

## Strategic Management Elements for Mining Enterprises Sustainability and Growth in Guangxi, China

*Jun Feng*<sup>1</sup> E-mail: 234693737@qq.com

*Sirigarn Phokheaw*<sup>2\*</sup> E-mail: luknam756@gmail.com

*Sombat Teekasap*<sup>3</sup> E-mail: sombat.teekasap@gmail.com

*Natdanai Singkhleewon*<sup>4</sup> E-mail: mar6666@hotmail.com

*Yu Zhong*<sup>5</sup> E-mail: zhongyuabc@126.com

<sup>1, 2, 3, 4</sup> Graduate School, Bansomdejchaopraya Rajabhat University, Thailand

<sup>5</sup> Nanning College for Vocational Technology, China

\*Corresponding Author. E-mail : luknam756@gmail.com

(Received: January 18, 2024; Revised: February 20, 2024; Accepted: February 23, 2024)

### Abstract

Mining resources are very important to the world, country, and community. Guangxi is one of the most important provinces in China in terms of mining resources. To maintain rapid, orderly, and healthy development, it is vital to implement strategic management for mining enterprises. The objective of this study is to deeply investigate strategic management elements of mining enterprises in Guangxi for their sustainable development through in-depth interviews with 20 industry experts and subsequently evaluations by another 18 experts. The key strategic management elements of mining enterprises in this area were identified. The findings revealed the elements of strategic management of mining enterprises in Guangxi, including a strategic analysis, strategy formulation, strategic implementation, control and evaluation strategies. The strategic analysis can be divided into an environmental analysis and organization direction setting. Strategy formulation needed to be considered at the company level, business level and intelligence level. As for strategic implementation, it was necessary to consider the organization structure, corporate culture, technology leadership, resource planning, people, and systems.

**Keywords:** Strategic Management Elements; Mining Enterprises; Sustainability; Strategic Management

## Introduction

Global resource allocation are still significant roles on politic and economic situation of the world, but there still have several management issues (Yu et al., 2021). Mining companies are distinguished from other types of businesses by their asset-heavy nature, advanced technology reliance, skilled personnel needed, and strict regulation control. Unlike other industries, mining companies operate in a capital-intensive environment particularly on equipment and infrastructure.

According to Huajing industry research institute report (2024), in 2021, under the adverse impact of the epidemic, the revenue of China's non-ferrous metal extraction and mining enterprises above designated size still rebounded, totaling RMB 309.36 billion for the year, a year-on-year increase of 16.2%, accounting for 0.3% of the annual GDP. In 2022, the revenue of China's non-ferrous metal extraction and mining enterprises above designated size totaled RMB 363.13 billion.

Mining enterprises' performance can be used as an essential indicator of company innovation success and businesses financial growth (Li, 2019). But so far, there is no strategic management model for mining companies. Due to benefits, derivative of operating income and overall expenses, is a fundamental guarantee for enterprise's continuous progress, so for long-term consideration, management strategy of enterprises should focus on the firm's benefits (Xu, 2022).

## Objectives

The objective of this research is to identify essential elements in the strategic management model of Mining Enterprises in Guangxi. This objective will be studied in two steps, firstly, study the elements, and secondly, evaluate the consistency of elements of strategic management.

## Literature reviews

Strategic management, operation practices and technological advancement can be considered as means for achieving goal of maximizing benefits (Salinas & Romani, 2014; Yu et al., 2021). Business environmental analysis has emerged as a pivotal element, reflecting industry's commitment to environmental responsible practices (Ali et al., 2019; Hill & Jones, 2011). Mining companies' operations should be aligned strategically to national and global sustainability goals, by incorporate environmental impact assessments and adopting eco-friendly technologies (Hunger & Wheelen, 2013; Mao, 2006). Setting of vision and objectives with considering the volatile nature of commodity prices and geopolitical influences has shifted towards a more adaptive model, (Zhao, 2023). In response to growing uncertainty, mining companies are placing greater emphasis on robust risk management strategies that combine technological innovation with cost reduction measures (Yang, 2003). Importance of including sustainable direction, environmental friendly technologies, and business functional level into strategy model can reflect on resources and environment concerns in

the context of appropriate growth (Hunger, 2020; Zhang, 2008).

