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# Discussion on Safety and Risk Control Strategy for Overseas Mineral Resources Investment and Development

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### Abstract

This paper analyzes multiple factors of politics, laws, macro economy, resource, market, community and public relations risk, etc that impact investment and development safety of overseas mineral resources, establishes overseas mineral resource investment and development safety evaluation system, an combines with safety current situation of mineral resources investment and development as well as experience and method of developed countries for ensuring safety of mineral resources, to propose the overseas mineral resource investment and development safety risk control policies as: “positively conduct resource diplomacy”, enhance consciousness of overseas insurance cover, perfect financial support system of overseas merger and acquisition, pay attention to safety management and environmental protection work, speed up cultivation of international operation talent, enhance liaison and idea exchange with local government and crowd, etc. It has certain reference effect to mineral resource enterprise to further enhance safety and risk prevention and control during the process of executing internationalization strategy.

Key words: OVERSEAS, MINERAL RESOURCE, INTERNATIONALIZATION, SAFETY RISK, RISK EVALUATION, CONTROL STRATEGY

### 1. Introduction

With increasingly development of economic globalization, and in order to resolve the problem of re-

source shortage in domestic, seek out new mineral resource acquisition approach, and ensure demand of enterprise's rapid development, many enterprises

of various countries in the world start to extend their visions to overseas, and successively go abroad to propose and positively execute the internationalization operation strategy, and participate in mineral resource international competition in the whole world. Nevertheless mineral resource industry is arduous with extremely great risk, the resource investment enterprise needs to make great efforts to gain efficiency. Through analysis on data publicized by related authorities in domestic/abroad, at present the investment, development and management of overseas mineral resources have very great risk. According to related theories to mineral resource safety research in domestic/abroad and through analysis on multiple impact factors of overseas mineral resource safety in combination with actual situation and existing problems of overseas mineral resource safety, as well as experience and method of developed countries for ensuring mineral resource safety, this paper mainly researches and analyzes the main risks encountered by overseas mineral resource investment and development and the risk prevention measures.

## 2. Research Theories of Foreign Experts and Scholars to Mineral Resource Safety

The mineral resource safety is related to national safety and is put on the strategy height by various countries in the world. From 1960s and 1970s the western countries started to research the safety issue of mineral resource and vigorously pushed forward global resource strategy and at the same time laid emphasis on protecting resource and mineral strategic reserve of one's own country. The scholars also researched the safety of mineral resource via multiple viewpoints.

R. N. Cooper (1975) analyzed relationship between natural resource and national security via multiple viewpoints, and deemed that maintaining safety supply of resource is extremely critical to a country[1]. Lee Calaway and W.C.J. van Rensburg (1982) deemed that USA is more and more relying on key strategic metallic ore and proposed a series of measures to improve safety supply of resources[2].

David Humphreys (1995) analyzed the variation of global mineral resource supply safety during post-cold war era and deemed that the government should enhance policy support[3] to mineral resource supply.

Guenter Tiess (2010) analyzed the development situation of mineral resource policy of Europe in the near future and deemed that EU should unify the policy to collectively deal with severe situation of mineral resource raw material supply.

David Humphreys (2013) analyzed the respective benefit and development of resource supply countries

and consumption countries to determine on how the politics impact the pattern[5] of global metal supply.

## 3. Main Risk Encountered During Investment and Development of Overseas Mineral Resources

The risk of overseas mineral resource investment and development refers to the possibility [6] that, overseas resource cooperation strategy suffers failure, great loss and even great calamity is incurred. According to risk classification of experts and scholars in domestic/abroad, the overseas mineral resource enterprise investment and development risk can be divided into external risk and internal risk subject to source of transnational investment risk of overseas mineral resource enterprise, wherein, external risk mainly includes political risk, legal risk, macro economy risk, resource risk, market risk, community and public relation risk, etc; internal risk mainly includes enterprise decision risk, investment and financing risk and project execution and management risk, etc.

(1) Political risk. The political risk refers to the loss to foreign investors due to sudden change of politics, laws, social environment of host country or political relationship between host country and other countries. The political risk mainly includes imposition risk, exchange limitation risk, war and internal disorder risk, government default risk. In addition, political risk also includes delay payment risk, it is the risk [7]that, the host country government stops the payment or delays the payment, the foreign investor accordingly cannot timely and full-amount withdraw the matured bonds principal and interest and investment profit.

(2) Legal risk. The legal risk refers to the potential or occurred important economic loss because the enterprise do not understand the laws and rules of host country during operation, neglects legal auditing and escape legal supervision and management and accordingly incurs economic dispute and suit; or the possibility of incurring negative legal consequence due to change of legal environment at outside of enterprise, or due to the situation that the entity (including the enterprise) does not effectively exercise the rights and perform the obligations as per stipulation of laws or contract.

(3) Macro economy risk. The macro economy risk refers to the risk caused by change of economy during enterprise' investing and developing overseas resources. There are many factors impacting macro economy risk, such as host country economic development stability, impact of international economy environment, and change of exchange rate of international financial market, etc. [8].

