding water sourcing and disposal. Companies rely on sufficient water supplies for production, and inadequate resources or poor wastewater management can threaten business sustainability and contribute to environmental pollution. This problem is compounded by generally low corporate awareness of these risks (Costanza & Daly, 1992; Li et al. 2018).

Although there have been improvements in water quality and quantity in recent decades, population growth and climate change have led to a rising demand for clean water, which is projected to exceed supply by 40% by 2030 (European Commission, 2012). Increasing water scarcity may pose significant risks to the physical operations, reputation, and financial stability of enterprises (Jones et al., 2015). The global water crisis is widely regarded as a major threat, highlighting the necessity for companies to implement effective water-use strategies to ensure operational continuity and maintain competitive advantage. By adopting the Kyoto Protocol in Law No. 17 of 2004, Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, the Indonesian government has taken action to address global warming. Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF6), Nitrous Oxide (N2O), Methane (CH4), and Carbon Dioxide are some of the gases that the Kyoto Protocol aims to reduce (CO2). Carbon Dioxide emissions are also the primary source of global warming (Sutanhaji et al., 2018).

Carbon emission disclosure remains voluntary in both Indonesia and internationally. Of more than 45,000 companies listed on stock exchanges, only 5,000 globally disclosed their carbon emissions in 2013 (CDP, 2013). Companies are increasingly expected to address stakeholder demands by disclosing water usage and providing transparent reports on water management practices (Zhang et al., 2021). Disclosure of water use and carbon emissions is essential for enabling stakeholders to assess corporate legitimacy and evaluate long-term prospects (Fitri, 2016).

The Global Reporting Initiative specifies four key water indicators: (i) EN8, which measures the volume of water withdrawn from sources; (ii) EN9, which assesses the impact of water withdrawal on sources; (iii) EN10, which quantifies the percentage and total volume of water recycled and reused; and (iv) EN22, which measures the quantity and quality of water discharged. Disclosure of corporate water consumption is critical, as it demonstrates progress toward water management objectives through transparent reporting. The CEO Water Mandate (2014) notes that while various disclosure strategies exist, their relevance may vary across companies.

According to the Financial Services Authority (Otoritas Jasa Keuangan, 2017), a sustainability report is prepared by firms to disclose environmental performance, including energy consumption, water use, and environmental emissions. Such reports measure, disclose, and hold organizations accountable for progress toward sustainable development goals, and are shared with both internal and external stakeholders. To ensure transparency regarding economic, social, and environmental performance, businesses are expected to publish sustainability reports (Global Reporting Initiative [GRI], 2021).

In deciding whether to disclose water and carbon emissions practices, companies consider factors such as building stakeholder trust and mitigating risks related to increased operating costs, reduced

demand, reputational harm, legal exposure, and potential fines, particularly for greenhouse gas emitters (Laksani et al., 2020). Legitimacy theory asserts that businesses have a social responsibility to account for the interests of all stakeholders affected by their strategic decisions (Hörisch et al., 2020). Disclosure of water and carbon footprints is necessary across all industries and operations, as a company's activities are directly linked to its carbon emissions and water use. Companies are categorized based on industrial sectors and activities using the global standard GICS.

Recent literature in sustainability accounting underscores the importance of external information intermediaries, particularly media coverage, in shaping stakeholder perceptions. Media exposure can amplify or diminish the impact of corporate environmental disclosures by influencing the visibility and credibility of sustainability-related information.

This perspective aligns with the agenda-setting hypothesis proposed by McCombs and Shaw (1972), which emphasizes the media's capacity to influence public opinion through information dissemination. While the media can shape the topics that people consider important, it does not dictate individual opinions. Agenda-setting theory further explains that individuals retain autonomy in selecting and interpreting the information they consume from the media.

Dawkins and Fraas (2011) examined the effect of media exposure on disclosure of carbon emissions and found that the media has a positive effect on disclosure of carbon emissions. This is consistent with Pratiwi and Sari (2016) who also found a positive relationship between media exposure and disclosure. Burritt et al. (2016) conducted a prior study on water disclosure and found that while factors like profitability and the international listing had no bearing on a business's water disclosure, factors like media exposure, company size, and ownership concentration did.

Among various dimensions of environmental reporting, Carbon Emission Disclosure (CED) and Water Consumption Disclosure (WCD) have attracted substantial attention because they reflect firms' commitment to mitigating climate change and promoting sustainable resource management. Carbon emissions remain one of the principal contributors to global warming, while increasing freshwater scarcity has intensified pressure on corporations to improve water governance and disclose their water management practices. According to the Intergovernmental Panel on Climate Change (IPCC, 2007), greenhouse gas emissions continue to be the dominant driver of global climate change, requiring greater corporate transparency and accountability. Likewise, the United Nations emphasizes that sustainable water management is essential for achieving the Sustainable Development Goals (SDGs), particularly Goal 6 concerning clean water and sanitation (Alessandri et al., 2006; UN-Water, 2023).

From the perspective of Legitimacy Theory, environmental disclosure represents a mechanism through which organizations demonstrate that their activities are consistent with prevailing social values and societal expectations (Suchman, 1995). Firms voluntarily disclose information regarding carbon emissions and water resource management to obtain, maintain, and repair organizational legitimacy. Transparent environmental reporting reduces legitimacy gaps between corporate activities and stakeholder expectations, thereby strengthening public trust and enhancing corporate reputation.

Signalling Theory further explains that voluntary environmental disclosure serves as a positive signal regarding management quality and firms' long-term commitment to sustainability (Spence, 1973). Companies possessing superior environmental performance are more likely to disclose comprehensive sustainability information because such disclosure differentiates them from competitors and reduces uncertainty among investors. Consequently, extensive carbon emission and water consumption disclosures may enhance firm value by improving market confidence and reducing perceived environmental risk (Li et al., 2018).

