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# INNOVATION STRATEGY TO SUPPORT GOOD MINING PRACTICE AND COMPETITIVENESS: A STUDY AT PT J RESOURCES BOLAANG MONGONDOW

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**Abstract:**
The gold mining industry faces increasing pressure to achieve not only high financial performance but also to ensure responsible and sustainable mining practices. The concept of Good Mining Practice (GMP) requires companies to integrate technical compliance, occupational safety, environmental protection, and social responsibility throughout the mining business cycle. In this context, innovation strategy plays a crucial role as a driver of change towards safer, more efficient, and more competitive mining operations. This article aims to critically review the literature on innovation strategy, GMP, and corporate competitiveness, and synthesize how the two can strengthen each other, with a contextual focus on PT J Resources Bolaang Mongondow (JRBM), one of the gold mining companies in Indonesia. The method used is a literature review of scientific articles, books, and policy documents related to innovation strategy, mining management, and sustainability. The results of the study indicate that innovation strategies aligned with GMP generally take the form of: (1) technological and process innovation to increase efficiency and reduce environmental impacts; (2) innovation in safety and risk management systems; (3) social innovation through strengthening relationships with communities and stakeholders; and (4) managerial innovation and business models that make sustainability a source of competitive advantage, not just a regulatory obligation. For a gold mining company like PT J Resources Bolaang Mongondow, the combination of exploitation innovation (continuous improvement of existing processes) and exploration (development of new technology- and social-based approaches) has the potential to strengthen its license to operate, reputation, and long-term competitiveness.

**Keywords**: Innovation Strategy, Good Mining Practice, Competitiveness

## INTRODUCTION

The mining industry is a strategic sector in the Indonesian economy, contributing to state revenue, employment, and accelerating regional development. Data from the Ministry of Energy and Mineral Resources (2023) shows that the mineral and coal sector contributed more than IDR 184 trillion to non-tax state revenue (PNBP), making it a major contributor to the national fiscal. However, the industry's growth has been consistently overshadowed by negative issues such as environmental degradation, land conflicts with communities, job insecurity, and water pollution. This phenomenon is evident in various national cases, such as watershed damage due to tailings, mercury pollution issues in small-scale gold mining, and the increasing number of occupational safety incidents at large mining companies (ILO, 2021).

These conditions have led to strong demands for mining companies to implement Good Mining Practice (GMP) as the primary guideline for ensuring efficient, safe, and sustainable operations. GMP encompasses aspects of good mining techniques, environmental management,

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occupational safety and health (K3), post-mining activities, and social responsibility to the community (Minister of Energy and Mineral Resources Regulation No. 26/2018). Thus, compliance with GMP is not merely a legal obligation but also the foundation of a company's reputation, social license to operate, and long-term competitiveness. In recent years, the global mining industry has been moving toward a transformation driven by technological and managerial innovation. The Deloitte Mining & Metals 2024 report emphasizes that mining companies seeking to survive in an era of commodity price volatility, climate change, and ESG (Environmental, Social, and Governance) pressures must invest in innovations such as operational digitalization, real-time environmental monitoring, heavy equipment automation, sensor-based safety systems, and more efficient waste management. Changing stakeholder expectations, from governments and investors to local communities, are accelerating the need for mining companies to move away from conventional approaches.

This growing demand for sustainability is also evident in Indonesia. For example, the government's push for the implementation of a technology-based National Resource and Reserves Account, mandatory post-mining reclamation, and the enforcement of stricter environmental compliance standards. For companies, especially those operating in ecologically and socially sensitive areas, innovation is a strategic tool for meeting GMP standards while maintaining productivity. PT J Resources Bolaang Mongondow (JRBM), a gold mining company operating in North Sulawesi, faces this reality. Gold mining operations in mountainous areas and near residential areas require the company to continuously implement breakthroughs in tailings waste management, water quality monitoring, occupational safety systems, and community empowerment programs. Several public reports indicate that gold mining companies, including those in Sulawesi, frequently face challenges such as land conflicts, concerns about environmental pollution, and social resistance due to a lack of community involvement (JATAM, 2022). This situation underscores the importance of an innovation strategy that focuses not only on production technology but also on social innovation and sustainable governance.

**Preliminaries or Related Work or Literature Review: Innovation Strategy.** Innovation is understood as the process of creating or developing new products, processes, or methods that add value to an organization. In strategic management, innovation is a strategic decision that determines how a company creates and maintains a competitive advantage. The literature categorizes innovation strategies into several key dimensions: incremental and radical innovation, exploration and exploitation, and product, process, and business model innovation.

