

## The Effect of Carbon Emission Disclosure, Operating Efficiency, Capital Structure, and Media Exposure on Firm Value, With Media Exposure as A Moderating Variable (an Empirical Study of Low-Carbon Leader Companies Listed on The Indonesia Stock Exchange)

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Keywords	Abstract
carbon emission disclosure, operating efficiency, capital structure, media exposure, company value	The perception of a company's performance, prospects, and sustainability is increasingly influenced by investors' attention to environmental issues and information transparency. As awareness of environmental concerns and the demand for transparent information continue to grow, companies are required not only to demonstrate strong financial performance, but also to manage and disclose their environmental impacts and business strategies in an accountable manner. In this context, this study aims to analyze the influence of carbon emission disclosure, operating efficiency, media exposure, and capital structure on firm value. This research is grounded in Stakeholder Theory, which emphasizes the importance of balancing stakeholder interests through transparency and accountability in information disclosure. The research method employed is a quantitative approach with a causal-comparative design. The research data were obtained from the annual reports and sustainability reports of companies included in the Low Carbon Leaders Index on the Indonesia Stock Exchange for the 2020–2024 period using the purposive sampling method. Data analysis was conducted using Partial Least Square (PLS). The results of the study indicate that carbon emission disclosure negatively affects firm value, while operating efficiency and capital structure have positive effects on firm value. Media exposure does not directly have a significant effect on firm value; however, it functions as a quasi-moderating variable. Media exposure was proven to strengthen the influence of carbon emission disclosure, while weakening the influence of operating efficiency and capital structure on firm value. These findings suggest that media exposure does not necessarily enhance the effectiveness of operational performance signals and corporate financing policies in the eyes of investors.

### INTRODUCTION

Company value is one of the main indicators reflecting management's success in managing economic resources effectively and efficiently in order to create added value for shareholders (Al-Ali & Al-Shabeeb, 2024; Zerfass & Link, 2022; Zhang et al., 2023). The higher the firm value, the more investors perceive the company as having strong performance, thereby increasing their interest in investing in the company. Every company strives to enhance its value as a positive reflection of performance in the eyes of shareholders and stakeholders. The valuation of firm value requires measurement tools capable of objectively reflecting market conditions and fundamental performance. Firm value can be measured using the Price-to-Book Value (PBV), Price-to-Earnings

Ratio (PER), and Tobin's Q ratio (Dwiastuti & Dillak, 2019). Although PBV and PER are widely used, the Tobin's Q approach is considered more comprehensive because it reflects market assessments of a company's assets, performance, and long-term prospects.

According to Ana and Wibowo (2025), firm value measured through Tobin's Q provides a more comprehensive picture of management effectiveness in managing company assets and liabilities. This ratio is calculated by comparing the market value of equity and debt with total assets, thereby reflecting the efficiency of utilizing all company resources. A Tobin's Q value above one indicates that the market perceives the company as having high growth potential because its assets are considered capable of generating returns exceeding acquisition costs. Conversely, a ratio below one indicates that the company's assets have not been managed optimally and that the company is considered undervalued. The use of Tobin's Q in this study aims to provide a comprehensive measure of firm value based not only on historical data, but also on market perceptions and expectations.

BRIS recorded an average Tobin's Q of only 0.53, reflecting an undervalued condition. BBTN and BMRI also showed average values of 0.92 and 0.95, respectively, which remain below the optimal threshold. JSMR, which initially recorded a value of 1.08 in 2020, experienced a gradual decline to 0.81 in 2024. Despite being included in the low-carbon leader category, these companies have not received proportional market appreciation in the form of high firm value ratios. This phenomenon raises questions regarding the relatively low firm value despite the companies' commitment to environmentally friendly practices. Compliance with sustainability principles has not been fully responded to positively by the market, indicating challenges in shaping investor perceptions due to internal and external factors that have not fully supported sustainable value creation. In this context, Stakeholder Theory provides a normative and strategic foundation for developing the empirical model in this study by positioning stakeholder involvement and perception as central to managerial decision-making. Therefore, carbon emission disclosure, operating efficiency, capital structure, and media exposure are positioned as forms of compliance as well as corporate responses to stakeholder demands for transparency, operational effectiveness, and financial stability.