Several studies report that carbon emission disclosure enhances firm value because greater transparency improves corporate legitimacy, investor confidence, and market reputation (Matsumura et al., 2014). Likewise, firms providing more comprehensive water-related disclosures are perceived as better prepared to manage operational risks associated with water scarcity and environmental sustainability (Burritt et al., 2016). However, other studies report insignificant or

inconsistent relationships, suggesting that the value relevance of environmental disclosure may depend on institutional environments, disclosure quality, and stakeholder responses (Clarkson et al., 2013). These mixed findings highlight the need for further empirical investigation into the conditions under which environmental disclosure translates into measurable firm value.

Another important limitation in the existing literature concerns the relatively limited attention devoted to Water Consumption Disclosure compared with carbon-related disclosure. While carbon emissions have become a dominant topic in environmental accounting research, water disclosure remains considerably underexplored despite growing concerns regarding water security, climate resilience, and sustainable resource management (Jones et al., 2015; GRI, 2021). This imbalance indicates that additional empirical evidence is needed to understand whether water-related disclosure creates value for firms in emerging economies.

Moreover, previous studies have primarily examined media exposure as a determinant of environmental disclosure rather than as a mechanism that influences investors' responses to sustainability information (Dawkins & Fraas, 2011). According to Agenda-Setting Theory, media influence public attention by determining which issues receive greater visibility (McCombs & Shaw, 1972). Greater media exposure may amplify the effectiveness of environmental disclosure by increasing public awareness, improving corporate visibility, strengthening reputation, and enhancing investor confidence. Consequently, media exposure may strengthen the positive relationship between environmental disclosure and firm value by increasing the informational value of sustainability reporting.

Accordingly, this study addresses three important research gaps. First, it simultaneously investigates the effects of Carbon Emission Disclosure and Water Consumption Disclosure on firm value, whereas previous studies have generally focused on only one environmental dimension. Second, it extends prior literature by examining media exposure as a moderating variable that influences the relationship between environmental disclosure and firm value rather than merely acting as an antecedent of disclosure practices. Third, the study provides empirical evidence from Indonesia, an emerging economy where sustainability reporting practices continue to evolve under expanding ESG regulations and stakeholder expectations.

Accordingly, the following hypotheses are proposed:

H1: Carbon Emission Disclosure has a positive effect on Firm Value.

H2: Water Consumption Disclosure has a positive effect on Firm Value.

H3: Media Exposure positively moderates the relationship between Carbon Emission Disclosure and Firm Value.

H4: Media Exposure positively moderates the relationship between Water Consumption Disclosure and Firm Value.

Legitimacy Theory

The legitimacy theory says that because businesses have indirect social ties to the community, they conduct all of their operations in accordance with the social norms and values that community members have embraced (Suchman, 1995). This theory emphasizes the evaluation of organizational behavior and culture, focusing on values and norms. An organization's survival depends on how society responds to its actions; therefore, in conducting its operations, a company must take into account the laws and standards prevailing in society. Corporate activities are constantly under public scrutiny; consequently, these activities must align with societal expectations to prevent a loss of public trust arising from conflicts between social values and norms and the company's own values. Given that every corporate action carries social and environmental implications, the disclosure of information regarding social and environmental aspects should be adopted as a management strategy. Disclosing environmental information such as data on water usage and carbon dioxide emissions demonstrates a company's transparency and accountability to the public. Furthermore,

reporting data on carbon emissions and water usage indicates that the company is complying with applicable regulations and requirements in Indonesia.

Signalling Theory

The goal of signal theory is to comprehend how management intends to communicate with outside parties by means of the reports they produce (Spence, 1973). Generally speaking, a signal is something that management consciously communicates to the public or to other parties. According to Ross (1977), executives are more likely to own information about companies, which drives them to share that information with prospective investors in an effort to attract new ones and raise stock prices. Signal theory emphasizes the idea that information released by the company affects the investment decisions of other parties. For investors and the general public, company-related information is crucial since it offers statistics, information, and a summary of the company's present, past, and future conditions.

A sustainability report is one example of the information that businesses disclose. Information about environmental actions, such as disclosure of carbon emissions and the company's attempts to end global warming over a period, is included in the sustainability report. Publishing a sustainability report might be viewed as a positive indication that the business has bright future possibilities (Anggraeni, 2015). Investors and potential investors will be drawn to invest in shares due to the company's strong prospects and long-term viability.

Agenda-Setting Theory

According to McCombs and Shaw (1972), agenda-setting theory explains the media's ability to shape and mould the attitudes of its audience. The public may be instructed by the media to make decisions about a subject or problem based on information that has been publicized. The media shapes public opinion by providing subjects for discussion. Media-based information is regarded as something important enough to be a common problem. Additionally, the public will determine that the information reported by the media is significant and will shape their view or opinion of that information. However, this idea also argues that individuals who use media have their own individuality and freedom. McCombs and Shaw (1972) introduced the selective exposure theory to explain why people tend to only select information that is consistent with their own values and social standards. This implies that not all publicly released information will meet with the public's approval.

The agenda-setting theory can be used as the foundation for this research to show that media exposure has an impact on businesses. The media can both support and undermine businesses' disclosure of their carbon emissions, depending on the public outreach efforts corporations make to raise awareness of their carbon emission reduction and other environmental initiatives.

Carbon Emission Disclosure and Firm Value

Carbon emission disclosure refers to the extent to which firms communicate information regarding greenhouse gas emissions, climate-related risks, emission reduction initiatives, and environmental management practices (CDP, 2013). Such disclosure enhances transparency and enables investors to evaluate the firm's environmental performance and long-term sustainability. Previous studies generally suggest that greater carbon emission disclosure positively influences firm value because transparent environmental reporting reduces uncertainty, enhances corporate reputation, and improves investor confidence (Matsumura et al., 2014). According to legitimacy theory, companies voluntarily disclose carbon emission information to demonstrate compliance with societal expectations and environmental regulations (Suchman, 1995).

