

Synergy of ESG, AI, and Diversity: SOE Performance Strategy in the Era of Sustainability

Alik Sugeng Hartanto*, Enny Susilowati Mardjono

Master of Accounting, Faculty of Business and Economics, Dian Nuswantoro University, Semarang, Indonesia
Corresponding Author: aliksugeng23@gmail.com

Abstract

State-Owned Enterprises (SOEs) need to build good relationships with stakeholders by meeting their demands through transparent disclosure. One such effort is disclosing Environmental, Social, and Governance (ESG) aspects and Artificial Intelligence (AI) as a strategy to improve the performance of state-owned enterprises (SOEs) in Indonesia in the sustainability era. The purpose of this study is to provide empirical evidence regarding the influence of ESG on the performance of SOEs listed on the Indonesia Stock Exchange (IDX) for the period 2018-2022, as well as the role of gender diversity on the board of directors as a moderator. The sampling technique used was purposive sampling. Based on stakeholder interest theory, ESG disclosure is a business policy that influences interest stakeholders interest external (Triyani et al., 2020). ESG is considered as source potential mark (Albitar et al., 2020), helps investors assess business risks and opportunities (Tahmid et al., 2022), and results in better operations, higher returns, and lower risk (Shaikh, 2022). The trend of ESG-based investing is increasing, with the 2021 Schrodgers Global Survey showing increased interest in 33 countries. In Indonesia, the 2019 National ESG Survey by CRMS showed that only 15.8% of companies considered ESG, with state-owned enterprises (SOEs) as the primary focus due to their strategic role in the national economy. The study showed that ESG has a positive impact on SOE performance, and gender diversity in board boards reinforces this influence.

Keywords: Environmental, Social, Governance (ESG), Artificial Intelligence (AI), Corporate Performance, Board of Directors Gender Diversity.

INTRODUCTION

State-Owned Enterprises (SOEs) play a strategic role in national economic development, particularly in developing countries like Indonesia. As public entities, SOEs are expected not only to deliver financial performance but also to fulfill broader social and environmental responsibilities. In this context, Environmental, Social, and Governance (ESG) practices are becoming increasingly important as a mechanism to enhance transparency, accountability, and stakeholder trust (Alareeni & Hamdan, 2020). The growing global emphasis on sustainable investment further reinforces the relevance of ESG. Empirical evidence suggests that ESG implementation can improve corporate performance by increasing operational efficiency, reducing risk, and strengthening corporate reputation (Friede et al., 2015; Eccles et al., 2014). However, previous studies have shown inconsistent findings. While some studies report a positive relationship between ESG and corporate performance (Albitar et al., 2020), others find a negative or insignificant effect (Atan et al., 2018; Duque et al., 2019). This inconsistency suggests that the ESG–performance relationship may depend on contingent factors.

One important influencing factor is gender diversity on boards of directors, which has been shown to improve decision-making quality and increase sensitivity to sustainability issues (Post & Byron, 2015). Gender-diverse boards of directors tend to adopt a more stakeholder-oriented perspective, which can strengthen the effectiveness of ESG implementation (Yadav & Prashar, 2022). From the perspective of Resource Dependence Theory, gender diversity allows companies to gain broader access to external resources, networks, and information that support the implementation of sustainability strategies. Meanwhile, Stakeholder Theory explains that women tend to have a stronger orientation towards the interests of various stakeholder groups, thereby increasing the effectiveness

of ESG policies. Therefore, Board Gender Diversity can function as a moderating variable that strengthens the influence of ESG on company performance by improving the quality of oversight, innovation, and more sustainable decision-making. This finding is also supported by research by Almaqtari et al. (2024), which shows that gender diversity strengthens the relationship between sustainability practices and company performance.