Effective strategic implementation is critical to transforming strategic plans into viable initiatives. Recent studies have highlighted the need for strong leadership, organizational coordination, and effective communication during the implementation phase (Dong, 2023). Strategy implementation now involves a collaborative approach, fostering partnerships with local communities and governments to ensure social license to operate (Chebotarev & Naumova, 2003; Slashchova et al., 2023). Strategic control and monitoring mechanisms have become more sophisticated, with improved technology, adoption of real-time data analytics, and performance metrics to improve operational efficiency. (Hu et al., 2023; Song, 2021). Mining enterprises urgently need to adjust their internal management mechanism to adapt to the changes in the market economy. This is a challenging reform of the enterprise operation system compared to those existing traditional systems.

## Material and Methods

According to literature review, there are 15 questions that make up the interview including strategic analysis, strategy formulation, strategic implementation, control, and evaluation strategies. Evaluate the interview form through the objective consistency index (IOC) of experts.

The first step: getting strategic mining enterprises' management elements through interviews 20 experts which were senior managers. The analysis of interview results is based on the principle of grounding.

The second step: evaluating the elements from the first step by three groups of experts; group of 6 senior managers with more than 10 years experiences, group of 6 professional mining, geological, manager, engineers, and corporate general manager, and group of 6 mining enterprises management experts. The expert evaluation table adopts Likert 5-level scoring.

Data analysis method used the median (Mdn) and interquartile range (interquartile range: IQR), and the selected items with the median of 3.50 and above, and quartile deviation is 1.50 and below.

## Results

### 1. The elements of strategic management of mining enterprises

From literature review, common business enterprises strategic management analysis is comprised of 11 elements, environmental analysis, objectives and goals setting, strategy formulation, strategy implementation, strategic control and monitoring, strategic leadership, organizational culture and change management, risk management, communication and stakeholder engagement, performance evaluation and feedback, and strategic review and adaptation as shown in Table 1.

**Table 1** Strategic management elements analysis.

Strategic management element	Parnell (2013)	Sadler (2003)	Hill, (2011)	Lynch, (2018)	Zhang (2009)	Yang (2003)	Song (2021)	Zhao (2023)	Mao (2006)	Wang (2018)	Total
Environmental analysis	√		√	√	√	√	√	√	√	√	9
Objectives and Goals Setting	√	√	√		√	√	√		√	√	8
Strategy formulation	√	√	√		√	√	√	√	√	√	9
Strategy implementation	√	√	√	√	√		√			√	7
Strategic control and monitoring		√	√	√	√			√	√		6
Strategic leadership			√	√	√					√	4
Organizational culture and change management	√		√	√						√	4
Risk management		√	√	√	√	√	√	√	√		8
Communication and stakeholder engagement					√	√			√	√	4
Performance evaluation and feedback			√			√	√		√	√	5
Strategic review and adaptation	√	√		√				√		√	5

Dimension analysis of 20 experts interviewed opinion on elements of mining enterprises strategic management in Guangxi can summarize as shown in table 2.

Strategic analysis can be divided into environmental analysis and organization direction setting. Environmental analysis can be divided into two categories, internal and external environment. The internal environment needs to consider appropriate internal technology (100%), Strong financial position (100%), appropriate equipment and infrastructure (95%), continuous mineral resources (95%), efficient human resource management (90%), and good teamwork (85%). And the external environment needs to consider knowledge of external factors (100%), government regulatory policies (95%), innovation and technological applications (95%), mining costs (85%), and changes in supply and demand (85%). Organization direction setting need to consider good mining teamwork (100%), Minimum operation cost objectives (95%), Achievable short- and long-term plans (90%), Morale of low and middle-level employees (85%). In the aspect of mission need to consider company's goal, vision, and core values (95%), concise and easy to understand mission statement (85%), development goals (80%), differentiated advantages and values (70%). In the aspect of objective, right direction (90%), organization performance (85%), enterprise sustainability (85%), effective strategy implementation (75%), strong execution (75%).

