

Environmental management and financial performance of Peruvian mining companies

Gestión ambiental y desempeño financiero de compañías mineras peruanas

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Abstract

This study examines the relationship between environmental management and financial performance of the main Peruvian mining companies during the 2017–2022 period. Given the growing pressure to adopt sustainable practices, it is analyzed whether the implementation of environmental strategies, evaluated by ESG indicators, correlates with favorable financial results, especially in terms of Roa, ROE and Ebitda margin. The investigation adopted a quantitative approach, with a relational, non -experimental, observational and longitudinal design. The intentional sample included four mining companies with data available in Bloomberg. Information collection focused on five key financial performance indicators and environmental sustainability. For statistical analysis, descriptive measures and correlations of Pearson were applied. The results reveal a marked heterogeneity among companies: Southern and Minsur demonstrated a positive relationship between environmental and financial performance; In contrast, volcano and Buenaventura showed a disconnection between both dimensions. It is concluded that the financial impact of environmental strategies depends on the degree of institutionalization of these strategies and their effective integration in the business model of each organization. Thus, sustainability should not only be an isolated practice, but a central component to achieve sustainable economic benefits in the mining sector.

Keywords: financial performance, environmental management, mining.

Resumen

Este estudio examina la relación entre la gestión ambiental y el desempeño financiero de las principales compañías mineras peruanas durante el periodo 2017–2022. Ante la creciente presión para adoptar prácticas sostenibles, se analiza si la implementación de estrategias ambientales, evaluadas mediante indicadores ESG, se correlaciona con resultados financieros favorables, especialmente en términos de ROA, ROE y margen EBITDA. La investigación adoptó un enfoque cuantitativo, con un diseño relacional, no experimental, observacional y longitudinal. La muestra intencional incluyó cuatro empresas mineras con datos disponibles en Bloomberg. La recolección de información se centró en cinco indicadores clave de desempeño financiero y sostenibilidad ambiental. Para el análisis estadístico, se aplicaron medidas descriptivas y correlaciones de Pearson. Los resultados revelan una marcada heterogeneidad entre las empresas: Southern y Minsur demostraron una relación positiva entre desempeño ambiental y financiero; en contraste, Volcán y Buenaventura mostraron una desconexión entre ambas dimensiones. Se concluye que el impacto financiero de las estrategias ambientales depende del grado de institucionalización de dichas estrategias y de su integración efectiva en el

modelo de negocio de cada organización. Así, la sostenibilidad no solo debe ser una práctica aislada, sino un componente central para lograr beneficios económicos sostenibles en el sector minero.

Palabras clave: desempeño financiero, gestión ambiental, minería.

Introduction

The growing concern over the adverse effects of climate change, biodiversity loss, and environmental pollution has generated intense global pressure on extractive industries, particularly those with high impact such as mining (Fernández et al., 2025). In response to these challenges, the international community has promoted sustainability frameworks like the Sustainable Development Goals (SDGs) and ESG (Environmental, Social, and Governance) standards, which encourage the adoption of responsible and appropriate practices (Sonter et al., 2018). These standards not only represent an ethical commitment but also constitute a strategic condition for ensuring operational sustainability and reputation in sectors highly exposed to social pressures (Finucane & Beckett, 2024).

Mining plays a dual role in this context. On one hand, it serves as a driver of economic growth and a supplier of essential raw materials for energy transitions; on the other, it generates significant negative externalities on the environment and local communities (Gravel, 2023). In developing countries like Peru, where this activity constitutes a substantial portion of GDP, the conflict between economic development and environmental protection is particularly acute (Bilro, 2020; Obaya et al., 2024). Moreover, mining requires intensive use of energy and resources, making it vulnerable to mitigation policies such as carbon taxes and stricter environmental regulations (Yu et al., 2024).

Over the last few decades, socially critical research has highlighted the increasing power of ESG factors, especially in attracting investments and securing social licenses to operate (Dou et al., 2023; Tian et al., 2024). Environmental transparency, energy efficiency, and the implementation of environmental management systems have become not only regulatory requirements but also indicators valued by financial markets (Hudnurkar et al., 2023). Therefore, the hypothesis arises that mining companies with greater environmental responsibility may achieve competitive advantages translated into better economic outcomes (Nguyen et al., 2019).

