

Current Risk Management Strategies for the Mining Industry in Gorontalo: A Review

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ABSTRACT

This research analyzes current risk management strategies relevant to the mining industry in Gorontalo, with a focus on mitigating negative impacts on the environment and local communities. Through a qualitative approach that includes a literature review and objective situation analysis of the assisted communities, this study aims to identify best practices in effective risk management. The research results highlight the importance of integrating cutting-edge technology, such as data analysis and the Internet of Things (IoT), in improving safety and cleanliness in the workplace (K3). Apart from that, continuous training for employees is also considered a crucial step in increasing awareness and responsibility for K3. The importance of a deep understanding of geotechnical conditions was also emphasized, especially in dealing with potential risks such as landslides. Strong partnerships between companies, governments and local communities are also considered important in managing environmental risks effectively. By adopting a sustainable approach that focuses on technology, training and partnerships, the mining industry in Gorontalo can maintain a balance between economic growth and environmental conservation. In conclusion, an integrated and proactive risk management strategy is needed to ensure the sustainability of the mining industry while still paying attention to the resulting social and environmental impacts.

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1. INTRODUCTION

Risk is an integral part of all corporate activities, especially in the decision-making process. When the outcome of a decision is uncertain, there is risk. Generally, people associate danger with negative impacts. One common form of risk expression is "considered risk". Specific events, changes in circumstances, the consequences of those events, or a

combination of these events are examples of how risk is described in the context of achieving an objective. Risk is generally defined as anything that can affect the achievement of an organization's objectives [1].

Today, companies face various changes, both in the context of business and the environment. Companies are able to improve their ability to adapt to

environmental changes because of the speed and uncertainty of these changes. Risk management is one of the important components in managing companies and organizations today. Therefore, having tools available for risk management will be useful in dealing with the rapid changes that occur in today's business and organizational world. Companies in Indonesia are currently facing similar challenges. To cope with rapid and complex environmental changes, risk management must be implemented effectively by organizations, both at the regional and national levels [1].

According to Rahman (2015), the risk management process consists of the following steps: (1) risk identification; (2) risk analysis; (3) technique selection; (4) strategy selection; and (5) control. Strategic hazards must be avoided, while operational hazards must be identified and controlled. If resources are limited, risk analysis can only be performed on risks that have significant consequences and require the selection of techniques to address them. Everyone in the company must be aware of the company's risk management objectives [2].

Factors inside and outside the company are what drive companies to engage in the risk management process. External factors can be government policies, both nationally and globally, while internal factors generally consist of potential financial problems and related costs, low revenue performance, growth opportunities, and dependence on the board of directors. Companies with good management are ready to take risks. The fact that every company is able to continue to exist in the market is closely related to its ability to control the various risks that arise in every aspect of its business. Companies must be able to manage risks in the most effective way if they want to achieve their goals [3].

The mining industry in Gorontalo plays a vital role in the regional and national economy of Indonesia. However, the industry also faces various risks such as workplace safety and health and environmental damage, which can affect business operations and sustainability. This

background emphasizes the importance of effective risk management to maintain sustainability and shared prosperity.

Study [4], stated that the mining industry is known for its high risk, large capital requirements, and high technological complexity. Therefore, the implementation of Occupational Safety and Health (K3) in mining activities is very necessary to ensure effective operations and avoid accidents and occupational diseases.

In addition, in research conducted by Zain (2017), operational risk analysis for PT Aneka Tambang (ANTAM) Tbk emphasizes the importance of risk management to ensure the continuity and success of the company in the mining industry. ANTAM involves various stakeholders, including the board of directors and executive management, in implementing the right approach to identify, measure, and monitor risks associated with its operations. The company has built a deep attitude towards risk by complying with regulations and implementing best practices in the industry. Thus, the company not only maintains its operational integrity, but also positions itself as a strong player in the industry, because it is able to take advantage of opportunities and overcome challenges intelligently.

The main problem faced is how the mining industry can develop adaptive and responsive risk management strategies to current conditions. The purpose of this study is to identify and analyze effective risk management strategies for the mining industry in Gorontalo, as well as to provide recommendations based on an objective situation analysis of mine workers and assisted communities, namely communities directly affected by mining activities.