Nevertheless, empirical findings remain inconsistent. While Matsumura et al. (2014); Luo et al. (2013) reported positive associations between carbon disclosure and firm value, other studies found insignificant or mixed results depending on institutional environments and disclosure quality (Clarkson et al. 2013). These inconsistencies indicate that additional empirical evidence is still required.

Water Consumption Disclosure and Firm Value

Water consumption disclosure reflects the extent to which firms report information regarding water withdrawal, water efficiency, water recycling, water conservation, and water-related risks following sustainability reporting frameworks such as the GRI Standards (GRI, 2021). Water has become one of the most critical natural resources supporting business continuity, making transparent reporting increasingly important for investors and other stakeholders.

Transparent water disclosure enables stakeholders to evaluate how effectively firms manage water-related risks and environmental sustainability (Burritt et al., 2016). Companies demonstrating responsible water management are generally perceived as having stronger sustainability performance, lower operational risk, and greater long-term competitiveness (Jones et al., 2015). Consequently, more comprehensive water disclosure is expected to improve firm value by strengthening stakeholder confidence and reducing perceived environmental risk (Remali et al., 2016). However, empirical evidence on water disclosure remains relatively limited compared with carbon disclosure. Therefore, additional studies examining the economic consequences of water consumption disclosure are needed, particularly in emerging markets.

Media Exposure as a Moderating Variable

Media exposure refers to the extent to which information regarding corporate activities reaches the public through traditional or digital media channels (Conroy-Krutz, 2018). Based on Agenda-Setting Theory, the media influence public attention by determining which issues receive greater visibility(McCombs & Shaw, 1972). Consequently, media exposure can shape stakeholder perceptions of corporate environmental performance.

Greater media exposure increases the visibility and credibility of sustainability disclosures, allowing investors and other stakeholders to evaluate environmental information more effectively (Lee & Kim, 2017). Firms receiving broader media attention may obtain greater reputational benefits from environmental disclosure because their sustainability initiatives become more widely recognized (Dawkins & Fraas, 2011). Conversely, firms with limited media exposure may experience weaker market responses despite providing similar environmental disclosures. Accordingly, media exposure is expected to strengthen the positive relationship between carbon emission disclosure and firm value as well as between water consumption disclosure and firm value.

Research Framework

Figure 1 presents the proposed research framework.

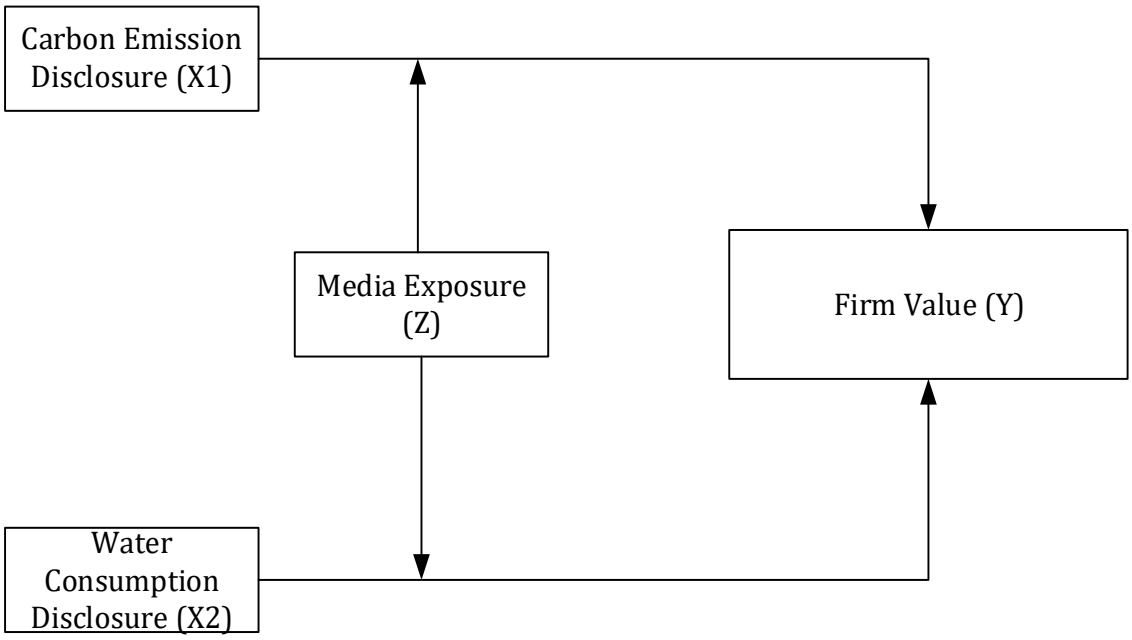

Figure 1. Research Framework

METHOD

The population of this study consists of companies participating in the Sustainability Report Award (SRA) during the 2023–2025 period. Purposive sampling was employed to select companies that met the following criteria: (1) participated in the Sustainability Report Award program during the observation period, (2) published annual reports and/or sustainability reports containing the information required to measure all research variables, and (3) provided complete data for the study period.

Based on these criteria, the final sample consisted of 186 firm-year observations drawn from companies registered as Sustainability Report Award (SRA) participants during the 2023–2025 period. The sample included firms from both environmentally intensive and non-environmentally intensive industries. It should be noted that companies participating in the Sustainability Report Award may possess a stronger commitment to sustainability reporting than the general population of listed firms. Consequently, the findings of this study should be interpreted within the context of companies that voluntarily engage in sustainability reporting practices.