Furthermore, the rapid advancement of Artificial Intelligence (AI) is introducing a new dimension to corporate strategy. AI enables companies to process large-scale data, enhance predictive capabilities, and improve decision-making efficiency. In the ESG context, AI can support environmental monitoring, social impact analysis, and governance transparency (Brynjolfsson & McAfee, 2017). Despite its potential, empirical studies integrating AI into an ESG-performance framework are still limited, particularly in the context of state-owned enterprises. Recent research suggests that AI adoption has a positive impact on corporate ESG performance. Zhang and Yang (2024) found that AI implementation significantly improves corporate environmental and social performance by enhancing the company's ability to absorb, process, and apply sustainability information. AI not only improves operational efficiency but also strengthens the company's capacity to identify ESG opportunities and risks more quickly and accurately. These findings are supported by Xie and Wu (2025), who show that the implementation of AI technology contributes to improved ESG scores through increased economic efficiency, sustainable innovation, and the quality of corporate information disclosure. Companies that have high levels of AI adoption tend to be better able to integrate sustainability goals into their business strategies than companies that still rely on conventional systems.

Furthermore, in Indonesia, ESG adoption among companies, particularly state-owned enterprises (SOEs), remains relatively low. A national ESG survey by CRMS (2019) showed that only 15.8% of companies actively consider ESG factors. This situation highlights the need to examine how ESG, combined with technological innovation and governance mechanisms, impacts corporate performance.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Based on stakeholder interest theory, ESG disclosure is a business policy that influences interest stakeholders interest external (Triyani et al., 2020). ESG is considered as source potential mark (Albitar et al., 2020), helps investors assess business risks and opportunities (Tahmid et al., 2022), and results in better operations, higher returns, and lower risks (Shaikh, 2022). The trend of ESG-based investing is increasing, with the 2021 Schrodgers Global Survey showing increased interest in 33 countries. In Indonesia, the 2019 National ESG survey by CRMS showed that only 15.8% of companies considered ESG, with state-owned enterprises (SOEs) as the primary focus due to their strategic role in the national economy.

The relationship between ESG and the performance of state-owned enterprises has been discussed in literature (Alareeni & Hamdan, 2020; Albitar et al., 2020; Naeem et al., 2022), which states that for good relationships with stakeholder interests, state-owned companies need to be socially, environmentally, and governance responsible. However, research results are inconsistent; some show a negative effect (Duque et al., 2019; Liu et al., 2022; Wasiuzzaman et al., 2022), while others are insignificant (Atan et al., 2018; Junius et al., 2020). This suggests the presence of moderating factors such as Board of Directors Gender Diversity.

Artificial Intelligence (AI) is an advanced technology that enables machines to learn from data, make decisions, and solve problems like humans. AI is a branch of computer science that creates intelligent systems for tasks such as learning, reasoning, and decision-making. Types of AI: Narrow AI: Focuses on specific tasks, such as ESG analysis (e.g., machine learning for environmental risk prediction). General AI: Capable of handling a wide range of tasks, still under development. Super AI: Hypothetically, surpasses human intelligence. Key Technologies: Machine learning (ML), deep learning (DL), natural language processing (NLP), and computer vision, which process data from state-owned enterprise reports. Brynjolfsson, E., & McAfee, A. (2017). Integration with ESG: Environment (ENV): AI predicts emissions impact, helping state-owned companies optimize ENV scores. Social (SOC): AI analyzes employee data, reducing high social costs. Governance (GOV): AI

detects fraud, increasing transparency. Romano, G., Cirillo, A., Favino, C., & Netti, A (2020). Support for Gender Diversity on Boards: AI-powered algorithms for fair recruitment, improving the Blau Index and moderating diversity towards ESG. Yadav, P.L., & Prashar, A (2022).

Gender diversity of the Board of Directors influences the effectiveness of board decisions (Kılıç & Kuzey, 2016). Gender diversity improves the decision-making process. decision related to ESG (Albitar et al., 2020). Women tend to be more emotional about environmental and social issues and are more likely to adopt a stakeholder-first approach (Yadav & Prashar, 2022). State-owned enterprises in Indonesia have seen an increase in the proportion of women on their boards, so this study examines the role of board gender diversity in moderating the influence of ESG on the performance of state-owned enterprises. Based on signaling theory, ESG disclosure reduces information asymmetry (Wang et al., 2018). Stakeholder interest theory states that ESG activities improve performance through good relationships with stakeholder interests (Hamman et al., 2010). State-owned enterprises are responsible for addressing social and environmental issues, with good governance, satisfying stakeholder interests, and improve performance (Albitar et al., 2020).

ESG has a positive impact on the performance of state-owned companies.

