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Operational Efficiency as a Bridge: ESG, Governance, and Financial Performance in State-Owned Enterprises

Abstract:
Indonesia's commitment to cutting emissions shows its serious approach to the environment. The country urges major businesses to act responsibly by supporting social initiatives and adopting open governance. The research matters because it tackles the real challenges global companies face when trying to balance social, environmental, and governance demands. This study explores how ESG, environmental costs, and governance shape financial outcomes in Indonesian SOEs, with OEOI as a key mediator. The study used quantitative panel data from 65 SOEs' annual, sustainability, and financial reports from 2020 to 2023. Variables cover ESG (GRI-based), CSR as environmental costs, independent commissioner proportion for GCG, and ROA for financial performance. Panel data regression analysis is performed with EViews 12 software. This study shows that only ESG can improve financial performance and reduce the OEOI ratio through operational efficiency, while environmental costs and the implementation of GCG do not have a significant impact, either directly or indirectly, on financial performance. These results show the need of including embedding efficiency into ESG plans to guarantee both sustainability and profitability in state-owned companies. This strategy emphasizes OEOI's mediation function among ESG, environmental expenses, GCG, and SOE financial performance.

Keywords:
Environmental Social and Governance (ESG), Environmental Costs, Good Corporate Governance (GCG), Operational Efficiency, State-Owned Enterprises (SOEs)

1. Introduction

Indonesia, recognized as a developing nation with significant economic potential, has integrated environmental sustainability into its national development agenda and has aligned itself with global initiatives to combat climate change by ratifying the Paris Agreement via the enactment of Law Number 16 of 2016 (Undang-Undang Nomor 16, 2016). The Paris Agreement asks countries to do their part to keep global warming under 2°C, while also working toward the even more ambitious goal of staying below 1.5°C. This commitment reflects Indonesia's responsibility in lowering carbon emissions and promoting low carbon growth (Delbeke et al., 2019). According to figures provided by the Indonesian Ministry of Energy and Mineral Resources, the industrial sector contributes the largest portion to national carbon emissions, accounting for 29%. The transportation sector follows with a contribution of 27%, while power generation accounts for 14%. Flaring adds 11%, processing operations add 10%, the remaining 9% comes from commercial activities and other side events. This knowledge enhances the four main pillars of State-Owned Enterprises social and environmental responsibility program. While the environmental component concentrates on sustainable strategies for managing natural resources, acknowledging them as fundamental to life, and so supporting economic development by job creation, business opportunities, and innovation, which is promoted through inclusive industrial development and adequate infrastructure, the social aspect ensures basic human rights are upheld fairly and equally while improving community welfare. For example, State-Owned Enterprises have to follow excellent corporate governance in conformity with rules published by the minister of state owned businesses on policies of governance and corporate activity direction. Emphasizing values like openness, responsibility, honesty, independence, and justice, good governance seeks to improve the competitiveness of these businesses both locally and abroad (Pemerintah Republik Indonesia, 2021).

Financial performance shows how successfully a company can properly allocate its resources to reach its strategic goals, raise its value, and satisfy the needs of its stakeholders that is, creditors, investors, and shareholders. This performance results from the operations of a company over a specified period, demonstrating how income is created and financial stability is kept by means of

resource use. Moreover affected by outside circumstances is financial performance, include corporate social responsibility, compliance with environmental policies, and the impact of government regulations. External factors also include internal ones, such as operational efficiency and asset management. Therefore, assessing business success calls for attention not only of financial accounts but also of non financial factors influencing the sustainability of the company. Ratio analysis in financial reports is one method a business shows its performance. Examining the return on assets ratio will help one evaluate this performance (Tutcu et al., 2024).

In line with growing public awareness of how corporate activities impact the environment, society, and corporate governance, business sustainability has grown to be a progressively critical global concern. In this regard, the environmental, social, and governance approach has been rather popular as a means of evaluating a company's sustainability performance. ESG disclosure is a mechanism for gauging a company's degree of environmental and social responsibility as well, but also as a key indicator in evaluating potential business risks and opportunities. This reflects the growing expectations among investors, regulators, and consumers, who are calling on companies to actively incorporate ESG considerations into their business practices (Nizamuddin et al., 2024). The consistent implementation of ESG enables companies to improve operational efficiency through responsible resource management, strengthen social relationships with stakeholders, and ensure transparent and ethical governance. These three features improve the company's standing and draw investors that give sustainability first priority. Companies dedicated to ESG principles therefore often show improved risk management, more consistent financial performance, and the building of long-term sustainable wealth (Nguyen, 2024). However, different findings indicate that ESG disclosure does not affect company performance, and that ESG disclosure has not yet reached an ideal level. As a result, ESG disclosure cannot influence the decision-making process (Morri et al., 2024).