**Table 2** Strategic management elements of mining enterprises in Guangxi from expert's opinion dimension analysis.

Items	Freq	%	Mn	IQR
<b>Strategic Analysis</b>				
<b>Environmental analysis</b>				
<b>Internal Analysis</b>				
1. Appropriate internal technology can ensure the efficient operation of enterprises	20	100	5.0	0.0
2. Strong financial position and accessible to funding agency can ensure business support of the enterprise.	20	100	5.0	0.0
3. Appropriate equipment and infrastructure can improve productivity of enterprises	19	95	5.0	0.0
4. Enough continuous mineral resources can ensure sustainable operation of enterprises	19	95	4.0	1.0
5. Efficient human resource management can improve enterprise efficiency	18	90	4.0	1.0
6. Good teamwork can improve work coordination and increase operation efficiency	17	85	3.5	1.0
<b>External Analysis</b>				
1. Knowledge of external factors (business environment, new technology, or government policy) can help timely adjustments management.	20	100	5.0	0.0
2. Government regulatory policies may lead to changes in production costs and production scale	19	95	5.0	0.0
3. Innovation and technological applications intensifying fierce competition in the industry	19	95	4.0	0.75
4. Mining costs have direct effect on financial optimization	17	85	4.0	1.0
5. Changes in supply and demand have direct effect on strategic inventory management	17	85	3.5	1.0
<b>Organization Direction Setting</b>				
<b>Vision</b>				
1. Good mining teamwork can increase efficiency	20	100	5.0	0.0
2. Establishing a minimum operation cost objectives can ensure the company benefits and growth	19	95	5.0	0.75
3. Establishing achievable short- and long-term plans can production targets	18	90	4.0	0.0
4. Inspiring morale of low and middle level employees in mining enterprises can effectively improve their enthusiasm	17	85	4.0	0.75

**Table 2** Strategic management elements of mining enterprises in Guangxi from expert's opinion dimension analysis. (Continued)

Items	Freq	%	Mn	IQR
<b>Mission</b>				
1. Company's goal, vision and core values have direct effect on enterprise mission development	19	95	5.0	0.0
2. Concise and easy to understand mission statement have effect on team consensus decision making	17	85	5.0	0.0
3. Development goals have direct effect on implementing of corporate strategy	16	80	5.0	1.0
4. Emphasize differentiated advantages and values can shape the corporate spirit	14	70	4.0	0.75
<b>Objective</b>				
1. Objectives can lead organizations to the right direction	18	90	5.0	0.0
2. Objectives can be used for organization performance direction evaluation	17	85	5.0	0.0
3. Objectives can promote enterprise sustainability	17	85	5.0	0.0
4. Objectives can facilitate effective strategy implementation	15	75	4.0	0.0
5. Objectives can facilitate strong execution of the organization	15	75	3.5	1.0
<b>Strategy Formulation</b>				
<b>Corporate - Level Strategy</b>				
1. Clear strategic objectives can guide company's development direction	20	100	5.0	0.0
2. Grasp correct market trends can ensure company's development	20	100	5.0	0.0
3. Rational resources allocation can maximize company benefits	18	90	5.0	0.0
4. Effective organization structure can improve company efficiency	17	85	4.5	1.0
5. Establishing core competitiveness can affect company growth	16	80	4.0	1.0
<b>Business - Level Strategy</b>				
1. Market analysis to understand customer needs can capture market segments	18	90	5.0	0.0
2. Competitive analysis to analyze competitors can help making right decisions	17	85	5.0	1.0
3. Clear business objectives should be originated from mining industry trends	17	85	4.0	0.75
4. Deep business understanding is an important basis for business development	16	80	4.0	1.0

