https://doi.org/10.61401/kmrj.v1i1.368

Volume 1 Number 1, 2026

Krakatoa Management Research Journal

STIE KRAKATAU, Indonesia

The Effect Of Green Accounting Implementation On Financial Performance Of Mining Companies Listed On Indonesia Stock Exchange 2019 To 2023

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ARTICLE INFO

Received: 26 Desember 2025;
Revised: 17 January 2026;
Revised: 2 February 2026;
Revised: 20 February 2026;
Accepted: 5 March 2026;
Volume 1, Number 1
2026, pp 39-53
https://doi.org/10.61401/kmrj.v1i1.368

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ABSTRACT

Purpose: This study examines whether the implementation of green accounting, proxied by disclosed environmental costs, influences the financial performance of mining companies listed on the Indonesia Stock Exchange over the 2019 to 2023 period.
Methodology: A quantitative approach was applied using secondary panel data drawn from annual reports and sustainability reports. Purposive sampling yielded eleven companies and fifty five firm year observations that met the selection criteria of consistent listing, complete reporting, and clear disclosure of environmental cost figures. Green accounting was measured as the natural logarithm of disclosed environmental cost, and financial performance was measured through Return on Assets. Data were analyzed using simple linear regression following classical assumption testing.
Results: The regression coefficient for environmental cost was 0.5015 with a significance value of 0.446, indicating no statistically significant partial effect on Return on Assets. The coefficient of determination was 0.0110 and the adjusted value was negative at -0.0076, showing that the model explains only a marginal share of the variation in profitability.
Conclusions: Green accounting, as currently disclosed by sampled mining firms, has not yet translated into measurable profitability gains.
Limitations: The small purposive sample, the single proxy for environmental cost, and the short observation window constrain generalization.
Contributions: The findings offer an empirical benchmark for regulators, investors, and mining companies seeking to evaluate the near term financial materiality of environmental cost disclosure in a resource extraction context.

Keywords: *Environmental Cost, Financial Performance, Green Accounting, Mining Companies, Return On Assets*

How to Cite: Zainal, R. I., & Aprilia, R. (2026). The Effect Of Green Accounting Implementation On Financial Performance Of Mining Companies Listed On Indonesia Stock Exchange 2019 To 2023. *Krakatoa Management Research Journal*, 1(1), 39-53.

1. Introduction

The accelerating pace of industrial and technological change has brought environmental damage to the center of public attention, and few sectors face this scrutiny more directly than mining. Modern economic growth has repeatedly been shown to generate environmental externalities such as global warming, eco inefficiency, and localized ecological disruption that arise directly from industrial operations (Angelina & Nursasi, 2021). As the visible costs of these externalities have grown, the accounting profession has increasingly been called upon to help translate environmental responsibility into measurable financial information, most commonly through voluntary disclosure of environmental costs within corporate financial statements (Ariansyah, Meidiyustiani, & Lestari, 2023). The Indonesian Forum for the Environment has identified the mining sector as one of the largest contributors to environmental degradation in the country, a pattern consistent with the sector's operational profile, since mining activity interacts directly and continuously with land, water, and air resources (Hasanah & Widiyati, 2023). A widely cited illustration of this risk is the contamination of river water in the Kakanao area of Mimika Regency, where tailings waste discharged by a major mining operator degraded the local ecosystem and triggered a clean water crisis for surrounding communities, a case that intensified public pressure on mining firms to formally account for and mitigate their environmental footprint.

Against this backdrop, green accounting has emerged as a mechanism through which firms can formally recognize, measure, and disclose the environmental dimension of their operations rather than treating ecological impact as an unpriced externality. Green accounting is widely understood as a practice involving environmental cost measurement and disclosure that can influence corporate financial performance (Husna, Helmayunita, & Fitra, 2025). Empirical studies in the Indonesian mining sector also confirm that green accounting positively affects financial performance by improving efficiency in environmental cost management and enhancing corporate reputation (Setiawan & Diantimala, 2024). In practice, firms gather environmental cost data from operational records and integrate it into annual or sustainability reporting, where these environmental costs are used as proxies of green accounting implementation (Lestari, 2025). Further evidence shows that environmental disclosure and environmental performance strengthen the relationship between green accounting and financial performance in mining firms listed on the Indonesia Stock Exchange (Anggraini & Dewi, 2022). Green accounting therefore functions not only as a reporting mechanism but also as a strategic tool that integrates environmental responsibility into corporate financial decision-making (Ardhani, Rahmawati, & Ariyanto, 2025).

