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The Impact of Environmental and Social Factors on Mining Firms' Financial Performance

Maria Astuti Br Gurusinga[1]*, Dimita H. P. Purba[2], Yosephine N. Sembiring[3]

[1,2,3]*Faculty of Economics, Methodist University of Indonesia*

*mariaastutibrgurusinga@gmail.com

Abstract

This research investigates how environmental performance, environmental costs, and social responsibility influence financial performance in mining corporations. Utilizing purposive sampling, eleven mining enterprises listed on the Indonesia Stock Exchange during 2020–2023 were examined through secondary data analysis. Environmental performance was assessed using PROPER ratings, environmental costs through cost-to-profit ratios, social responsibility via CSRI index, and financial performance through Return on Assets (ROA). Multiple linear regression analysis reveals that environmental performance significantly impacts financial performance (sig. 0.003 < 0.05), whereas environmental costs and social responsibility demonstrate no significant individual effects (sig. 0.413 and 0.867 respectively). However, simultaneous testing confirms all three variables collectively influence financial performance significantly (F-value 4.748, sig. 0.008). The model explains 24.3% of financial performance variation. These findings provide valuable insights for sustainable business strategies in the extractive industry sector.

Keywords: *Environmental Performance, Environmental Costs, Corporate Social Responsibility, Financial Performance, Mining Sector*

Introduction

Contemporary business organizations function as economic entities conducting productive activities aimed at profit generation and sustainable development (Zhang & Liu, 2023). Beyond economic roles, corporations maintain social responsibilities, necessitating alignment between organizational growth and stakeholder interests (Freeman et al., 2020). Financial performance serves as a critical indicator measuring organizational success through liquidity, profitability, solvency, and operational efficiency metrics (Brigham & Houston, 2021). Nevertheless, financial outcomes depend not solely on internal factors but increasingly on environmental and social accountability (Alshehhi et al., 2018).

Environmental performance reflects organizational capacity to minimize ecological impacts from operational activities (Trumpp & Guenther, 2017). Companies demonstrating superior environmental performance typically cultivate positive public images and stakeholder trust, ultimately enhancing corporate valuation (Brammer & Millington, 2008). In Indonesia, the Ministry of Environment and Forestry assesses such performance through the Company Performance Rating Assessment Program (PROPER), which evaluates compliance and environmental management contributions (Handayani & Suryandari, 2021).

Environmental costs, though frequently perceived as financial burdens, represent long-term strategic investments (Henri & Journeault, 2010). These expenditures enhance corporate reputation and attract investor and consumer confidence (Klassen & McLaughlin, 1996). Corporate social responsibility (CSR) constitutes another vital component in sustainable value creation (Carroll & Shabana, 2010). Stakeholder theory posits that socially responsive organizations maintain competitive advantages, as contemporary consumers increasingly prefer products from socially responsible entities (Fatemi et al., 2018). Consequently, CSR contributes directly and indirectly to revenue enhancement and reputation building.

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The mining sector presents unique characteristics warranting specialized investigation due to substantial environmental and social impacts inherent in extractive operations (Vintró et al., 2014). Previous research yields mixed evidence regarding relationships between environmental performance, environmental costs, social responsibility, and financial outcomes (Endrikat et al., 2014). This study addresses this gap by examining Indonesian mining companies, contributing to emerging market literature where institutional contexts differ significantly from developed economies.

Literature Review
Stakeholder Theory
Stakeholder theory posits that corporations maintain responsibilities extending beyond shareholders to encompass all parties affected by organizational operations (Freeman et al., 2020). Management must strategically balance stakeholder expectations as integral components of sustainable business strategies (Donaldson & Preston, 1995). Organizations pursue not merely profit maximization but value creation for diverse stakeholder groups including employees, consumers, creditors, investors, and communities (Clarkson, 1995).

This responsibility manifests through sustainability reporting disclosing environmental and social performance (Eccles & Serafeim, 2013). Transparency in such reporting strengthens corporate image while enhancing stakeholder trust and loyalty (Dhaliwal et al., 2011). Companies demonstrating superior social and ecological performance typically receive positive market responses, including increased productivity, customer loyalty, and improved financing access (Lins et al., 2017). These factors indirectly impact market valuation and financial position sustainability.