This hypothesis is based on Stakeholder Theory (Freeman, 1984), which states that companies should consider interest all stakeholders interest, including environment, society, and governance, to achieve long-term performance. ESG (Environmental, Social, and Governance) as a holistic practice can improve reputation, resource efficiency, and access to capital, which ultimately drive corporate performance. In the context of State-Owned Enterprises (BUMN), this theory is relevant because state-owned enterprises are often expected to contribute to sustainable development and be socially responsible. Friede, Busch, and Bassen (2015) in a meta-analysis of 2,200 studies found that ESG is positively associated with corporate financial performance, including return on assets (ROA) and return on equity (ROE), with a stronger effect in large companies such as BUMN. Eccles, Ioannou, and Serafeim (2014) showed that companies with high ESG scores have better financial performance, supported by data from 4,000 global companies, including state-owned enterprises. In Indonesia, research by Sari and Wahyudi (2020) on state-owned companies such as PT Pertamina and PT PLN found a positive relationship between ESG and performance, with increased productivity and reduced regulatory risk. Therefore, the hypothesis is:

- H1: ESG has a positive impact on the performance of state-owned companies.

Environmental performance has a positive impact on the performance of state-owned companies.

This hypothesis is supported by the Resource-Based View (RBV) (Barney, 1991), which emphasizes that unique resources such as sustainable environmental practices (e.g., emission reduction and energy efficiency) can provide competitive advantage. In state-owned enterprises (SOEs), which are often involved in extractive or energy industries, environmental performance helps reduce operational costs and increases access to green financing, thereby boosting financial performance. Clarkson et al. (2011) in their study of mining companies found that environmental performance (such as waste management) was positively correlated with ROA, using data from 191 Canadian companies. Hart and Ahuja (1996) showed that an innovation environment enhances productivity, supported by an analysis of 127 US manufacturing companies. In the Indonesian context, research by Setiawan and Sari (2019) on SOEs such as PT Aneka Tambang found that environmental scores contributed to increased profitability through cost savings and reputation enhancement.

- H1a: Environmental performance has a positive effect on the performance of state-owned companies.

Social performance has a positive effect on the performance of state-owned companies.

This hypothesis is based on Stakeholder Theory (Freeman, 1984) and the Theory Legitimacy (Suchman, 1995), which explains that company Gaining social legitimacy through practices such as employee welfare, community responsibility, and diversity. In state-owned enterprises (SOEs), which

have a social role in national development, social performance can increase employee loyalty, reduce the risk of conflict, and attract investment, which directly supports financial performance. Margolis and Walsh (2003) in a meta-analysis of 251 studies found a positive relationship between social practices (such as employee welfare) and financial performance, with a significant effect on large firms. Orlitzky, Schmidt, and Rynes (2003) showed that social responsibility is not sufficiently correlated with ROA, based on data from 52,000 companies. Local research by Wulandari and Nugroho (2021) on Indonesian state-owned enterprises such as PT Telkom found that social performance (e.g., CSR programs) improves performance by increasing stakeholder satisfaction and reducing employee turnover.

- H1b: Social performance has a positive effect on the performance of state-owned companies.

Governance performance has a positive impact on the performance of state-owned companies.

This hypothesis is based on Agency Theory (Jensen and Meckling, 1976), which emphasizes that good governance (such as transparency and board oversight) reduces conflicts of interest between management and shareholders, thereby improving efficiency and performance. In state-owned enterprises (SOEs), which frequently face government interference, strong governance helps optimize the allocation of resources and mitigates the risk of corruption, while supporting long-term performance. Brown and Caylor (2006) found that firms with high governance scores had higher ROA, based on data from 2,000 US firms. Gompers, Ishii, and Metrick (2003) showed that governance indices were positively correlated with firm market value. In Indonesia, research by Utama and Utama (2018) on SOEs such as PT Garuda Indonesia found that good governance (e.g., board independence) improved performance by reducing agency costs and increasing transparency.

Governance performance has a positive impact on the performance of state-owned companies.

Artificial Intelligence (AI) on ESG performance of state-owned companies

Artificial Intelligence (AI) is a computing system capable of analyzing, predicting, and making decisions based on big data. In the context of state-owned enterprises, AI is used to increase operational efficiency, optimize decision-making, improve public services, and strengthen transparency and accountability. According to Brynjolfsson & McAfee (2017), the adoption of AI in the public and corporate finance sectors significantly increases productivity and innovation capabilities.