Within the dynamics of a global economic transformation increasingly oriented toward sustainability principles, business entities are required not only to maintain their existence amid market pressures, but also to strengthen competitiveness through efficient and measurable resource utilization. Indonesia is one of the countries that ratified the Kyoto Protocol through Government Regulation No. 17 of 2004 as part of its commitment to sustainable development and greenhouse gas emission reduction efforts on December 3, 2004. In response to sustainability demands, the Indonesia Stock Exchange launched the IDX LQ45 Low Carbon Leaders (IDX LQ45LCL) Index on November 11, 2022. This index includes companies from the LQ45 Index that demonstrate low carbon emission intensity and strong commitment to ESG (Environmental, Social, and Governance) principles. The primary objective of launching this index is to reduce carbon emission exposure in investment portfolios by at least 50% compared to the parent LQ45 Index, while excluding companies operating in the coal sector (Indonesia Stock Exchange, 2022).

According to data from the Joint Research Centre (2024), Indonesia recorded total emissions of 1,200.2 MtCO<sub>2</sub>-eq, contributing approximately 2.3% of global emissions. This high figure indicates that Indonesia ranks among countries with significant emission levels, particularly within the Southeast Asian region. Although emissions increased only slightly by 0.1% in 2023, the average annual growth rate (CAGR) of 3.4% since 1990 reflects a continuing long-term upward trend in emissions. This fact suggests that climate mitigation policies in Indonesia still face considerable challenges in terms of implementation and effectiveness, particularly in the energy, transportation, and land-use sectors.

Research on carbon emission disclosure conducted by Bahriansyah and Ginting (2022) shows that the disclosure of carbon emission information contributes significantly to increasing firm value. Companies capable of demonstrating compliance with sustainability principles tend to receive positive market responses because they are considered to possess stronger governance and greater competitiveness in adapting to regulatory pressures and investor preferences increasingly oriented toward ESG aspects. This finding strengthens the argument that carbon emission disclosure is not merely a form of social responsibility, but also a relevant corporate strategy for increasing firm value amid economic dynamics that increasingly demand sustainability.

Several studies have examined the relationship between carbon emission disclosure and firm value. Research conducted by Putri and Sebrina (2025) found that carbon emission disclosure has a positive effect on firm value. Their analysis indicates that companies disclosing carbon emission information transparently tend to receive positive responses from investors. This reflects that openness regarding environmental issues is perceived as a signal of commitment to sustainable business practices. Carbon emission disclosure not only fulfills corporate ethical responsibilities, but also serves as a value-added strategy for improving market perception and strengthening competitive position. This finding is consistent with the research of Bahriansyah and Ginting (2022), which demonstrated that carbon emission disclosure positively affects firm value because it reflects a commitment to sustainability that can increase investor confidence. Similarly, Aeni and Murwaningsari (2023) found that carbon emission disclosure contributes to reducing information asymmetry and strengthening corporate legitimacy.

In contrast, research conducted by Gayatri and Yuniarta (2024) found that carbon emission disclosure does not significantly affect firm value. Limited investor understanding of sustainability issues has caused information related to carbon emission disclosure to fail to stimulate an increase in stock market valuation. Similar results were also found by Kencana et al. (2024) and Leilani and Andayani (2025), who reported that carbon emission disclosure has no significant effect on Tobin's Q. These findings indicate that limited investor literacy and low market attention to sustainability issues may prevent carbon emission disclosure from enhancing firm value. Thus, the effectiveness of carbon emission disclosure in creating firm value may depend on the social context, the level of investor literacy, and market responses to environmental issues disclosed by companies.