**Table 2** Strategic management elements of mining enterprises in Guangxi from expert's opinion dimension analysis. (Continued)

Items	Freq	%	Mn	IQR
<b>Functional - Level Strategy</b>				
1. Functional objectives need to be aligned with mining enterprise strategy	19	95	5.0	0.0
2. Effective incentives can promote the realization of mining enterprise strategy	18	90	5.0	1.0
3. Innovative technology is one of important factor for realization of mining business strategy	15	75	5.0	1.0
4. Departmental collaboration can improve efficiency	15	75	4.0	1.0
5. Rational allocation of resources can make profit growth	12	60	4.0	0.0
<b>Strategy Implementation</b>				
<b>Organization Structure</b>				
1. Increase employee engagement with flexible and efficient strategies can improve enterprise performance	18	90	5.0	0.0
2. Enhance team and departmental collaboration and flexibility can improve enterprise performance	17	85	5.0	0.0
3. Organizational structure should design according to strategic goals	16	80	5.0	0.0
4. Open communication can increase the smoothness of strategy implementation	15	75	4.0	1.0
5. Rapid appropriate actions are needed for response to market changes	13	65	4.0	1.0
<b>Corporate Culture</b>				
1. Establishing clear values and vision can promotes employee buy-in	18	90	5.0	0.0
2. Recognize and reward employee can motivate employees	18	90	5.0	1.0
3. Promote employee engagement can help for goal achievement	17	85	3.5	1.0
<b>Technology Leadership</b>				
1. To be a technology leader, company need to focus on technology development and innovation	20	100	5.0	0.0
2. To be a technology leader, company need to have a good strategic vision and a sense of innovation	19	95	5.0	0.0
3. Technology development requires strategic alignment	18	90	4.5	1.0
4. To be a technology leader, company agility, adaptive thinking, and continuous learning are required	17	85.	4.0	0.75
5. Financial intelligence is required to maximize profitability	16	80	4.0	1.0

**Table 2** Strategic management elements of mining enterprises in Guangxi from expert's opinion dimension analysis. (Continued)

Items	Freq	%	Mn	IQR
<b>Resource Planning</b>				
1. Use of enterprise resource planning (ERP) can promote effective utilization of enterprise resources	20	100	5.0	0.0
2. Use of human resource planning (HRP) can promote human resource development	20	100	5.0	0.0
3. Use of financial resource planning (FRP) can promote the rational use of funds	20	100	5.0	0.0
4. Use of sales and operation plan (S&OP) can promote successful sales and operations	20	100	4.5	1.0
5. Use of production planning can promote orderly production	20	100	4.0	.75
6. Use of technology resource planning can promote effective technology resource utilization and development	12	60	3.5	1.0
<b>People and System</b>				
1. Good understanding on people and system can improves employee's skills and competencies	20	100	5.0	0.0
2. Good understanding on people and system can improves employee performance	19	95	5.0	0.0
3. Good understanding on people and system can increase employee engagement and retention rates	18	90	5.0	0.0
4. Good understanding on people and system can increases innovation and creativity of employees	13	65	4.5	1.0
<b>Strategy Control and Evaluation</b>				
<b>Strategy Control</b>				
1. Strategic goals need to be set around efficient control standardization in the organization	20	100	5.0	0.0
2. Feasibility of objectives can help for promoting strategic achievement of company	18	90	5.0	0.0
3. Risk management can ensure the organization for avoiding and dealing with risks	17	85	5.0	0.0
4. Appropriate measure and control can ensure smooth project implementation	16	80	5.0	0.0
5. Benchmark with historical performance, external standards, future market supply, and demand can help to improve company performances.	15	75	4.0	0.0
6. Continuous improvement in setting objectives or standards can ensure the response on market needs and adaptation	15	75	4.0	1.0

