



Problems And Strategies For Resolving Environmental Issues Of Several Mining Companies In Southeast Sulawesi (Case Study)

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Abstract

Sustainable environmental management is expected to be present not only from the government or environmentalists, but must be applied in real efforts in the field of large industries, which make the environment as the origin of raw materials or raw materials of the company, especially mining companies that have a significant impact on ecological, social and cultural changes from a particular region. Companies in Southeast Sulawesi engaged in mining have many activities and profiles related to environmental issues faced. Various areas that are the point of conservation and cultivation of mining companies have a lot of contact with the environment, be it the natural environment or the artificial environment. In addition, the internal environment of the company also provides many crucial problems for mining companies. The many problems and challenges of the company require that each company must have a powerful resolution strategy for the sustainability of the mining company and the resolution of these environmental issues. This case study aims to identify and describe environmental problems and issues faced and overcome or reconciled by mining companies in Southeast Sulawesi, so as to provide an overview of how to approach sustainable environmental management practically in the field in order to achieve sustainable development goals. This research method is carried out by observation, namely direct observation in the field by conducting documentation, recapitulating secondary data in the form of company files that can be accessed. The results of the case study found that these mining companies manage environmental issues very moderately, where there are work units devoted to addressing environmental issues related to environmental pollution that occurs both physical, chemical and biological. For the work environment, certain work management is applied to





overcome Human Resources (HR) problems as well as derivative issues such as work safety (K3), and disaster mitigation. The main strategy of these mining companies is created from solid performance and coordination in increasing environmental awareness without reducing the company's main goal, for sustainable development synergy.

Keyword: Environmental issues, mining company strategies, and sustainable development

INTRODUCTION

Environmental degradation resulting from mining activities in Southeast Sulawesi presents a multifaceted challenge encompassing legal, social, and ecological dimensions. Among the most prominent drivers of environmental harm in the region is the nickel mining industry, which has been associated with widespread pollution, deforestation, and the conversion of agricultural land—thereby threatening local livelihoods and food security. This complex scenario underscores the need for a comprehensive and systemic approach to identifying root causes and formulating effective solutions.

A key structural issue lies in the current legal and regulatory framework. Indonesian policies have historically favored extractive industries, particularly coal and nickel mining, often at the expense of other land uses. This has resulted in overlapping land claims and pervasive legal uncertainty (Muhdar et al., 2023). Despite the existence of environmental legislation—such as the Environmental Protection and Management Law—its enforcement remains inconsistent. As a result, pollution persists, and affected communities continue to voice grievances (Agustin & Ruhaeni, 2024). For example, nickel mining operations have led to severe contamination of air, soil, and water resources, significantly disrupting local ecosystems and contributing to deteriorating public health and economic hardship (Agustin & Ruhaeni, 2024; Naryono, 2023).

The loss of agricultural land to mining exacerbates food insecurity and limits economic opportunities for rural populations. In many cases, insufficient regulatory oversight allows mining companies to operate with minimal accountability. To counter this, strengthening environmental enforcement mechanisms is critical. Such mechanisms must ensure not only compliance with environmental standards but also offer clear channels for public participation and redress (Agustin & Ruhaeni, 2024). Community engagement programs, when properly implemented, have the potential to empower local populations to assert their environmental rights and participate in decision-making processes (Mustafa, 2024).

In addition to strengthening governance, promoting sustainable mining practices is essential. Sustainable approaches may include adopting cleaner extraction technologies,





improving waste management systems, and rehabilitating post-mining landscapes to restore ecological balance (Firdaus et al., 2020). However, these initiatives often encounter resistance from entrenched corporate interests and are hindered by weak institutional governance, both of which impede meaningful progress toward sustainability.

At a broader scale, mining continues to play an essential role in the global economy by supplying raw materials critical to modern industries (Wulandari et al., 2023). Nevertheless, the environmental costs of mining are profound. Studies have documented severe consequences such as deforestation, biodiversity loss, land degradation, and contamination of natural resources (Purwanti et al., 2020; Simanjuntak et al., 2023). These environmental impacts extend beyond local scales and contribute to global ecological instability if left unmitigated. The growing public awareness of these risks, combined with mounting regulatory pressures, has compelled some mining companies to incorporate sustainability principles into their operations (Siregar et al., 2024).

