

Green Accounting and Profitability: Evidence from PROPER Mining Firms in Indonesia

Kareen Andina¹, Violetta Elsa Namira Susanto^{2*}, Haryanto Haryanto³

^{1,2,3}Accounting Department, BINUS Online Learning, Bina Nusantara University, Indonesia

*Corresponding Author: violetta.susanto@binus.ac.id or Violetta.susanto16@gmail.com

Tanggal Masuk:

01 November 2025

Tanggal Revisi:

02 Mei 2026

Tanggal Diterima:

06 Juni 2026

Keywords: *Environmental Costs; Environmental Disclosure; Green Accounting; Green Investment; PROPER.*

How to cite (APA 6th style)

Andina, K., Susanto, V. E. N., & Haryanto, H. (2026). Green Accounting and Profitability: Evidence from PROPER Mining Firms in Indonesia. *Jurnal Eksplorasi Akuntansi (JEA)*, 8 (2), 840-855.

DOI:

<https://doi.org/10.24036/jea.v8i2.3947>

Abstract

Sustainability has become a strategic issue for mining companies because their operations create direct environmental and financial consequences. This research examines the effect of environmental costs, green investment, and environmental disclosure on the profitability of PROPER-participating mining companies listed on the Indonesia Stock Exchange during 2022–2024. Profitability is measured using return on assets. The study uses a quantitative associative approach based on secondary data from annual reports, sustainability reports, and PROPER publications. The final sample comprises 13 mining companies and 39 firm-year observations. Panel data regression is applied, and the model specification tests indicate that the Random Effects Model is the most appropriate. The results show that environmental costs have a significant negative effect on profitability, whereas green investment and environmental disclosure have no significant effect. These findings indicate that green accounting practices do not automatically improve short-term profitability in the mining sector. Environmental costs may still pose a financial burden when immediate expenditures outweigh short-term benefits. Green investment and environmental disclosure may require longer time horizons and stronger operational integration before their financial effects appear in ROA. This study contributes to green accounting literature by showing that environmental costs, investment, and disclosure have distinct financial implications.



This is an open access article distributed under the [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

INTRODUCTION

Sustainability has become an important part of corporate strategy, especially in sectors with high environmental exposure. Mining companies face stronger pressure because their

operations affect land use, waste generation, emissions, water quality, and local communities. In Indonesia, this issue is relevant because the mining industry contributes to economic activity while also creating substantial environmental risks. Companies in this sector are therefore expected to manage profitability and environmental responsibility simultaneously. This condition creates a central managerial problem. Mining firms need to maintain financial performance while allocating resources to environmental protection, restoration, and transparent reporting.

Green Accounting provides a framework for integrating environmental information into accounting and managerial decision-making. It links environmental costs, environmental disclosure, and green investment with financial performance by making environmental impacts more visible in accounting systems (Gonzalez & Peña-Vinces, 2023; Sreenu, 2026). Environmental costs represent expenditures used to prevent, control, or repair environmental damage. Environmental disclosure reflects the extent to which firms report environmental information to stakeholders. Green investment refers to capital allocation for environmentally friendly projects, including resource efficiency, pollution reduction, reclamation, and green technology (Becchetti et al., 2022; Falcone, 2020). These three components are connected because they show how firms recognize environmental impacts, allocate financial resources to environmental action, and communicate environmental responsibility.

In Indonesia, the Company Performance Rating Program, known as PROPER, has become an important policy mechanism for evaluating and encouraging corporate environmental performance. Through PROPER, firms receive environmental ratings that reflect their compliance and environmental management practices. For mining companies, PROPER is not only a regulatory instrument but also a public signal of how seriously they take environmental risk management. ESG readiness extends beyond formal compliance because firms translate global standards through national institutions and sectoral logics, making sector-specific benchmarks and institutional capacity building important (Setiawan et al., 2023, 2025). Internal control also strengthens the relevance of this argument because it supports risk management, cost efficiency, and business sustainability when environmental responsibilities are embedded in corporate processes (Harasheh & Provasi, 2023; Haryanto et al., 2024). However, participation in PROPER does not automatically mean that firms have integrated Green Accounting into their strategic and financial systems. Some firms may report environmental information to meet formal requirements, while others may allocate environmental costs and green investment more substantively to improve operational efficiency and reduce long-term risk.

Previous studies have examined Green Accounting, environmental costs, environmental performance, and environmental disclosure in relation to firm value or financial performance (Gustinya, 2022; Hidayat et al., 2023; Riyadh et al., 2020). Other studies suggest that environmental initiatives may improve reputation, efficiency, and stakeholder trust (Aida et al., 2024; Baah et al., 2021). Evidence from blue economy research also shows that environmentally responsible practices can strengthen financial performance by improving corporate accountability and stakeholder trust (Atikah & Haryanto, 2026). However, the empirical evidence remains mixed. Environmental costs may reduce profit when treated solely as additional expenses, but they may improve profitability by preventing sanctions, reducing waste, and supporting efficiency. Green investment may also create long-term financial benefits, although its effect depends on the quality of the investment and the firm's ability to convert environmental initiatives into operational gains (Chandra & Sumani, 2023; Fitriyani et al., 2025; Khalid et al., 2023). Environmental disclosure has an even more complex relationship with profitability because disclosure can improve transparency, but it does not always produce immediate financial benefits (Rahman et al., 2023).