**Table 2** Strategic management elements of mining enterprises in Guangxi from expert's opinion dimension analysis. (Continued)

Items	Freq	%	Mn	IQR
<b>Strategy Evaluation</b>				
1. Clear key indicators and directions are needed in assessment process	20	100	5.0	0.0
2. Clarify baseline data and benchmarks to related strategic objectives can be helpful for creative evaluation	18	90	5.0	0.0
3. Assessments should be designed for achieving continuous improvement	18	90	5.0	0.0
4. High quality and in-depth analysis of assessment data is required for fruitful evaluation	17	85	4.0	1.0
5. Regular monitoring and review is a good basis for meaningful evaluation	16	80	4.0	1.0
6. Good resource allocation can be used to guarantee the efficiency of the goal implementation process	15	75	4.0	1.0

Strategy Formulation needs to consider clear strategic objectives (100.00%), correct market trends (100.00%), rational resources allocation (90%), effective organization structure (85%), core competitiveness (80%). In the aspect of business-level strategy need to consider marketing analysis (90%), competitive analysis (85%), clear business objectives (85%), deep business understanding (80%). In the aspect of functional-level strategy need to consider functional objectives (95%), effective incentives (90%), innovative technology (75%), departmental collaboration (75%), rational allocation of resources (60%).

Strategy implementation needs to consider increasing employee engagement (90%), team and departmental collaboration (85%), organizational structure (80%), open communication (75%), rapid appropriate actions (65%). In the aspect of corporate culture need to consider establishing clear values and vision (90%), recognize and reward employees (90%), promote employee engagement (85%). In the aspect of technology leadership, need to focus on technology development and innovation (100.00%), good strategic vision and a sense of innovation (95%), strategic alignment (90%), company agility, adaptive thinking, and continuous learning (85%), financial intelligence (80%). In the aspect of resource planning, enterprise resource planning (ERP) (100%), human resource planning (HRP) (100%), financial resource planning (100%), sales and operations planning (S&OP) (100%), production planning (100%), technology resource planning (60%). In the aspect of people and system, need to consider enhanced employee skills and competencies (100%), improved employee performance (95%), employee engagement and retention rates (90%), increased innovation and creativity (65%).

Strategies control and evaluation need to consider strategic goals (100%), feasibility of objectives (90%), risk management (85%), appropriate measure and control (80%), benchmark with historical performance (75%), continuous improvement (75%). In the aspect of evaluation strategies,

need to consider clear key indicators and directions (100%), clarify baseline data and benchmarks (90%), designed for achieving continuous improvement (90%), high quality and in-depth analysis (85%), regular monitoring and review (80%), good resource allocation (75%).

2. Consistency of strategic management elements of mining enterprises.

Another group of experts evaluate the results of expert's opinion on strategic management elements of mining enterprises in Guangxi to analyze its consistency by using median (Mdn) and interquartile range (IQR). Data analysis on a per item basis is shown in table 2. All items are within a median value of 3.50 and above and an interquartile range of 1.50. The experts suggested that the text of elements of strategic management dimension in strategy formulation should be revised to make the elements more consistent, improvement results are shown in Table 3.

**Table 3** Re-adjustment on strategy management elements dimension of strategy formulation

Elements of strategic management dimension of strategy formulation	
Original Item	New Item
Needs important equipment and infrastructure to <b>improve production efficiency</b> of enterprises	Need equipment upgrades and maintenance to <b>improve production efficiency and product quality, and reduce costs</b>
Deep business understanding for <b>business</b> development	Deep business understanding of <b>industry</b> development
Flexible and efficient strategies to <b>Increase employee engagement</b>	Flexible and effective strategies to <b>enhance organizational efficiency</b>
Use of <b>technology resource planning</b>	<b>Acquisition mineral technology resources guarantee</b> to make enterprise stable development

From Table 3, four items need modified according to the suggestion of another experts group, which are: from original Items, "Needs important equipment and infrastructure to improve production efficiency of enterprises", changed to: " Need equipment upgrades and maintenance to improve production efficiency and product quality, and reduce costs"; " Deep business understanding for business development" changed to " Deep business understanding of industry development"; " Flexible and efficient strategies to Increase employee engagement:" changed to: " Flexible and effective strategies to enhance organizational efficiency"; " Use of technology resource planning" changed to: " Acquisition mineral technology resources guarantee to make enterprise stable development."