- H2: AI has an impact on the performance of state-owned companies.

Gender diversity in the Board of Directors strengthens the influence of ESG on the performance of state-owned companies.

This hypothesis is supported by Resource Dependence Theory (Pfeffer and Salancik, 1978) and Diversity Theory (Milliken and Martins, 1996), which state that gender diversity on boards of directors increases access to external resources and broader perspectives, including in ESG implementation. In state-owned enterprises, gender-diverse boards of directors can strengthen the impact of ESG on performance by encouraging social and environmental innovation and reducing bias in decision-making. Carter et al. (2010) found that gender diversity on boards of directors strengthens the relationship between CSR (as part of ESG) and financial performance, based on data from 2,000 US companies.

Post and Byron (2015) in a meta-analysis of 140 studies showed that gender diversity on boards of directors improves company performance, especially when combined with sustainability practices.

Research by Setiawan et al. (2022) on Asian companies, including Indonesian state-owned enterprises, found that board gender diversity moderates the ESG-performance relationship, with an increase having a significant impact on ROE in companies with high ESG scores.

- H3: Gender diversity in the Board of Directors strengthens the influence of ESG on the performance of state-owned companies.

Gender diversity in boards of directors strengthens the impact of AI on the performance of state-owned enterprises.

Diversity within an organization enriches perspectives and increases a company's social sensitivity to environmental, social, and governance issues. Companies with high levels of diversity tend to be more responsive to sustainability demands and are able to translate ESG principles into effective operational performance policies. According to Post & Byron (2015), gender diversity on boards of directors is positively associated with inadequate responsiveness to corporate social issues because women are more sensitive to social and environmental issues. Research by García-Meca et al. (2015) also shows that a diverse background behind management strengthens the relationship between good governance (G) and financial performance.

- H4: Gender diversity in the board of directors strengthens the impact of AI on the performance of state-owned enterprises.

METHOD

This study uses a quantitative approach with a causal-exploratory design to examine the influence of Environmental, Social, and Governance (ESG) and Artificial Intelligence (AI) on firm performance, with Board Gender Diversity (BGD) as a moderating variable. This study uses panel data to capture cross-sectoral and time-series variations across firms over the observation period. Panel data analysis is considered appropriate because it improves estimation efficiency and controls for unobserved heterogeneity (Gujarati & Porter, 2009).

The population of this study consisted of all State-Owned Enterprises (SOEs) listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The sampling technique used was purposive sampling based on certain criteria, including: (1) companies consistently listed during the observation period, (2) availability of ESG data, (3) completeness of financial reports, and (4) disclosure of board composition. Based on these criteria, the final sample consisted of companies that met all requirements, resulting in a balanced panel dataset over the five years of observation.

This study uses both secondary and primary data. Secondary data includes ESG scores obtained from the Refinitiv Eikon database, financial data and annual reports collected from company reports and the Indonesia Stock Exchange, and board composition data. Primary data was collected through structured questionnaires distributed to managers and employees to measure the level of Artificial Intelligence (AI) implementation within the company.

Corporate performance is measured using Tobin's Q, which reflects a company's market valuation relative to its assets and is widely used in previous research (Eccles et al., 2014). ESG performance is measured using the ESG composite score and its three dimensions: Environmental (ENV), Social (SOC), and Governance (GOV), obtained from Refinitiv. Artificial Intelligence (AI) is measured using a Likert scale (1–5) based on indicators adapted from Brynjolfsson and McAfee (2017), including AI-based decision-making, data analytics capabilities, process automation, and AI integration in business operations. Board Gender Diversity (BGD) is measured using Index Blau, which caught heterogeneity Board composition by gender. The index ranges from 0 (no diversity) to 0.5 (maximum diversity). To increase the robustness of the model, this study includes control variables such as firm size (logarithm of total assets), leverage (total debt to total assets), and firm age.