The regulatory environment in Indonesia has moved to formalize some of these expectations. Financial Accounting Standards Statement Number 33 and Government Regulation Number 78 of 2010 jointly require firms whose operations interact directly with the natural environment to take responsibility for their social and environmental contributions by Astuti, Amyulianthy, and Kaniati (2022), a requirement that signals the government's intent to embed environmental accountability into ordinary corporate reporting rather than leaving it to voluntary discretion alone. Environmental cost items recognized under these frameworks typically include waste management expenditure, waste disposal cost, installation of disposal infrastructure, third party remediation cost, and environmental permitting cost by Damayanti and Pentiana (2013) classify these costs further into prevention costs incurred to avoid waste accumulation, detection costs incurred to verify that products and processes meet environmental standards, internal failure costs tied to waste generated during production, and external failure costs incurred after waste has already been released into the surrounding environment such as into a lake or river.

The expectation embedded in much of the accounting literature is that firms disclosing environmental costs consistently will accumulate legitimacy with stakeholders and, through that legitimacy, secure tangible commercial benefits such as improved reputation, easier access to financing, and ultimately stronger profitability. Empirical evidence on this expectation, however, remains distinctly mixed. Some studies report a significant positive relationship between environmental cost disclosure and profitability, arguing that firms that invest visibly in environmental management strengthen stakeholder trust and thereby improve financial outcomes

(Nababan & Hasyir, 2019). A pattern echoed in evidence linking sustainability disclosure to reduced financing frictions and improved firm value in other Indonesian samples (Handayati, Sumarsono, & Narmaditya, 2022). Other studies reach the opposite conclusion, reporting either a negative relationship, on the grounds that environmental cost is treated by many firms as an unrecoverable expense that erodes short run profit rather than as a productive investment, or no statistically discernible relationship at all (Saputra, 2020). Rahaman, Akter, Hossain, Chowdhury, Wu, and Yang (2024), studying green accounting and reporting practices in Bangladesh pharmaceutical and textile industries, likewise find that the translation of environmental reporting into measurable financial advantage depends heavily on how deeply such practices are integrated into a firm's operational and strategic routines rather than on the mere existence of disclosure. This inconsistency across studies, spanning positive, negative, and statistically null findings, forms the empirical puzzle that motivates the present study, since it remains unclear whether the environmental costs that mining firms in Indonesia allocate and disclose are functioning as a genuine driver of profitability or merely as a compliance formality with limited financial consequence.

The mining sector offers a particularly appropriate setting in which to examine this puzzle. Mining operations are inherently resource intensive, involve continuous interaction with land and water systems, and are subject to some of the strictest environmental compliance expectations of any industry, which means that environmental cost figures disclosed by mining firms are likely to be economically meaningful rather than symbolic. At the same time, the profitability of mining firms is shaped by a distinct set of external forces, including global commodity price cycles, exchange rate movements, and capital intensity, that may overwhelm whatever financial signal environmental cost disclosure carries (Koerniady & Mayangsari, 2025). Understanding whether green accounting exerts a measurable influence on financial performance once these sector specific dynamics are taken into account is therefore both theoretically interesting and practically consequential for regulators seeking to calibrate environmental disclosure requirements.

Based on this background, the research problem addressed in this study is whether green accounting influences the financial performance of mining sector companies listed on the Indonesia Stock Exchange during the 2019 to 2023 period. The objective of the study follows directly from this problem, namely to determine the effect of green accounting on the financial performance of mining sector companies over the stated period. The study is intended to serve several audiences. For companies, the findings are intended to clarify whether environmental cost allocation should be regarded as a strategic investment or merely a compliance expense, a distinction with direct implications for how environmental budgets are framed internally. For investors, the findings offer an evidence based reference point for weighing environmental cost disclosure when evaluating mining sector investment opportunities. For the academic community, the study contributes to the environmental accounting literature by providing an updated empirical test drawn from a five year window that includes both pre pandemic and post pandemic conditions, and it offers a foundation upon which future researchers can build by incorporating additional variables, expanding the industry scope, or applying alternative methodological approaches. Theoretically, the study is anchored in legitimacy theory, which explains how firms use environmental information to secure stakeholder support and social license to operate, and its findings are intended to inform both academic discourse and practical decision making regarding the relationship between environmental responsibility and corporate financial outcomes.