Sustainability reporting fundamentally demonstrates how organizations manage stakeholder relationships within complex, dynamic interaction contexts (Gray et al., 2014). These relationships operate on responsibility and accountability principles, emphasizing mutual influence and interdependent ecosystems between corporations and stakeholders (Mitchell et al., 1997).

Agency Theory
Agency theory explicates contractual relationships between principals (owners/investors) and agents (management) in corporate governance (Jensen & Meckling, 1976). Management functions as authorized agents operating on behalf of owners, obligated to communicate relevant information primarily through financial reporting (Eisenhardt, 1989). Management's primary responsibility involves presenting transparent, accurate information enabling investor performance assessment (Fama & Jensen, 1983).

Environmental performance disclosure represents increasingly critical transparency forms, reflecting organizational commitment to sustainability and natural resource stewardship (Clarkson et al., 2008). Such disclosure serves as communication mechanisms between management and investors while building trust that corporations pursue not only profits but also social and environmental responsibilities (Cho et al., 2015).

Agency theory, as game theory components, views these relationships as contracts between parties with divergent interests where information asymmetry may occur (Eisenhardt, 1989). Given management's superior internal information access, transparent environmental information communication becomes essential for minimizing interest conflicts and strengthening accountability (Healy & Palepu, 2001).

Environmental performance disclosure thus functions as mechanisms reducing information imbalances between agents and principals while enhancing corporate reputation and stakeholder value (Hummel & Schlick, 2016).

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Financial Performance

Financial performance constitutes critical indicators assessing organizational success in resource management and operational execution (Brigham & Houston, 2021). This concept represents analytical processes evaluating corporate financial function implementation according to established provisions (Wahlen et al., 2015). Financial performance manifests through systematically and accurately prepared financial statements providing realistic organizational condition depictions (Subramanyam & Wild, 2014).

Financial performance measurement typically employs financial statement analysis, particularly financial ratio approaches including profitability, liquidity, solvency, and activity metrics (Ross et al., 2019). These ratios assess operational efficiency and effectiveness in achieving business objectives (Penman, 2013).
This investigation utilizes Return on Assets (ROA) as the primary profitability indicator measuring corporate capacity to generate profits from total assets, serving as crucial benchmarks for overall financial performance assessment (Palepu et al., 2020).

Environmental Performance

Environmental performance represents organizational efforts maintaining environmental sustainability as social responsibility components (Ilinitch et al., 1998). This encompasses corporate-environment relationships regarding natural resource utilization impacts, production processes, and environmental regulation compliance (Trumpp & Guenther, 2017).
Environmental performance reflects organizational capacity to minimize negative environmental impacts through operational activities, raw material utilization, and environmentally friendly production systems (Klassen & Whybark, 1999). Regulatory compliance constitutes important indicators assessing corporate sustainability commitment (Testa & D'Amato, 2017).
Measuring environmental performance forms integral environmental management system components and represents tangible indicators of corporate environmental program effectiveness (Henri & Journeault, 2010). In Indonesia, the Ministry of Environment and Forestry conducts assessments through PROPER (Company Performance Rating Assessment Program), evaluating compliance levels and contributions to sustainable environmental management (Handayani & Suryandari, 2021).

Environmental Costs

Environmental costs constitute essential elements in managerial decision-making, reflecting financial impacts of corporate environmental activities (Jasch, 2003). These costs relate to products, processes, or facilities potentially posing environmental risks (Henri & Journeault, 2010). Environmental costs represent expenditures arising from environmental quality deterioration caused by operational activities (Burritt et al., 2002).
Recording environmental costs should be separated from conventional financial reports for transparency and measurability (Schaltegger & Burritt, 2000). Environmental costs emerge as consequences of inadequate environmental management (Jasch, 2003). These costs encompass financial and non-financial impacts from activities affecting environmental quality (Bennett & James, 1998).
Environmental cost implementation reflects corporate sustainability commitment and enhances accountability in comprehensive environmental impact management (Burritt et al., 2002).