This research addresses that gap by examining the effects of environmental costs, green investment, and environmental disclosure on profitability among PROPER-participating mining companies listed on the Indonesia Stock Exchange during 2022–2024. The focus on profitability is important because managers and investors need evidence on whether environmental accounting practices are associated with asset-based financial performance. Unlike studies that primarily link Green Accounting to firm value, this research uses Return on Assets as the dependent variable to assess whether environmental actions are reflected in the firm's ability to generate profits from its assets. The inclusion of green investment also strengthens the research model because it captures proactive environmental resource allocation, not only compliance-related costs and disclosure.

This research uses a focused theoretical foundation. The cost-benefit perspective helps explain why environmental costs and green investment may have two possible financial consequences. They can reduce profitability by increasing expenses without producing operational benefits. They can also improve profitability when their benefits exceed their costs by improving efficiency, reducing risk, ensuring regulatory compliance, and optimizing asset utilization. The Triple Bottom Line perspective complements this logic by explaining why firms need to balance profit, people, and planet in long-term business decisions (Gallardo-Vázquez, 2025; Larivière & Smit, 2022). Legitimacy Theory and Stakeholder Theory are used more specifically to explain environmental disclosure (Del Gesso & Lodhi, 2025). Firms disclose environmental information to maintain social acceptance and respond to stakeholder information needs, but disclosure alone may not improve profitability unless it is supported by tangible environmental action (Gidage et al., 2025; Rohendi et al., 2024).

Based on these considerations, this research aims to examine whether environmental costs, green investment, and environmental disclosure influence the profitability of PROPER-participating mining companies listed on the IDX. The study contributes to the Green Accounting literature by clarifying the financial relevance of concrete environmental action and environmental reporting in a highly regulated extractive sector. It also provides practical insight for managers, investors, and policymakers by showing whether sustainability-oriented accounting practices are associated with profitability in Indonesia's mining industry.

LITERATURE REVIEW AND HYPOTHESIS

Green Accounting and Profitability

Green Accounting refers to the integration of environmental considerations into accounting and managerial decision-making processes. It enables companies to identify, measure, manage, and disclose environmental impacts associated with their operations while evaluating their implications for financial performance (Gonzalez & Peña-Vinces, 2023; Sreenu, 2026). Within this framework, environmental costs, green investment, and environmental disclosure represent three complementary dimensions of corporate environmental responsibility.

This research primarily adopts the cost-benefit perspective and the Triple Bottom Line framework. From a cost-benefit perspective, environmental initiatives may initially increase corporate expenditures. However, these expenditures can yield financial benefits by improving operational efficiency, reducing environmental risks, preventing regulatory penalties, strengthening stakeholder confidence, and enhancing resource utilization. The Triple Bottom Line framework further suggests that long-term corporate success depends on balancing economic, environmental, and social objectives rather than focusing solely on short-term financial outcomes (Gallardo-Vázquez, 2025; Larivière & Smit, 2022). Accordingly, environmental initiatives are expected to contribute to profitability when they create economic value that exceeds their implementation costs.

Environmental Costs and Profitability

Environmental costs represent expenditures incurred to prevent, monitor, control, and remediate environmental impacts arising from business activities. Hansen and Mowen classify these costs into prevention, detection, internal failure, and external failure costs (Azizah & Cahyaningtyas, 2023). In environmentally sensitive industries such as mining, environmental costs are unavoidable because firms must comply with environmental regulations and manage operational risks associated with resource extraction.

From a cost-benefit perspective, environmental costs may reduce profitability in the short term when the costs of prevention, monitoring, remediation, and compliance exceed the immediate financial benefits. Excessive environmental expenditures can reduce earnings by increasing operating costs. However, environmental costs can also generate financial benefits when they improve efficiency, reduce waste, prevent environmental sanctions, lower litigation risk, and enhance operational performance. Companies that proactively manage environmental issues are often able to avoid larger future costs associated with environmental accidents, remediation obligations, and regulatory penalties (Yenidogan et al., 2021).

Empirical evidence remains mixed. Some studies report that environmental costs negatively affect profitability because they increase corporate expenditures and reduce short-term earnings (Boakye et al., 2020; Karim et al., 2025). Other studies find insignificant effects, suggesting that environmental spending does not automatically improve financial performance (Aurelia et al., 2022). In contrast, several studies indicate that well-managed environmental expenditures contribute to operational efficiency and profitability (Shabbir & Wisdom, 2020; Susanti et al., 2023). Given the increasing importance of environmental management in Indonesia's mining industry, environmental costs are expected to generate net benefits that exceed their associated expenditures.

H1: Environmental costs have a positive and significant effect on profitability.

Green Investment and Profitability

Green investment refers to capital allocation toward environmentally sustainable projects, including renewable energy, energy efficiency, green technology, waste reduction, and environmental rehabilitation initiatives (Larasati et al., 2023; Xiong & Dai, 2023). Unlike environmental costs often associated with compliance requirements, green investment reflects a proactive, strategic commitment to long-term sustainability.

The financial benefit of green investment may not be immediately reflected in ROA because environmental technology, reclamation, and efficiency projects often have longer payback periods. Consequently, profitability may decline in the short term because firms incur additional investment costs. Nevertheless, these investments can create long-term value by improving resource efficiency, reducing operating costs, supporting innovation, minimising regulatory risk, and strengthening competitive advantage. The Triple Bottom Line framework also supports the view that investments benefiting environmental and social performance can simultaneously generate economic value (Gallardo-Vázquez, 2025; Larivière & Smit, 2022).

Prior empirical findings generally support a positive relationship between green investment and profitability. Khalid et al. (2023) found that environmentally oriented investments improve financial performance through efficiency gains and stronger investor confidence. Similarly, Fitriyani et al. (2025) reported that green investment enhances competitiveness and corporate value. However, Chandra and Sumani (2023) found no significant relationship, indicating that the financial impact of green investment depends on investment quality and implementation effectiveness. Given the strategic role of environmental innovation and sustainability initiatives in mining operations, green investment is expected to contribute positively to profitability.

