

The Role of Online Search Attention in Enhancing Environmental Impact on Financial Performance

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ABSTRACT

This study examines the influence of environmental performance on financial performance, with a focus on the moderating role of online search attention, using a sample of Indonesian State-Owned Enterprises (SOEs) listed on the Indonesia Stock Exchange in the 2021–2024 period. Data were collected from sustainability reports, financial statements, and Google Trends. A pilot study approach in moderated regression analysis was used to accommodate manifest variables and evaluate interaction effects between variables. The results indicated that environmental performance positively contributed to improved financial performance. Furthermore, online search attention strengthened the relationship between environmental performance and financial performance. The effect of environmental performance on financial performance after moderating variables was highly significant. This indicates that public interest strengthens the financial benefits of environmental practices. These findings highlight the strategic importance of both environmental responsibility and digital visibility in enhancing firm value. This study contributes to the ESG literature by integrating the role of online public attention and offers managerial implications for improving environmental communication and stakeholder engagement in achieving sustainable financial outcomes.

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INTRODUCTION

State-Owned Enterprises (SOEs) play a pivotal role in Indonesia's national economic development, not only as commercial entities but also as instruments of government policy aimed at fostering public welfare (Firmansyah et al., 2024). Through their presence in strategic sectors such as infrastructure, energy, and healthcare, SOEs are expected to support economic growth and deliver essential public services (Xaviera & Rahman, 2023). Nevertheless, inefficiencies in management, governance, and organisational

structures continue to hinder the full realisation of SOEs' performance potential (Mareta, 2018; Sunarto & Fanani, 2020).

In recent years, the concept of sustainability, particularly the environmental dimension of Environmental, Social, and Governance (ESG) criteria, has become increasingly relevant in evaluating corporate performance and reputation, including among SOEs (Salendu, 2022). The environmental component reflects a firm's commitment to ecological preservation through emission control, energy efficiency, and waste reduction (Zou et al., 2025). Environmentally conscious practices can reduce operational expenses, attract ESG-orientated investors, and enhance financial performance over the long term (Xie & Cao, 2023).

However, empirical findings on the direct effect of environmental practices on financial performance remain inconclusive. Duque-Grisales & Aguilera-Caracuel (2021) argue that ESG-related investments, especially in environmental initiatives, may strain financial resources in the short term, thereby reducing profitability. Conversely, Chininga et al. (2024) report that environmental efforts significantly improve accounting- and market-based financial indicators. These inconsistencies in findings highlight a research gap that warrants further investigation.

In the digital era, public awareness and scrutiny of environmental sustainability are increasingly captured through online behaviour, particularly online search activity. Online Search Attention, referring to the volume of internet searches related to specific environmental issues or corporate activities, serves as a proxy for public interest and concern (Zhao et al., 2023). Several studies have shown that heightened online attention towards sustainability issues can amplify positive stakeholder perceptions and ultimately influence a company's financial outcomes (Meng et al., 2023).

Online Search Attention may serve as a moderating variable that either strengthens or weakens the relationship between environmental practices and financial performance. High public attention to environmental issues tends to perceive sustainability initiatives as strategic investments in corporate reputation. On the other hand, if public interest is low, such initiatives may go unnoticed, failing to translate into tangible financial benefits (Gurun et al., 2018).

This relationship aligns with legitimacy theory, which posits that organisations must conform to societal norms and values to be perceived as legitimate (Gilley, 2006). In this context, environmental practices function as a mechanism through which companies can secure social legitimacy. When such practices are widely visible—particularly through increased online attention—they enhance stakeholder trust and positively impact financial performance (Gharchia & Mindosa, 2023).

Given this background, the present study aims to investigate the effect of the environmental aspect of ESG on the financial performance of State-Owned Enterprises (SOEs) listed on the Indonesia Stock Exchange during the period 2021-2024. Moreover, it examines the role of Online Search Attention as a moderating variable. This research contributes to the growing body of literature on sustainability by integrating digital public attention as a contextual factor that may influence the effectiveness of environmental initiatives in improving financial outcomes, particularly in government-owned enterprises with dual mandates: financial profitability and socio-environmental responsibility.

LITERATURE REVIEW

Legitimacy Theory

Legitimacy theory focuses on the relationship between organisations and society, asserting that companies must operate in accordance with prevailing social norms to maintain societal approval and ensure long-term survival (Olateju et al., 2021). Rooted in the concept of a social contract, this theory posits that although such a contract is often unwritten, companies are expected to align their activities with public expectations to secure legitimacy (Mahmud, 2019). Legitimacy is not only essential for maintaining corporate image, but it also contributes positively to organisational performance in both financial and nonfinancial aspects (Zhong & Wang, 2023). To achieve and sustain legitimacy, firms engage in strategies such as corporate social responsibility (CSR) disclosures, sustainability reporting, and strategic communication, all of which reflect their commitment to societal values (Camico, 2024).