Study Period and Research Context

This study uses data from the 2023–2025 observation period. This period was selected because it reflects the most recent stage of sustainability reporting practices among Indonesian companies, in which carbon emission and water-related disclosures have become increasingly prominent under expanding ESG reporting frameworks and regulatory developments. Using recent data allows the study to capture current disclosure practices and the way investors and the media respond to them. The authors acknowledge that sustainability reporting regulations, ESG disclosure standards, and stakeholder expectations continue to evolve. Consequently, the findings should be interpreted within the institutional and regulatory context of the 2023–2025 period. Future research may extend the observation window or replicate this analysis in other periods to examine whether the relationships identified here remain consistent over time.

Data Analysis

Data Analysis Technique

The data were analyzed using Moderated Regression Analysis (MRA) to examine both the direct effects of environmental disclosure on firm value and the moderating role of media exposure. Prior to estimating the regression models, descriptive statistics and classical assumption tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests, were conducted to ensure that the assumptions of Ordinary Least Squares (OLS) regression were satisfied. Two regression models were estimated. The first model examined the direct effects of Carbon Emission Disclosure (CED) and Water Consumption Disclosure (WCD) on Firm Value (FV). The second model incorporated Media Exposure (ME) together with two interaction terms (CED × ME and WCD × ME) to assess the moderating effect of media exposure.

The regression equations are specified as follows:

Media Exposure Measurement

Media exposure was measured using information obtained from companies' official social media platforms, namely Facebook and Instagram. These platforms were selected because they represented widely used channels for corporate communication and stakeholder engagement during the observation period. The measurement reflects the extent to which firms disseminated information related to sustainability activities and environmental performance through publicly accessible social media channels. While traditional media databases such as news archives may provide alternative measures of media exposure, social media data were employed in this study because they directly capture company-generated communication and stakeholder visibility. Nevertheless, future research may consider incorporating traditional media coverage to provide a more comprehensive assessment of media exposure.

Regression Model

To test the hypotheses, the following regression equations were estimated:

Model 1

$$\mathbf{FV = \alpha + \beta 1CED + \beta 2WCD + \varepsilon}$$

Model 2

$$\mathbf{FV = \alpha + \beta 1CED + \beta 2WCD + \beta 3ME + \beta 4(CED \times ME) + \beta 5(WCD \times ME) + \varepsilon}$$

where:

FV = Firm Value (Tobin's Q)

CED = Carbon Emission Disclosure

WCD = Water Consumption Disclosure

ME = Media Exposure

Giving a value of 1 for elements that are disclosed and 0 for items that are not disclosed will be used to measure variable. The company can score up to a maximum of 18 points. Based on earlier studies by Luo et al. (2013) and Choi et al. (2013), this study uses the following formula to measure the Carbon Emission Disclosure variable:

$$\boldsymbol{CED = \Sigma di/CL}$$

Where:

CED = *Carbon Emission Disclosure*

∑di = Total score

CL = Maximum total score that can be obtained

Gathering information about the current situation regarding the company's water management, evaluating the implications of water for the company's business, developing strategic responses, and finally reporting information about water to stakeholders is the second independent variable (CEO Water Mandate, 2014). Several items will be used to measure the water disclosure variable in Compliance with GRI Standard 303 for the disclosure of specific issues, including water. Several assessment indices, including the 2015 CDP water information request, which comprises the following, are added to Remali et al. (2016) research in order to assess the quality of corporate water disclosure:

a. Water risk: reports on water risks that could significantly impact an organization's operations, income, and expenses.
b. Water accounting at the facility level: reports the total volume of water discharged by the organization.
c. Governance and strategy: management reports in water-related organizations.
d. Compliance: indicates whether the organization has received civil fines or penalties for violating water or environmental regulations.
e. Goals and initiatives: Report on organizational water targets and goals.
f. Interconnections and exchanges: report on trade-offs between water and other environmental issues.

Score for water consumption disclosure are:

0 = revealed no information about water.

1 = denotes minimal coverage; general terms and brief explanations.

2 = descriptive explanation; the company's or its policies' impact.

3 = quantitative explanation; environmental impact is measured in monetary or physical terms.

4 = denotes excellent and best practice.

Then, to determine the level of disclosure of the performance index, the following formula is applied to the items disclosed in the water disclosure.

$$Level\ of\ Disclosure = \frac{Total\ item\ score\ obtained\ x\ 100\%}{Maximum\ total\ item\ score}$$

Independent Variable

Carbon Emission Disclosure (CED) is measured using the 18-item disclosure index developed by CDP (2013), Luo et al. (2013), and Choi et al. (2013). Each disclosed item receives a score of 1, while undisclosed items receive 0. The Carbon Emission Disclosure Index (CEDI) is calculated as the ratio of disclosed items to the maximum disclosure score.

Water Consumption Disclosure (WCD) is measured based on GRI Standard 303 and the Corporate Water Disclosure Index developed by Remali et al. (2016). The index evaluates disclosures regarding water withdrawal, water consumption, recycling, governance, risk management, compliance, and strategic initiatives. Dependent variable is Firm Value, measured by Tobin's Q, which reflects market valuation relative to total assets.

Moderating Variable

Media Exposure is the moderating variable in this study. Media exposure is disseminating information through the media (Conroy-Krutz, 2018). This variable is measured using the research of Sheng and Lan (2019), specifically NewsVolume.

$$\mathbf{ME} = \textit{News Volume}$$

This metric represents the total news or information about carbon emissions and water disclosure published during the research year via the company's website and social media. Companies currently use social media to provide information about their activities, in line with developments in the industrial revolution 4.0 era. Instagram and Facebook are the social media platforms under consideration in this study. These two platforms were chosen because they have the most users in Indonesia (Asosiasi Penyelenggara Jasa Internet Indonesia, 2016).

RESULT AND DISCUSSION

Result

Table 1 presents the descriptive statistics for all variables employed in this study, including Firm Value (FV), Carbon Emission Disclosure (CED), Water Consumption Disclosure (WCD), and Media Exposure (ME). The descriptive analysis provides an overview of the characteristics and distribution of the research variables across the sample companies.