H2: Green investment has a positive and significant effect on profitability.

Environmental Disclosure and Profitability

Environmental disclosure refers to the communication of environmental information through annual reports, sustainability reports, or other corporate reporting mechanisms (Aureli et al., 2020; Caputo et al., 2021; Monteiro et al., 2023). Such disclosure typically includes information related to emissions, waste management, energy consumption, environmental policies, and sustainability initiatives.

Environmental disclosure may improve transparency and legitimacy, but it does not directly alter cost structures or asset productivity unless supported by substantive environmental action. Legitimacy Theory suggests that firms disclose environmental information to maintain social acceptance and demonstrate conformity with societal expectations. Stakeholder Theory argues that disclosure serves as a mechanism for addressing stakeholder information needs and strengthening corporate accountability (Haryanto, 2020; Osei et al., 2025; Sciulli & Adhariani, 2023). Through greater transparency, firms may improve stakeholder trust, corporate reputation, and access to external resources.

However, the relationship between environmental disclosure and profitability remains uncertain. While disclosure can strengthen stakeholder confidence and improve corporate image, disclosure activities alone do not necessarily improve operational efficiency or financial performance. The benefits of disclosure often materialize gradually and may depend on whether disclosure is accompanied by substantive environmental actions (Rahman et al., 2023). Empirical evidence also remains inconsistent. Aida et al. (2024) found a positive but insignificant relationship between environmental disclosure and profitability, whereas Rahman et al (2023) reported a significant negative association. Despite these inconsistencies, environmental disclosure is expected to contribute positively to profitability because greater transparency may strengthen stakeholder trust and enhance corporate legitimacy.

H3: Environmental disclosure has a positive and significant effect on profitability.

RESEARCH METHOD

Research Type

This research uses a quantitative associative approach with an explanatory design. The quantitative approach is appropriate because the research examines numerical data obtained from annual reports, sustainability reports, and PROPER publications. The associative approach is used to examine the relationships among environmental costs, green investment, environmental disclosure, and profitability. The explanatory design allows this research to assess whether variations in profitability can be explained by selected green accounting variables.

This research is non-experimental because it does not involve direct intervention in the observed companies. Instead, it uses secondary data publicly disclosed by mining companies listed on the Indonesia Stock Exchange and participating in the PROPER program. The use of panel data is relevant because the observations combine cross-sectional data from several companies and time-series data across the 2022–2024 period.

Population and Sample

The population of this research consists of mining companies listed on the Indonesia Stock Exchange that participated in the PROPER program during the 2022–2024 period. The sample was selected using purposive sampling. This method was used because the research required companies that consistently published annual reports, sustainability reports, and PROPER-related environmental information during the observation period.

Table 1
Sample Selection of Mining Companies

No.	Description	Number
1.	Listed on the Indonesian Stock Exchange	53
2.	Did not publish annual financial reports consecutively during 2022–2024	(9)
3.	Did not publish sustainability reports consecutively during 2022–2024	(10)
4.	Did not participate in PROPER during 2022–2024	(21)
	Mining companies that met the research criteria	13
	Years of observation	3
	Total firm-year observations	39

Source: Processed data

Method of Data Collection

This research uses secondary data collected through documentation. The data were obtained from annual reports, sustainability reports, and PROPER publications. Annual financial reports were accessed via the official Indonesia Stock Exchange website and the companies' websites. Sustainability reports were collected from each company's official website. PROPER participation and ratings were obtained from publications issued by the Ministry of Environment and Forestry. The collected data were checked, coded, and organized in Microsoft Excel before statistical processing. Because the dataset combines firm-level and year-level observations, the analysis was conducted using a panel data approach.

Variable Operations

This research consists of one dependent variable and three independent variables. Profitability is the dependent variable, measured by return on assets. The independent variables consist of environmental costs, green investment, and environmental disclosure. These variables represent measurable components of green accounting practices in mining companies.

Table 2
Operational Variables

Variable	Reference	Definition and Measurement	Scale
Profitability, ROA (Y)	Fitriyatun and Meirini (2024)	Profitability measures the company's ability to generate profit from its assets. It is measured using return on assets. $ROA = \text{Net Profit After Tax} / \text{Total Assets} \times 100\%$	Ratio
Environmental Costs (X1)	Aida et al. (2024)	Environmental costs refer to expenditures incurred for environmental management, prevention, control, and restoration activities. $\text{Environmental Costs} = \text{Total Environmental Costs} / \text{Current Year Profit} \times 100\%$	Ratio
Green Investment (X2)	Khalid et al. (2023)	Green investment refers to investment allocated to environmentally friendly projects, green technology, reclamation, energy efficiency, or other sustainability-oriented activities. $\text{Green Investment} = \text{Environmental Investment Costs} / \text{Total Assets} \times 100\%$	Ratio
Environmental Disclosure (X3)	GRI (2021)	Environmental disclosure measures the completeness of environmental information in sustainability reports, based on the GRI 14: Mining Sector 2024. The checklist consists of 25 disclosure indicators. $\text{Environmental Disclosure} = \text{Total Disclosed Environmental Indicators} / \text{Total GRI Environmental Indicators} \times 100\%$	Ratio

Source: Processed data

Data Analysis Method

This research uses panel data regression to test the effect of environmental costs, green investment, and environmental disclosure on profitability. Panel data regression is appropriate because the dataset consists of observations across companies and years. This method allows the analysis to capture firm-level and time-related variation in the data.