Operating efficiency reflects the extent to which a company can utilize its assets optimally to generate sales. When substantial funds are invested in assets, companies are required to manage

those assets productively in order to drive revenue growth. Increased efficiency in asset utilization will contribute to higher profits, which in turn become positive signals to the market. Investor responses to efficient operational performance can encourage investment interest and ultimately increase firm value (Nurwahyuni et al., 2019). In research conducted by Husna and Siregar (2025), operating efficiency proxied through the Total Asset Turnover (TATO) ratio was proven to positively influence firm value. This finding indicates that the greater the company's ability to utilize assets to generate sales, the stronger investor confidence becomes regarding the company's business prospects.

Research conducted by Putri and Wardani (2022) also found that efficient asset utilization contributes significantly to increasing firm value. The greater the company's ability to maximize assets in generating sales, the greater the economic value created. However, not all studies report similar findings. Research conducted by Simorangkir (2019) and Wati et al. (2021) found that operating efficiency does not significantly affect firm value. Similar results were also reported by Ernawatiningsih and Swandewi (2025), who revealed that the Total Asset Turnover (TATO) ratio has no effect on firm value. These findings suggest that asset efficiency is not always considered a determining factor by investors, as market attention is often more focused on financial stability and the company's ability to generate sustainable cash flows. This condition indicates that the influence of operating efficiency on firm value is strongly affected by industry characteristics, management quality, and market responses to available information.

Capital structure refers to a company's policy in determining the composition of long-term financing derived from debt and equity. This composition plays an important role in determining the level of risk and capital costs borne by the company, while also influencing investor perceptions of firm value (Dhany et al., 2024). A study conducted by Manurung and Wildan (2023) shows that the proportional use of debt can increase firm value, as it reflects managerial confidence and strategic capability in utilizing financing sources to drive business growth and strengthen market expectations regarding the company's future prospects.

## **METHODS**

### **Population, Sample, and Sampling Techniques**

The population used in this study uses the population of low carbon leader sector companies listed on the Indonesia Stock Exchange and takes the period 2020-2024. The determination of the research sample uses the purposive sampling method, which is a non-probability sampling technique based on special considerations and criteria, so that the selected sample has direct relevance to the research objectives. The samples were selected based on the following criteria:

**Table 1. Research Sampling**

<b>Yes</b>	<b>Sample Criteria</b>
1	Low carbon leader sector companies listed on the IDX for the period 2020 - 2024
2	Leading low carbon <i>sector companies</i> that publish annual reports during the research period
3	Low <i>carbon leader companies</i> that publish sustainability reports for the 2020 - 2024 period
4	Companies that have complete data related to the variables in the research conducted

### **Data Collection Methods**

The data collection method in this study is carried out through documentation techniques. According to Johnson and Christensen (2017), documentation is a data collection technique that is carried out through recording documents or written records, images, or information that has been officially available and can be accounted for. This technique is used because all the data required in this study is available in the form of public documents that are published periodically by companies and capital market authoritative institutions.

Documentation is done by accessing and downloading annual reports, sustainability reports, and other relevant publications from the Indonesia Stock Exchange website or the website of each company. The information collected through the document includes quantitative data such as net profit, total assets, total debt, stock market value, and carbon emission disclosure items. In addition, an online news search containing the company's name was also carried out to measure media exposure during the observation period. All data obtained through documentation is then compiled in tabulation form and used as a basis for quantitative statistical analysis.

## **RESULTS AND DISCUSSION**

### **Descriptive Analysis**

Descriptive analysis aims to determine the distribution of values from the research variables, namely carbon emission disclosure, operating efficiency, Capital Structure, Media Exposure, and company value. This analysis includes the calculation of the average value (red), minimum, maximum, and standard deviations of each variable, so as to provide a preliminary overview of the distribution of research data. This information is important to understand the characteristics of the data, as well as being the basis for further analysis. The following are presented the results of statistical descriptive calculation outputs obtained from annual report data, sustainability reports, and company media publications Low Carbon Leader listed on the Indonesia Stock Exchange (IDX) for the 2020-2024 period, with data processing using the SmartPLS 4.0 application.