In this context, aligning corporate strategies with sustainable development goals becomes not only a regulatory requirement but also a strategic imperative. Sustainable development, as defined by the Brundtland Report, entails fulfilling present needs without compromising the ability of future generations to meet theirs (Brundtland Report, 1987 in Setyobudi et al., 2023). For mining companies, this involves balancing economic growth with social responsibility and environmental stewardship. Strategic actions can include investing in green technologies, restoring degraded lands, reducing emissions, and supporting community welfare programs (Anggraini et al., 2021; Utami & Pratama, 2021).

Importantly, the adoption of sustainability strategies offers long-term benefits. These include enhancing corporate reputation, attracting ethical investors, reducing operational risks, and ensuring long-term resource availability (Siregar et al., 2024). Some forward-thinking companies have demonstrated genuine commitment through adherence to international environmental certifications, initiatives to reduce carbon footprints, and the implementation of targeted Corporate Social Responsibility (CSR) programs (Purwanti et al., 2020). Nevertheless, the practical application of such strategies remains uneven. Mining companies frequently face trade-offs between sustainability goals and the imperative to maximize short-term profits, particularly in regions with socio-economic vulnerabilities and weak regulatory environments (Utami & Pratama, 2021).

Given these complexities, this study aims to explore how mining companies in Indonesia operationalize their sustainability commitments amid persistent environmental challenges. Through a combination of theoretical frameworks and case study analysis, the research seeks to





uncover best practices, identify barriers to implementation, and contribute to a deeper understanding of how sustainable development can be achieved in the mining sector.

METHOD

This research will use a case study approach to explore in depth the implementation of sustainable development strategies by mining companies. The case study approach was chosen because it allows for a comprehensive investigation of contemporary phenomena in real-life contexts, particularly in complex environments such as the mining industry (Yin, 2018). The main focus is to understand how mining companies' strategies translate into good on-the-ground performance, as well as how strategic management of employees, work safety and disaster mitigation contribute to the achievement of sustainable development goals.

Data Collection Techniques

1. Direct Observation: Observations will be conducted at the operating sites of the selected mining companies. The focus of the observation includes the on-site performance phase: Observation of environmentally friendly mining practices, waste management, post-mining land reclamation and biodiversity conservation efforts. This will include visual verification of the implementation of environmental and sustainability-related standard operating procedures (SOPs). Management and Employee Performance: Observation of interactions between management and employees, compliance with work safety procedures, and participation in company environmental programs. Disaster Mitigation: Observation of early warning systems, evacuation routes, disaster mitigation equipment, and simulations conducted.
2. Reviewing the Mining Company's Working File: Researchers will analyze various internal and external company documents, including: Sustainability/ESG (Environmental, Social, and Governance) Report: To understand the company's commitments, sustainability targets and reported achievements. Standard Operating Procedures (SOPs): Related to responsible mining, environmental management, occupational safety and health (OHS), and disaster emergency response.
3. Documentation of CSR (Corporate Social Responsibility) Programs: Including engagement with local communities and local economic development initiatives.

Focus of Analysis

Data analysis will center on four key pillars in achieving sustainability goals namely,





Performance in the Field: Proving the extent to which mining practices are in line with sustainability principles and their impact on the environment. This involves comparing policies on paper with actual implementation. People Management Strategy: Assesses how the company engages, trains and empowers its employees to support sustainability goals. This includes an organizational culture that supports safety and environmentally friendly practices. Occupational Safety: Analyzes the effectiveness of safety programs in protecting employees and minimizing incidents, as an indicator of the company's commitment to the social aspects of sustainable development. Company Internal and External Disaster Mitigation: Evaluate the company's readiness to deal with potential disasters, whether caused by internal operations (e.g., tailings dam failure) or external factors (e.g., natural disasters). This demonstrates the company's responsibility to the environment and surrounding communities.

Through the integration of data from direct observation and file review, this research will provide a holistic picture of mining companies' efforts to balance economic objectives with environmental and social responsibilities, towards achieving sustainable development.