Before interpreting the regression results, model specification tests were conducted to select the most appropriate panel data estimation model. The Chow test was used to compare the Common Effects Model and the Fixed Effects Model. The Hausman test was used to compare the Fixed Effects Model and the Random Effects Model. The Lagrange Multiplier test was used to compare the Common Effects Model and the Random Effects Model. The final interpretation was based on the model selected through these specification tests.

The regression model is formulated as follows:

$$ROA_{it} = \alpha + \beta_1 EC_{it} + \beta_2 GI_{it} + \beta_3 ED_{it} + \epsilon_{it}$$

Where:

ROA_{it} = profitability of firm i in year t
 α = constant
 β_1 to β_3 = regression coefficients
EC_{it} = environmental costs of firm i in year t
GI_{it} = green investment of firm i in year t
ED_{it} = environmental disclosure of firm i in year t
 ϵ_{it} = error term

Hypothesis testing was conducted by examining the direction of each independent variable's coefficient and its probability value. A variable is considered statistically significant when its probability value is below 0.05. The model fit was evaluated using R-squared, adjusted R-squared, F-statistic, and Prob(F-statistic).

RESULTS

Descriptive Statistics

Descriptive statistics are presented to characterize the distributions of the research variables prior to hypothesis testing. This research uses 39 firm-year observations from PROPER-participating mining companies listed on the Indonesia Stock Exchange during 2022–2024. The variables include environmental costs, green investment, environmental disclosure, and profitability, measured by return on assets.

Table 3
Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
Environmental Costs	0.000	0.613	0.07508	0.149690
Green Investment	0.000	0.055	0.01500	0.014224
Environmental Disclosure	0.000	1.000	0.63077	0.323983
ROA	-0.246	0.616	0.13062	0.185247

Source: Processed data

Table 3 shows that the mean ROA is 0.13062, with a minimum of -0.246 and a maximum of 0.616. This indicates that profitability varies substantially across the sampled mining companies. Environmental costs have a mean of 0.07508 and a maximum of 0.613. Green investment has a lower mean of 0.01500, indicating that it remains relatively limited compared to the other green accounting indicators. Environmental disclosure has a mean of 0.63077, indicating a moderate average level. The minimum value of 0.000 indicates that some firm-year observations did not report the relevant environmental indicators, given the measurement used in this research.

Panel Data Model Specification Tests

This research uses panel data regression because the dataset combines cross-sectional observations from companies and time-series observations from 2022 to 2024. Before hypothesis testing, model specification tests were conducted to determine the most appropriate panel data estimation model. The Chow test was used to compare the Common Effects Model and the Fixed Effects Model. The Hausman test was used to compare the Fixed Effects Model and the Random Effects Model. The Lagrange Multiplier test was used to compare the Common Effects Model and the Random Effects Model.

Table 4
Panel Data Model Specification Tests

Test	Model Comparison	Statistic	Probability	Decision
Chow Test	Common Effects Model vs Fixed Effects Model	9.7601	0.0000	Fixed Effects Model preferred
Hausman Test	Fixed Effects Model vs Random Effects Model	4.6586	0.1986	Random Effects Model preferred
Lagrange Multiplier Test	Common Effects Model vs Random Effects Model	17.4289	0.0000	Random Effects Model preferred

Source: Processed data

Table 4 shows that the Chow test has a probability value of 0.0000, which is below 0.05. This result indicates that the Fixed Effects Model is preferred over the Common Effects Model. The Hausman test has a probability value of 0.1986, which is above 0.05. This result indicates that the Random Effects Model is preferred over the Fixed Effects Model. The Lagrange Multiplier test yields a p-value of 0.0000, which is below 0.05. This result confirms that the Random Effects Model is preferred over the Common Effects Model. Based on these model specification tests, the Random Effects Model is selected as the final estimation model.

Random Effects Regression Results

The Random Effects Model was used to examine the effect of environmental costs, green investment, and environmental disclosure on profitability. The regression results are presented in Table 5.

Table 5
Random Effects Regression Results

Panel A. Regression Coefficients

Variable	Coefficient	Std. Error	t-statistic	Probability
Constant	0.233614	0.095520	2.445716	0.019627
Environmental Costs	-0.434435	0.177688	-2.444929	0.019663
Green Investment	-0.729058	3.511175	-0.207639	0.836714
Environmental Disclosure	-0.094244	0.117103	-0.804794	0.426372

Panel B. Model Summary

Indicator	Value
R-squared	0.208045
Adjusted R-squared	0.140164
F-statistic	3.064818
Prob(F-statistic)	0.040625
Number of observations	39

Source: Processed data

Table 5 shows that environmental costs have a coefficient of -0.434435 and a probability value of 0.019663. Since the probability value is below 0.05, environmental costs have a significant effect on ROA. However, the coefficient is negative. This means that higher environmental costs are associated with lower profitability among the sampled mining companies during the 2022–2024 period. Therefore, H1 is rejected because the result is significant but does not support the proposed positive direction.

Green investment has a coefficient of -0.729058 and a probability value of 0.836714. Since the probability value is above 0.05, green investment does not have a significant effect on ROA. Therefore, H2 is rejected. This result indicates that green investment has not yet generated a measurable effect on profitability during the observation period.

Environmental disclosure has a coefficient of -0.094244 and a probability value of 0.426372. Since the probability value is above 0.05, environmental disclosure does not have a significant effect on ROA. Therefore, H3 is rejected. This result indicates that environmental disclosure does not directly translate into higher profitability in the observed sample.