The analysis was conducted using panel data regression, with model selection determined by the Chow and Hausman tests to select between fixed and random effects models. Moderation effects were tested using interaction terms, following the approach of Baron and Kenny (1986). To ensure the validity of the results, classical assumption tests were conducted, including tests for normality, multicollinearity, heteroscedasticity, and autocorrelation. For the questionnaire measuring AI variables, validity and reliability tests were conducted using factor loadings and Cronbach's alpha, respectively. The use of panel data allows for better control of firm-specific effects and increases the robustness of statistical inferences. Furthermore, the inclusion of interaction terms allows the study to capture the moderating role of board gender diversity in strengthening the relationship between ESG, AI, and performance. company.

From the explanation on can We analysis use formula Moderated Regression Analysis (MRA) as following:

$$KP = \alpha + \beta_1 \text{ ESG} + \beta_2 \text{ AI} + \beta_3 \text{ BGD} + \beta_4 (\text{ESG} \times \text{BGD}) + \beta_5 (\text{AI} \times \text{BGD}) + e$$

RESULTS AND DISCUSSION

Variables	Descriptive Statistics				
	Means	Median	Minimum	Maximum	Standard Deviation
KP (Tobin's Q)	1.76	1.73	0.84	2.93	0.48
ENVIRONMENT	69.75	70.10	45.20	89.50	10.12
SOC	76.33	75.80	52.00	90.00	8.95
GOVERNMENT	80.27	81.00	61.30	91.60	7.83
ESG	75.45	75.70	58.00	87.00	8.55
AI	3.67	3.70	2.10	4.80	0.72
BGD	0.27	0.26	0.05	0.48	0.11

Statistics descriptive give general description of sample data:

a. Company Performance (KP) The average value of Tobin's Q = 1.76, indicating that the average market value of SOEs is higher than their book value, indicating a positive investor perception of SOE performance. The fairly wide range of values (0.84–2.93), indicates differences in performance between sectors (energy, transportation, telecommunications, and finance).

b. The Environmental Average (ENV) of 69.75 indicates that environmental awareness is classified as good, especially in the state-owned energy and mining sectors. However, the standard deviation of 10.12 indicates that there is still greater variation in green program implementation between companies (e.g., PLN and Pertamina) compared to Kimia Farma or Pos Indonesia.

c. Social (SOC) An average score of 76.33 indicates a high commitment to CSR, employee welfare, and community relations. Almost all state-owned companies have active social programs due to public demand and Ministry of State-Owned Enterprises regulations.

d. Governance (GOV) A score of 80.27 indicates good governance. State-owned enterprises are relatively strong and transparent, in line with the Ministry of State-Owned Enterprises' GCG guidelines. Variation across companies is low (SD 7.83), indicating uniformity in the application of good governance principles.

e. Artificial Intelligence (AI) Average of 3.67 (scale 1–5) indicates that AI has been implemented in a moderate-high manner.

Several large state-owned companies (Telkom, PLN, Pertamina) have utilized AI for energy demand prediction, customer analysis, and financial automation.

f. Board of Directors Gender Diversity (BGD) The average Blau Index = 0.27 means that the composition of women on the board of directors is on average 25–30%, which meets the OECD minimum inclusion standard ($\geq 30\%$). However, the variation is still quite large (0.05–0.48), indicating that not all state-owned companies have balanced female representation.

Variables	Hypothesis testing results		
	Coefficient (β)	t statistics	p-value
ESG	0.312	4,231	0,000
Environment (ENV)	0.178	2,890	0.005
Social (SOC)	0.201	3.105	0.003
Governance (GOV)	0.243	3,654	0.001
Artificial Intelligence (AI)	0.295	4,002	0,000
Board of Directors Gender Diversity (BGD)	0.167	2,412	0.018
ESG \times BGD	0.121	2,050	0.043
AI \times BGD	0.138	2,478	0.016

Explanation of hypothesis testing:

Hypothesis 1: ESG has a positive influence on the performance of state-owned companies.

The regression test results show a coefficient of $\beta = 0.312$ with $t\text{-count} = 4.231$ and $\text{Sig.} = 0.000 < 0.05$. This means that ESG has a positive and significant influence on the performance of state-owned companies. The higher the implementation of Environmental, Social, and Governance (ESG) principles, the better the company's performance as measured by Tobin's Q. This indicates that good sustainability practices improve operational efficiency, company reputation, and investor confidence. H1 is accepted. These results are in line with research by Friede, Busch, and Bassen (2015) and Eccles et al. (2014) which states that ESG has a positive contribution to a company's financial performance and market value.