RESULTS AND DISCUSSION

Issues of Pollution and Damage to the Natural Environment

PT Vale Indonesia Tbk is one of the major players in Indonesia's nickel industry, and they have concessions in the Pomalaa Block, Kolaka Regency, Southeast Sulawesi, in addition to their main site in Sorowako. It is important to note that although Vale has concessions in Pomalaa, their activities there are currently more at the construction and development stage of a new project (Indonesia Growth Project/IGP Pomalaa), rather than full-scale mining as in Sorowako, the potential environmental impacts of their operations in Pomalaa (both from construction activities and preparation for future mining) remain a concern. Here are some of the relevant environmental impacts and issues recognized by the company, namely; Landscape change and vegetation loss, land clearing, topography, erosion, sedimentation, and Water quality. As seen in figure 1 below:





Figure 1: Runoff water during rainfall at PT Vale Pomalaa

Silt and sedimentation that enter rivers or springs can reduce the quality of clean water used by the community for daily needs and agricultural irrigation. Systematic damage caused by turbidity and sedimentation will cause the river to become shallower and reduce the quality of rice fields in Kolaka. To prevent this, PT Vale Pomalaa has built water runoff facilities such as sedimentation ponds and monitors water quality every three days, so the company is committed to meeting environmental quality standards.

From the observation, it was found that the area of the sedimentation pond is still just enough to accommodate runoff from a small area and the discharge of runoff is not large enough, such as when there is intense rain, this condition can be seen in Figure 2 below:



Figure 2: Location and condition of PT Vale Pomalaa sediment ponds

For the potential of heavy metal pollution, PT Vale states that compliance with quality standards by reducing the risk of heavy metal pollution from mine waste (e.g. from tailings or waste rock) discharged into water bodies remains a concern if not managed very strictly because the impact of pollution is at the same level as hazardous and toxic waste (B3). Hazardous and toxic (B3) waste from the processing process also requires special handling. PT Vale's Sustainability Report recognizes an increase in the volume of hazardous and toxic waste by 2024, although they are coordinating and pursuing effective activities in the utilization of waste heat and biomass. For solid waste, large volumes of overburden and tailings require effective management to prevent environmental impacts.

A different strategy was implemented by PT Stargate Pasific Resources (SPR), located in North Konawe, in responding to environmental issues in the form of damage to land, sedimentation, topography and landscape, focused on reclamation and conservation activities or reforestation of ex-mining land. These activities can be seen in the following figure:



Figure 3: Land reclamation process

Reforestation is not only carried out on ex-mining land, but far downstream to the coastal ecosystem is also a concern for the company to handle environmental issues. Mangrove planting activities are carried out every period to ensure that water sedimentation due to mining activities can be prevented by reforesting the beach, so that the mangrove vegetation that is formed will filter sedimentation. The following is a picture of the beach in the SPR mining company area and the mangrove planting process.



Figure 4: Mangrove conservation process and sedimentation thickness measurement

The description of figure eight is in the form of bolded letters in a circle, starting from A is a visualization of coral reefs covered with mud or sedimentation from mining excavation, then B is a visualization of the company's efforts in this case PT Stargate Pacific Resources (SPR) to measure the level of water sedimentation with an indicator of high mud cover or sediment, and finally C is evidence of mangrove conservation in the form of several mangrove shoots that continue to be monitored for growth in the area. The condition of the location of the water floor is yellow and there are several corals, indicating that the area was originally a coastal coral rock formation which is generally dark gray in color. It can be concluded that mining activities can trigger changes in water conditions, be it freshwater (rivers, lakes and ponds), brackish water (estuaries) and saltwater (beaches and seas).

Human Resources (HR) and Work Safety Issues

PT Vale prioritizes the improvement of human resources on several indicators and competencies, among others; Ensuring that all workers from management level to field workers (including contractor workers), have adequate competencies, certifications, and safety training is an ongoing challenge. Especially in new projects, massive recruitment often involves workers who do not have specific experience in the Vale environment. Disciplining Unsafe Behavior and enforcing discipline such as securing workers who do not use complete Personal Protective Equipment (PPE), cut procedures or work in a hurry that can cause accidents. Build and maintain a strong safety culture where every individual feels responsible



and courageous to report potential violations and hazards that will occur in the field. Implement Effective Communication, i.e. Communication on safety procedures, hazard warnings, and *lessons learned* are effectively delivered to all levels of workers, including those with diverse language and educational backgrounds.

PT Vale Pomalaa's strategy is not much different from that of PT Stargate Pacific Resources (SPR). In handling human resources and occupational health and safety (K3), PT SPR implements a working group or unit that always supervises, reminds, and applies discipline in the form of increased concern for employee competence and K3. Through team briefing, group discussions and training, the company can address various internal issues related to HR and occupational safety and health (K3).