In the current modern era, there is growing awareness of the importance of managing social and environmental responsibilities, which requires companies to not only focus on profitability but also on social and environmental accountability. Various studies have shown a complex correlation between environmental costs and a company's financial performance. Some studies have found that increased environmental costs can have a negative impact on short-term profitability due to the additional burdens that companies must bear (Wu et al., 2024). However, on the other hand, investing in good environmental performance can also increase the company's value and long-term reputation, as well as attract investors who care about sustainability (Rena et al., 2024). Thus, the dynamic link between environmental costs and financial performance calls for a deliberate strategy so that sustainability can be reached in balance and economic advantages can be obtained (Ghosh, n.d.).

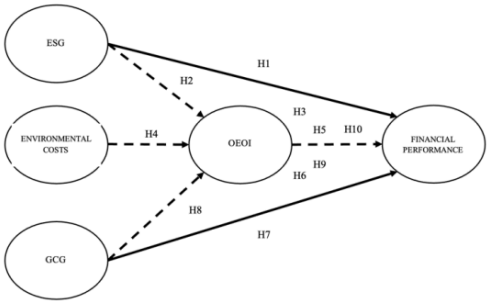
Developing trust both inside and outside of businesses depends on using sound business governance policies (Otoxsusilo et al., 2023). GCG ensures that the business operations of the organization are carried out with openness, accountably, responsibly, autonomously, and fairly and generates a favorable future decision-making environment (Khusnia & Wardana, 2024). The corporation can build its reputation by including the ideas of good corporate governance into policies and activities, minimize risks, and maintain harmonious relationships with stakeholders, which ultimately supports long-term sustainability (Chasanah et al., 2024). Other research results show that companies strive to meet the demands of stakeholders by implementing and reporting good corporate governance, which is focused on creating corporate value rather than directly oriented towards financial performance. Therefore, the use of sound corporate governance turns into a strategic strategy to raise organizational value by means of stakeholder confidence and satisfaction (Gulo et al., 2025a). Indirectly, GCG affects financial performance, a rise in the company's value indicates strong management and success in satisfying stakeholders' expectations (Istan, 2024).

The Influence of the operational expenses to operating income (OEOI) in assessing the efficiency and financial performance of a company. A company's operational effectiveness in controlling expenses to create income improves with decreasing OEOI ratio. In a study on the management, processing, and marketing of plantation products, it was found that although there was no significant difference between the operational cost budget and revenue in assessing

financial performance, the relationship between OEOI and ROA remained fairly strong, therefore suggesting that financial performance is influenced by operational cost control (Mega et al., 2024).

This study stands out for using the OEOI ratio to examine how corporate governance policies, environmental expenses, and ESG impact financial results in state-owned companies. This study looks not just at the direct consequences of these factors but also assesses how operational efficiency of the organization moderates these linkages. Emphasizing the OEOI ratio as a mediating variable, the study clarifies hitherto undiscovered links, hence perhaps influencing future academic debate in management and finance. Panel data analysis is used in this study to better grasp how governance and sustainability initiatives affect financial results of a corporation. This study is very relevant practically in the rather complicated and competitive corporate environment of today. The findings of the research can help businesses create better financial performance and more successful sustainability plans. This paper also provides suggestions for legislators to tighten rules supporting the application of GCG, environmental expenses, and ESG. As a result, this research not only provides theoretical benefits but also has practical advantages to support better sustainability improvements through transformation.

Understanding the dynamics of SOE financial performance within demands for sustainability and public responsibility depends on a growing relevance of efforts to evaluate the efficacy of ESG, environmental cost burdens, and the role of good governance. Beyond evaluating the direct impacts of ESG, this study also considers whether OEOI mediates the connection between sustainability practices, environmental costs, and the implementation of GCG on financial performance (Figure 1).



Source: Author (2025)

Figure 1. The framework guiding this research

2. Literature Review

2.1 Environmental, social, and governance

Ongoing inconsistencies in research on ESG disclosure's financial impact point to underlying complexities that make this connection challenging to interpret. Previous research found that ESG has not yet had a direct impact on profitability (Duque-Grisales & Aguilera-Caracuel, 2021). Evidence from related studies shows that despite considerable investment in ESG initiatives, the expected financial returns are frequently lacking (Shaikh, 2021). Research also suggests that ESG efforts may actually lower a company's value if resources are not managed optimally (Darnall et al., 2022). Emphasizing improved reputation and profitability in the infrastructure sector and increased competitiveness in the technology sector, some study points out that ESG projects can

genuinely assist boost a company's financial results (Mohy-ud-Din, 2024). Moreover, companies that open about their ESG policies usually have higher company value, which indicates better financial situation (Ge et al., 2022). Reflecting operational efficiency, the OEOI ratio helps expose the ways in which ESG practices could affect a company's profitability in this context. Good operational efficiency shown by a low OEOI supports financial stability and firm profitability. On the other hand, a high OEOI, which indicates ineffective operations, might balance or even reverse the possible benefits that ESG policies provide for the financial situation of a company. Reaching better financial results for businesses depends mostly on managing ESG well and simplifying processes at the same time. Following the above mentioned results, the study presents this hypothesis:

H1: Environmental, social, and governance attributes do not exhibit a statistically significant relationship with financial performance
H2: Environmental, social, and governance affects OEOI
H3: Environmental, social, and governance various factors determine financial performance through the mediating role of OEOI

2.2 Environmental Costs

Many companies find that funding environmental projects does not regularly result in appreciable financial performance improvement. This outcome is attributed to the extra expenses incurred for meeting environmental standards, which may temporarily lower profitability (Lopatta et al., 2024). Some studies suggest that even though firms with strong environmental records enjoy a reputational boost, this doesn't always show up in their financial results (Candio, 2024). However, in the context of operational efficiency, companies that implement better environmental strategies tend to have more efficient operational cost management. Lower operational costs can be reflected in the OEOI ratio, which shows how efficiently a company runs its operational activities (Padilla-Lozano & Collazzo, 2022). Furthermore, earlier studies show that green accounting and environmental management might enable businesses to better spot and control environmental expenses, hence enhancing operational efficiency (Han et al., 2024). OEOI serves as a mediating variable connecting CSR expenditures to financial performance. Companies that are more efficient in managing operational costs due to good environmental strategies tend to have higher profitability levels. Findings from both the pharmaceutical and mining fields suggest that companies running more efficiently often achieve stronger financial results over time (Bascompta et al., 2024). In this context, OEOI acts as a crucial link, connecting how environmental spending indirectly affects a company's financial results. After considering the findings above, the study puts forward this hypothesis:

H4: Environmental costs do not affect financial performance
H5: Environmental costs affect OEOI
H6: Environmental costs affect financial performance with OEOI as a mediation

2.3 Good corporate governance

Research on the relationship between good corporate governance and financial performance shows varied results. Evidence from several settings points to the possibility that, in spite of greatest efforts, excellent corporate governance might not always result in observable financial benefits. This is so because the success of GCG usually depends on how its application is tailored to the internal conditions of the organization, including the dedication of management and shareholders to follow good governance. Take the manufacturing industry as an example here, good corporate governance alone may not boost financial results, especially if it's not aligned with other drivers of operational efficiency (Gulo et al., 2025b). Moreover, GCG has the capacity to impact the operational expenses to operating income ratio, highlighting its role in determining how efficiently a firm conducts its operations. Companies demonstrating lower OEOI ratios tend to be more efficient in their operations, a trait commonly found among those with strong governance frameworks. Acting as a controller and supervisor, GCG can positively influence how companies manage costs, as illustrated by research from the financial sector that associates GCG with greater

operational efficiency via the OEOI ratio (Nurwulandari et al., 2022). The research also looks at whether OEOI helps explain how good corporate governance influences a company's financial results. As a mediating variable, OEOI captures the mechanism by which GCG indirectly affects financial performance by first improving operational efficiency. Previous research has shown that although GCG may not directly influence financial performance, its impact can be felt through increased operational efficiency or cost management reflected in operational costs (Riyadh et al., 2022). OEOI acts as a critical link, facilitating the transmission of indirect effects from good corporate governance to financial performance. By improving operational efficiency, OEOI creates a pathway through which governance mechanisms can ultimately enhance financial results. After considering the findings above, the study puts forward this hypothesis:

H7: Good corporate governance does not significantly influence financial performance
H8: Good corporate governance affects OEOI
H9: Good corporate governance influences financial performance through the mediating Impact of OEOI

2.4 Operational expenses to operating income

Evaluating financial performance provides valuable insight into a company's success, regardless of whether it belongs to the financial or non financial sector, is by measuring operational efficiency, which can be gauged using the ratio of operational expenses to operating income (OEOI). Studies show that OEOI affects return on assets (ROA), meaning that higher operational efficiency can increase asset returns in the financial sector (Jefri et al., 2024). As demonstrated by previous research, operational cost efficiency in the non-financial sector also significantly contributes to profit growth. Moreover, recent research reveals that OEOI greatly influences ROA both alone and in relation to other elements. One of the main factors helping a business to support and enhance its financial performance is efficient control of operating expenses (Yang et al., 2025). Following the above mentioned results, the study proposes this hypothesis:

H10: Operational expenses to operating income affects financial performance

3. Methodology

Measuring by the balance of costs and income, this study uses panel data analysis to investigate the interaction between ESG commitments, environmental expenditures, corporate governance, and operational efficiency, therefore revealing their combined impact on corporate financial performance. Based on secondary data gathered from annual reports, sustainability filings, and financial databases, the study follows how open reporting and good financial practices form a better knowledge of business outcomes. Official records from the Ministry of State Owned Enterprises and the specialized SOEs portfolio website provide thorough coverage for the year 2020 to 2023. Starting with 65 state-owned companies, the study reflected the variety of Indonesia's public sector scene. Targeting organizations who issued entire annual and sustainability reports, revealed ESG and governance metrics, and supplied pertinent financial data during the four year period, a purposeful sampling approach helped to guarantee data quality and consistency. This progressive approach, as shown in Table 1, reduced the sample to 42 enterprises with consecutive yearly reports, then to 24 with comprehensive sustainability disclosures, and lastly to 18 SOEs regularly reporting social and environmental responsibility expenses. With each chosen company seen during all four years of the research, this produced a total of 72 firm-year observations.

Table 1. Population Selection Results

Number	Criteria	Amount
1	State-Owned Enterprises companies in the Republic of Indonesia	65
2	Companies presenting consecutive Annual Reports from the period 2020-2023	42

3	Companies presenting consecutive Sustainability Reports from the period 2020-2023	24
4	Companies disclosing TJSL Costs consecutively from the period 2020-2023	18
	Total research sample (18 companies × 4 periods from 2020 to 2023)	72

Source: data created (2025)

Table 2 guarantees objective comparisons between organizations by giving a thorough summary of the factors and their measurement in this research. Counting its disclosures in line with the GRI Standards (2016 and 2021) and then dividing this figure by the total possible disclosures a technique that enables a fair, uniform ESG score regardless of company size or sector helps ESG to quantify the degree of compliance of every company (Ming et al., 2024). Examining the ratio of CSR expenditure to income after tax gives the study a direct estimate of how much of a company's profit is given to sustainability initiatives, therefore addressing environmental costs (Aulia et al., 2025). The ratio of independent commissioners to the overall board size is used to evaluate governance quality, therefore reflecting the company's dedication to openness and fair decision making (Hanun et al., 2023). The OEOI ratio, which compares operating expenses with operating income to show how effectively a company uses its resources, reflects operational efficiency. At last, financial performance is evaluated using return on assets, a standard indicator of how profitably a company converts its assets (Windriya, 2019). This study helps to evaluate how various sustainability and governance policies translate into actual financial results by expressing all these variables as ratios, therefore facilitating uniform analysis and relevant comparisons across the selected companies. The research process encompassed a number of verifications to ensure the data were both accurate and dependable prior to proceeding with the analysis. Descriptive analysis offered an extensive overview of the data, detailing the central values, range, and distribution for each variable, thereby revealing inherent patterns and traits within the dataset. Unit root tests or other comparable tests were carried out to guarantee the stationary nature of the panel data employed. This aims to avoid spurious regression problems that could affect estimation results. After the data meets the stationarity assumption, panel data model selection was performed using the Chow Test, Breusch-Pagan Lagrange Multiplier (LM) Test, and Hausman Test to determine whether the best model is Fixed Effect, Random Effect, or Pooled OLS.

Table 2. Variable Definitions and Measurement Methods

No	Variable	Definition	Measurement Formula	Scale
1	Independent Variable (X1): Environmental, Social, and Governance (ESG)	ESG disclosure measured based on the number of items disclosed according to GRI Standard 2016 (94 items) and GRI Standard 2021 (126 items).	ESG Score = Number of Disclosures / Total Possible Disclosures	Ratio
2	Independent Variable (X2): Environmental Costs	Environmental cost measured as the ratio of CSR (Corporate Social Responsibility) costs to earnings after tax.	Environmental Costs Ratio = CSR Costs / Earnings After Tax	Ratio

3	Independent Variable (X3): Good Corporate Governance (GCG)	The proportion of independent commissioners relative to the total number of board commissioners, used to measure Good Corporate Governance (GCG).	Independent Commissioners Ratio = Number of Independent Commissioners / Total Board Commissioners	Ratio
4	Mediating Variable (Z): Operational Expenses to Operating Income (OEOI)	Operational efficiency measured by comparing operational expenses to operating income.	OEOI = Operational Expenses / Operating Income	Ratio
5	Dependent Variable (Y): Financial Performance (Return on Assets)	Financial performance in this analysis is quantified using the Return on Assets (ROA) indicator, highlighting the effectiveness with which a company leverages its assets to produce profits.	ROA = Net Income / Total Assets	Ratio