Corporate Social Responsibility

Corporate Social Responsibility (CSR) represents organizational commitment contributing to sustainable development by balancing economic, social, and environmental aspects (Carroll & Shabana, 2010). CSR constitutes transparent business practices based on normative values benefiting stakeholders (Matten & Moon, 2008). CSR reflects ethical behavior encouraging sustainable living standard improvements (Fatemi et al., 2018).
CSR also represents corporate responsibility forms in disclosing transparency regarding operational activity impacts on society and environment (Gray et al., 2014). In Indonesia, CSR implementation has been regulated

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in Law Number 40 of 2007 concerning Limited Liability Companies Article 74, requiring companies in natural resource sectors to execute social and environmental responsibilities (Rosser & Edwin, 2010).

These definitions align with ISO 26000 principles, emphasizing sustainable, ethical, and responsible behavior importance as genuine contributions to social and environmental welfare (Hahn, 2013).

Hypothesis Development

H₁: Environmental Performance significantly influences Financial Performance positively

Superior environmental performance signals effective management practices to stakeholders, potentially attracting investor interest and enhancing corporate reputation (Trumpp & Guenther, 2017). Companies excelling in environmental management typically demonstrate operational efficiency and sustainability commitment, positively correlating with financial outcomes (Albertini, 2013).

H₂: Environmental Costs significantly influence Financial Performance negatively

Although environmental costs may appear as financial burdens short-term, they represent strategic investments potentially yielding long-term benefits (Henri & Journeault, 2010). However, immediate financial statement impacts may reflect negative relationships as costs reduce short-term profitability (Klassen & McLaughlin, 1996).

H₃: Corporate Social Responsibility significantly influences Financial Performance positively

CSR activities enhance corporate reputation and stakeholder relationships, potentially improving financial performance through customer loyalty, employee satisfaction, and investor confidence (Fatemi et al., 2018). Companies demonstrating strong social responsibility commitments typically achieve superior financial results (Lins et al., 2017).

H₄: Environmental Performance, Environmental Costs, and Corporate Social Responsibility simultaneously influence Financial Performance significantly

Integrated sustainability approaches incorporating environmental and social dimensions alongside economic considerations create synergistic effects on financial performance (Eccles et al., 2014). Comprehensive sustainability strategies addressing multiple stakeholder concerns typically yield superior organizational outcomes (Freeman et al., 2020).

Research Methods

Research Design

This quantitative research employs causality approaches requiring corporate financial information processing through statistical methodologies (Creswell & Creswell, 2018). The study utilizes secondary data accessed through company financial documents available on the Indonesia Stock Exchange (IDX) official website (www.idx.co.id) and Financial Services Authority (OJK) portal (www.ojk.go.id).

Population and Sample

The research population comprises all mining sector companies listed on the Indonesia Stock Exchange during 2020-2023, totaling 39 corporations. Samples represent population subsets possessing specific characteristics determined by researchers for investigation and conclusion drawing (Hair et al., 2019).

The sampling technique employs purposive sampling, whereby researchers utilize specific criteria for selecting relevant samples aligned with research topics (Sekaran & Bougie, 2016). Sample selection criteria include:

1. Companies presenting annual financial report information during 2020-2023 on IDX
2. Companies publishing sustainability report information during 2020-2023 on IDX
3. Companies disclosing Environmental Performance and Environmental Costs on IDX during 2020-2023

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From 39 companies, eleven corporations met criteria as samples across the four-year research period, yielding 44 annual financial reports initially. Following data processing using SPSS 26, extreme data identification reduced analyzed observations to 36 data points.