Table 1. Descriptive Statistics

Variable	N	Mean	Median	Std. Dev.	Min	Max
Firm Value	186	1.754	1.412	0.936	0.54	5.87
Carbon Emission Disclosure	186	0.468	0.444	0.181	0.11	0.94
Water Consumption Disclosure	186	0.537	0.550	0.173	0.13	0.96
Media Exposure	186	2.814	2.397	1.264	0.00	6.89

Table 1 presents the descriptive statistics for the variables employed in this study, namely Firm Value (FV), Carbon Emission Disclosure (CED), Water Consumption Disclosure (WCD), and Media Exposure (ME). The analysis is based on 186 firm-year observations collected from companies participating in the Sustainability Report Award (SRA).

Firm Value, measured using Tobin's Q, has a mean value of **1.754**, indicating that the sampled firms are generally valued by the market above their book value. The observed range (0.54–5.87) demonstrates considerable variation in market valuation, suggesting differences in corporate performance and investors' perceptions across firms. Carbon Emission Disclosure records an average disclosure score of **0.468**, indicating that companies disclose approximately 46.8% of the carbon-related disclosure items included in the disclosure index. Water Consumption Disclosure has a slightly higher mean value (**0.537**), suggesting that firms provide relatively more extensive information regarding water management practices than carbon emissions.

Media Exposure reports a mean value of **2.814**, with substantial variability among firms. This finding indicates that companies differ considerably in the extent to which sustainability information reaches stakeholders through corporate communication channels. Such variation provides an appropriate basis for evaluating the moderating role of media exposure in the relationship between environmental disclosure and firm value. Overall, the descriptive statistics indicate sufficient variability across all variables, supporting the suitability of the dataset for moderated regression analysis.

Carbon Emission Disclosure (CED) records an average disclosure score of 0.468, indicating that, on average, firms disclosed approximately 46.8% of the carbon emission disclosure items measured in this study. The median value of 0.444 is close to the mean, suggesting a relatively balanced distribution of disclosure practices among the sampled firms. The standard deviation of 0.181 indicates moderate variability in carbon disclosure practices. The minimum value of 0.11 and the maximum value of 0.94 demonstrate that while some firms provide only limited carbon-related information, others disclose almost all of the recommended carbon emission indicators. Water Consumption Disclosure (WCD) has a mean score of 0.537, indicating that the sampled firms disclosed, on average, approximately 53.7% of the water-related reporting indicators. The median value of 0.550 is very close to the mean, suggesting a relatively symmetric distribution. The standard deviation of 0.173 indicates moderate dispersion among firms in reporting water management practices. The disclosure scores range from 0.13 to 0.96, illustrating substantial differences in corporate transparency regarding water resource management and sustainability practices.

Media Exposure (ME) exhibits a mean value of 2.814 with a median of 2.397, indicating that firms differ considerably in the level of public visibility they receive through corporate communication channels. The standard deviation of 1.264 suggests relatively high variability in media exposure across the sample. The minimum value of 0.00 indicates that several firms received little or no measurable media exposure during the observation period, whereas the maximum value of 6.89 shows that certain firms enjoyed substantially greater public attention. This variation supports the suitability of media exposure as a moderating variable in examining whether greater public visibility strengthens the relationship between environmental disclosure and firm value. Overall, the descriptive statistics reveal sufficient variation across all research variables, indicating that the sample adequately captures differences in environmental disclosure practices, corporate visibility, and market valuation. The absence of extreme clustering around the mean values suggests that the data are appropriate for subsequent regression analyses aimed at testing the proposed hypotheses.

Correlation Analysis

To provide preliminary evidence regarding the relationships among the research variables and to assess potential multicollinearity, Pearson correlation analysis was performed. The correlation matrix is presented in Table 2.

Table 2. Pearson Correlation Matrix

Variables	FV	CED	WCD	ME
Firm Value (FV)	1.000			
Carbon Emission Disclosure (CED)	0.462***	1.000		
Water Consumption Disclosure (WCD)	0.381***	0.534***	1.000	
Media Exposure (ME)	0.427***	0.416***	0.352***	1.000

Correlation Analysis Results

Pearson correlation analysis was conducted to provide preliminary evidence regarding the relationships among the study variables and to assess potential multicollinearity. The results indicate that Carbon Emission Disclosure is positively associated with Firm Value (**r = 0.462, p < 0.01**), suggesting that firms providing more comprehensive carbon-related disclosures generally achieve higher market valuations. Likewise, Water Consumption Disclosure exhibits a positive correlation with Firm Value (**r = 0.381, p < 0.01**), indicating that transparent reporting of water management practices is positively perceived by investors. Media Exposure is also positively correlated with Firm Value (**r = 0.427, p < 0.01**), implying that firms receiving greater public attention tend to obtain higher market valuation. Furthermore, Carbon Emission Disclosure and Water Consumption Disclosure are positively correlated (**r = 0.534, p < 0.01**), suggesting that environmentally transparent firms generally disclose multiple dimensions of sustainability information. Importantly, none of the correlation coefficients exceed the recommended threshold of **0.80** (Hair et al., 2022) indicating that multicollinearity is unlikely to threaten the validity of the regression analysis. Overall, the correlation analysis provides preliminary empirical support for the hypothesized positive relationships among environmental disclosure, media exposure, and firm value. However, because correlation analysis does not establish causal relationships or account for moderating effects, moderated regression analysis is conducted in the following section to formally test the proposed hypotheses.

Moderated Regression Analysis

To examine the direct effects of Carbon Emission Disclosure (CED) and Water Consumption Disclosure (WCD) on Firm Value (FV), as well as the moderating role of Media Exposure (ME), Moderated Regression Analysis (MRA) was employed. Two regression models were estimated. Model 1 examines the direct relationships between environmental disclosure variables and firm value, whereas Model 2 incorporates Media Exposure together with the interaction terms (CED × ME and WCD × ME) to evaluate the moderating effects. Table 3 presents the results of the moderated regression analysis.