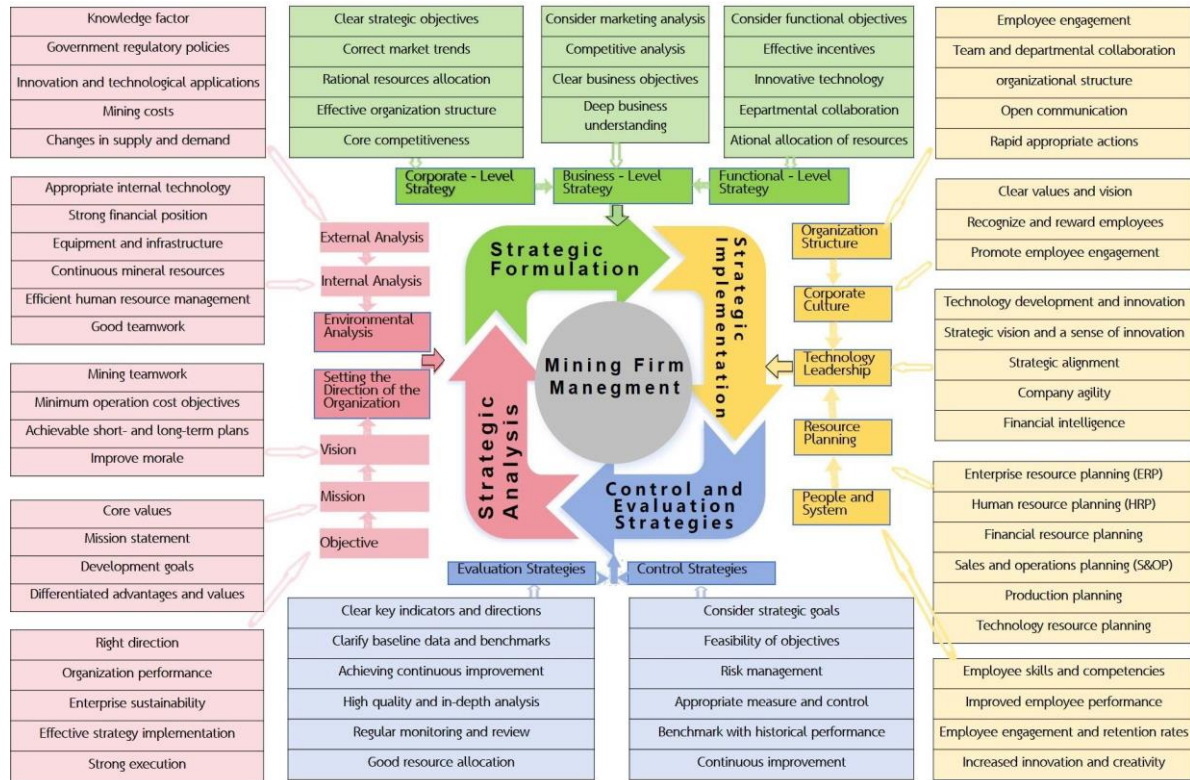


Fig 1. The elements of strategic management model for mining enterprises.

So far, after 20 experts' interviews and 18 experts' evaluations, 4 items were revised according to experts' opinions, and a total of 4 strategic management links, namely strategic analysis, strategy formulation, strategic implementation, control and evaluation strategies, 12 strategic management contents include strategic analysis can be divided environmental analysis and organization direction setting. Strategy formulation needs to consider company level, business level and intelligence level. Strategic implementation needs to consider organization structure, corporate culture, technology leadership, resource planning, people, and system. Control and evaluation strategies are about control strategies and evaluation strategies.