Source: data created (2025)

Panel data regression is used to explore how all the different variables in this research interact with one another over time and across companies. The analysis begins with a fundamental model designed to uncover the ways in which ESG activities, environmental expenditures, and governance practices contribute to or detract from a company's financial results. Including the interaction between the independent variables and OEOI helps one to evaluate how it could mediate the interaction between GCG, environmental costs, and ESG variables with financial performance using a mediation model with OEOI. Statistical tests including the F-test to evaluate the general significance of the model, the t-test for the significance of every variable, adjusted r-squared to evaluate the model's capacity to explain data variation, and the Durbin Watson Test to identify autocorrelation in the residuals analyzed the regression results. Multicollinearity is investigated in diagnostic testing utilizing the variance inflation factor (VIF) to guarantee absence of strong linear connections among the independent variables. While autocorrelation testing is carried out with the Breusch Godfrey serial correlation LM test, heteroskedasticity tests employing the Breusch-Pagan or white test are used to find non-constant residual variance. Every analysis is conducted with the E Views 12 program, which guarantees correct results by means of many statistical and visualization tools and provides flexibility in handling panel data. The chosen approach intends to produce accurate and pertinent results directly addressing the hypotheses of the research.

4. Results and Analysis

4.1 Research results

Table 3 shows a mean for the ESG variable of 0.51, observed values range from a low of 0.05 to a maximum of 0.98. With values between a minimum of -0.37 and a maximum of 1.89, the environmental costs variable records a mean of 0.05. Analysis reveals that the GCG variable centers around an average value of 0.41, with a minimum recorded at 0.14 and a maximum at 0.75. Findings indicate that OEOI centers around a mean of 0.30, while its distribution extends from a minimum of -0.11 to a maximum of 2.85. Analysis shows that ROA is centered at a mean value of 0.014, with a distribution rangin``` g from -0.58 at least to 0.6 maximum.

Table 3. Descriptive Analysis

	ESG	EC	GCG	OEOI	ROA
Mean	0.512778	0.058611	0.418333	0.309722	0.014028
Median	0.495000	0.010000	0.400000	0.145000	0.010000
Maximum	0.980000	1.890000	0.750000	2.850000	0.600000
Minimum	0.050000	-0.370000	0.140000	-0.110000	-0.580000
Std. Dev.	0.265517	0.239279	0.151583	0.432073	0.109964
Skewness	0.153823	6.492480	0.263255	3.277202	-0.232382
Kurtosis	1.812609	49.70071	2.303121	18.07317	24.12473
Jarque-Bera	4.513626	7048.697	2.288556	810.4817	1339.410
Probability	0.104684	0.000000	0.318454	0.000000	0.000000
Sum	36.92000	4.220000	30.12000	22.30000	1.010000
Sum Sq. Dev.	5.005444	4.065061	1.631400	13.25479	0.858532
Observations	72	72	72	72	72

4.2 Regression model selection

Table 4 presents the results of the Chow Test, with the initial model indicating a chi-square probability value of 0.00, which is below the 0.05 threshold, so it can be concluded that in the first model, the FEM (Fixed Effects Model) is better than the CEM (Common Effects Model). Meanwhile, in the second model, the chi-square probability value is 0.00 > 0.05. Based on this result, it is confirmed that the FEM is better in the second model as well.

Table 4. Chow Test

Effects Test		Statistic	d.f.	Prob.
Model I	Cross-section F	4.981411	(17,51)	0.0000
	Cross-section Chi-square	70.45221	17	0.0000
Model II	Cross-section F	3.830549	(17,50)	0.0001
	Cross-section Chi-square	60.044129	17	0.0000

Table 5 displays the Hausman test results, with the first model reporting a random cross-section probability of 0.106, exceeding the 0.05 significance level, which leads to the conclusion that the Random Effects Model (REM) is better than the Fixed Effects Model (FEM). Next, the LM test will be conducted. Meanwhile, for the second model, the probability value of the random cross-section is 0.000 < 0.05, which means that the Fixed Effects Model (FEM) is the best model for the study using the second model structure.

Table 5. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.

Model I	Cross-section random	6.114243	3	0.1062
Model II	Cross-section random	53.239116	4	0.0000

The Lagrange Multiplier test is presented in Table 6. Results from the LM test show a probability of 0.007 in the first model, which is less than the 0.05 cutoff. Analysis identifies the REM model as the most appropriate specification for the first model's structure.