The R-squared value is 0.208045, which means that environmental costs, green investment, and environmental disclosure explain 20.8045% of the variation in ROA. The adjusted R-squared value is 0.140164. The probability value of the F-statistic is 0.040625, which is below 0.05. This indicates that the model is statistically significant. The remaining variation in ROA is explained by other factors outside the model, including firm-level financial characteristics, operational efficiency, commodity price movements, governance quality, and macroeconomic conditions.

Overall, the results show that the effect of green accounting practices on profitability is not uniformly positive. Environmental costs have a significant negative effect on profitability, whereas green investment and environmental disclosure have no significant effect. These findings indicate that, over the short observation period of 2022–2024, environmental costs may still pose a financial burden rather than a source of immediate profitability. Green investment and environmental disclosure may require a longer period before their benefits can be reflected in asset-based profitability.

DISCUSSION

This section interprets the results of the Random Effects Model on the relationship between Green Accounting practices and profitability in PROPER-participating mining companies listed on the Indonesia Stock Exchange during 2022 to 2024. The results show that environmental costs have a significant negative effect on ROA, whereas green investment and environmental disclosure have no significant effect. These findings indicate that Green Accounting practices do not produce uniform financial outcomes. Their financial relevance depends on timing, implementation quality, and the extent to which environmental initiatives are converted into efficiency, risk control, and stronger asset productivity.

The Effect of Environmental Costs on ROA of PROPER-Participating Mining Companies Listed on the IDX during 2022 to 2024

Environmental costs have a significant negative effect on ROA, with a coefficient of -0.434435 and a probability value of 0.019663. This result rejects H1 because the relationship is significant but moves in the opposite direction from the proposed positive hypothesis. The finding suggests that higher environmental costs are associated with lower profitability among the sampled mining companies during the observation period.

This result supports the cost-benefit perspective. Environmental costs may enhance long-term resilience by preventing regulatory sanctions, reducing environmental risk, and strengthening operational discipline. However, they may reduce short-term profitability when the immediate costs of prevention, monitoring, remediation, waste control, and compliance exceed the financial benefits realized in the same period. In mining companies, this issue is especially relevant because environmental responsibility often entails substantial expenditures on reclamation, land rehabilitation, pollution control, and waste management.

The negative coefficient also indicates that environmental costs may not yet function as efficiency-generating investments in the observed firms. Some environmental expenditures may be reactive rather than preventive. They may arise from regulatory obligations, remediation needs, or accumulated environmental impacts. Under such conditions, environmental costs can reduce current earnings without immediately improving asset utilization. This interpretation is consistent with studies showing that environmental costs can suppress profitability when they increase corporate expenditures and reduce short-term earnings (Boakye et al., 2020; Karim et al., 2025).

The finding differs from studies that report a positive financial role of environmental spending when environmental costs are linked to operational efficiency and risk prevention (Kuo et al., 2023; Shabbir & Wisdom, 2020; Susanti et al., 2023; Yenidogan et al., 2021). This difference suggests that the profitability effect of environmental costs depends on managerial execution. Environmental costs are more likely to support profitability when they are embedded in planning, process improvement, energy efficiency, and cost control. They are less likely to improve ROA when they are incurred mainly for compliance or remediation.

The Effect of Green Investment on ROA of PROPER-Participating Mining Companies Listed on the IDX during 2022 to 2024

Green investment does not have a significant effect on ROA, with a coefficient of -0.729058 and a probability value of 0.836714. This result rejects H2 because green investment does not provide statistically significant evidence of improving profitability during the observation period. The finding indicates that green investment has not yet generated a measurable financial effect on asset-based profitability among the sampled mining companies. The result can be explained by the time lag between investment and financial return. Green investment in mining firms often involves green technology, reclamation projects, energy efficiency, environmental infrastructure, and cleaner operational systems. These investments usually require substantial initial costs. Their benefits may emerge through lower energy use, reduced environmental risk, improved compliance, or stronger operating resilience, but these benefits may not appear within a three-year observation window.

The insignificant result also implies that the investment amount alone is not enough. Green investment needs to be connected to operational strategy, measurable performance targets, and managerial monitoring. Without this integration, green investment may remain a sustainability allocation that is visible in reports but not yet reflected in cost savings, productivity, or ROA. This interpretation is consistent with Chandra and Sumani (2023), who found that the financial impact of green investment depends on investment quality and implementation effectiveness.

This finding differs from Khalid et al. (2023), who found that green investment can enhance profitability, and Fitriyani et al (2025), who reported that green investment can support competitiveness and firm value. The difference may reflect sectoral characteristics. Mining-related green investment is often capital-intensive and tied to long-term environmental obligations. Its financial return may appear later than in sectors where green investment more directly reduces production costs or increases market demand.

The Effect of Environmental Disclosure on ROA of PROPER-Participating Mining Companies Listed on the IDX during 2022 to 2024

Environmental disclosure does not have a significant effect on ROA, with a coefficient of -0.094244 and a probability value of 0.426372. This result rejects H3 because environmental disclosure does not provide statistically significant evidence of improving profitability. The finding suggests that environmental disclosure does not directly translate into higher ROA among the sampled mining companies.

This result is consistent with the argument that disclosure improves transparency but does not directly change cost structures or asset productivity. Environmental disclosure can communicate environmental policies, energy use, emissions, waste management, and sustainability initiatives. However, disclosure alone does not reduce costs, increase output, improve operating efficiency, or increase asset returns unless it reflects substantive environmental action.

Legitimacy Theory and Stakeholder Theory help explain this result (Del Gesso & Lodhi, 2025; Sciulli & Adhariani, 2023). Firms may disclose environmental information to maintain social acceptance and respond to stakeholder information needs (Osei et al., 2025). Disclosure can support accountability, reputation, and legitimacy, especially in an environmentally sensitive sector such as mining. However, disclosure may not influence profitability when stakeholders view it as formal compliance rather than credible evidence of operational improvement. Thus, disclosure is necessary for accountability, but it is not sufficient to improve ROA.