In Peru, mining accounts for over 10% of national GDP and more than 60% of total export value, solidifying its status as one of the country's economic pillars (Delgado et al., 2022). However, this importance has also been accompanied by a sustained increase in socio-environmental conflicts, as seen in the emblematic case of Las Bambas and other mining projects in the highland areas (Dethier et al., 2023). It is estimated that more than 60% of the social conflicts recorded in recent years in Peru are related to mining, indicating a growing questioning of its environmental and social legitimacy (Neyra, 2025). These conflicts not only delay operations and generate significant costs but also erode trust among the involved parties. In this scenario, the "social license to operate"—the support and acceptance of local communities toward extractive projects—becomes vitally important (Sanguinetti, 2020).

Despite its relevance, existing studies still present significant gaps regarding the specific relationship between environmental management and financial performance in Peruvian mining. Although there is research on this connection in other sectors and contexts, evidence in the national mining industry is scarce, limiting the understanding of how sustainability is articulated in this business and its economic repercussions (Coayla et al., 2024; Flores-Alvarez et al., 2018).

In response to this need, this study aims to analyze the relationship between environmental management and financial performance of the major Peruvian mining companies during the period 2017–2022. It is hypothesized that effective implementation of environmental strategies, measured through ESG indicators, is positively associated with key financial variables such as return on assets (ROA), return on equity (ROE), and EBITDA margin.

The central question guiding this research is: What is the relationship between environmental management and financial performance of the major Peruvian mining companies?

Thus, this study aims to contribute to the academic and practical debate on corporate sustainability, providing empirical evidence to better understand the integration of environmental responsibility and economic efficiency in a highly strategic sector for the country. It also seeks to offer valuable insights for the business sector and for the design of public policies aimed at promoting responsible, profitable, and legitimate mining.

Methodology

This study adopted a quantitative, relational approach with a non-experimental, observational, and longitudinal design, allowing for the investigation of relationships between variables without directly intervening in the phenomenon under study (Hernández et al., 2018). Its primary objective was to analyze the relationship between environmental management and financial performance of the major Peruvian mining companies during the period 2017–2022.

For the sample selection, operational mining companies with available information on the Bloomberg platform were identified, forming a purposive sample of four companies: Southern Copper, Minsur, Buenaventura, and Volcán. These companies represent a significant proportion of the Peruvian mining sector and have consistent ESG data. Those below a minimum threshold or with incomplete information were excluded.

Data collection was conducted through a structured review of the documentation available on Bloomberg, focusing on five key indicators: EBITDA margin, ROA, ROE, ESG environmental score, and ESG disclosure score. The information collected was organized into a database to facilitate comparative analysis between companies and over time.

Statistical analysis included descriptive measures and Pearson correlations to identify associations between the variables (Widaman & Helm, 2023), performed by company to capture contextual differences in the implementation of ESG practices. Regarding ethical aspects, the study was based on publicly accessible secondary data, without involving personal or confidential information, thus not requiring ethical approval or consent. Additionally, the principles of research ethics, scientific integrity, and transparency were respected, ensuring proper use of sources.

Results and discussion

The analysis allowed for the comparison of performance in terms of profitability and environmental management among the major mining companies during the period 2017–2022, revealing significant differences between them. The measurements obtained, primarily based on indicators such as ROA, ROE, EBITDA margin, and ESG environmental and disclosure evaluations, show that some companies, such as Southern and Minsur, combine sustainable practices with positive economic results. Conversely, other companies, like Volcán and Buenaventura, exhibit a disconnection between their financial performance and environmental management.

Table 1 and Figure 1 clearly illustrate this reality: while Southern and Minsur demonstrate favorable performance in both profitability and sustainability, Volcán and Buenaventura show weaker results in both dimensions. This reflects the heterogeneity in the application of environmental policies within the national mining sector and their potential impact on the economic outcomes of the companies.