In the situation analysis, it was found that many people depend on the mining sector for their livelihoods, but are also exposed to environmental risks such as water and soil pollution. The main issue that is the focus is how to minimize the negative impacts of mining activities on the environment and society. Thus, this article is expected to provide real contributions in developing more effective and sustainable

risk management strategies for the mining industry in Gorontalo.

In 2024, research conducted by [6] about Risk Management Analysis in Coal Mining in Mining Business License Area (IUP) Banko Tengah Block B PT Bukit Asam Tbk shows that there are 15 risks in the risk register which are successfully categorized at different levels. At the high-risk level such as work accidents at the mining site, medium risks such as coal production that is not according to plan and risks at low levels such as environmental pollution. Some of the studies above have differences with this study, such as the research object above which focuses more on one mining company and the research method used.

2. LITERATURE REVIEW

2.1 Risk Management

Risk management is a structured approach or methodology for dealing with uncertainty related to threats. It involves a series of human activities, including risk assessment, developing strategies to manage risk, and mitigating risk by utilizing or managing resources. Some strategies that can be applied include transferring risk to another party, avoiding risk, reducing the negative impact of risk, and bearing some or all of the consequences of a particular risk. Traditional risk management focuses more on risks caused by physical or legal factors, such as natural disasters, fires, death, and lawsuits. Risk is related to uncertainty, which arises from the lack or absence of sufficient information about what will happen. This uncertainty can potentially produce positive or negative impacts. According to Wideman, uncertainty that has the potential to be profitable is called an opportunity, while uncertainty that can cause losses is called a risk [7].

2.2 Mining Industry

According to Hutabarat (2020), mining is the process of extracting natural resources from within the earth to obtain mining results. In the context of research, management, and exploitation

of minerals or coal, the activities carried out include general investigations, exploration, feasibility studies, construction, mining, processing and refining, transportation and sales, and post-mining activities, all of which are included in the definition of mining in Article 1 paragraph 1 of Law No. 4 of 2009. This knowledge is useful for assessing the possibility of various types of mining operations that can be carried out before, during, and after the mining process [8].

3. METHODS

This research method uses a qualitative approach through a literature review to review the current risk management strategies in the mining industry in Gorontalo. The subjects of the study included local communities and mining industry players in the region. The data analysis method uses the Miles and Huberman analysis method which contains three models, namely: data reduction, data presentation, and drawing conclusions, each of which aims to select, focus, and transform data; present structured information to draw accurate conclusions; and draw conclusions from the data that has been collected. Data collection uses secondary data from books, scientific journals, industry reports, and other relevant sources, as well as qualitative data analysis to identify patterns and best practices.

4. RESULTS AND DISCUSSION

The role played by the mining industry in the development of a country is very important. Not only in the fiscal, monetary, and real sectors, but also in other parts of the national economy, the mining industry is an important component. It is clear that mining is one of the sources of income for the country. This industry contributes to regional development, both through funds from profits and through community development programs or corporate social responsibility (CSR). This

industry creates a surplus in the trade balance and increases investment. In addition, mining has a positive impact on the workforce. This industry is also a major contributor to the composite stock price index. This industry is characterized by high risk, requires large capital, and high technological complexity [4].

The current risk management strategy for the mining industry in Gorontalo includes various approaches that integrate cutting-edge technology and the participation of all stakeholders. One strategic approach is the implementation of technological systems for workplace safety and hygiene (K3) management, such as data analysis and the Internet of Things (IoT). Sensors installed on equipment and the work environment allow companies to monitor conditions in real time and detect potential hazards before they occur. Data analysis also allows for the evaluation of accident trends and the implementation of better preventive measures, making monitoring more proactive than reactive.

Each strategy for managing risk includes not only technology, but also ongoing training for employees. Emergency simulations and training in handling hazardous materials, as well as improving procedures for safe work practices, are all included in the training program. It is hoped that the formation of a strong attitude towards K3 through this training program will increase the awareness and responsibility of individuals in maintaining the safety of themselves and their co-workers. Thus, all employees, from managers to field operators, agree on the importance of maintaining safety and minimizing risks in the workplace.