This finding is consistent with Aida et al. (2024), who reported that environmental disclosure may have a positive but insignificant effect on profitability. It also aligns with Rahman et al. (2023), who argued that environmental disclosure does not always improve financial performance. In the context of this research, the insignificant result indicates that environmental reporting has not yet become a strong financial differentiator among PROPER-participating mining firms.

The findings refine the role of Green Accounting in profitability analysis. Environmental costs, green investment, and environmental disclosure should not be treated as identical mechanisms. Environmental costs directly affect current earnings and can reduce ROA when their short-term burden is high. Green investment may require a longer period before its benefits appear in financial performance. Environmental disclosure may support legitimacy and transparency, but it does not directly improve profitability without substantive operational change.

The Triple Bottom Line framework remains relevant, but the findings show that balancing profit, people, and planet requires more than environmental spending, investment allocation, or formal reporting (Gallardo-Vázquez, 2025; Larivière & Smit, 2022). Mining companies need to integrate environmental practices into cost control, capital budgeting, operational planning, and performance measurement. Without this integration, Green Accounting practices may remain visible in reports but weakly connected to profitability.

For managers, the results indicate the need to distinguish preventive environmental costs from reactive remediation costs. Preventive costs can reduce future risk, while reactive costs may only absorb current profit. Green investment also needs clearer evaluation through

indicators such as energy savings, waste reduction, avoided penalties, reclamation progress, and operating efficiency. For disclosure, firms should connect reported information with verifiable environmental outcomes so that stakeholders can assess whether environmental claims reflect actual performance.

For policymakers, the findings suggest that PROPER and related sustainability policies should continue to encourage substantive environmental performance rather than focus solely on disclosure compliance. Sector-specific benchmarks can help evaluate whether firms convert environmental responsibility into measurable operational and financial outcomes. Stronger institutional guidance can also improve the credibility and usefulness of environmental information for investors, regulators, and other stakeholders.

CONCLUSION

This research examines the effect of environmental costs, green investment, and environmental disclosure on the profitability of PROPER-participating mining companies listed on the Indonesia Stock Exchange during 2022 to 2024. The study uses panel data regression, and the model specification tests indicate that the Random Effects Model is the most appropriate estimator. The results show that environmental costs have a significant negative effect on ROA, whereas green investment and environmental disclosure have no significant effect.

These findings show that Green Accounting practices do not automatically improve short-term profitability in the mining sector. Environmental costs are financially relevant, but their negative coefficient indicates they remain a short-term burden during the observation period. Green investment has not yet had a measurable effect on ROA, suggesting that its financial return may require a longer payback period. Environmental disclosure also does not significantly affect ROA, indicating that transparency alone is insufficient without operational improvement and substantive environmental action.

The study contributes to Green Accounting literature by showing that environmental costs, green investment, and environmental disclosure have different financial implications. This finding strengthens the need to examine Green Accounting as a set of distinct practices rather than as a single unified construct. It also refines the cost-benefit logic in mining firms by showing that environmental responsibility may reduce short-term profitability when its immediate costs exceed its short-term financial benefits. At the same time, the findings suggest that environmental practices may still carry long-term value when firms link them to efficiency, risk reduction, and better operational control.

The managerial implication is clear. Mining companies need to manage environmental costs through stronger planning, monitoring, and performance evaluation. Environmental spending should be linked to measurable outcomes, such as reduced waste, avoided sanctions, improved reclamation performance, and improved resource efficiency. Green investment should also be evaluated using long-term operational indicators rather than expected to generate immediate improvements in ROA. Environmental disclosure should be strengthened by linking reported information to verifiable environmental performance.

For policymakers, the findings support the need for sustainability governance that moves beyond formal reporting. PROPER and related environmental policies can become more effective when they reward measurable environmental outcomes, not only disclosure or participation. Sector-specific benchmarks are important because mining firms face different environmental risks, cost structures, and investment horizons from firms in less environmentally sensitive sectors.

This research has limitations. It focuses only on PROPER-participating mining companies and covers a three-year period from 2022 to 2024. This period may be too short to capture the long-term effects of green investment and environmental disclosure. The model

also excludes firm-level control variables such as firm size, leverage, liquidity, or firm age because the compiled dataset focuses on green accounting indicators and profitability. Future research should extend the observation period, include firms from other sectors, and incorporate firm-level control variables to improve model robustness. Future studies may also examine whether governance quality, PROPER ratings, operational efficiency, or commodity price volatility mediate or moderate the relationship between Green Accounting and profitability.

Acknowledgments

The authors sincerely thank all parties who contributed to this research.

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Approval

This research used publicly available secondary data and did not involve human participants; thus, ethical approval was not required.

Data Availability Statement

Data supporting the findings are available upon reasonable request.

Author Contributions

Kareen Andina (K.A.), Violetta Elsa Namira Susanto (V.E.N.S.), and Haryanto Haryanto (H.H.) contributed to this research. Conceptualization, K.A. and V.E.N.S.; methodology, K.A. and V.E.N.S.; formal analysis, K.A. and V.E.N.S.; writing original draft, K.A. and V.E.N.S.; writing review and editing, K.A.; supervision, H.H.; project administration, V.E.N.S. V.E.N.S. Served as the corresponding author. All authors have read and approved the final manuscript.