Table 6. Lagrange Multiplier Test

Null (no rand. effect)	Cross-section	Period	Both
Alternative	One-sided	One-sided	
Honda	4.317015	-0.842889	2.456578
	(0.0000)	(0.8004)	(0.0070)

4.3 Classical assumptions

Multicollinearity assessment results in Table 7 and Table 8 indicate that correlation coefficients between variables in both models remain below 0.9. Analysis confirms that the data pass the multicollinearity test, allowing for reliable interpretation of the model.

Table 7. Multicollinearity of Model I

	ESG	**EC**	**GCG**	**OEOI**
ESG	1.000000	0.035864	-0.157113	-0.227854
EC	0.035864	1.000000	-0.060409	-0.11685
GCG	-0.157113	-0.060409	1.000000	0.305037
OEOI	-0.227854	-0.11685	0.305037	1.000000

Table 8. Multicollinearity of Model II

	ESG	**EC**	**GCG**	**OEOI**	**ROA**
ESG	1.000000	0.035864	-0.157113	-0.227854	0.106847
EC	0.035864	1.000000	-0.060409	-0.11685	-0.016271
GCG	-0.157113	-0.060409	1.000000	0.305037	0.037841
OEOI	-0.227854	-0.116850	0.305037	1.000000	-0.468824
ROA	0.106847	-0.016271	0.037841	-0.468824	1.000000

Heteroscedasticity test outcomes presented in Table 9 and Table 10 indicate that the probability values for the independent variables in both models exceed 0.05. The analysis shows that the data meet the requirements for heteroskedasticity, supporting the validity of the results.

Table 9. Heteroscedasticity of Model I

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**

C	0.267936	0.316876	0.845557	0.4008
ESG	-0.479465	0.315628	-1.519081	0.1334
EC	-0.085092	0.336058	-0.253207	0.8009
GCG	0.361448	0.569571	0.634597	0.5278

Table 10. Heteroscedasticity Model II

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-139.3417	1.665644	-83.65637	0.0000
ESG	1.146957	1.543967	0.742863	0.4610
EC	-0.558925	1.260068	-0.443568	0.6593
GCG	1.732518	3.594305	0.482018	0.6319
OEOI	-0.230254	1.030552	-0.223427	0.8241

4.4 Hypothesis testing

According to Table 11, the first model's F test yields a probability of 0.150, which is higher than 0.05. This suggests that, when considered together, ESG, environmental costs, and GCG do not have a significant impact on OEOI. The second model yields an F statistic probability of 0.000, which falls below the 0.05 significance threshold. Therefore, it can be concluded that in the second model, the variables ESG, EC, GCG, and OEOI simultaneously (together) have an effect on the variable ROA.

Table 11. F Test (Simultaneous Test)

	Model I	Model II
R-squared	0.074582	0.678870
Adjusted R-squared	0.033755	0.543996
S.E. of regression	0.297266	0.074256
Sum squared resid		0.275700
Log likelihood		98.18032
F-statistic	1.82678	5.033352
Prob(F-statistic)	0.150522	0.000001
Mean dependent var	0.138988	0.014028
S.D. dependent var	0.302414	0.109964
Sum squared resid	6.008979	
Akaike info criterion		-2.116120
Schwarz criterion		-1.420472
Hannan-Quinn criter.		-1.839180
Durbin-Watson stat	1.865990	2.892149

4.5 Coefficient of determination test

Table 12 display that, in the first model, an adjusted R-square of 0.033 indicates ESG, EC,

and GCG account for 3.3% of the variance in OEOI. Meanwhile, the remaining 96.7% is explained by other factors outside the research model. In the second model, it can be seen that the adjusted R-square value is 0.543, which means that the variables ESG, EC, GCG, and OEOI are able to explain the ROA variable by 54.3%. Unexplained variation, totaling 45.7%, highlights the impact of additional variables not captured within the scope of this model.

Table 12. Test of Determination Coefficient

	Model I	Model II
R-squared	0.074582	0.678870
Adjusted R-squared	0.033755	0.543996
S.E. of regression	0.297266	0.074256
Sum squared resid		0.275700
Log likelihood		98.18032
F-statistic	1.826780	5.033352
Prob(F-statistic)	0.150522	0.000001
Mean dependent var	0.138988	0.014028
S.D. dependent var	0.302414	0.109964
Sum squared resid	6.008979	
Akaike info criterion		-2.116120
Schwarz criterion		-1.420472
Hannan-Quinn criter.		-1.839180
Durbin-Watson stat	1.86599	2.892149

4.6 Regression equation and t-Test (partial test)

The test results in Table 13 show the statistical values from the t-test and the first model equation as follows:

OEOI = 0,459 – 0,405 ESG – 0,100 EC + 0,153 GCG

1. ESG shows a coefficient of -0.405 and is significant at the level of 0.023 < 0.05, which indicates that ESG has a clear negative impact on OEOI.
2. Environmental costs show a coefficient of -0.100 and a significance value of 0.541 > 0.05, suggesting they do not meaningfully impact OEOI.
3. GCG yields a coefficient of 0.153 and a significance of 0.674 > 0.05, showing it does not have a meaningful effect on OEOI.