Environmental hazard assessment and management are also part of risk management. Given that mining has a significant impact on the surrounding environment, it is important to have a sustainable strategy in dealing with the environment. These efforts include effective waste management, rehabilitation of areas after exploitation, and regular monitoring of air and water quality. By complying with

strict regulations, industries in Gorontalo can reduce their negative impacts on the environment. Strategies for effective and comprehensive risk management for the modern offshore industry are created by combining technological, training, and environmental mitigation approaches [9].

In addition, it is necessary to pay attention to the implementation aspects of the strategy effectively and efficiently. Steps such as duplication, improvement of SOPs, and risk control will require good coordination between various departments and internal stakeholders. Meanwhile, the use of new technologies and diversification also require wise investment and careful monitoring of their impact. Thus, in addition to identifying risks, effective risk management also involves continuous monitoring and evaluation of the strategies implemented, as well as the ability to adapt to changes in the external and internal environment that may affect the company's risks.

Many countries have realized that transparency in mining activities helps boost the economy and reduces the risk of conflict and corruption associated with mining activities. Given that its benefits can be utilized to improve the general welfare of society, mining is one of the important resources that can support development at both the national and regional levels [10].

An integrated risk management strategy, including the use of advanced technology, ongoing training, and a commitment to regulatory compliance, is key to minimizing risks and improving occupational safety and health. With such a proactive approach, mining companies such as PT Bara Indonesia Tbk. and PT. Senamas Energindo Mineral can identify, evaluate, and manage risks more effectively. In addition, the study also highlighted the importance of a deep understanding of geotechnical conditions to reduce risks associated with natural disasters such as landslides. By adopting appropriate strategies, mining companies can maintain safe and sustainable operations, while

minimizing negative impacts on the environment and surrounding communities.

4.1 Implementation of K3

Occupational Health and Safety (OHS) is a very important aspect for mining companies, especially in Gorontalo, considering the work environment is often full of risks and dangers. Mining, with all its activities such as excavation, transportation, and material processing, has a high potential for danger, including work accidents, exposure to hazardous chemicals, and adverse environmental impacts. Therefore, the implementation of an effective OHS program is a must for mining companies to protect the health and safety of their workers. In addition, companies also need to comply with OHS regulations that have been set by the government to prevent incidents that can threaten the lives and welfare of workers. By prioritizing OHS, mining companies not only ensure protection for employees, but also maintain the company's reputation, minimize legal risks, and increase operational efficiency by reducing the time of productivity disrupted due to accidents or occupational diseases. In addition, investment in OHS training can also increase awareness of potential hazards and strengthen the safety culture in the workplace, creating a safer and more productive work environment for all parties involved in mining operations.

To prevent mining-related activities, increasing individual capacity in terms of knowledge and understanding of Occupational Health and Safety (OHS) can be a solution. Organizing events aimed at increasing workers' awareness of OHS in the context of mining activities can also be done. If a situation that is potentially dangerous to humans occurs, preventive measures must be taken to avoid accidents and uncertainties related to drilling activities. Inspection of buildings and equipment for workplace safety starts from the construction stage,

placement, installation, and storage of goods, as well as continuous safety measures and signs are applied to monitor and prevent accidents [11].

K3 is seen as an effort to prevent work-related accidents and diseases. The implementation of K3 begins by identifying potential causes of accidents and occupational diseases that occur during mining business activities, and taking necessary preventive measures. This includes risk management such as fire, explosion, landslide, toxic gas, and extreme temperatures. Risk management is an interactive process that mining companies use to identify, evaluate, and reduce risks in the workplace, thereby creating a safe and hazard-free working environment. The importance of systematic and fundamental risk management requires integration between occupational health and safety management with other business management. This integration begins with the social K3 management policy and the operationalization of the Occupational Safety and Health Management System (SMK3) [12].

In the context of the mining industry, occupational safety and health (OHS) is not only a regulatory obligation, but also a strategic investment for the company. By prioritizing OHS, the company not only protects its most important asset, namely employees, but also ensures stable operational continuity, maintains the company's reputation, and minimizes legal risks and financial losses that may arise from work incidents. Through the integration of systematic risk management and a sustainable approach to OHS, mining companies can create a safe, productive and sustainable working environment for all parties involved in their operational activities.