Hypothesis 1a: Environmental performance has a positive effect on the performance of state-owned companies.

The coefficient value $\beta = 0.178$, $t\text{-count} = 2.890$, and $\text{Sig.} = 0.005 < 0.05$. This indicates that environmental performance (ENV) has a positive and significant effect on company performance. State-owned companies that implement energy efficiency, emission reduction, and sustainable waste management will achieve cost savings and an improved positive image. These results support the Resource-Based View (Barney, 1991) that environmental capabilities are unique resources that create competitive advantage. H1a is accepted.

Hypothesis 1b: Social performance has a positive effect on the performance of state-owned companies.

The regression coefficient $\beta = 0.201$, $t\text{-count} = 3.105$, and $\text{Sig.} = 0.003 < 0.05$. This indicates that social performance (SOC) has a positive and significant influence on the performance of active state-owned companies in terms of lack of social responsibility, employee welfare, and public relations which tend to increase employee loyalty as well as a good public image.

This result is consistent with Stakeholder Theory (Freeman, 1984) and Legitimacy Theory (Suchman, 1995) which emphasize that social legitimacy contributes to long-term sustainability performance. H1b is accepted.

Hypothesis 1c: Governance performance has a positive effect on the performance of state-owned companies.

The regression results show $\beta = 0.243$, $t\text{-test} = 3.654$, and $\text{Sig.} = 0.001 < 0.05$. This proves that governance performance (GOV) has a positive impact on company performance. The implementation of good governance—such as board independence, transparent reporting, and internal control—reduces conflicts of interest and increases efficiency. This finding supports Agency Theory (Jensen & Meckling, 1976) which states that effective governance reduces agency costs and improves company performance. H1c is accepted.

Hypothesis 2: Artificial Intelligence (AI) has a positive influence on the performance of state-owned companies

The coefficient $\beta = 0.295$, $t\text{-test} = 4.002$, and $\text{Sig.} = 0.000 < 0.05$. This indicates that AI has a positive and significant impact on SOE performance. The implementation of AI technology helps companies improve operational efficiency, accelerate decision-making, and increase transparency. These results are in line with the views of Brynjolfsson & McAfee (2017) who emphasized that AI can increase organizational productivity and innovation capabilities. H2 is accepted.

Hypothesis 3: Gender diversity in the board of directors strengthens the influence of ESG on the performance of state-owned companies.

The ESG*BGD interaction value shows $\beta = 0.121$, t -test = 2.050, and Sig. = 0.043 < 0.05. This indicates that Board of Directors Gender Diversity (BGD) acts as a variable that strengthens the moderating relationship between ESG and company performance. The involvement of women in the board of directors brings a broader perspective socially and ethically, thereby strengthening the effectiveness of ESG implementation. These results support the Resource Dependence Theory (Pfeffer & Salancik, 1978) and the Diversity (Milliken & Martins, 1996), which explains that diversity expands access to resources, power, and innovation in decision-making. H3 is accepted.

Hypothesis 4: Gender diversity in the board of directors strengthens the impact of AI on the performance of state-owned enterprises.

The AI*BGD interaction test shows $\beta = 0.138$, t -count = 2.478, and Sig. = 0.016 < 0.05.

This means that gender diversity on boards of directors strengthens the relationship between AI and corporate performance. Gender-diverse boards are more responsive to the ethical and social challenges of implementing AI technology, resulting in more effective and sustainable AI implementation.

This finding is in line with Post & Byron (2015) and García-Meca et al. (2015) who found that gender diversity increases strategic and social value in decision-making. H4 is accepted.

RESULTS AND DISCUSSION

The overall influence of ESG on firm performance is consistent with previous research, which shows that ESG practices improve performance company through signal positive to investors and more relationships strong with stakeholders interest (Alareeni & Hamdan, 2020; Albitar et al., 2020). In the context of BUMN, this finding is very important, because entity This expected No only fulfil objective economy but also social and environmental responsibility to maintain public trust.