Table 13. Regression and t-Test (Partial Test) Model I

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.459228	0.187058	2.455004	0.0167
ESG	-0.405594	0.175228	-2.314664	0.0237
EC	-0.100727	0.164305	-0.61305	0.5419
GCG	0.153890	0.364450	0.422254	0.6742

Table 14 reports the t-test statistic values and presents the corresponding equation for the second model as follows:

ROA = 0,117 – 0,106 ESG – 0,001 EC + 0,124 GCG – 0,327 OEOI

1. ESG has a coefficient of -0.106 and a significance of 0.053 > 0.05, suggesting it does not meaningfully influence ROA.
2. Environmental costs yield a coefficient of 0.001 and a significance of 0.964 > 0.05, showing no meaningful impact on ROA.
3. GCG yields a coefficient of 0.124 and a significance of 0.322 > 0.05, suggesting it does not have a meaningful effect on ROA.
4. The OEOI variable yields a coefficient of -0.327 with a significance level of 0.000 < 0.05, indicating a statistically significant negative impact on ROA.

Table 14. Regression and t-Test (Partial Test) Model II

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.117637	0.057815	2.034717	0.0472
ESG	-0.106044	0.053591	-1.978761	0.0534
EC	0.001970	0.043737	0.045035	0.9643
GCG	0.124667	0.124759	0.999264	0.3225
OEOI	-0.327711	0.035771	-9.161464	0.0000

4.7 Mediation test Sobel ESG test on ROA through OEOI

Table 15 presents the results of the online Sobel test, yielding a p-value of 0.024, which falls below the 0.05 threshold for statistical significance. The results indicate that OEOI helps explain how ESG practices translate into higher ROA, highlighting its important role in strengthening the link between sustainability efforts and financial outcomes.

Table 15. Sobel ESG test on ROA through OEOI

Parameter	Value	Description
Coefficient A	-0.4055	Effect of ESG on OEOI
Coefficient B	-0.3277	Effect of OEOI on ROA
Standard Error A (SE_A)	0.1755	Standard error of coefficient A
Standard Error B (SE_B)	0.0357	Standard error of coefficient B
Sobel Statistic	2.2437	Sobel test statistic
One-sided p-value	0.0124	One-tailed probability
Two-sided p-value	0.0248	Two-tailed probability; significant (< 0.05)

4.8 Mediation test Sobel environmental costs test on ROA through OEOI

Table 16 shows that the online Sobel test generated a p-value of 0.513, indicating that the result is not statistically significant at the 0.05 level. This suggests that OEOI does not significantly mediate the relationship between environmental expenses and return on assets.

Table 16. Sobel BL test on ROA through OEOI

Parameter	Value	Description
Coefficient A	-0.1007	Effect of BL on OEOI
Coefficient B	-0.3277	Effect of OEOI on ROA
Standard Error A (SE_A)	0.1643	Standard error of coefficient A

Standard Error B (SE_B)	0.0357	Standard error of coefficient B
Sobel Statistic	0.6115	Sobel test statistic
One-sided p-value	0.2704	One-tailed probability
Two-sided p-value	0.5408	Two-tailed probability; not significant (> 0.05)

4.9 Mediation test Sobel GCG test on ROA through OEOI

As shown in Table 17, the online Sobel test produced a p-value of 0.673, which is greater than 0.05. This result implies that OEOI does not play a significant role in mediating the relationship between good corporate governance and return on assets.

Table 17. Results of the Sobel GCG Test on ROA through OEOI

Parameter	Value	Description
Coefficient A	0.1538	Effect of GCG on OEOI
Coefficient B	-0.3277	Effect of OEOI on ROA
Standard Error A (SE_A)	0.3644	Standard error of coefficient A
Standard Error B (SE_B)	0.0357	Standard error of coefficient B
Sobel Statistic	2.2437	Sobel test statistic
One-sided P-value	0.0124	One-tailed probability
Two-sided P-value	0.6731	Two-tailed probability; not significant (> 0.05)

5. Discussion

This research investigates how sustainability factors such as environmental, social, and governance, environmental costs and strong governance practices can help state-owned enterprises achieve better financial results, with operational efficiency measured through the OEOI ratio as a mediating factor. The study results indicate that ESG does not have a direct impact on return on assets but makes a significant contribution to operational efficiency. These findings indicate that ESG plays a strategic role in creating cost efficiency and improving internal processes, which ultimately enhances financial performance indirectly. ESG also reflects the company's ability to manage non-financial risks and respond to stakeholder pressures. Therefore, effective implementation of ESG can serve as a managerial tool to sustainably improve business financial performance (Yudhanto & Simamora, 2023; Yunica & Rofikoh Rokhim, 2023).