Environmental Performance

The environmental component of Environmental, Social, and Governance (ESG) practices reflects a company's commitment to ecological sustainability, including energy efficiency, emission reduction, and waste management (Christy & Sofie, 2023). Firms with strong environmental performance are often better equipped to anticipate long-term strategic issues and manage associated risks more effectively (Bissoondoyal-Bheenick et al., 2023). Environmental disclosures, typically found in sustainability reports, serve as a strategic communication tool for companies to convey their environmental efforts and risk management approaches to stakeholders, including investors (Gesso & Lodhi, 2024). These disclosures are essential not only for transparency but also for strengthening public trust and investor confidence.

For stakeholders, especially investors, the environmental dimension serves as an indicator of non-financial risks and future-orientated opportunities. People generally view companies with high environmental performance scores as having better long-term value potential, more robust risk management, and greater reputational capital (Dong, 2024). Furthermore, environmental initiatives can lead to cost savings, enhanced innovation, and improved access to capital, as such firms are often perceived as having lower risk profiles (Shan et al., 2024). As public awareness of environmental issues grows—amplified by media and civil society—environmental practices increasingly serve as a competitive differentiator and a foundation for sustainable financial performance.

Online Search Attention

Online search attention refers to the frequency of keyword searches on search engines like Google and serves as a powerful tool for tracking and predicting large-scale social behaviours (Zhao et al., 2023). Originally rooted in techniques to improve website visibility through search engine optimisation (El Oubani, 2024), this concept has evolved into a valuable proxy for the public's interests. Studies have shown that online search attention can forecast various phenomena, from disease outbreaks to company performance (Da et al., 2011). It reflects public awareness and can influence managerial decision-making and investor perceptions (Gurun et al., 2018), highlighting its relevance across economic and strategic domains.

Financial Performance

Financial performance is a key measure of how well a company is doing financially, how well it is running, and how well it is meeting its operational goals over a certain period of time (Dutt & Ajay Dwivedi, 2023; Shan et al., 2024). It encompasses critical aspects such as profitability, liquidity, and solvency, which indicate a firm's ability to generate profit, meet short-term obligations, and fulfil its overall financial commitments (Duque-Grisales & Aguilera-Caracuel, 2021). Evaluating financial performance helps stakeholders assess potential changes in economic resources and the effectiveness of resource management in creating long-term value (Prasad & Mondal, 2025).

One of the most widely used tools for financial performance evaluation is ratio analysis, particularly Return on Assets (ROA), which measures a firm's efficiency in utilising its assets to generate net income (Myšková & Hájek, 2017). ROA is calculated by dividing net profit by total assets and serves as a key indicator of profitability and asset management effectiveness. A high ROA reflects productive asset use and strong operational performance, while a low ROA may suggest inefficiencies or operational challenges (Chininga et al., 2024). As such, ROA is not only essential for assessing short-term financial outcomes but also valuable for strategic planning and investment decisions.

Effect Environmental performance on Financial Performance

In the context of developing countries, several studies have shown that good environmental practices positively influence financial performance. Prasad & Mondal (2025) found that in the banking sector, Return on Assets (ROA) and Tobin's Q improved following mandatory ESG disclosures. Similarly, Bissoondoyal-Bheenick et al. (2023) confirmed a positive relationship between environmental performance and financial outcomes. Chininga et al. (2024) emphasise that the financial benefits of environmental initiatives are dynamic and time-sensitive, requiring continuous strategic updates. These findings suggest that higher environmental performance scores are associated with increased firm value and profitability.

H₁: Environmental performance has a significant effect on financial performance.

Moderating Role Online Search Attention

Online Search Attention plays a crucial role in shaping public perception of a company's environmental practices, particularly in the digital era, where online searches serve as a key mechanism for legitimacy evaluation (Deegan, 2019). When companies receive high public attention for their environmental efforts—such as energy efficiency, emission reduction, and waste management—it can enhance their reputation, attract investors, and ultimately strengthen financial performance (Qian & Yu, 2024; Xie & Cao, 2023). Studies by Liu et al. (2023) suggest that Online Search Attention moderates the relationship between environmental performance and financial outcomes. Therefore, the greater the public attention a company receives, the stronger the positive impact of its environmental initiatives on financial performance.