When ESG is examined across its individual dimensions, results show varying effects. Environmental performance tends to be less significant, as it is generally associated with long-term investments whose benefits are not immediately felt by investors, who often prioritize profit term short (Atan et al., 2018). Similarly, the social dimension can have a negative or weaker impact on performance due to the high costs associated with corporate social responsibility programs, which can reduce short-term profitability, especially in state-owned enterprises that have obligation social addition (Sugiyanto et al., 2021). In contrast, governance shows consistent positive effects, especially in emerging markets such as Indonesia, where strong governance mechanisms play a crucial role in reducing corruption risks and improving mark company (Inawati & Rahmawati, 2023).

Furthermore, Board Gender Diversity (BGD) acts as an important moderating variable in strengthening the ESG-performance relationship. Gender diversity enhances board effectiveness by encouraging innovation, broader perspectives, and greater sensitivity to ESG-related issues (Manita et al., 2018). The presence of women on a company's board of directors tends to encourage more empathetic, ethical, and sustainability-oriented decision-making. In the context of state-owned enterprises, this is particularly relevant due to government initiatives promoting gender inclusion, which ultimately strengthens the positive impact of ESG on company performance.

However, this study has several limitations. The relatively low R-squared value (0.26) indicates that most of the variation in firm performance is explained by factors outside the model, such as firm size, macroeconomic conditions, and industry characteristics. Furthermore, the focus on state-owned enterprises limits the generalizability of the findings to other types of firms, so future research should expand the sample to include private sector firms and broader contexts.

CONCLUSION

ESG implementation improves the performance of state-owned enterprises through competitiveness and positive signals. Only the governance pillar is positive, demonstrating the importance of good corporate governance in state-owned enterprises. Gender diversity on the board of directors strengthens the ESG-KP relationship, as women increase the social and ethical sensitivity of research. This provides validation for accounting in Indonesia. Theoretical Implications This study contributes

to development theory in the field of accounting and sustainability: Strengthening Signal Theory and Stakeholder Interests: Positive ESG support findings indicate that non-financial disclosures reduce informative asymmetries and satisfy stakeholder demands, ultimately increase performance (Pulino et al., 2022; Hamman et al., 2010). This extends the application of this theory to the context of state-owned enterprises in developing countries. Contribution to Corporate Governance: The moderating role of gender adds insight into how board composition influences ESG effectiveness, suggesting that diversity is not only an ethical norm, but also a mechanism for improving decision quality (Kılıç & Kuzey, 2016; Romano et al., 2020). Consistency with Previous Literature: These results are in line with research that found positive ESG impact (Albitar et al., 2020; Mohammad & Wasiuzzaman, 2021), however add nuances specifically in state-owned enterprises, where the negative social and environmental pillars are not significant, in contrast to the context of private companies. Practical Implications These findings have direct relevance for practitioners and policy makers: For State-Owned Enterprise Management: Focus on improving GOV scores through transparent reporting and accountability, while integrating environmental and social aspects into cost-effective strategies. Promote gender diversity on board boards to strengthen ESG impact, for example through training or recruiting experienced women. For Investors and Capital Markets: Use ESG scores as a risk analysis tool, particularly in the state-owned enterprise sector, to select investments in state-owned companies. Institutional investors can encourage companies to improve ESG disclosure through market pressure. For Regulators and the Government: The Ministry of State-Owned Enterprises and the IDX can integrate ESG into regulations, such as mandatory annual ESG reports and minimum gender quotas on boards of directors. This will encourage SOEs to contribute to the Sustainable Development Goals (SDGs), such as environmental management and social welfare. For Society and Stakeholders: State-Owned Enterprises that are strong in ESG can deliver broader social benefits, such as reduced environmental impact and improved well-being, despite initial cost challenges. Overall, this study confirms the importance of ESG as a business strategy in state-owned enterprises (SOEs), with significant potential to improve performance through good governance and gender diversity. Implementing these findings can promote sustainable development practices in Indonesia, contributing to improved economic and social development. Further research is needed to fill gaps and strengthen the validity of these findings in a broader context. Artificial Intelligence (AI) has a positive impact on company performance. The integration of AI into SOE business processes has been shown to improve operational efficiency, accelerate decision-making, and encourage sustainability-oriented innovation. The use of AI also helps SOEs improve transparency and accuracy in reporting and risk management.

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