Table 1

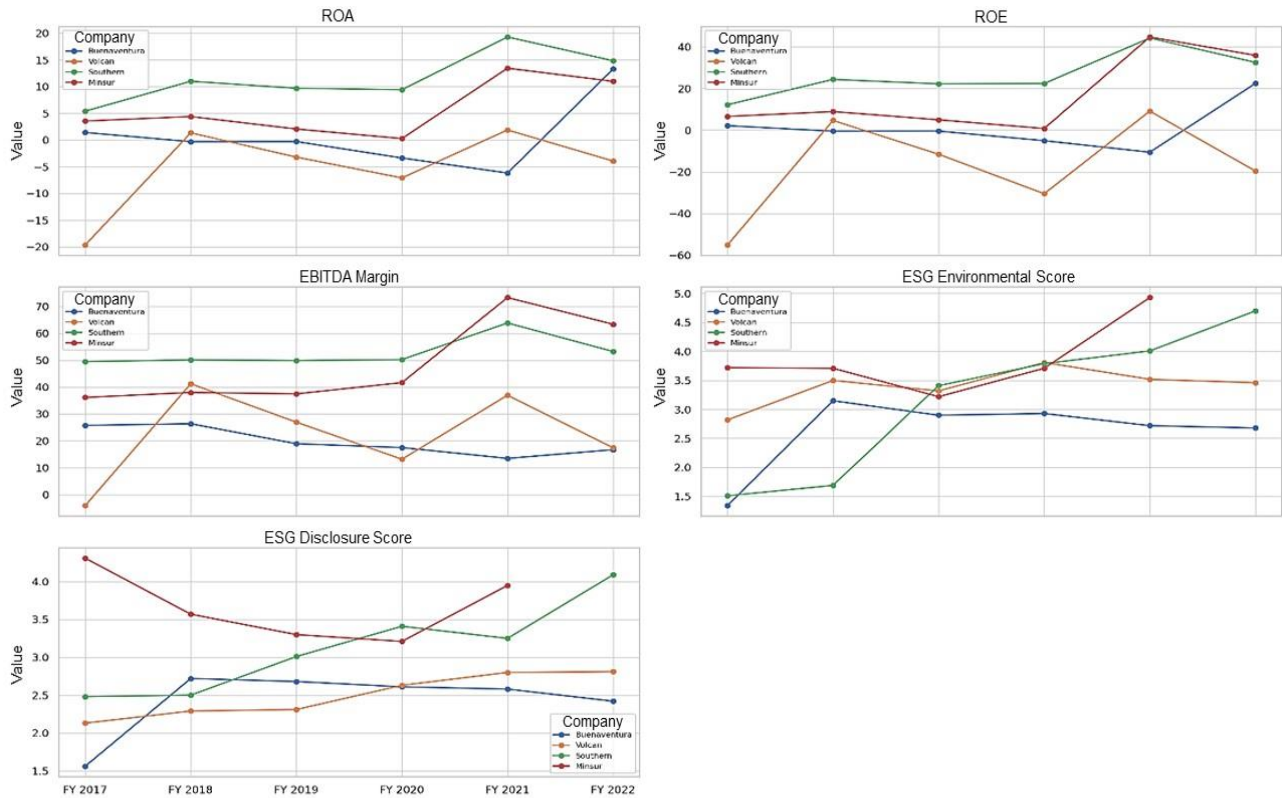
Average financial performance and ESG scores in Peruvian mining companies (2017–2022)

Company	EBITDA Margin	ROA	ROE	ESG Environmental	ESG Disclosure
Southern	52.78	11.60	26.31	3.18	3.12
Minsur	48.32	5.78	16.97	3.86	3.67
Volcán	21.93	-5.11	-17.14	3.40	2.49
Buenaventura	19.78	0.76	1.34	2.62	2.43

Note. Compiled by the authors (2025)

Figure 1

Evolution of financial and environmental performance in Peruvian mining companies (2017–2022)



Note. Annual trends of the indicators ROA, ROE, EBITDA Margin, ESG Environmental Score, and ESG Disclosure Score for Buenaventura, Minsur, Southern, and Volcán | Compiled by the authors (2025)

The correlations observed between the various ESG and financial indicators reinforce the organizational differences detected. In particular, Minsur exhibits a strong positive correlation, especially with ROA and ROE ($r > 0.90$), suggesting that environmental management is clearly integrated into its business model, possibly supported by a strong organizational culture oriented toward sustainability. On the other hand, Southern also shows positive correlations, albeit of lesser magnitude, reflecting a significant relationship between environmental management and operational efficiency (Finucane & Beckett, 2024). These findings align with previous research indicating that adequate ESG management can generate sustainable competitive advantages in sectors exposed to reputational and regulatory risks (Hudnurkar et al., 2023; Nguyen et al., 2019). As illustrated in Table 2, the correlation coefficients linking ESG indicators with the financial variables of each analyzed company are presented.