BIBLIOGRAPHY

- Aida, N., Muhammad, N., Baharuddin, B., Susanto, S. E., & Mus, N. F. (2024). Pengaruh Penerapan Green Accounting terhadap Profitabilitas pada Perusahaan Sektor Basic Materials Di Bursa Efek Indonesia Periode 2017-2021. *Tangible Journal*, 9(1), 163–179. <https://doi.org/10.53654/tangible.v9i1.449>
- Atikah, M., & Haryanto, H. (2026). Driving Sustainable Growth through the Blue Economy: Empirical Evidence from Indonesia's Transport and Logistics Companies. *JURNAL EKSPLORASI AKUNTANSI*, 8(1), 309–326.
- Aureli, S., Del Baldo, M., Lombardi, R., & Nappo, F. (2020). Nonfinancial reporting regulation and challenges in sustainability disclosure and corporate governance practices. *Business Strategy and the Environment*, 29(6), 2392–2403.
- Aurelia, R. A., Murni, Y., & Yatim, M. R. (2022). Pengaruh Kinerja Lingkungan, Biaya Lingkungan, Leverage, dan Firm Size Terhadap Profitabilitas Pada Perusahaan Pertambangan Di Indonesia. *Jurnal Sistem Informasi, Akuntansi Dan Manajemen*, 2(3), 397–411. <https://doi.org/10.54951/sintama.v2i3.393>
- Azizah, N., & Cahyaningtyas, F. (2023). Pengaruh CSR, Kinerja Lingkungan, dan Biaya Lingkungan terhadap Profitabilitas (Studi Empiris Perusahaan Industri Dasar dan Bahan Kimia). *Jurnal Ilmiah Bisnis Dan Ekonomi Asia*, 17(2), 212–225.

<https://doi.org/10.32812/jibeka.v17i2.1557>

- Baah, C., Opoku-Agyeman, D., Acquah, I. S. K., Agyabeng-Mensah, Y., Afum, E., Faibil, D., & Abdoulaye, F. A. M. (2021). Examining the correlations between stakeholder pressures, green production practices, firm reputation, environmental and financial performance: Evidence from manufacturing SMEs. *Sustainable Production and Consumption*, 27, 100–114.
- Becchetti, L., Cordella, M., & Morone, P. (2022). Measuring investments progress in ecological transition: The Green Investment Financial Tool (GIFT) approach. *Journal of Cleaner Production*, 357, 131915.
- Boakye, D. J., Tingbani, I., Ahinful, G., Damoah, I., & Tauringana, V. (2020). Sustainable environmental practices and financial performance: Evidence from listed small and medium-sized enterprise in the United Kingdom. *Business Strategy and the Environment*, 29(6), 2583–2602.
- Caputo, F., Pizzi, S., Ligorio, L., & Leopizzi, R. (2021). Enhancing environmental information transparency through corporate social responsibility reporting regulation. *Business Strategy and the Environment*, 30(8), 3470–3484.
- Chandra, W., & Sumani, S. (2023). PENGARUH INOVASI TERHADAP PROFITABILITAS PERUSAHAAN SEKTOR INDUSTRI ENERGI DI INDONESIA. *Jurnal Akuntansi*, 17(1), 59–83. <https://doi.org/10.25170/jak.v17i1.4331>
- Del Gesso, C., & Lodhi, R. N. (2025). Theories underlying environmental, social and governance (ESG) disclosure: a systematic review of accounting studies. *Journal of Accounting Literature*, 47(2), 433–461.
- Falcone, P. M. (2020). Environmental regulation and green investments: The role of green finance. *International Journal of Green Economics*, 14(2), 159–173.
- Fitriyani, F. A., Rely, G., & Sari, P. N. (2025). PENGARUH GREEN INVESTMENT, ECO EFFICIENCY DAN GOOD CORPORATE GOVERNANCE TERHADAP NILAI PERUSAHAAN (EMITEN SEKTOR ENERGI BURSA EFEK INDONESIA PERIODE 2019-2023). *Jurnal Akuntansi, Keuangan, Perpajakan Dan Tata Kelola Perusahaan*, 2(3), 890–904. <https://doi.org/10.70248/jakpt.v2i3.1953>
- Gallardo-Vázquez, D. (2025). Defining the Path to Sustainability Based on Triple Bottom Line Dimensions. *Corporate Social Responsibility and Environmental Management*.
- Gidage, M., Gyamfi, B. A., & Asongu, S. A. (2025). Environmental reporting and financial performance: Evidence from the banking sector in BRICS countries. *Business Strategy and the Environment*, 34(6), 7412–7437.
- Gonzalez, C. C., & Peña-Vinces, J. (2023). A framework for a green accounting system-exploratory study in a developing country context, Colombia: CC Gonzalez, J. Peña-Vinces. *Environment, Development and Sustainability*, 25(9), 9517–9541.
- Gustinya, D. (2022). PENGARUH PENERAPAN GREEN ACCOUNTING TERHADAP NILAI PERUSAHAAN MANUFAKTUR PESERTA PROPER YANG LISTING DI BURSA EFEK INDONESIA TAHUN 2017 - 2019. *Jurnal Akuntansi Dan Bisnis Krisnadwipayana*, 9(2), 759–771. <https://doi.org/10.35137/jabk.v9i2.688>
- Harasheh, M., & Provasi, R. (2023). A need for assurance: Do internal control systems integrate environmental, social, and governance factors? *Corporate Social Responsibility and Environmental Management*, 30(1), 384–401.
- Haryanto, H. (2020). Pengaruh Corporate Governance dan Corporate Reputation terhadap Employee Engagement (Studi pada Sebuah Perusahaan Logistik Multinasional di Indonesia). *Bina Ekonomi*, 24(1), 41–60.
- Haryanto, H., Hapsari, D. W., & Hidayah, N. (2024). Unlocking the Power of Internal Control: How It Lowers Risk and Slashes Logistics Costs in Retail. *Jurnal Orientasi Bisnis Dan Entrepreneurship*, 5(2), 133–149.