## Discussion and Conclusion

### 1. Discussion

Business environmental analysis has emerged as a pivotal element, reflecting the industry's commitment to environmentally responsible practices (Ali et al., 2019). Mining companies' operations should be strategically aligning with national and global sustainability goals, by incorporating environmental impact assessments and adopting eco-friendly technologies (Hunger & Wheelen, 2013;

Mao, 2006). The setting of vision and objectives with considering the volatile nature of commodity prices and geopolitical influences has shifted towards a more adaptive model, (Zhao, 2023). Strategy implementation now involves a collaborative approach, fostering partnerships with local communities and governments to ensure social license to operate (Chebotarev & Naumova, 2003; Slashchova et al. , 2023) . Strategic control and monitoring mechanisms have become more sophisticated, with improved technology, adoption of real-time data analytics, and performance metrics to improve operational efficiency (Hu et al. , 2023; Song, 2021). Mining enterprises urgently need to adjust their internal management mechanism to adapt to the changes in the market economy.

## 2. Conclusion

Elements of strategic management of mining enterprises in Guangxi include strategic analysis, strategy formulation, strategic implementation, control and evaluation strategies. And strategic analysis can be divided environmental analysis and organization direction setting. Strategy formulation needs to consider company level, business level and intelligence level. Strategic implementation needs to consider organization structure, corporate culture, technology leadership, resource planning, people, and system. Control and evaluation strategies are about control strategies and evaluation strategies. A graphical model is also proposed.

In addition, this study emphasizes the importance of determining organizational direction and the need for a clear vision and mission to guide strategic decision-making. Strategic formulation has become a key factor, reflecting the dynamic nature of the industry and the importance of adapting to changing market conditions. The strategy implementation strategy is considered as translation key to formulated strategy into concrete actions, with special emphasis on effective use of resources and cooperation with stakeholders. Control and evaluation strategies are identified as key to ensure the efficiency of implemented strategies, among which real-time monitoring and performance indicators play a crucial role.

## Recommendations

In the realm of strategic analysis, it is recommended to prioritize focus on cutting-edge technology, ensuring the organization remains at the forefront of industry advancements. Fostering a culture of innovation and continuous improvement in technology will be essential. Additionally, the enterprise should uphold a robust financial position by implementing sound financial management practices, diversifying revenue streams, and exploring cost-cutting measures to enhance overall financial strength.

Clear strategic objectives provide a roadmap for the entire mining enterprises, ensuring a unified direction. Secondly, staying attuned to correct market trends is imperative. Lastly, mining enterprises should make a clear rational resource allocation, which is crucial for optimal performance.

In the realm of strategic implementation, the enterprise can significantly enhance its organizational structure by prioritizing three crucial elements. Firstly, a focus on increasing employee engagement is paramount. This involves creating an environment where employees are motivated, connected to their work, and contribute actively to the organization's goals. Team and departmental collaboration form the second element, fostering a culture of teamwork and open communication. Additionally, a well-defined organizational structure is essential for efficient operations. Clearly outlining roles, responsibilities, and reporting lines ensures a streamlined workflow and optimal utilization of resources.

In the realm of control and evaluation strategies, the enterprise is advised to prioritize three critical elements to ensure effective oversight and assessment of its operations. Firstly, a meticulous focus on strategic goals is essential. The organization should establish clear and measurable goals that align with its overarching mission and vision. These goals serve as benchmarks for progress and success, providing a directional guide for the entire mining enterprise. Secondly, the feasibility of objectives must be rigorously evaluated. Ensuring that objectives are realistic and attainable is crucial for maintaining mining enterprises' morale and momentum. Thirdly, robust risk management is imperative. Identifying potential risks and implementing mitigation strategies safeguards the mining enterprise against unforeseen challenges, contributing to the overall resilience and stability of operations.

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