Table 2

Correlations between ESG Indicators and Financial Performance by Company (2017–2022)

ESG Indicator	Financial Variable	Buenaventura	Minsur	Southern	Volcán
ESG Disclosure Score	EBITDA Margin	-0.43	0.25	0.31	0.27
	ROA	-0.21	0.51	0.55	0.51
	ROE	-0.20	0.42	0.54	0.40
ESG Environmental Score	EBITDA Margin	-0.35	0.94	0.47	0.53
	ROA	-0.13	0.92	0.66	0.70
	ROE	-0.12	0.93	0.67	0.63

Note. Compiled by the authors (2025)

Conversely, Volcán and Buenaventura present poor ESG scores, even negative ones, which can be primarily attributed to limitations in their institutional infrastructure and a slower pace in the preparation of their ESG reports. Moreover, it could be due to these companies adopting more reactive than strategic approaches in the implementation of their environmental policies. As Gravel (2023) states, when sustainability is not an integral part of corporate strategy, efforts may be perceived as superficial or unconvincing to both markets and communities (Dubínski & Koterás, 2023; Enriquez et al., 2022). In particular, the negative correlations observed in Buenaventura may reflect the existing gap between their sustainability declarations and the actual impacts on their financial outcomes, a common challenge for organizations that have not yet consolidated sustainable models (Aryanfar et al., 2025; Tian et al., 2024).

Based on this information, it can be noted that while there is a general positive trend between environmental management and financial performance in the Peruvian mining sector, this relationship is not homogeneous; rather, it is conditioned by the degree of institutionalization of ESG practices. Research such as that of Dou et al. (2023) and Obaya et al. (2024) emphasizes that the success of ESG standards does not solely depend on their formalization but also on their ability to meet stakeholder expectations, including those of communities and investors, and especially on their effective integration into the objectives of all involved parties.

The Peruvian case presents specific particularities. Mining contributes approximately 10% of national GDP and is a source of numerous social and environmental conflicts (Delgado et al., 2022; Neyra, 2025). In this sense, environmental management transcends ethics and reputation to become a fundamental tool for obtaining the social license to operate (Sanguinetti, 2020). Companies like Minsur, which have advanced in transparency and disclosure, have achieved greater operational stability, while others, like Volcán, have generated controversies that affect their performance.

The results obtained confirm that the link between environmental management and financial performance among the studied Peruvian mining companies is heterogeneous. The observed differences in correlations suggest that mere declarative adoption of ESG indicators is insufficient; instead, the financial impact essentially depends on the real degree of implementation and the internal strategic coherence established (Ali & Kim, 2024; Saleh & AlShafeey, 2025).

Ultimately, companies with a defined environmental management strategy tend to achieve better economic results, whereas those with lower institutional maturity exhibit weak or negative relationships (Apau & Sibindi, 2025; Nabi et al., 2025). This situation reinforces the interpretation of the business model, given that adequate integration of environmental commitments allows sustainable actions to translate into lasting economic outcomes over time (Xu & Chen, 2020; Zhang et al., 2021).

Conclusions

The analysis conducted in this study demonstrates that the relationship between environmental management and financial performance of Peruvian mining companies is conditioned by structural and strategic factors that go beyond the simple formal adoption of ESG indicators. It was evident that those companies that solidly integrate environmental practices into their business model, such as Minsur and Southern, achieve better financial results. This empirically supports the premise that robust environmental management not only responds to ethical or regulatory demands but can also translate into greater operational efficiency, profitability, and corporate legitimacy.

This finding underscores the importance of considering sustainability as a structural dimension of corporate performance, especially in resource-intensive sectors with high social sensitivity, such as mining. Conversely, the cases of Volcán and Buenaventura reflect a disconnection between their environmental commitments and economic results, possibly attributable to a lower degree of institutional maturity, deficiencies in ESG governance, or a more reactive than strategic management approach. These internal differences within the same sector illustrate that there is not a single path to financial sustainability, and its impact depends both on the quality of implementation and the organizational context. Thus, the study emphasizes the need to move beyond superficial or merely declarative approaches to environmental issues, promoting genuine integration between environmental responsibility, business strategy, and economic performance.

While the findings are consistent, the scope of the study is limited by the number of companies analyzed and the use of secondary sources. Future research could expand the sample to include other extractive industries or incorporate mixed methodologies that allow for the exploration of internal practices, managerial perceptions, and governance structures associated with ESG implementation. Additionally, it would be pertinent to analyze the role of the regulatory environment and social pressures in shaping authentic corporate sustainability. Ultimately, this study aims to contribute to the academic and practical debate on how to build a mining industry in Peru that is not only profitable but also environmentally responsible and socially legitimate.

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