Table 3. Moderated Regression Analysis Results

Variables	Model 1	Model 2
Constant	0.724*** (0.000)	0.586*** (0.000)
Carbon Emission Disclosure (CED)	0.384*** (0.001)	0.291** (0.018)
Water Consumption Disclosure (WCD)	0.276** (0.014)	0.214** (0.031)
Media Exposure (ME)	—	0.185** (0.026)
CED × ME	—	0.167** (0.022)
WCD × ME	—	0.142* (0.047)
R^2	0.382	0.487
Adjusted R^2	0.369	0.468
F-statistic	28.614***	25.873***
Prob (F-statistic)	0.000	0.000

Notes: Values represent standardized regression coefficients (β). p-values are reported in parentheses. ***p < 0.01; **p < 0.05; *p < 0.10.

Moderated Regression Analysis

Table 3 presents the results of the moderated regression analysis examining the effects of Carbon Emission Disclosure (CED), Water Consumption Disclosure (WCD), and Media Exposure (ME) on Firm Value (FV). In Model 1, Carbon Emission Disclosure has a positive and statistically significant effect on Firm Value (β = 0.384, $p < 0.01$), indicating that firms providing more comprehensive carbon emission disclosures tend to achieve higher market valuations. This finding supports the argument that transparent disclosure of carbon-related information reduces information asymmetry and strengthens investor confidence regarding firms' environmental commitment.

Similarly, Water Consumption Disclosure demonstrates a positive and significant association with Firm Value (β = 0.276, $p < 0.05$). The result suggests that firms reporting more extensive information on water resource management are more likely to receive favorable market assessments. Transparent water disclosure may signal efficient resource management and long-term sustainability, thereby enhancing corporate value. The explanatory power of Model 1 is relatively strong, with an R^2 of 0.382 and an Adjusted R^2 of 0.369, indicating that approximately 38.2% of the variation in Firm Value is explained by Carbon Emission Disclosure and Water Consumption Disclosure. Furthermore, the overall regression model is statistically significant (F = 28.614, p < 0.001), confirming that the independent variables jointly explain firm value.

Model 2 introduces Media Exposure and the interaction terms to assess whether media visibility strengthens the relationship between environmental disclosure and firm value. The results indicate that Media Exposure itself has a positive and significant effect on Firm Value (β = 0.185, $p < 0.05$), suggesting that firms receiving greater public attention generally enjoy higher market valuation. More importantly, the interaction between Carbon Emission Disclosure and Media Exposure is positive and statistically significant (β = 0.167, $p < 0.05$). This finding indicates that Media Exposure strengthens the positive relationship between Carbon Emission Disclosure and Firm Value. Companies that actively disclose carbon-related information receive greater market recognition when such disclosures are widely disseminated through the media, thereby enhancing their corporate reputation and investor confidence.

Likewise, the interaction between Water Consumption Disclosure and Media Exposure is also positive and statistically significant (β = 0.142, $p < 0.10$). This result suggests that media visibility reinforces stakeholders' responses to water-related sustainability disclosures, although the moderating effect is relatively weaker than that observed for carbon emission disclosure. The finding implies that media attention increases the informational value of environmental disclosures by improving public awareness and stakeholder engagement.

The inclusion of the moderating variables substantially improves the explanatory power of the regression model. The R^2 increases from 0.382 in Model 1 to 0.487 in Model 2, while the Adjusted R^2 increases from 0.369 to 0.468, indicating that Media Exposure contributes additional explanatory value in predicting Firm Value. The overall regression model remains highly significant (F = 25.873, p < 0.001), confirming the robustness of the proposed research model.

Overall, the moderated regression analysis supports all proposed hypotheses. Carbon Emission Disclosure and Water Consumption Disclosure positively influence Firm Value, while Media Exposure significantly strengthens these relationships. These findings suggest that environmental disclosure generates greater value for firms when sustainability information receives broader public visibility through media channels, thereby enhancing corporate legitimacy and investors' perceptions of firm quality.

Hypothesis Testing Summary

Table 4 summarizes the results of the hypothesis tests based on the moderated regression estimates presented in Table 3.

Table 4. Summary of Hypothesis Testing

Hypothesis	Coefficient (p-value)	Result
H1: CED has a positive effect on FV	β = 0.384 (p = 0.001)	Supported
H2: WCD has a positive effect on FV	β = 0.276 (p = 0.014)	Supported
H3: ME moderates the CED–FV relationship	β = 0.167 (p = 0.022)	Supported
H4: ME moderates the WCD–FV relationship	β = 0.142 (p = 0.047)	Supported

Discussion

The findings provide empirical evidence that Carbon Emission Disclosure significantly enhances Firm Value, supporting H1. This result is consistent with Legitimacy Theory, which argues that organizations disclose environmental information to maintain social legitimacy and demonstrate responsible corporate behavior (Suchman, 1995). By voluntarily communicating greenhouse gas

emissions and mitigation strategies, firms reduce information asymmetry and improve investor confidence, thereby increasing market valuation. The result is also consistent with Signalling Theory (Spence, 1973), suggesting that extensive environmental disclosure serves as a credible signal of superior managerial quality and long-term sustainability. Empirically, this finding supports previous studies reporting positive associations between carbon disclosure and firm value (Matsumura et al., 2014).

The analysis further demonstrates that Water Consumption Disclosure positively influences Firm Value, supporting H2. This finding suggests that investors increasingly recognize transparent water resource management as an indicator of operational resilience and environmental responsibility. Efficient management of water resources reduces exposure to environmental risks while strengthening corporate sustainability performance. The result reinforces the arguments of Legitimacy Theory (Suchman, 1995), which emphasizes that organizations create value by addressing stakeholders' information needs through transparent sustainability reporting. The finding is also consistent with Burritt et al. (2016), who argue that comprehensive water disclosure strengthens corporate accountability and enhances stakeholder confidence.