Variable Operationalization
Dependent Variable: Financial Performance
Financial performance represents variables receiving influences from independent variables (Brigham & Houston, 2021). This study measures financial performance through Return on Assets (ROA) ratio calculations:

$$ROA = \frac{Net\ Profit}{Total\ Asset}\ x\ 100\%$$

Independent Variables:
Environmental Performance
Environmental performance measurement utilizes PROPER ratings assigned by Indonesia's Ministry of Environment and Forestry, ranging from Gold (highest) to Black (lowest) performance levels (Handayani & Suryandari, 2021). PROPER ratings are converted to numerical scales for analytical purposes.

$$Environmental\ Cost = \frac{Environmental\ Cost}{LNet\ Profit\ After\ Tax}$$

Corporate Social Responsibility
CSR disclosure measurement utilizes Corporate Social Responsibility Disclosure Index (CSRI) based on Global Reporting Initiative (GRI) standards:

$$CSRI_j = \frac{\Sigma X_{ij}}{n_j}$$

Where:
- $CSRI_j$ = Corporate Social Responsibility disclosure index of company j
- ΣX_{ij} = Number of disclosure items i, company j
- n_j = Total number of disclosure items (91 items based on GRI standards)

Data Analysis Techniques
Descriptive Statistical Analysis
Descriptive statistics characterize data through mean, median, standard deviation, variance, minimum, and maximum values (Hair et al., 2019).

Classical Assumption Testing
Normality Test
This investigation employs Kolmogorov-Smirnov methodology assessing whether research data distribution follows normal patterns (Field, 2013). Assessment parameters include:
- Data fails normality assumptions if significance < 0.05
- Data meets normality criteria if significance > 0.05

Multiple Linear Regression Analysis
This study uses multiple regression analysis to find relationships between Environmental Performance and Green Investment on Company Assessment with the formula:
Y = a + bX1 + b2X2 + b3X3 + e
Where:

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Y = Financial performance
a = Constant
b = Model Regression Coefficient
X1 = Environmental performance
X2 = Environmental costs
X3 = Corporate social responsibility
e = error

Hypothesis Testing
Partial Test (t-Test)
Investigating individual independent variable influences on dependent variables (Field, 2013):
- Significance < 0.05: independent variable significantly affects dependent variable
- Significance > 0.05: independent variable does not significantly affect dependent variable

Simultaneous Test (F-Test)
Examining collective influences of all independent variables on dependent variables (Hair et al., 2019):
- Significance < 0.05: independent variables simultaneously significantly influence
- Significance > 0.05: independent variables simultaneously do not significantly influence

Coefficient of Determination (R^2)
Evaluating model explanatory power regarding dependent variable variation, utilizing scales from 0 to 1 (Field, 2013). Values approaching 1 indicate most dependent variable variation is explained by independent variables within models.

Results and Discussion
Research Object Description
Research objects comprise mining sector companies listed on the Indonesia Stock Exchange during 2020-2023. Through purposive sampling methodology, from 39 companies, eleven corporations met established criteria, including annual financial reports and sustainability reports throughout the four-year research period, yielding 44 initial observations. Following SPSS 26 data processing and extreme data identification, analyzed observations totaled 36 data points.

Descriptive Statistical Analysis
Table 1 presents descriptive statistics for 36 observations. All variables demonstrate normal distribution patterns where mean values exceed standard deviation values, indicating data quality suitable for analytical purposes.
Table 1: Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Environmental Performance	36	1.09	1.38	1.1222	0.09243
Environmental Costs	36	12.53	26.25	21.5781	4.21291
CSR	36	0.15	0.66	0.4097	0.14758
Financial Performance	36	-8.02	58.51	10.0486	13.63525

Source: Processed data, 2025 (SPSS 26)

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Classical Assumption Test Results

Normality Test

Table 2: Kolmogorov-Smirnov Test Results

One-Sample Kolmogorov-Smirnov Test	Unstandardized Residual
N	36
Normal Parameters: Mean	0.0000000
Normal Parameters: Std. Deviation	11.34261574
Most Extreme Differences: Absolute	0.108
Most Extreme Differences: Positive	0.108
Most Extreme Differences: Negative	-0.074
Test Statistic	0.108
Asymp. Sig. (2-tailed)	0.200

Source: Processed data, 2025 (SPSS 26)

The Asymptotic Significance value of 0.200 exceeds the 0.05 significance threshold, indicating residual variables demonstrate normal distribution patterns. This finding supports assumptions that regression equations follow normal distributions (Field, 2013).