H₂: Online Search Attention moderates the effect of environmental performance on financial performance.

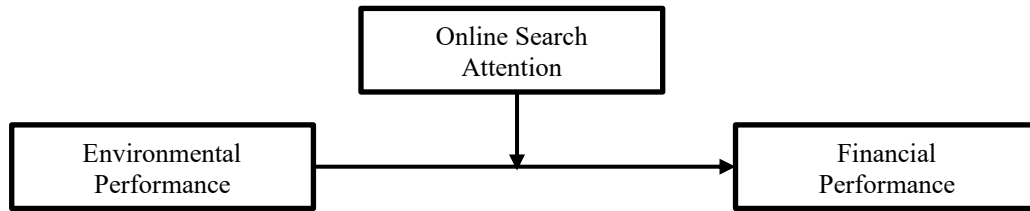


Figure 1. Research Framework

RESEARCH METHODS

This study adopts an explanatory research design to examine the causal relationship between the environmental dimension of ESG and the financial performance of Indonesian state-owned enterprises (SOEs), while also analysing the moderating effect of Online Search Attention. This research is quantitative and uses data covering 27 state-owned enterprises listed on the Indonesia Stock Exchange (IDX) in 2021-2024. This period was selected as a strategic window following the post-pandemic recovery, during which ESG reporting and corporate governance practices were increasingly emphasised by regulators. The study draws on secondary data sourced from sustainability reports, annual financial statements, and public search-interest indices (Google Trends). The environmental scores are based on GRI 2021 indicators, financial performance is measured by Return on Assets (ROA), and Online Search Attention is measured using search index data based on firm-specific keywords from Google Trends.

This study employs the Moderated Regression Analysis (MRA) method, a standard technique for examining the effects of independent variables and their interactions with moderating variables on dependent variables (Hair et al., 2014). In contrast to ordinary regression, MRA allows the detection of changes in the strength or direction of the relationship due to the presence of a moderator (Kock, 2023). MRA provides clear regression results per step, so the process and results are more open and easier to understand. By this approach, the study aims to assess both the direct effects of the environmental variable on financial performance and the moderating effect of Online Search Attention.

RESULTS AND DISCUSSION

Results

Descriptive Statistics

Table 1. Descriptive Statistic

| Variable | N | Mean | Max | Min | S Deviation |
|-------------------------|----|----------|----------|----------|-------------|
| Environmental | 27 | 0.639434 | 1 | 0.129032 | 0.250275 |
| Financial Performance | 27 | 50.72236 | 82.35849 | 1.145225 | 19.62836 |
| Online Search Attention | 27 | -0.00694 | 0.122995 | -0.54111 | 0.130181 |

Table 1 presents the descriptive statistics for Environmental Performance, Financial performance, and Online Search Attention across 27 in 2021-2024 state-owned enterprises (SOEs) in 2021-2024. The mean score for financial performance shows a high average value of 50.72, with a wide range between 1.15 and 82.36 and a standard deviation of 19.63, reflecting substantial disparities in profitability across the sample. Environmental performance is 0.6394, with a maximum of 1 and a minimum of 0.1290, indicating a moderate average level of environmental engagement and considerable

variation among firms (SD = 0.2503). Online Search Attention has a mean of -0.0069, ranging from -0.5411 to 0.1230, with a standard deviation of 0.1302, suggesting differences in public visibility among companies. The presence of negative values (likely due to data normalisation) indicates that several firms received below-average public attention. These variations highlight the differing levels of environmental performance, financial success, and online attention within the SOEs, which are crucial factors in understanding how sustainability and digital visibility contribute to financial outcomes.

Hypothesis Tests

The results of hypothesis testing show in Table 2 below:

Table 2. Hypothesis Testing

| Hypothesis | Variable | Sig | P-Value | Justification | R Square |
|----------------|---|--------|---------|---------------|----------|
| H ₁ | Environmental on Financial Performance (X->Y) | ≤ 0,05 | 0,001 | Accepted | 0,422 |
| H ₂ | Moderating Online Search Attention (Z×X) | ≤ 0,05 | 0,002 | Accepted | 0,925 |

It is known that the significance value of the environmental performance variable is 0.001 (less than 0.05), so it is concluded that the environmental performance variable has a significant effect on the financial performance variable. Based on the results of the first hypothesis, the Environmental variable has a positive and significant effect on financial performance; this indicates that higher environmental performance is associated with improved financial outcomes, supporting the acceptance of H₁. The R-Square value is 0.422, indicating that the environmental performance variable has a 42.2% effect on the financial performance variable.