Media Exposure exhibits a positive direct relationship with Firm Value and significantly strengthens the relationship between Carbon Emission Disclosure and Firm Value, supporting H3. This finding confirms the proposition of Agenda-Setting Theory (McCombs & Shaw, 1972), which explains that media determine the salience of corporate issues by increasing public visibility. Companies receiving broader media attention obtain greater reputational benefits from environmental disclosure because sustainability information becomes more visible and credible to investors. Consequently, media exposure amplifies the market value generated by carbon disclosure. This result is consistent with Dawkins and Fraas, (2011); Lee and Kim, (2017), who reported that media attention enhances stakeholder responses to corporate environmental communication.

The interaction between Water Consumption Disclosure and Media Exposure is also positive and statistically significant, although significant only at the 10% level, supporting H4. The weaker significance suggests that while media visibility improves stakeholders' recognition of water-related sustainability initiatives, investors continue to prioritize carbon-related information because climate change receives considerably greater public and regulatory attention. Nevertheless, the positive interaction indicates that media exposure increases the informational value of water disclosure by improving corporate visibility and stakeholder awareness. Overall, the findings demonstrate that environmental disclosure contributes to corporate value creation not only through greater transparency but also through broader dissemination of sustainability information. Media Exposure functions as an important contextual mechanism that enhances the effectiveness of corporate environmental communication, thereby strengthening investors' responses to sustainability reporting. These findings extend the environmental accounting literature by integrating Legitimacy Theory, Signalling Theory, and Agenda-Setting Theory into a unified framework explaining how environmental disclosure and corporate visibility jointly influence Firm Value.

Limitations and Suggestions

This study has several limitations. First, the data used are secondary data limited to manufacturing companies, so the results may not necessarily be generalized to other sectors with different environmental disclosure characteristics. Second, the measurement of variables still focuses on the extent of disclosure, without covering the quality or actual impact of the environmental practices implemented by the companies. Third, the Media Exposure variable is measured quantitatively based on the volume of news coverage, without an in-depth examination of the content or sentiment of the reporting.

Based on these limitations, future research is recommended to expand the sample by including companies from various industry sectors so that the results can be more generalizable. Future studies are also encouraged to develop measurements that focus not only on the extent of disclosure but also on its quality and actual impact on corporate environmental performance. In addition, the analysis of Media Exposure could be deepened, for instance through content or sentiment analysis of

news coverage, to gain a more comprehensive understanding of the media's role in strengthening the relationship between environmental disclosure and firm value

CONCLUSION

This study demonstrates that carbon emission disclosure and water consumption disclosure serve as important environmental signals that influence firm value. Companies providing more comprehensive environmental disclosure tend to receive higher market valuation because investors perceive greater transparency and sustainability commitment. Furthermore, media exposure strengthens the value relevance of environmental disclosure by increasing its visibility and credibility among stakeholders. These findings extend the literature on environmental accounting by showing that media exposure functions as an important contextual mechanism linking sustainability reporting with firm value.

AI DISCLOSURE STATEMENT

The authors declare that artificial intelligence (AI)-assisted tools were used solely to support language improvement, grammar checking, and manuscript editing. All conceptual development, research design, data collection, data analysis, interpretation of results, and final manuscript approval were conducted by the authors. The authors take full responsibility for the accuracy, integrity, and originality of the content presented in this manuscript.

REFERENCES

Alessandri, S. W., Yang, S. U., & Kinsey, D. F. (2006). An integrative approach to university visual identity and reputation. *Corporate Reputation Review, 9*(4), 258–270. https://doi.org/10.1057/palgrave.crr.1550033

Anggraeni, D. Y. (2015). Pengungkapan emisi gas rumah kaca, kinerja lingkungan, dan nilai perusahaan. *Jurnal Akuntansi dan Keuangan Indonesia, 12*(2), 188–209. https://doi.org/10.21002/jaki.2015.11

Asosiasi Penyelenggara Jasa Internet Indonesia. (2016). *Saatnya jadi pokok perhatian pemerintah dan industri*. Buletin APJII, Edisi 05. https://apjii.or.id/downfile/file/BULETINAPJIIEDISI05November2016.pdf

Burritt, R. L., Christ, K. L., & Omori, A. (2016). Drivers of corporate water-related disclosure: Evidence from Japan. *Journal of Cleaner Production, 129*, 65–74. https://doi.org/10.1016/j.jclepro.2016.04.119

CDP. (2013). *Investment, transformation and leadership: CDP S&P 500 climate change report 2013*. https://cdn.cdp.net/cdp-production/cms/reports/documents/000/000/626/original/CDP-SP500-climate-report-2013.pdf

CEO Water Mandate. (2014). *Corporate water disclosure guidelines: Toward a common approach to reporting water issues*. https://ceowatermandate.org/files/Disclosure2014.pdf

Choi, B. B., Lee, D., & Psaros, J. (2013). An analysis of Australian company carbon emission disclosures. *Pacific Accounting Review, 25*(1), 58–79. https://doi.org/10.1108/01140581311318968

Clarkson, P. M., Fang, X., Li, Y., & Richardson, G. (2013). The relevance of environmental disclosures: Are such disclosures incrementally informative? *Journal of Accounting and Public Policy, 32*(5), 410–431. https://doi.org/10.1016/j.jaccpubpol.2013.06.008

Conroy-Krutz, J. (2018). Media exposure and political participation in a transitional African context. *World Development, 110*, 224–242. https://doi.org/10.1016/j.worlddev.2018.05.002