**Table 2. Descriptive Statistical Analysis**

Name	No.	Type	Missings	Red	Median	Min	Max	Standard deviation
<b>CED</b>	1	WITH	0	0,656	0,667	0,167	0,889	<b>0,158</b>
<b>TATTOO</b>	2	WITH	0	0,071	0,048	-0,030	0,349	<b>0,076</b>
<b>THE ER</b>	3	WITH	0	2,896	2,252	0,130	16,08	<b>3,039</b>
<b>AND</b>	5	0 1	0	0,635	1,000	0,000	1,000	<b>0,481</b>
<b>TQ</b>	6	WITH	0	2,274	1,247	0,436	14,42	<b>2,232</b>

### **Variable Carbon Emission Disclosure**

The Carbon Emission Disclosure (CED) variable is used to measure the level of transparency and environmental responsibility of companies based on an 18-item index from Choi et al. (2013), which includes the calculation of emissions, energy consumption, reduction strategies, and managerial accountability. The results of the descriptive statistics showed a minimum value of 0.167, a maximum of 0.889, an average of 0.656, and a standard deviation of 0.158. The average shows that most companies have disclosed more than half of the indicators, so sustainability commitments are quite good, although there are still irregularities between companies. The lowest scores were found in AMRT (2020), while the highest scores were achieved by ANTM, MEDC, PGAS, and SIDO, which showed near-perfect disclosure rates. This difference confirms that the implementation of sustainability in the Low Carbon Leader sector still varies, influenced by reporting capacity, managerial priorities, and regulatory and social pressures.

### **Variable Operating Efficiency**

The Operating Efficiency variable is proxied with Total Asset Turnover (TATO) to measure the company's ability to utilize assets to generate revenue. The results of the analysis showed a minimum value of -0.030, a maximum of 0.349, an average of 0.071, a median of 0.048, and a standard deviation of 0.076. The low average indicates that most companies are still not optimal in utilizing their assets. A negative minimum value in MEDC (2020) indicates inefficient operating conditions, while a maximum value in UNVR (2020) reflects management's ability to manage assets effectively through increased output, cost control, and efficient operational strategies.

### **The Effect of Carbon Emission Disclosure on Company Value**

The study finds that Carbon Emission Disclosure (CED) has a negative effect on firm value, as investors tend to interpret such disclosures not as a sign of sustainability commitment but as an indication of higher environmental risks, regulatory pressure, and additional costs. From a stakeholder theory perspective, although companies disclose carbon emissions to fulfill accountability and transparency demands, the market often perceives this information as a burden that may reduce operational efficiency and future performance.

These findings are consistent with prior studies, which show that broader carbon disclosure is associated with lower firm valuation due to perceived compliance costs and operational risks. In the Indonesian context, CED is still viewed more as a risk signal rather than a value-enhancing factor. Therefore, companies need to align disclosure practices with concrete environmental management strategies. High-quality, consistent disclosures supported by real emission reduction efforts can help shift investor perception and potentially enhance firm value in the long term.

### **The Effect of Operating Efficiency on Company Value**

The study shows that operating efficiency has a positive and significant effect on firm value. High efficiency signals the company's ability to manage resources effectively, reduce costs, and generate stable revenue, leading to stronger investor confidence and higher valuation. From a stakeholder theory perspective, efficiency reflects good governance, managerial discipline, and operational resilience, which enhance competitiveness and long-term prospects.

These findings align with previous studies, indicating that Total Asset Turnover (TATO) is a key driver of firm value, as it represents effective asset utilization and operational stability. Overall, operating efficiency is a fundamental determinant of firm value, demonstrating that sustainable performance depends not only on financial outcomes but also on effective and efficient operational management.

### **The Influence of Capital Structure on Company Value**

The study finds that capital structure has a positive and significant effect on firm value. A controlled use of debt is perceived positively by investors, as it provides benefits such as tax shields, increased funding capacity, and expanded investment opportunities, leading to better future profit prospects.

From a stakeholder theory perspective, a well-managed capital structure reflects financial stability, effective risk management, and good governance, which strengthen stakeholder confidence in the company's long-term sustainability. Previous studies also support that indicators like Debt to Equity Ratio (DER) can enhance firm value when debt is used productively. Overall, an effective and proportionate use of debt increases investor trust and contributes to higher company valuation.