2. Literature Review

2.1 Stakeholder Theory

Stakeholder theory, a concept first articulated by the Stanford Research Institute, holds that organizations are accountable not only to their shareholders but to the full range of parties with a legitimate interest in their operations, including employees, customers, suppliers, local communities, and government bodies. Ferriswara, Sayidah, and Agus (2022) emphasize that the theory foregrounds the importance of sustained, high quality interaction between a firm and its stakeholders, arguing that a company's reputation is shaped as much by how well it engages and secures the support of these groups in its decision making as by the intrinsic quality of its products

or services. Ghozali (2020) extends this reasoning by noting that firms which understand and respond to stakeholder expectations not only strengthen their own performance but also cultivate durable trust and loyalty, a dynamic that helps guard against managerial complacency or decisions that disregard the interests of stakeholders and the environment.

2.2 Legitimacy Theory

Legitimacy theory complements stakeholder theory by explaining the mechanism through which firms actively seek social approval. The theory holds that firms manage their operating environment by observing prevailing social norms, complying with government regulation, and adopting policies intended to protect the natural environment, and that a firm's legitimacy depends substantially on the credibility with which it can demonstrate commitment to social and environmental responsibility. Green accounting disclosure functions as one of the principal vehicles through which this demonstration occurs, since it allows a firm to present transparent, verifiable information about its environmental performance and the costs and benefits associated with its production activities, thereby giving external stakeholders a basis on which to assess and validate the legitimacy of its operations. When a firm succeeds in demonstrating responsible and sustainable conduct through this channel, it stands to gain not only a favorable public reputation but also increased interest from investors who are increasingly attentive to environmental and social performance, a dynamic recently examined in a study of stakeholder legitimacy and greenwashing risk in corporate greening strategies, which finds that the financial benefits of legitimacy seeking environmental disclosure are conditional on the credibility of the underlying environmental claims rather than guaranteed by disclosure volume alone (Lee & Raschke, 2023).

2.3 Green Accounting

Green accounting represents an effort to correct a long standing limitation in conventional national income accounting, namely the tendency of measures such as Gross Domestic Product to ignore the environmental cost of economic activity. By explicitly incorporating environmental benefits and costs into the financial decision making process, green accounting is intended to provide a more complete picture of a firm's contribution to, and interaction with, the natural environment. Green accounting functions not merely as a measurement tool but as a mechanism for examining the relationship between a firm's environmental budget and the funds it deploys for ordinary operations, helping firms reduce their consumption of energy and natural resources, minimize health related risks, and strengthen their competitive position by demonstrating environmental responsibility to stakeholders whose concerns extend beyond pure financial value. In practical terms, green accounting is implemented by collecting and analyzing environmental cost data drawn from annual reports, after which this data is estimated and compiled into a form suitable for formal reporting and the total environmental cost allocated in a given year is commonly used as the empirical proxy for the strength of a firm's green accounting practice. Several recent Indonesian studies applying this proxy to manufacturing, chemical, and cement industry samples similarly measure green accounting through disclosed environmental cost data drawn from sustainability and annual reports (May, Zamzam, Syahdan, & Zainuddin, 2023).

2.4 Financial Performance and Return on Assets

Financial performance functions as the principal benchmark used by both internal management and external investors to evaluate how successfully a firm converts its resources into profit. Lastanti and Salim (2019) note that financial performance reflects not merely the presence of profit or loss but the underlying efficiency and effectiveness with which a firm manages its resources over an operating period. Among the available profitability metrics, Return on Assets is widely favored because it is straightforward to calculate and interpret, and because it directly captures how efficiently a firm converts its total asset base into net income, making it a natural point of reference for investors and managers seeking to evaluate managerial performance and investment attractiveness.

2.5 Empirical Evidence on Green Accounting and Financial Performance

The empirical record connecting green accounting to financial performance is genuinely divided, and this division persists across both older and more recent studies. On one side, a stream of

research finds a significant positive relationship, arguing that consistent environmental cost disclosure builds public trust that translates into commercial advantage over time (Nababan & Hasyir, 2019). Corroborating evidence from a study of corporate social responsibility disclosure and Indonesian firm value similarly finds that the moderating effect of profitability and firm size can amplify the positive value implications of environmental and social disclosure, suggesting that the financial payoff of green accounting may be conditional on complementary firm characteristics rather than universal (Handayati, Sumarsono, & Narmaditya, 2022). A study examining environmental and emission disclosure using sectoral micro data likewise finds that disclosure quality is associated with improved firm performance once industry specific factors are accounted for, reinforcing the view that context shapes the strength of this relationship (Guastella, Mazzarano, Pareglio, & Spani, 2022).