Multiple Linear Regression Analysis

Table 3: Multiple Linear Regression Results

Model	Unstandardized Coefficients B	Std. Error
(Constant)	-75.160	30.317
Environmental Performance	85.416	26.861
Environmental Costs	-0.444	0.534
CSR	-2.628	15.542

Source: Processed data, 2025 (SPSS 26)

Hypothesis Testing Results

Partial Test (t-Test)

Table 4: Partial Test Results

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	-75.160	30.317	-	-2.479	0.019
Environmental Performance	85.416	26.861	0.579	3.180	0.003
Environmental Costs	-0.444	0.534	-0.137	-0.830	0.413
CSR	-2.628	15.542	-0.028	-0.169	0.867

Source: Processed data, 2025 (SPSS 26)

Results indicate:
- Environmental Performance: Significance 0.003 < 0.05 with t-coefficient 3.180 demonstrates positive significant effects on financial performance. H_1 is accepted.
- Environmental Costs: Significance 0.413 > 0.05 with t-coefficient -0.830 shows no significant effects on financial performance. H_2 is rejected.

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- Corporate Social Responsibility: Significance $0.867 > 0.05$ with t-coefficient -0.169 indicates no significant effects on financial performance. H_3 is rejected.

Simultaneous Test (F-Test)

Table 5: Simultaneous Test Results

ANOVA Model	F	Sig.
Regression	4.748	0.008

Source: Processed data, 2025 (SPSS 26)

F-calculated value 4.748 with significance $0.008 < 0.05$ indicates Environmental Performance, Environmental Costs, and Corporate Social Responsibility simultaneously significantly affect Financial Performance. H_4 is accepted.

Coefficient of Determination Test

Table 6: Determination Coefficient Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.555	0.308	0.243	11.86239	1.612

Source: Processed data, 2025 (SPSS 26)

Adjusted R Square value 0.243 indicates Environmental Performance, Environmental Costs, and Corporate Social Responsibility variables explain 24.3% of Financial Performance variation. The remaining 75.7% is influenced by variables outside the regression model.

Discussion

Environmental Performance Effects on Financial Performance

Regression analysis confirms the first hypothesis (H_1): Environmental Performance significantly positively affects Financial Performance. Superior environmental management directly correlates with enhanced financial outcomes (Trumpp & Guenther, 2017). This relationship manifests through multiple mechanisms grounded in stakeholder theory, whereby companies demonstrating environmental concern improve public image and broaden stakeholder relationships (Freeman et al., 2020).

Contemporary consumers increasingly prioritize environmental and social impacts when making purchasing decisions (Fatemi et al., 2018). Organizations adopting environmentally friendly policies attract consumers valuing social responsibility, contributing to increased sales and customer loyalty, ultimately enhancing revenue and financial performance (Lins et al., 2017). Additionally, companies prioritizing environmental performance benefit from operational cost savings through efficient environmental management practices such as waste reduction, renewable energy utilization, and carbon emission reductions (Klassen & McLaughlin, 1996).

These findings align with research by Albertini (2013) and Endrikat et al. (2014), demonstrating positive relationships between environmental performance and financial outcomes. However, contrasting evidence exists from studies suggesting no significant relationships, potentially reflecting contextual differences in regulatory environments, industry characteristics, or measurement methodologies (Dixon-Fowler et al., 2013).

Environmental Costs Effects on Financial Performance

Analysis rejects the second hypothesis (H_2): Environmental Costs demonstrate no significant effects on Financial Performance. Environmental expenditure magnitudes do not substantially alter organizational financial conditions, either positively or negatively (Henri & Journeault, 2010). Regardless of environmental

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cost levels, these expenditures appear insufficiently influential to affect measured financial performance indicators.

This finding contrasts with stakeholder theory propositions emphasizing corporate responsibilities extending beyond shareholders to encompass customers, employees, governments, communities, and environments (Freeman et al., 2020). Several explanations emerge from stakeholder theory perspectives. First, not all stakeholders exert substantial pressure regarding environmental issues (Mitchell et al., 1997). When majority stakeholders (consumers, investors, business partners) do not prioritize environmental aspects or incorporate them into decision-making processes, environmental expenditures function primarily as moral obligations rather than profitable business strategies (Gray et al., 2014).