The concept of dynamic capabilities emphasizes that successful innovation depends on a company's ability to identify opportunities, seize them, and reconfigure resources (Teece, 2018). In the mining industry, innovation strategies include the adoption of production technologies, sensor-based safety systems, real-time environmental monitoring, and social innovations in community management. These innovations are prerequisites for addressing regulatory demands, sustainability, and operational efficiency.

**Good Manufacturing Practice (GMP).** Good Mining Practice (GMP) is a standard for implementing mining activities that integrates technical, environmental, occupational health and safety (OHS), and social aspects. In Indonesia, GMP is regulated by Law No. 4/2009 and Regulation of the Minister of Energy and Mineral Resources No. 26/2018, and Decree of the Minister of Energy and Mineral Resources No. 1827/2018. The four main aspects of GMP include: Mine planning and operations in accordance with technical principles; Environmental management (waste, water, reclamation, emissions); Occupational safety and health; and Social responsibility and community empowerment.

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The implementation of GMP not only ensures compliance but also serves as a risk management instrument and ensures the sustainability of mining operations.

**Company Competitiveness.** Competitiveness refers to a company's ability to maintain superior performance compared to its competitors. In the mining context, competitiveness is measured not only by production costs or output volume, but also by the ability to maintain its license to operate, social reputation, community relations, and compliance with sustainability standards (ESG). Innovation strategy and GMP practices are strategic factors influencing long-term competitiveness (Porter & Kramer, 2011).

Based on this phenomenon, an important question arises: how can mining companies utilize innovation strategies to support GMP implementation and simultaneously strengthen their competitiveness? Innovation literature shows that companies that develop process innovation, environmental innovation, and managerial innovation tend to have better operational performance and a stronger social license to operate (Porter & Kramer, 2011; OECD Mining Innovation Report, 2020). Therefore, the integration of innovation and GMP can be viewed as a win-win strategic approach: improving sustainability while enhancing company competitiveness. Based on this background, this article aims to:

1. Review the key concepts of innovation strategy, Good Mining Practice, and company competitiveness.
2. Examine the relationship between innovation strategy and GMP implementation in the mining context.
3. Develop a conceptual synthesis of how innovation strategy can be leveraged to support GMP and competitiveness, focusing on PT J Resources Bolaang Mongondow as the study context.

## METHODS

The literature review did not collect primary data from the field, but rather analyzed various relevant secondary sources, including:

1. National and international scientific journal articles discussing innovation strategies, sustainable mining, and Good Mining Practices;
2. Textbooks on strategic management, innovation, and mining management;
3. Reports, guidelines, or official documents related to good mining practices and mining sector regulations in Indonesia;
4. Company publications and open documents related to PT J Resources Bolaang Mongondow (as context).

The literature review stages included:

1. Identification: searching literature sources through journal databases, repositories, and relevant policy documents using the keywords "innovation strategy," "gold mining," "good mining practices," "competitiveness," and "sustainability."
2. Selection: selecting relevant literature focusing on the relationship between innovation, GMP, and competitiveness, particularly as it relates to the mining industry.
3. Classification: grouping literature based on themes such as innovation strategy typology, GMP implementation, environmental innovation, social innovation, and their impact on competitiveness.
4. Synthesis: Arranging key findings narratively and analytically to build a more comprehensive conceptual framework and linking it to the context of PT J Resources Bolaang Mongondow.

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This method was chosen because it is appropriate for answering conceptual questions and providing a theoretical basis for further empirical research.

## RESULT AND DISCUSSION

**Innovation Strategy Patterns in the Mining Industry.** The literature review shows that innovation in the mining sector is no longer limited to exploration and exploitation technology, but extends across various dimensions, including:

1. Process technology innovation: the use of automation, sensors, remote monitoring, and mine information systems to improve operational efficiency, accuracy, and safety.
2. Environmental innovation: the development of tailings waste processing technology, more efficient water management systems, renewable energy in mining areas, and more effective reclamation methods.
3. Occupational safety and health innovation: the implementation of technology-based occupational health and safety management systems, such as real-time worker tracking, air quality monitoring, and the use of more ergonomic personal protective equipment.
4. Social and institutional innovation: the establishment of dialogue mechanisms with communities, local economic partnership models, and empowerment programs integrated with company strategy.

The innovation strategy of progressive mining companies tends to combine incremental innovation (continuous improvement of existing operations) with more transformational innovation, particularly in environmental and social aspects.