Regularly practicing ESG not only strengthens a company's image but also builds lasting trust among investors (Lee et al., 2023). Companies engaged in sustainability initiatives typically exhibit stronger resilience to external challenges and enhanced adaptability within evolving business environments. Moreover, ESG is not only seen as a form of social compliance but also as part of a managerial strategy capable of creating operational efficiency and competitive advantage (Al-Tarawneh et al., 2024). A structured implementation of ESG can help companies across various sectors generate sustainable financial benefits (Loan et al., 2024). Therefore, ESG needs to be positioned as a strategic asset within the framework of corporate decision-making oriented toward business sustainability.

Analysis of the environmental cost variable, measured by expenditures on social and environmental responsibility, indicates that this factor is not strongly associated with enhanced operational efficiency or improved financial performance. These findings suggest that environmental expenditures have not yet been fully positioned as a strategic element in the company's business planning (Anis et al., 2023). Without strong integration into operational policies and performance targets, sustainability costs risk becoming an additional financial burden rather than a source of value or the expected competitive advantage (Lin et al., 2022).

Analysis reveals that, for state-owned enterprises, putting good governance measures in place

hasn't led to a marked improvement in financial results. Although theoretically, the presence of independent commissioners is intended to enhance supervisory functions and ensure managerial accountability, in practice this role has not been fully effective in driving operational efficiency in public companies, especially in developing countries where it is often carried out merely as an administrative formality without addressing the substance of operational efficiency (Gamal et al., 2022). This condition limits the contribution of GCG to increasing the company's value. Companies with governance structures that support operational cost efficiency tend to show more optimal financial performance (Del Gesso & Lodhi, 2025). Therefore, strategies to strengthen GCG should focus on the active role of independent commissioners in directing internal efficiency and cost control as part of efforts to achieve financial sustainability (Nicolò et al., 2022).

6. Conclusion

This study focuses on 18 State-Owned Enterprises in Indonesia during the period from 2020 to 2023. It concludes that among the three main variables examined, only environmental, social, and governance shows a significant influence on operational efficiency measured by the OEOI ratio (operational expense to operating income ratio), and indirectly contributes to improving the company's financial performance measured by return on assets. Companies that focus their ESG efforts on making internal processes more efficient often achieve lower operational cost ratios, which can lead to better financial outcomes Sobel test results back up this finding by showing that OEOI plays a key role in connecting ESG to ROA. Meanwhile, the variables of environmental costs and good corporate governance do not show significant influence, either directly on ROA or indirectly through OEOI. This indicates that these two variables have not been optimally integrated into the company's operational policies as strategic instruments capable of creating efficiency or increasing profitability.

These results provide practical guidance for decision-makers seeking to strengthen both sustainability efforts and governance standards within organizations. Effective ESG implementation can be a managerial strategy to strengthen company performance in the long term. In practice, ESG is not only viewed as a form of compliance with social and environmental standards but also as an approach to create operational advantages and attract investors who are sensitive to sustainability issues. By emphasizing cost efficiency through ESG, companies can enhance competitiveness while building a positive reputation in the eyes of stakeholders. Conversely, the implementation of unstructured environmental costs and GCG, which tend to be administrative without real contributions to efficiency, risks becoming a financial burden and does not provide added value for the company.

This research comes with some drawbacks, the main one being the analysis of only 18 SOEs, which could limit how far the findings apply to other organizations, and the observation period of four years may not be sufficient to capture the long-term dynamics of sustainability variables on financial performance. Second, the measurement of the GCG variable only uses the indicator of the independent commissioner ratio, while other aspects of governance such as the audit committee, report transparency, and management involvement have not been explored. Third, the quantitative approach used does not consider the qualitative context and organizational culture that may affect the effectiveness of ESG implementation, environmental costs, and GCG.

Based on these limitations, suggestions for further research include expanding the sample coverage to include more companies, including non SOEs or private companies with different governance characteristics and sustainability strategies. Using broader ways to measure GCG and environmental costs, together with both quantitative and qualitative research methods, can give a fuller picture of how sustainability efforts relate to company results. Another promising direction would be to track companies over time, allowing researchers to see how ESG and GCG practices shape firm value in the long run. Thus, the findings can provide stronger contributions, both theoretically in the development of sustainable management science and practically in formulating effective and sustainable corporate policies.

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