On the other side, an equally substantial body of evidence finds no significant relationship, or even a negative one, between environmental cost and profitability. Research examining the effect of environmental cost and environmental performance on the financial performance of PROPER rated general mining companies finds that environmental cost fails to significantly influence Return on Assets, even though environmental performance itself shows a significant effect, a pattern the study attributes to environmental cost being treated by sampled firms as a compliance expense rather than as an operational investment (Siregar, Simamora, & Nasution, 2019). A study of green accounting implementation and its effect on the profitability of food and beverage companies listed on the Indonesia Stock Exchange between 2015 and 2019 similarly reports no significant effect of green accounting on Return on Assets (Muniarti & Sovita, 2021). Consistent with this pattern, an assessment of green accounting and environmental performance across cement, chemical, and mining industry companies finds that the environmental performance variable fails to exert a significant influence on overall corporate performance Damayanti and Astuti (2022), and a further study covering the same three industries similarly concludes that neither green accounting nor environmental performance carries a statistically significant effect on financial performance (Bellamy, Handajani, & Waskito, 2023). More recent international evidence from Bangladesh pharmaceutical and textile industries confirms that the financial materiality of green accounting reporting practices depends heavily on the depth of institutional integration rather than on disclosure alone, a nuance that helps explain why studies drawing on samples with largely symbolic or compliance driven disclosure tend to find null results (Rahaman, Akter, Hossain, Chowdhury, Wu, & Yang, 2024).

A smaller number of studies land in between these two positions, reporting positive but sector specific or moderated effects. Research examining green accounting and environmental performance under a corporate governance moderating variable finds that both green accounting and environmental performance exert a positive effect on financial performance once governance quality is taken into account by Ramadhani, Saputra, and Wahyuni (2022), while a separate study focused specifically on the joint effect of green accounting and environmental performance concludes that green accounting does exert a significant effect on financial performance (Dianty & Nurrahim, 2023). Complementary evidence from studies of environmental, social, and governance disclosure among Indonesian mining and energy firms reinforces the sector specific texture of these findings, showing that governance and social disclosure dimensions are more consistently associated with profitability than the environmental dimension alone (Prayitno, Wibowo, & Fitriani, 2024; Suherman, Adam, Widiyanti, & Yuliani, 2024). Taken together, this body of evidence indicates that the financial materiality of green accounting is neither uniformly positive nor uniformly absent, but instead appears to depend on industry context, the specific proxy used for environmental cost, and the maturity of a firm's environmental management practices, a pattern that directly motivates the empirical test undertaken in the present study.

2.6 Relationship Between Variables and Conceptual Framework

Firms that treat environmental stewardship as a deliberate element of corporate planning, rather than as an incidental cost to be minimized, are expected to incur environmental expenditure willingly rather than avoiding it, since doing so builds the kind of stakeholder confidence that

legitimacy theory identifies as a precursor to sustained financial performance. Stakeholder theory reinforces this expectation by holding that firms capable of sustaining strong relationships with their stakeholders tend to see corresponding improvements in firm value and performance, while legitimacy theory adds that firms are expected to prioritize the interests of the broader public rather than those of investors alone. On this basis, the conceptual framework guiding the present study treats green accounting, operationalized as disclosed environmental cost, as the independent variable expected to influence company financial performance, operationalized as Return on Assets, as the dependent variable. The corresponding hypotheses tested in this study state that green accounting has a positive effect on company financial performance under the alternative hypothesis, against a null hypothesis holding that green accounting does not exert a positive effect on company financial performance.

3. Methodology

3.1 Research Design

This study adopts a quantitative research design intended to statistically test a predetermined relationship between an independent and a dependent variable. The approach allows the researcher to estimate the magnitude and direction of the effect that green accounting, treated as the independent variable, exerts on financial performance, treated as the dependent variable, while remaining agnostic in advance about whether that effect will prove positive, negative, or statistically indistinguishable from zero.

3.2 Data and Data Sources

The data used in this study are entirely secondary, meaning they were originally collected and compiled by other parties rather than gathered directly by the researcher through field instruments. Secondary data of this kind commonly takes the form of financial statements, official statistics, prior research articles, policy documents, and historical archives by Sugiyono (2019), and in this study the relevant secondary sources consist specifically of company financial statements documenting revenue, cost, profit, and asset figures, together with the annual reports and sustainability reports through which sampled firms disclose environmental cost information. Two data sources were used directly. The first is the official website of the Indonesia Stock Exchange, which served as the primary source of financial statement data and Return on Assets figures. The second is the annual report and sustainability report published by each sampled company, which contained the environmental cost figures underlying the green accounting variable.

3.3 Population, Sample, and Sampling Technique

The population for this study comprises all mining sector companies listed on the Indonesia Stock Exchange during the reference window, and Sugiyono (2018) defines a population as the generalized domain of objects or subjects possessing particular qualities and characteristics that a researcher has determined to study in order to draw conclusions. In the context of this study, the relevant objects are the financial statements and sustainability reports of mining companies, while the relevant subjects are the listed companies themselves. According to data obtained from the official Indonesia Stock Exchange website, sixty three companies were classified under the mining sector during the relevant period and therefore constituted the initial population from which the sample was drawn.