**Innovation Strategies to Support Good Mining Practice.** Good Mining Practice requires companies to meet stringent technical, environmental, OHS, and social standards. Innovation strategies can be a tool to achieve these standards more effectively and efficiently. A literature synthesis reveals several key relationships between innovation and GMP:

1. Technological innovation as an enabler of environmental and OHS standards compliance. The use of real-time environmental monitoring technology, early warning systems, and more environmentally friendly mining equipment helps companies reduce the risk of pollution and workplace accidents. These innovations not only comply with regulations but also reduce long-term costs due to fines, operational disruptions, or reputational damage.
2. Innovation in risk management and management systems. The implementation of integrated management systems (e.g., ISO 14001 for environmental and ISO 45001 for OHS) often requires innovation in work procedures, reporting systems, and internal audit mechanisms. Innovation is managerial in nature, and this process is part of an organization's innovation strategy.
3. Social innovation in community relations. The implementation of GMP requires companies to build fair and constructive relationships with the surrounding community. Social innovations in the form of partnership models, local economic development, and educational programs can reduce conflict, increase trust, and strengthen the social license to operate.
4. Business model innovation towards sustainable mining. Several mining companies are beginning to integrate sustainability principles into their business models, for example, by internalizing environmental and social costs into investment decisions or developing business portfolios that support the energy transition. This is a form of strategic innovation closely related to GMP.

Therefore, a well-designed innovation strategy will strengthen the implementation of Good Mining Practices, rather than simply adding new complexity.

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**The Impact of Innovation Strategy on Mining Company Competitiveness.** The literature shows that companies that successfully integrate innovation and sustainability tend to have a more durable competitive advantage. Several mechanisms explaining this influence include:

1. Cost efficiency and increased productivity. Process and technological innovation can lower operating costs per unit of product, improve resource utilization, and reduce downtime. This strengthens a company's cost position relative to competitors.
2. Risk reduction and operational stability. Compliance with GMP through environmental, OHS, and social innovation reduces the potential for operational disruptions due to accidents, community protests, or regulatory sanctions. Stable operations provide supply certainty and are attractive to buyers and investors.
3. Reputation and stakeholder trust. Innovation that supports GMP demonstrates a company's commitment to responsible mining practices. This positive reputation becomes a reputational asset that is difficult to imitate and a source of non-material competitive advantage.
4. Access to capital and markets. Investors and financial institutions are increasingly considering environmental, social, and governance (ESG) aspects in investment decisions. Innovative mining companies and GMP-compliant ones have the potential to access capital and establish strategic partnerships more easily. In other words, an innovation strategy aimed at supporting GMP not only impacts compliance with regulatory obligations but also contributes to long-term competitiveness.

**Contextual Implications for PT J Resources Bolaang Mongondow.** In the context of PT J Resources Bolaang Mongondow as a gold mining company, this literature synthesis has several implications:

1. Expanding the innovation focus. Innovation needs to be directed not only at increasing mine productivity but also at strengthening environmental management systems, occupational health and safety (K3), and community relations. This is relevant given the sensitive nature of the operating area and the involvement of various stakeholders.
2. Strengthening dynamic capabilities. JRBM needs to continuously develop capabilities to respond to changing regulations, global standards, and community expectations. This includes the ability to absorb new technologies, adapt best practices, and integrate them into the company's management system.
3. Integrating innovation into corporate strategy. Innovation strategies that support GMP should be explicitly stated in the company's strategic plan, not simply as technical initiatives at the operational level. This way, resource allocation and performance measurement can be directed to encourage innovation relevant to sustainability.
4. Further research opportunities. This conceptual study can form the basis for empirical research on JRBM, for example, through case studies of specific innovation initiatives, stakeholder perception surveys, or analysis of environmental and social performance before and after the adoption of specific innovations.

## CONCLUSION

This article reviews the literature on innovation strategy, Good Mining Practice, and corporate competitiveness in the mining industry, focusing on PT J Resources Bolaang Mongondow. The study's findings indicate that:

1. Innovation strategy is a critical component in mining companies' efforts to adapt to the dynamic business environment, regulations, and stakeholder expectations.

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2. Good Mining Practice provides a normative and regulatory framework that requires companies to address technical, environmental, safety, and social aspects in an integrated manner.
3. An innovation strategy aligned with Good Manufacturing Practice (GMP) through technological, process, social, and business model innovation can strengthen a company's competitiveness through efficiency, risk reduction, reputation enhancement, and ease of access to capital and markets.
4. For PT J Resources Bolaang Mongondow, innovation that supports GMP has the potential to become a source of sustainable competitive advantage if integrated into the company's strategy and supported by adequate dynamic capabilities.

Based on these findings, several recommendations can be put forward:

1. Mining companies, including JRBM, need to develop an explicit innovation strategy roadmap that places Good Mining Practice and sustainability as key pillars.
2. Further research should be conducted using an empirical approach (e.g., case studies or surveys) to examine in more detail how mining companies' innovation strategies impact GMP indicators and competitiveness.
3. The government and other stakeholders can foster an innovation ecosystem in the mining sector through incentives, research collaborations, and best practice sharing platforms, so that GMP and innovation become part of the industry culture, not just formal obligations.

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