The advantages of workshops, training and or lessons learned to improve employee competence in mining companies are more about maintaining a lifelong learning atmosphere in the form of direct work practice in the work environment, so that experience is formed and the character of employees becomes technically established. So that experience and length of work in the mining sector is a benchmark for professionalism in mining companies.

Regulatory Issues and Environmental Compliance

PT Vale Indonesia Tbk. has officially received an extension of its Special Mining Business License (IUPK) valid until December 28, 2035. This IUPK was issued on May 13, 2024. This indicates that the company has met the requirements to obtain an extension of the operating license from the government. Continuing from this, the implementation of the Pomalaa Project (IGP Pomalaa) itself is one of Vale's strategic projects in Indonesia. The groundbreaking of this project was carried out on November 27, 2022, marking the start of the development of nickel processing facilities in the Pomalaa region.

Regulations with a long enough time of more than 10 years provide a huge opportunity for companies to develop various business activities with large profits, but in line with this, environmental monitoring and compliance must also be continuously improved. The company also cooperates with independent parties such as Bureau Veritas as an external auditor for environmental performance evaluation. For the Pomalaa project, PT Vale Indonesia has conducted a comprehensive AMDAL (Environmental Impact Assessment) study. Environmental management and monitoring implementation reports (RKL-RPL) for the Pomalaa Block are also prepared periodically (for example, RKL-RPL Report Semester II Year 2023).

In 2024 (2024 Sustainability Report), PT Vale Indonesia recorded a Gold PROPER award, which is the highest award from the Ministry of Environment and Forestry (MoEF) for companies





that go beyond compliance and implement sustainable practices. This demonstrates a strong commitment to environmental management at the national level. While this 2024 report generally focuses on the Sorowako operations, some topics also cover the ongoing operations at Pomalaa and Bahodopi.

A mining company proceeding from scratch with a commitment to sustainable development requires a great deal of coordination and regulation from all stakeholders. With a strict and dynamic licensing process, despite the commitment and awards, improvement and monitoring are still required.

Sustainable commitment is also implemented by PT SPR, which holds a 1,213.2 hectare production Mining Business License (IUP) in North Konawe, Southeast Sulawesi. The company's sustainability commitment is still in its early stages but intense, unlike PT Vale Pomalaa, which is a branch of PT Vale Indonesia in Sorowako, which already has established regulations.

PT SPR also has a mining business license (IUP) that is valid until December 22, 2029 and can be extended every 10 years. The company has also obtained various additional permits, including forestry IPPKH, port permits, and environmental permits, and has secured all 540 hectares of operational land that includes ports, main access roads, and other industrial areas. Regulatory and licensing processes are implemented by the company in tandem with environmental compliance. Following the rules and procedures of national mining companies, PT SPR also has AMDAL and environmental accountability reports that are reported every period. With a fairly large operational coverage area, the company is involved in an industrial area development program called ASPIRE Atargate industrial Park in North Konawe. This program has provided a great deal of assistance to the company on mining regulations, permits and implementation since PT SPR joined. PT Stargate Pasific Resource has a corporate social responsibility (CSR) program as a social engagement effort in terms of environmental responsibility and compliance. PT SPR has implemented various CSR programs aimed at improving the welfare of the communities around its operational areas, especially in Molore Village and Lameruru Village. These programs include; Commitment to the Environment and Public Health and not forgetting all parties directly related to the company. The commitment is manifested in the provision of scholarships for students (Figure 5), the construction of religious education infrastructure and markets (Market) in Figure 6. The following is a visualization of PT SPR's CSR programs and commitments:





Figure 5: Photo with PT SPR employees and student scholarship recipients



Figure 6: Kanitra Mosque and Market Infrastructure

CONCLUSION

Strategic mining companies in dealing with environmental issues that develop, both internally and externally, are management or strict arrangements ranging from human resource management (HR) to regulatory arrangements, licensing, and environmental compliance. Based on the case study analysis, it was found that the company's experience in the mining industry is the main key to the maturity of the company's management system, so that the regulation time of PT Vale Pomalaa is longer until 2035 while the regulation time of PT Stargate Pacific Resource



is until 2029. The experience of companies and employees in the development strategy of the mining management system provides a real synergy for sustainable development.

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