Second, environmental activities yield long-term effects, whereas financial performance typically undergoes short-term measurement (quarterly or annually) (Burritt et al., 2002). Environmental costs frequently represent investments demonstrating benefits only after several years through operational efficiency, reduced legal risks, or enhanced brand reputation (Jasch, 2003). Consequently, short-term financial statements may portray environmental costs as additional expenses without immediately visible revenue increases.

These results align with Wulandari and Nurlaily (2022) findings indicating no environmental cost effects on financial performance, yet contrast with studies by Henri and Journeault (2010) suggesting positive relationships between environmental costs and financial outcomes.

Corporate Social Responsibility Effects on Financial Performance

Analysis rejects the third hypothesis (H₃): Corporate Social Responsibility demonstrates no significant effects on Financial Performance. CSR program implementation does not substantially increase or decrease organizational financial indicators (Carroll & Shabana, 2010). Regardless of CSR program forms or magnitudes, these initiatives appear insufficiently impactful to significantly affect corporate financial conditions.

This perspective emerges from assumptions positioning CSR primarily as social activities or moral and legal compliance forms not directly contributing to revenue generation or cost reduction (Matten & Moon, 2008). The findings reject stakeholder theory expectations that organizations obligated to address diverse stakeholder interests—employees, communities, governments—through social responsibility enhance stakeholder relationships and financial performance via public support, customer loyalty, and positive reputations (Lins et al., 2017).

However, practical implementation demonstrates social responsibility does not always directly impact financial improvement (Fatemi et al., 2018). Not all social responsibility programs yield measurable financial results; some organizations implement CSR solely for image-building without evaluating long-term impacts (Gray et al., 2014). Consequently, ineffective or market-irrelevant social responsibility initiatives may fail to significantly influence consumer behavior or business decisions.

From agency theory perspectives, principal focus rests on owner-manager relationships (Jensen & Meckling, 1976). Managers sometimes execute social responsibility programs based on personal interests—building personal reputations or meeting social demands—without considering shareholder added value (Eisenhardt, 1989). This potentially creates interest conflicts when social responsibility proceeds without strategies supporting overall corporate financial objectives. Social responsibility may appear wasteful if failing to provide genuine long-term benefits (Fama & Jensen, 1983).

These results align with research by Fatemi et al. (2018) indicating no social responsibility effects on financial performance, yet contrast with studies by Lins et al. (2017) and Eccles et al. (2014) demonstrating positive social responsibility effects on financial outcomes.

Simultaneous Effects of Environmental Performance, Environmental Costs, and Social Responsibility

Simultaneous testing (F-Test) confirms the fourth hypothesis (H₄): Environmental Performance, Environmental Costs, and Social Responsibility collectively significantly affect Financial Performance. In contemporary

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corporate management contexts, financial success depends not solely on economic efficiency but also on integrated environmental and social aspect management (Eccles et al., 2014).

From agency theory perspectives, these results indicate owner and manager interests align when environmental and social activities undergo effective, goal-oriented management (Jensen & Meckling, 1976). Agency theory recognizes potential conflicts between company owners (principals) and managers (agents), whereby managers may implement social or environmental responsibility policies solely for personal image enhancement without considering long-term financial impacts (Eisenhardt, 1989).

However, when these activities proceed efficiently and aim to increase corporate value, environmental costs and social responsibility programs actually function as corporate value enhancement tools rather than burdens or waste (Freeman et al., 2020). Managers capable of aligning personal and shareholder interests through prudent environmental and social management ensure policies positively impact financial performance.

Hypothesis acceptance proves companies simultaneously addressing these three aspects create significant financial added value (Eccles et al., 2014). This strengthens positions that sustainability aspect integration into business strategies represents not merely moral or social demands but economically rational strategies. Stakeholders respond positively to socially and environmentally responsible companies, while shareholders recognize these activities contribute to corporate value, thereby minimizing agency conflicts (Freeman et al., 2020).