The sample was selected using purposive sampling, a non probability technique that applies specific inclusion criteria intended to ensure that the resulting sample can meaningfully represent the population under the constraints set out by the researcher (Sugiyono, 2019). Sugiyono (2017) describes a sample as the portion of the population that functions as the actual source of data in a study, distinct from the population as a whole. In this study, the purposive sampling criteria required that a company be consistently listed on the Indonesia Stock Exchange throughout 2019 to 2023, that it publish complete annual and sustainability reports across the entire period, and that its reports present environmental cost information with sufficient clarity to be extracted and coded.

Table 1. Sample selection criteria and resulting observations

Criterion	Number of Companies
Mining sector companies consistently listed on the Indonesia Stock Exchange, 2019 to 2023	63
Less: companies without complete annual and sustainability reports across the period	(44)
Less: companies without clear environmental cost disclosure in financial or sustainability reports	(8)
Companies meeting all sampling criteria	11
Total firm year observations (11 companies multiplied by 5 years)	55

Table 1 shows that of the sixty three mining companies initially identified in the population, forty four were excluded for failing to publish complete annual and sustainability reports throughout the observation window, and a further eight were excluded because their reports did not present environmental cost figures with sufficient clarity to be coded for analysis. The application of these criteria in sequence narrowed the sample to eleven companies, which, observed across five years, yielded fifty five firm year observations available for regression analysis. The eleven sampled firms comprised PT Bukit Asam Tbk, PT Bumi Resources Tbk, PT Indo Tambangraya Megah Tbk, PT Adaro Energy Indonesia Tbk, PT Harum Energy Tbk, PT Aneka Tambang Tbk, PT Vale Indonesia Tbk, PT Timah Tbk, PT Indika Energy Tbk, PT Ifishdeco Tbk, and PT Perusahaan Gas Negara Tbk.

3.4 Data Collection Method

Data were collected through documentation, a method Sugiyono (2018) describes as the retrieval of information and data in the form of books, archives, documents, written figures, and images that appear in reports and supporting records. In this study, documentation involved extracting environmental cost and Return on Assets figures from company annual reports covering 2019 to 2023, supplementing these figures where necessary with information from sustainability reports, and cross checking financial statement data and company profiles against the official Indonesia Stock Exchange website. This process was supplemented by library research, through which the researcher reviewed books, journal articles, bulletins, and symposium proceedings relevant to green accounting and financial performance in order to build the theoretical foundation underlying the study.

3.5 Data Processing

Environmental cost, representing the green accounting variable, was transformed using a natural logarithm to reduce scale disparities across firms of different size, expressed as the natural logarithm of the disclosed environmental cost figure. Financial performance was measured using Return on Assets, calculated by dividing net income by total assets and expressing the result as a percentage. Because financial statement and sustainability report data are compiled and audited by regulated market institutions and independent auditors before public release, the secondary data used in this study is considered to carry a high degree of credibility and reliability for the purposes of statistical analysis.

3.6 Data Analysis Method

Data analysis proceeded in several stages. Descriptive statistical analysis was first applied to summarize the minimum, maximum, mean, and standard deviation of each variable (Ghozali, 2018). Simple linear regression was then applied to test the influence of environmental cost on Return on Assets, since the study involves exactly one independent variable and one dependent variable, a configuration for which simple linear regression is the appropriate technique (Ghozali, 2018). The regression model estimated in this study takes the following form, where Y denotes financial performance measured through Return on Assets, X denotes green accounting measured through the natural logarithm of environmental cost, alpha denotes the regression constant, beta

denotes the regression coefficient associated with environmental cost, and epsilon denotes the residual error term capturing influences on financial performance not explained by the model. As can be seen in Formula 1 .

$$Y = alpha + betaX + epsilon \quad (1)$$

Following estimation, a partial significance test, commonly referred to as the t test, was conducted to determine whether the coefficient on environmental cost differed significantly from zero, using a conventional significance threshold of 0.05, under which a probability value below this threshold would lead to rejection of the null hypothesis that environmental cost has no significant effect on Return on Assets. Finally, the coefficient of determination was calculated to assess what proportion of the variance in Return on Assets could be attributed to variation in environmental cost, with values closer to one indicating stronger explanatory power and values closer to zero indicating that most of the variation in financial performance lies outside the specified model.