- Hidayat, I., Ismail, T., Taqi, M., & Yulianto, A. S. (2023). The effects of environmental cost, environmental disclosure and environmental performance on company value with an independent board of commissioners as moderation. *International Journal of Energy Economics and Policy*, 13(3), 367–373.
- Karim, E., Elmarzouky, M., & Shohaieb, D. (2025). Green revenue generation and sales contribution: are consumers willing to bear the cost of sustainability? *Business Strategy and the Environment*.
- Khalid, F., Naveed, K., Nawaz, R., Sun, X., Wu, Y., & Ye, C. (2023). Does corporate green investment enhance profitability? An institutional perspective. *Economic Research-Ekonomska Istraživanja*, 36(1), 1–24. <https://doi.org/10.1080/1331677X.2022.2063919>
- Kuo, K., Lu, W., & Ganbaatar, O. (2023). Sustainability and profitability efficiencies: the moderating role of corporate social responsibility. *International Transactions in Operational Research*, 30(5), 2506–2527.
- Larasati, A. R., Arimuljarto, N., & Azhar, Z. (2023). Pengaruh Green Investment Dan Kinerja Keuangan Terhadap Nilai Perusahaan Pada Perusahaan Industri Pertambangan Yang Terdaftar Di Bursa Efek Indonesia Tahun 2017-2022. *NAMARA: Jurnal Manajemen Pratama*, 2(1), 1–22.
- Larivière, B., & Smit, E. G. (2022). People–planet–profits for a sustainable world: integrating the triple-P idea in the marketing strategy, implementation and evaluation of service firms. *Journal of Service Management*, 33(4/5), 507–519.
- Monteiro, A. P., Pereira, C., & Barbosa, F. M. (2023). Environmental disclosure on mandatory and voluntary reporting of Portuguese listed firms: the role of environmental certification, lucratively and corporate governance. *Meditari Accountancy Research*, 31(3), 524–553.
- Osei, A., Zhu, N., & Agyemang, A. O. (2025). Advancing business ethical standards: unpacking the synergistic influence of governance structures and CSR engagement on corporate integrity in BRICS countries. *Corporate Social Responsibility and Environmental Management*, 32(3), 3471–3494.
- Rahman, Z. A., Handajani, L., & Kartikasari, N. (2023). Pengaruh Penerapan Green Accounting Terhadap Profitabilitas. *Monex Journal Research Accounting Politeknik Tegal*, 12(2), 251–263. <https://doi.org/10.30591/monex.v12i2.5255>
- Riyadh, H. A., Al-Shmam, M. A., Huang, H. H., Gunawan, B., & Alfaiza, S. A. (2020). The analysis of green accounting cost impact on corporations financial performance. *International Journal of Energy Economics and Policy*, 10(6), 421–426.
- Rohendi, H., Ghozali, I., & Ratmono, D. (2024). Environmental, social, and governance (ESG) disclosure and firm value: the role of competitive advantage as a mediator. *Cogent Business & Management*, 11(1), 2297446.
- Sciulli, N., & Adhariani, D. (2023). The use of integrated reports to enhance stakeholder engagement. *Journal of Accounting & Organizational Change*, 19(3), 447–473.
- Setiawan, A., Haryanto, H., Soedibyo, A. N., Wirawan, S., Djajadikerta, H., Faninda, S., & Mardiana, M. (2025). Institutional Translation and Sectoral Readiness: Localizing IFRS S1 and S2 in Indonesia. *International Research Journal of Multidisciplinary Scope*, 06(04), 410–421. <https://doi.org/10.47857/irjms.2025.v06i04.06292>
- Setiawan, A., Soedibyo, A. N., Wirawan, S., Haryanto, H., Djajadikerta, H., & Faninda, S. (2023). The Mapping of IFRS S1 and S2 with SEOJK-16-2021. *The 2nd International Conference On Economics, Business, And Management Research (ICEBMR)*, 343–353.
- Shabbir, M. S., & Wisdom, O. (2020). The relationship between corporate social responsibility, environmental investments and financial performance: evidence from manufacturing companies. *Environmental Science and Pollution Research*, 27(32), 39946–39957.

- Sreenu, N. (2026). Green financial accounting in India's mining sector: a path to sustainable development. *Journal of Applied Accounting Research*, 1–21.
- Suandi, A., & Ruchjana, E. T. (2021). Pengaruh Kinerja Lingkungan dan Biaya Lingkungan terhadap Return On Assets (ROA). *Jurnal Riset Terapan Akuntansi*, 5(1). <https://doi.org/https://doi.org/10.5281/zenodo.4733822>
- Susanti, I. D., Hertati, L., & Putri, A. U. (2023). The Effect of Green Accounting and Environmental Performance on Company Profitability. *CURRENT ADVANCED RESEARCH ON SHARIA FINANCE AND ECONOMIC WORLDWIDE*, 2(2), 320–331. <https://doi.org/https://doi.org/10.55047/cashflow>
- Xiong, Y., & Dai, L. (2023). Does green finance investment impact on sustainable development: Role of technological innovation and renewable energy. *Renewable Energy*, 214, 342–349.
- Yenidogan, A., Gurcaylilar-Yenidogan, T., & Tetik, N. (2021). Environmental management and hotel profitability: operating performance matters. *Tourism & Management Studies*, 17(3), 7–19.