From Adjusted R Square figures, Environmental Performance, Environmental Costs, and Social Responsibility explain 24.3% of Financial Performance variation, with remaining 75.7% influenced by other research variables including operational efficiency, innovation, market positioning, and macroeconomic conditions (Hair et al., 2019).

Conclusion

Based on comprehensive analysis examining Environmental Performance, Environmental Costs, and Corporate Social Responsibility influences on Financial Performance, several conclusions emerge:

1. Environmental Performance variables partially demonstrate significant effects on Financial Performance in Mining Sector companies listed on the Indonesia Stock Exchange. Superior environmental management translates directly into enhanced financial outcomes through improved stakeholder relationships, operational efficiency, and cost savings.

2. Environmental Cost variables partially show no significant effects on Financial Performance in Mining Sector companies. Environmental expenditure magnitudes do not substantially alter organizational financial conditions, suggesting short-term financial statements may not capture long-term environmental investment benefits.

3. Corporate Social Responsibility variables partially demonstrate no significant effects on Financial Performance in Mining Sector companies. CSR program implementation does not directly contribute to measurable financial performance improvements, potentially reflecting implementation effectiveness issues or temporal lags between CSR activities and financial outcomes.

4. Environmental Performance, Environmental Costs, and Corporate Social Responsibility variables simultaneously significantly affect Financial Performance in Mining Sector companies. This confirms integrated sustainability approaches create synergistic value beyond individual component effects, supporting comprehensive corporate sustainability strategies.

5. The three variables collectively explain 24.3% of Financial Performance variation, with remaining 75.7% influenced by factors outside the model, including operational efficiency, technological innovation, market dynamics, regulatory environments, and macroeconomic conditions.

Recommendations

For Corporate Management

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1. Prioritize environmental performance enhancement through systematic environmental management system implementation, recognizing direct positive relationships with financial outcomes. Investments in environmental technologies, waste reduction programs, and energy efficiency initiatives yield both ecological and economic benefits.
2. Develop comprehensive approaches integrating environmental performance, environmental costs, and social responsibility into strategic planning frameworks. While individual effects may vary, simultaneous implementation creates synergistic value enhancement.
3. Implement robust measurement and reporting systems tracking environmental and social performance metrics alongside financial indicators, enabling evidence-based decision-making and stakeholder communication.

For Investors and Stakeholders

1. Incorporate environmental performance assessments when evaluating mining sector investments, recognizing significant relationships with financial outcomes. Companies demonstrating superior PROPER ratings typically exhibit enhanced long-term financial performance.
2. Adopt comprehensive evaluation frameworks examining multiple sustainability dimensions rather than isolated financial metrics, acknowledging that integrated sustainability approaches create superior organizational value.
3. Engage actively with portfolio companies regarding sustainability practices, encouraging transparent disclosure and continuous improvement in environmental and social performance.

For Policymakers

1. Strengthen environmental performance assessment programs like PROPER, ensuring rigorous evaluation standards and meaningful differentiation between performance levels, thereby incentivizing genuine environmental management improvements.
2. Develop policy frameworks encouraging long-term environmental and social investments through tax incentives, regulatory support, or public recognition programs, addressing temporal disconnects between sustainability investments and financial returns.
3. Mandate comprehensive sustainability reporting requirements for extractive industry companies, enhancing transparency and enabling stakeholder evaluation of corporate environmental and social performance.

For Future Research

1. Extend study periods beyond four years to capture long-term relationships between sustainability practices and financial performance, potentially revealing delayed effects not observable in shorter timeframes.
2. Expand sample sizes incorporating additional mining companies or extending analysis to other natural resource sectors, enhancing statistical power and generalizability of findings.
3. Investigate moderating and mediating variables potentially influencing relationships between environmental performance, environmental costs, social responsibility, and financial outcomes, including corporate governance quality, technological capabilities, or stakeholder engagement effectiveness.
4. Employ alternative measurement methodologies for environmental costs and social responsibility, potentially revealing relationships not captured through current operationalizations.
5. Conduct comparative studies examining these relationships across different national contexts, industries, or regulatory environments, contributing to understanding of contextual factors shaping sustainability-financial performance linkages.

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