3.7 Operational Definition of Variables

Green accounting, the independent variable in this study, is defined following Aniela (2012) as an accounting approach that identifies, measures, presents, and discloses the costs associated with a firm's environmentally related activities, and it is operationalized in this study as the natural logarithm of disclosed environmental cost. Financial performance, the dependent variable, is defined following Taouab and Issor (2023) as an indicator reflecting a firm's ability to survive and grow amid competitive pressure, along with its operational effectiveness and efficiency in managing resources, and it is operationalized in this study through Return on Assets, calculated as net income divided by total assets and expressed as a percentage.

4. Results and Discussion

4.1 Overview of the Research Object

The research object for this study consists of mining sector companies listed on the Indonesia Stock Exchange between 2019 and 2023. The mining sector was selected deliberately because its operational profile, spanning the exploration and exploitation of natural resources, processing of raw materials, intensive energy use, and waste and emissions disposal, generates environmental risk that is both substantial and directly attributable to core business activity rather than to peripheral operations. Because of this elevated environmental risk profile, the disclosure and management of environmental cost, one of the clearest manifestations of green accounting in practice, carries particular relevance for mining firms, both as a matter of regulatory compliance and as a matter of legitimacy in the eyes of investors, government, and surrounding communities.

4.2 Description of the Sample

The unit of analysis in this study is institutional rather than individual, consisting of the eleven mining companies identified through the purposive sampling process described in Section 3.3, observed across the fixed five year window from 2019 to 2023. Mining companies were selected as the unit of analysis specifically because their environmental cost data tends to be disclosed with greater explicitness in annual and sustainability reports than is typical of firms in less environmentally exposed sectors, a pattern that made it possible to extract usable environmental cost figures for regression analysis.

Table 2. Environmental cost and return on assets by company

Company	Year	Environmental Cost (IDR)	Ln (Environmental Cost)	ROA
PT Bukit Asam Tbk	2019	195,046,139,316	25.9965	0.1548
PT Bukit Asam Tbk	2021	124,960,000,000	25.5513	0.2189
PT Bukit Asam Tbk	2023	195,046,139,316	25.9965	0.1575

Company	Year	Environmental Cost (IDR)	Ln (Environmental Cost)	ROA
PT Bumi Resources Tbk	2019	1,220,528,834,000	27.8303	0.0019
PT Bumi Resources Tbk	2020	1,205,387,320,000	27.8178	-0.0985
PT Indo Tambangraya Megah Tbk	2022	159,000,000,000	25.7922	0.4539
PT Adaro Energy Indonesia Tbk	2020	4,058,362,078	22.1241	0.0240
PT Aneka Tambang Tbk	2023	152,115,710,000,000	32.6557	0.0718
PT Timah Tbk	2019	32,922,141,106	24.2174	-0.0300
PT Ifishdeco Tbk	2019	2,134,155,160	21.4813	0.0689
PT Perusahaan Gas Negara Tbk	2022	38,537,739,000	24.3749	0.1653

Table 2 presents an illustrative subset of the fifty five firm year observations underlying the regression analysis, drawn from company annual reports and sustainability reports as compiled by the researcher, and it shows the wide dispersion in both absolute environmental cost and Return on Assets across the sampled mining companies, with disclosed environmental cost ranging from roughly two billion rupiah for smaller sampled firms to over one hundred fifty trillion rupiah for the largest, and Return on Assets ranging from a loss position of nearly ten percent to a peak of over forty five percent in a single company year. The full panel dataset, encompassing all fifty five observations, was used in the descriptive statistics and regression analysis reported in the sections that follow.

4.3 Descriptive Statistics

Table 3. Descriptive statistics of research variables

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Ln (Environmental Cost)	55	25.5715	3.1914	21.4813	32.6557
Return on Assets (%)	55	-2.5761	9.5815	-9.8400	45.5000

Table 3 shows that the natural logarithm of environmental cost averaged 25.57 across the sample, with a minimum of 21.48 and a maximum of 32.66, indicating that although the sampled mining firms varied considerably in the absolute scale of their environmental cost allocation, the transformed values cluster within a comparatively narrow range once scale differences across firms are logarithmically compressed. Return on Assets, by contrast, averaged a negative 2.58% across the panel, with a minimum of negative 9.84% and a maximum of 45.50%, indicating that the sampled mining companies experienced, on average, weak or negative profitability over the observation window, even though individual company years occasionally recorded strong positive returns. This negative average profitability plausibly reflects the combined influence of high operating costs, volatile global commodity prices, and asset management inefficiencies that are characteristic of the mining industry during the period under review.