4.2 Continuous Training for Employees

In the mining context, ongoing training for employees is even more important given the often complex and diverse risky working environment. This

training will include an in-depth introduction to the specific hazards and risks associated with mining activities, such as mine accidents, explosions, exposure to hazardous chemicals, and environmental impacts. Employees will also be trained to use appropriate safety equipment and safe working techniques, as well as to identify potential hazards on the mine site. In addition, the training will provide a solid understanding of emergency procedures and evacuation plans, so that employees can act quickly and effectively in an emergency situation. In addition to focusing on safety aspects, ongoing training will also cover best practices in environmental risk management, including efforts to reduce the impact of mining on the environment and surrounding communities. Thus, this ongoing training aims not only to protect the safety and health of employees, but also to ensure the sustainability of responsible and sustainable mining operations (Ramadan & Jati, 2019).

Continuous training for employees in the mining industry in Gorontalo is an important investment in human resource development and occupational safety. By strengthening employee skills in identifying, managing, and mitigating risks in the work environment, companies can create a safer and more productive work environment. In addition, continuous training also allows employees to remain relevant in the face of technological changes and best practices in the mining industry, thereby improving operational efficiency and work quality.

On the other hand, continuous training also plays an important role in maintaining the balance between natural resource exploitation and environmental preservation in Gorontalo. By providing a deeper understanding of the environmental impacts of mining activities and how to reduce them, employees can play an active role in maintaining environmental

sustainability. This is important to ensure that mining in Gorontalo can provide long-term benefits to the community and the environment, while still meeting the needs of the industry.

4.3 *Environmental Risk Management*

In managing environmental risks in the Gorontalo mining industry, the current approach that can be adopted is to prioritize sustainable and environmentally friendly practices. Mining companies must prioritize technological improvements and innovation to reduce environmental impacts. This can include the use of advanced technology in the mining process, such as cleaner and more efficient extraction methods and the use of environmentally friendly equipment. In addition, the implementation of post-mining land restoration and rehabilitation practices is also important to minimize long-term environmental damage.

In addition, collaboration between mining companies, government, and local communities is essential to effectively manage environmental risks. This involves establishing strong and transparent partnerships to monitor and evaluate the environmental impacts of mining activities and identify timely solutions. Local governments can also strengthen regulations and law enforcement to ensure that mining companies operate in accordance with established environmental standards. Furthermore, it is important to increase community awareness and involvement in environmental risk mitigation efforts. This can be done through education and training programs on the importance of environmental conservation and active community participation in monitoring and supervising mining activities. By actively involving communities, mining companies can gain a better understanding of local needs and concerns, and can design more effective and sustainable risk management strategies. By implementing these

strategies, the mining industry in Gorontalo can reduce its negative impacts on the environment while maintaining its productivity and sustainability [13].

By adopting an approach that focuses on sustainable practices, strong collaboration between companies, government and local communities, and the application of the latest technology and innovation, the mining industry in Gorontalo can maintain a balance between economic growth and environmental preservation. Through these steps, mining companies can manage environmental risks more effectively, minimize their negative impacts, and create long-term benefits for the environment and communities. With a shared commitment to sustainability, the mining industry can become a positive agent in sustainable development in Gorontalo. These steps will not only generate profits for companies and communities as a whole, but will also provide long-term benefits for the environment that is vulnerable to the impacts of mining activities. Through this approach, mining companies can become pioneers in changing the industry paradigm from a potential

source of environmental damage to an agent of positive change that contributes to sustainable development in Gorontalo, combining economic success with continued environmental protection.

5. CONCLUSION

The current risk management strategy for the mining industry in Gorontalo highlights the importance of an integrated and proactive approach to managing complex and diverse risks. Through the use of advanced technology, ongoing training for employees, and a commitment to regulatory compliance, mining companies can minimize risks and improve occupational health and safety. The importance of a thorough understanding of geotechnical conditions is also highlighted as a key step in reducing risks associated with natural disasters such as landslides. Strong collaboration between companies, government, and local communities is also a key factor in effectively managing environmental risks. By adopting a sustainable and sustainability-focused approach, the mining industry can be a positive agent in Gorontalo's sustainable development, creating long-term benefits for the environment and communities.

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