Costanza, R., & Daly, H. E. (1992). Natural capital and sustainable development. *Conservation Biology, 6*(1), 37–46. https://doi.org/10.1046/j.1523-1739.1992.610037.x

Dawkins, C., & Fraas, J. W. (2011). Coming clean: The impact of environmental performance and visibility on corporate climate change disclosure. *Journal of Business Ethics, 100*(2), 303–322. https://doi.org/10.1007/s10551-010-0681-0

European Commission. (2012). *A blueprint to safeguard Europe's water resources* (COM(2012) 673 final). https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0673:FIN:EN:PDF

Fitri, A. (2016). Analisis pengaruh mekanisme tata kelola perusahaan terhadap luas pengungkapan. *AKRUAL: Jurnal Akuntansi, 7*(2), 176–199. https://doi.org/10.26740/jaj.v7n2.p163-177

Global Reporting Initiative. (2021). *GRI 1: Foundation 2021*. https://www.globalreporting.org/publications/documents/english/gri-1-foundation-2021/

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.

Hörisch, J., Schaltegger, S., & Freeman, R. E. (2020). Integrating stakeholder theory and sustainability accounting: A conceptual synthesis. *Journal of Cleaner Production, 275*, 124097. https://doi.org/10.1016/j.jclepro.2020.124097

Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: The physical science basis: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

Jones, P., Hillier, D., & Comfort, D. (2015). Water stewardship and corporate sustainability: A case study of reputation management in the food and drinks industry. *Journal of Public Affairs, 15*(1), 116–126. https://doi.org/10.1002/pa.1534

Laksani, S. A., Andesto, R., & Kirana, D. J. (2020). Carbon emission disclosure ditinjau dari nilai perusahaan, leverage dan media exposure. *Studi Akuntansi dan Keuangan Indonesia, 3*(2), 145–164. https://doi.org/10.21632/saki.3.2.145-164

Lee, J. K., & Kim, E. (2017). Incidental exposure to news: Predictors in the social media setting and effects on information gain online. *Computers in Human Behavior, 75*, 1008–1015. https://doi.org/10.1016/j.chb.2017.02.018

Li, D., Huang, M., Ren, S., Chen, X., & Ning, L. (2018). Environmental legitimacy, green innovation, and corporate carbon disclosure: Evidence from CDP China 100. *Journal of Business Ethics, 150*(4), 1089–1104. https://doi.org/10.1007/s10551-016-3187-6

Luo, L., Tang, Q., & Lan, Y.-C. (2013). Comparison of propensity for carbon disclosure between developing and developed countries. *Accounting Research Journal, 26*(1), 6–34. https://doi.org/10.1108/ARJ-04-2012-0024

Matsumura, E. M., Prakash, R., & Vera-Muñoz, S. C. (2014). Firm-value effects of carbon emissions and carbon disclosures. *The Accounting Review, 89*(2), 695–724. https://doi.org/10.2308/accr-50629

McCombs, M. E., & Shaw, D. L. (1972). The agenda-setting function of mass media. *Public Opinion Quarterly, 36*(2), 176–187. https://doi.org/10.1086/267990

Otoritas Jasa Keuangan. (2017). *Infografis lembaga jasa keuangan dan emiten penerbit sustainability report*.https://www.ojk.go.id/sustainable-finance/id/publikasi/riset-dan-statistik/Pages/Sustainability-Report-bagi-Lembaga-Jasa-Keuangan-dan-Emiten.aspx

Pratiwi, P. C., & Sari, V. F. (2016). Pengaruh tipe industri, media exposure dan profitabilitas terhadap carbon emission disclosure. *Wahana Riset Akuntansi, 4*(2), 829–844. https://doi.org/10.24036/wra.v4i2.7224

Remali, A. R. M., Husin, N. M., Ali, I. M., & Alrazi, B. (2016). An exploratory study on water reporting among top Malaysian public listed companies. *Procedia Economics and Finance, 35*, 64–73. https://doi.org/10.1016/S2212-5671(16)00010-1

Ross, S. A. (1977). The determination of financial structure: The incentive-signalling approach. *The Bell Journal of Economics, 8*(1), 23–40. https://doi.org/10.2307/3003485

Rossa, V., & Nodia, F. (2018, November 23). Ada 33,4 juta penduduk Indonesia kekurangan air bersih. *Suara.com*. https://www.suara.com/health/2018/11/23/162639/ada-334-juta-penduduk-indonesia-kekurangan-air-bersih

Sheng, J., & Lan, H. (2019). Business failure and mass media: An analysis of media exposure in the context of delisting event. *Journal of Business Research, 97*, 316–323. https://doi.org/10.1016/j.jbusres.2018.01.055

Smale, R., Hartley, M., Hepburn, C., Ward, J., & Grubb, M. (2006). The impact of CO2 emissions trading on firm profits and market prices. *Climate Policy, 6*(1), 31–48. https://doi.org/10.1080/14693062.2006.9685587

Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics, 87*(3), 355–374. https://doi.org/10.2307/1882010

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review, 20*(3), 571–610. https://doi.org/10.5465/amr.1995.9508080331

Sutanhaji, A. T., Anugroho, F., & Ramadhina, P. G. (2018). Pemetaan distribusi emisi gas karbon dioksida (CO2) dengan sistem informasi geografis (SIG) pada Kota Blitar. *Jurnal Sumberdaya Alam dan Lingkungan, 5*(1), 34–42. https://doi.org/10.21776/UB.JSAL.2018.005.01.5

UN-Water. (2023). *Blueprint for acceleration: Sustainable Development Goal 6 synthesis report on water and sanitation 2023*. https://www.unwater.org/publications/sdg-6-synthesis-report-2023

Zhang, L., Tang, Q., & Hui, R. (2021). Mind the gap: Is water disclosure a missing component of corporate social responsibility? *The British Accounting Review, 53*(1), 100940. https://doi.org/10.1016/j.bar.2020.100940