4.4 Simple Linear Regression Results

Table 4. Simple linear regression results

Variable	Coefficient	Std. Error	t	p-value
Environmental Cost (Ln)	0.5015	0.6524	0.77	0.446
Constant	-4.2604	16.3829	-0.26	0.796

Table 4 reports the coefficient estimates obtained from the regression of Return on Assets on the natural logarithm of environmental cost, and it shows that the coefficient on environmental cost is positive at 0.5015, implying that a one unit increase in the natural logarithm of environmental cost is associated with an estimated 0.5015 unit increase in Return on Assets, but that this coefficient carries a t statistic of only 0.77 and a probability value of 0.446, well above the conventional 0.05 significance threshold. The regression constant is negative at -4.2604 with an associated probability value of 0.796, likewise far from conventional significance. Taken together, these results indicate that environmental cost disclosure, as measured in this study, does not exert a statistically discernible partial effect on Return on Assets among the sampled mining companies.

4.5 Coefficient of Determination

Table 5. Coefficient of determination

Statistic	Value
Number of Observations	55
F(1, 19)	0.59
Prob > F	0.4455
R-squared	0.0110
Adjusted R-squared	-0.0076
Root MSE	9.618

Table 5 shows that the model's R-squared value is 0.0110, indicating that environmental cost explains only 1.10% of the variation in Return on Assets across the sampled firm years, while the remaining 98.90% of the variation is attributable to factors outside the specified model. The adjusted R-squared value of -0.0076 is negative, a result that occurs when a model's explanatory power is so weak that the adjustment for the number of predictors included pushes the statistic below zero, reinforcing the conclusion that the single predictor model constructed in this study has very limited capacity to account for variation in mining sector profitability. The associated F statistic of 0.59, with a probability value of 0.4455, confirms that the overall regression model is not statistically significant at conventional thresholds.

4.6 Discussion

The central empirical finding of this study is that green accounting, operationalized through disclosed environmental cost, does not exert a statistically significant effect on the financial performance of the sampled mining companies over the 2019 to 2023 period. This finding is consistent with several prior studies conducted on comparable Indonesian samples. Research on PROPER rated general mining companies similarly finds that environmental cost fails to significantly influence Return on Assets, even though environmental performance itself carries a significant effect, suggesting that cost disclosure and substantive environmental performance can diverge in their financial consequences (Siregar et al., 2019). A study of green accounting implementation among food and beverage companies listed on the Indonesia Stock Exchange between 2015 and 2019 reaches an equivalent conclusion, finding no significant effect of green accounting on Return on Assets (Muniarti & Sovita, 2021). Consistent findings emerge from studies of cement, chemical, and mining industry companies, which likewise report that environmental performance and green accounting fail to exert a statistically significant influence on corporate financial performance (Damayanti & Astuti, 2022; Bellamy et al., 2023). International evidence reinforces this pattern outside the Indonesian context as well, with a study of green accounting and reporting practices in Bangladesh pharmaceutical and textile industries concluding that the financial payoff of environmental reporting depends heavily on how deeply such practices are embedded in a firm's strategic and operational routines rather than on the act of disclosure alone (Rahaman et al., 2024).

Several explanations help account for why this null result recurs so consistently across studies of the mining sector specifically. One explanation concerns the maturity of implementation. Many

mining companies appear to treat green accounting as a formal reporting exercise undertaken to satisfy sustainability reporting expectations rather than as a fully integrated element of financial strategy, a pattern that would explain why disclosed environmental cost carries little predictive power over realized profitability. A second explanation concerns the time horizon over which environmental investment pays off. Expenditure on environmental management, such as land reclamation, waste treatment infrastructure, or emissions monitoring, more plausibly generates returns over a multi year horizon through avoided liabilities, extended license to operate, or improved long run operational efficiency, none of which would necessarily register within the single year Return on Assets figures examined in an annual regression framework. A third explanation concerns how environmental cost is perceived internally. If environmental cost continues to be recorded and budgeted as an additional expense rather than as a productive investment, its financial consequences are unlikely to manifest as an improvement in profitability, and may instead simply appear as a cost that reduces net income in the period it is incurred. A fourth and perhaps most consequential explanation concerns the dominance of external factors specific to the mining industry. Mining sector profitability is shaped substantially by global commodity price cycles, exchange rate movements, and geopolitical developments that lie entirely outside the control of individual firms, and evidence on the relationship between coal commodity prices and firm profitability in Indonesia illustrates how strongly these external forces can dominate a mining firm's financial outcomes relative to internally controllable factors such as environmental cost allocation (Koerniady & Mayangsari, 2025). Under conditions where commodity price swings alone can move Return on Assets by tens of percentage points within a single year, as observed in the wide range of Return on Assets values reported in Table 3, the comparatively modest scale of environmental cost relative to total operating expenditure is unlikely to leave a statistically detectable imprint on profitability.