It is known that the significance value of the interaction variable between environmental performance and OSA is 0.002 (less than 0.05), so it is concluded that the OSA variable is able to moderate the influence of the environmental performance variable on the financial performance variable. The analysis reveals that Online Search Attention significantly moderates the relationship between Environmental and financial performance; then this result supports the acceptance of H₂. The R-Square value is 0.925, which means that the influence of environmental performance variables on financial performance variables after the presence of moderating variables OSA is 92.5%. Therefore, it can be concluded that the presence of moderating variables like OSA can strengthen the influence of environmental performance on financial performance variables.

Discussion

This study demonstrates that environmental performance significantly enhances financial performance. This finding aligns with prior research indicating that proactive environmental practices—such as reducing emissions, improving energy efficiency, and managing waste—consistently yield stronger financial outcomes across diverse contexts (Chininga et al., 2024; Pramudiati et al., 2022; Shan et al., 2024). Such practices not only reduce operational expenses but also bolster corporate image and legitimacy among environmentally conscious stakeholders (Bissoondoyal-Bheenick et al., 2023). Echoing legitimacy theory, firms aligning with societal sustainability expectations gain greater social acceptance, which translates into improved market performance (Deegan, 2019). Effective environmental policy management further underpins this link, enhancing both

environmental outcomes and financial viability (Mikial, 2019). Stakeholders demonstrably favour companies pursuing sustainability, reinforcing trust and financial success, while transparent environmental disclosures reduce information asymmetry, aiding investor decisions (Danso et al., 2020; Wang & Yang, 2023). Ultimately, strategic communication of sustainable commitments cultivates stakeholder engagement and financial advantages, solidifying the interplay between environmental responsibility and enhanced financial results (Gholami et al., 2022; Lastiningsih et al., 2020).

Critically, the study identifies Online Search Attention as a significant moderator in the Environment to Financial Performance. Higher OSA indicates increased public visibility through search activity, which strengthens the financial impact of environmental initiatives. When sustainability efforts garner greater online attention, firms benefit from amplified public trust, investor confidence, and stakeholder engagement (Da et al., 2011; Zhao et al., 2023). This aligns with literature showing that digital visibility magnifies the reputational value of ESG efforts, attracting capital and customer loyalty (Meng et al., 2023; Xie & Cao, 2023). Search engine prominence itself signals credibility, further enhancing stakeholder trust. Consequently, OSA acts not merely as an indicator of public interest but as a mechanism amplifying ESG strategy effectiveness.

Moreover, transparency in environmental practices significantly sways investment behaviour, particularly among institutional investors who favour firms with robust disclosures (Moktadir & Ren, 2024; Singhanian & Gupta, 2024). By ensuring visible online communication about environmental initiatives, companies capture investor interest and leverage their digital reputation. When the public is watching, investors pay more attention to the environment, which speeds up the effect of online searches on financial results (Liu et al., 2024; Singh, 2023; Yang et al., 2023). Thus, maintaining a consistent digital presence around sustainability is strategically imperative.

In summary, online search attention reinforces a robust environment-performance link. Firms must not only adopt sustainable practices for operational and cost benefits but also proactively communicate these efforts online to maximise visibility, trust, and financial returns, especially in emerging markets where sustainability and digital engagement are becoming increasingly pivotal.

CONCLUSION

This study concludes that environmental performance has a positive and significant effect on the financial performance of state-owned enterprises (SOEs) in Indonesia. Additionally, Online Search Attention was found to significantly moderate this relationship, indicating that public interest and digital visibility enhance the financial benefits of environmental initiatives. These findings highlight the importance of not only implementing environmentally responsible practices but also ensuring they are visible and acknowledged by the public. This conclusion supports the theoretical foundation of legitimacy theory, which suggests that companies aligning their operations with societal expectations, particularly in sustainability, are more likely to be rewarded in terms of market and financial performance.

Despite its contributions, this study has limitations. The analysis was limited to secondary data from SOEs listed on the Indonesia Stock Exchange in 2021–2024, which may not fully represent the overall condition of SOEs in previous years, as the data used does not capture the full dynamics and variations in environmental and financial performance over

time. Furthermore, relying solely on ROA as an indicator of financial performance may not accurately reflect a company's overall financial health. Future research should broaden the sample to include non-SOEs and incorporate multi-dimensional financial measures to enhance the generality and depth of the analysis. In addition, examining alternative moderating variables would offer a more complete understanding of the factors shaping the relationship between environmental and financial performance. Such developments would improve the generalisability of findings, provide a more holistic assessment of financial performance beyond profitability, and deepen insights into the contextual factors that influence the strength and direction of the environmental–financial performance linkage.

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