### **The Influence of Media Exposure on Company Value**

The study finds that media exposure has no significant effect on firm value, indicating that the intensity of media coverage does not influence market responses or investor decisions. Investors tend to disregard media information as it is often not directly related to financial performance or economic prospects.

From a stakeholder theory perspective, although media plays a role in shaping public perception, it does not significantly impact investor behavior. Consistent with prior studies, media exposure is not considered a reliable source of economic information in the Indonesian capital market, where investors prioritize fundamental financial indicators over general media coverage.

### **The Effect of Carbon Emission Disclosure on Company Value with Media Exposure Variables as Moderation**

The results show that the interaction between Carbon Emission Disclosure (CED) and Media Exposure has a significant effect on firm value, indicating that media exposure strengthens the impact of CED. Media acts as a communication channel that increases the visibility and accessibility of sustainability information, making it easier for investors to understand and evaluate a company's environmental commitments.

From a stakeholder theory perspective, media exposure also functions as external validation, enhancing the company's legitimacy and reinforcing investor confidence. Companies with high

media exposure gain greater market appreciation because their sustainability disclosures are perceived as more credible and relevant. In contrast, firms with low media exposure do not experience the same value enhancement, even with high CED, due to limited information dissemination.

### **The Effect of Operating Efficiency on Company Value with Media Exposure Variables as Moderation**

The study shows that Media Exposure weakens the relationship between operating efficiency and firm value. The negative interaction indicates that higher media coverage does not enhance, but rather reduces, the impact of operational efficiency on company value.

From a stakeholder theory perspective, although media is expected to improve transparency, it is not perceived as a credible source for evaluating operational performance. Investors tend to rely on objective and verifiable data rather than media narratives. High media intensity may even create fragmented or irrelevant information, weakening the clarity of efficiency signals. As a result, companies with strong operational efficiency do not necessarily receive higher market appreciation when media exposure is high.

### **The Effect of Capital Structure on Company Value with Media Exposure Variables as Moderation**

The test results show that media exposure acts as a moderating variable that weakens the relationship between capital structure and firm value. These findings indicate that the influence of capital structure on firm value is not constant, but rather depends on the level of media exposure associated with the company. Media exposure affects how the market evaluates a company's financing policies; therefore, changes in capital structure are not always responded to proportionally by the market in terms of changes in firm value.

From the perspective of Stakeholder Theory, the media is positioned as an external stakeholder that plays a strategic role in shaping public perception and attention toward a company. The media functions as a channel for disseminating information capable of directing stakeholder focus toward particular issues related to the company's activities and conditions. When a company receives high levels of media attention, investors' focus is directed not only toward capital structure policies, but also toward other aspects such as corporate reputation, non-financial risks, and management responses to various external issues. This condition causes financing policy to no longer become the primary factor in the process of firm value formation.

The results further show that market responses to capital structure become weaker in companies with high levels of media exposure. Investors tend to evaluate companies more broadly by considering additional information communicated through the media. As a result, changes in capital structure are not always directly responded to by the market, causing the influence of capital structure on firm value to decline when companies experience high levels of media reporting intensity.

## CONCLUSION

The results of the study conducted on 23 Low Carbon Leader companies listed on the Indonesia Stock Exchange during the 2020–2024 period reveal several important findings. Carbon emission disclosure has a negative and significant effect on firm value, leading to the rejection of H1. In contrast, operating efficiency has a positive and significant effect on firm value, thereby supporting H2. Capital structure is also found to have a significant influence on firm value, confirming H3. Meanwhile, media exposure does not have a significant effect on firm value, resulting in the rejection of H4.

However, media exposure is found to strengthen the effect of carbon emission disclosure on firm value, supporting H5, while simultaneously weakening the relationship between operating efficiency and firm value, thereby confirming H6. Furthermore, media exposure does not moderate the relationship between capital structure and firm value, leading to the rejection of H7.

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