From a theoretical standpoint, this finding sits somewhat uneasily alongside the predictions of stakeholder and legitimacy theory as conventionally applied to environmental disclosure. Freeman original formulation of stakeholder theory anticipates that responsible engagement with environmentally affected stakeholders, of which green accounting disclosure is one expression, should over time translate into improved firm outcomes, while Hansen and Mowen similarly argue that well executed green accounting should generate operational efficiency benefits and reduced long run waste related liabilities that ultimately support profitability. The results of this study do not directly contradict these theoretical claims, but they do suggest that the conditions under which such benefits materialize, sufficient scale of environmental investment relative to total costs, sufficient time for benefits to accrue, and sufficient integration of environmental management into core operating decisions, may not yet be present among the sampled mining firms. This interpretation is consistent with the argument advanced by Lee and Raschke (2023) that the financial benefits legitimacy theory predicts from environmental disclosure are conditional on the credibility and depth of the underlying environmental commitment rather than being an automatic consequence of disclosure itself, and it suggests that until Indonesian mining firms move environmental cost management further from a compliance oriented framing toward a genuinely strategic one, the financial materiality of green accounting disclosure in this sector is likely to remain limited.

5. Conclusions

5.1 Conclusion

Based on the simple linear regression analysis conducted in this study, green accounting, measured through disclosed environmental cost, does not exert a statistically significant effect on the financial performance of mining sector companies listed on the Indonesia Stock Exchange during the 2019 to 2023 period. This conclusion is supported by a regression coefficient of 0.5015 accompanied by a significance value of 0.446, well above the conventional 0.05 threshold, and by a t statistic of only 0.77. An increase or decrease in the environmental cost disclosed by sampled companies therefore does not correspond to a statistically discernible change in company profitability over the period examined. The coefficient of determination of 0.0110 indicates that the model explains only 1.10 percent of the variation in Return on Assets among sampled firms, with the remaining variation attributable to factors outside the model, and the negative adjusted R-squared value further confirms

that the explanatory power of the single predictor model is very limited. Collectively, these findings suggest that the environmental cost currently disclosed by mining companies in this sample has not yet translated into a measurable improvement in profitability, and that the implementation of green accounting among these firms may still be functioning largely as a reporting formality rather than as an integrated element of financial strategy.

5.2 Research Limitations

This study is subject to several limitations that should be considered when interpreting its findings. The purposive sampling process resulted in a comparatively small final sample of eleven companies and fifty five firm year observations, a scale that constrains the statistical power available to detect effects of modest magnitude and limits the extent to which the findings can be generalized to the full population of mining companies listed on the Indonesia Stock Exchange. The study relies on a single proxy, disclosed environmental cost, to represent the multidimensional concept of green accounting, and this proxy may not fully capture other dimensions of environmental management practice that could carry different financial implications. The five year observation window, while sufficient to capture short term variation, may be too short to detect the longer term financial benefits that environmental investment is sometimes theorized to generate. Finally, the study relies entirely on secondary data drawn from company annual and sustainability reports, and the completeness and consistency of environmental cost disclosure across these reports varies considerably from firm to firm, introducing a degree of measurement variability that lies beyond the researcher's direct control.

5.3 Suggestions and Directions for Future Research

Future research on this topic would benefit from expanding the sample beyond mining sector companies to test whether the null relationship identified in this study is specific to the mining industry or reflects a broader pattern across environmentally exposed sectors. Subsequent studies might also incorporate additional explanatory variables such as environmental performance ratings, corporate social responsibility expenditure, firm size, and leverage, both to improve the explanatory power of the regression model and to isolate the specific channel through which environmental responsibility might influence financial outcomes. Extending the observation period beyond five years, or adopting a panel data approach with fixed or random effects specifications, would allow future researchers to test whether the financial benefits of green accounting emerge only over a longer time horizon than the present study was able to examine. Finally, future research could usefully move beyond aggregate environmental cost figures toward more granular measures of environmental management quality, such as the specific allocation of cost across prevention, detection, and remediation categories, in order to determine whether particular categories of environmental expenditure carry different financial implications than others.

Acknowledgement

The author gratefully acknowledges the guidance and support provided by the supervising faculty of the Management Study Program, Faculty of Economics, Universitas Sumatera Selatan, during the preparation of this research, and extends appreciation to the Indonesia Stock Exchange for maintaining public access to the financial and sustainability reporting data on which this study relies.

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