(4) Resource risk. The resource risk mainly refers to the risk[9] to mining investment caused by deviation of mine type, grade, reserve and mining extent of metallogenic belt. The risk from above factors shall incur fairly great deviation between actual situation of previous prediction result of project invested by the enterprise, and incur increase of project mining cost, reduction of output shortening of mining period.

(5) Market risk. The market risk refers to uncertainty of mining investment caused by uncertainty of market condition of the resource-located country. The market risk mainly includes mineral product price, supply and demand uncertainty and competition extent from other mining company, and the existence (or not) of substitute mineral product, etc. Furthermore, the market risk also includes economic cycle impact and restriction of market developed extent of mineral resource. The mining industry is the fundamental industry of national economy, the activity cycle includes four stages as prosperity, recession, depression and recovery, its development is directly impacted by operation situation of national economy, and its periodic fluctuation also directly impacts sale quantity and sales price[10] of product of mining company. Furthermore, since development of foreign mineral product market is imperfect, some countries also have serious regional protectionism, they usually set some policy obstacles to stop entry of potential investors in abroad, and this greatly suppresses normal development of mineral product market, and brings about huge market risk to mineral resource enterprise.

(6) Community and public relation risk. When the mineral resource enterprise conducts overseas mining development, it is mainly impacted by local community, if the disposal thereof is not good it shall inevitably impact effective operation of enterprise work. The community and public risk mainly includes community public security situation, impact of culture difference to project and labor union and labor dispute, etc[11].

(7) Enterprise decision risk. Whether the enterprise decision mechanism and decision program is scientific shall have an overall impact to overseas resource development strategy. Due to impact of traditional culture and enterprise management system, for many years the decision entity of some enterprises is always the top leader, some project decision is mainly impacted by achievement of one's official career, pursuing achievement of one's official career is usually the first consideration instead of attention to comprehensive efficiency of project, it is hard to ensure scientificity of decision, and this greatly increases project risk [12].

(8) Risk of investment and financing. The investment and financing is the general term of investment and financing decision mode (who makes investment), investment collection mode (source of capital) and investment utilization mode (how to invest) during resource configuration process, and is the detailed presentation of investment and financing activity. Therefore, during internationalization operation by enterprise in abroad, if the decision mode of investment and financing, investment collection mode and investment utilization mode are not appropriate, or the operation during detailed execution process is not appropriate, it shall incur great loss to enterprise.

(9) Project management risk. The mineral resource enterprise's overseas project usually has large time span and complicated layers, organization execution of project shall usually be conducted by programs and related links as feasibility research, project establishment, design, organization construction, completion acceptance, trial production (put into production), etc, these programs and links shall ensure smooth execution of project. Nevertheless, organization execution of each link all has certain risk, if it is not controlled well, problem of any link shall incur failure of project investment.

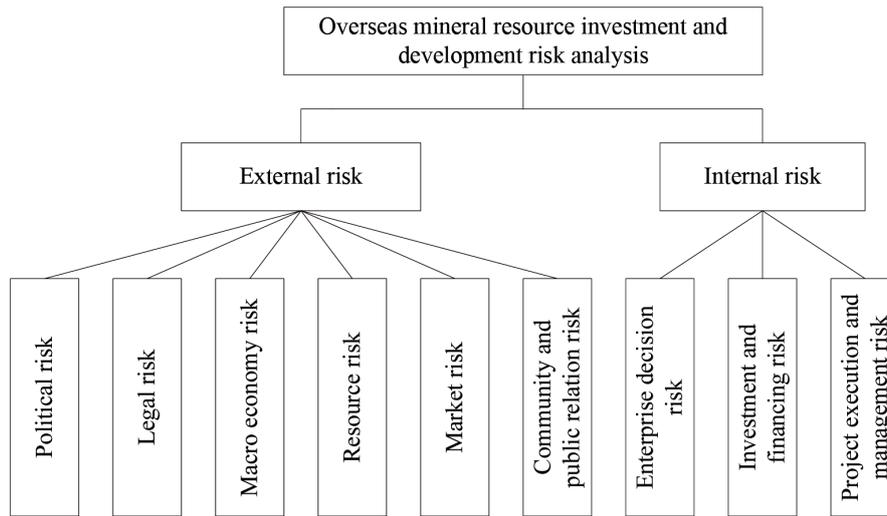
### **4. Overseas Mineral Resource Investment and Development Risk Evaluation**

#### **4.1 Overseas mineral resource investment and development risk evaluation index system**

Through analysis to main risks encountered during overseas mineral resource investment and development, and with reference to comments of related experts and through scientific sifting, overseas mineral resource investment and development risk evaluation index is divided into two types as external risk and internal risk, and is in details divided into 9 sub-risks, these 9 sub-risks shall also be detailed into 23 indexes, finally the overseas mineral resource investment and development risk evaluation index system is established, as shown in Figure 1.

#### **4.2. Risk Evaluation Method and Evaluation Process**

Overseas mineral resource investment risk evaluation system adopts analytic hierarchy process, through querying data and consulting related experts, the hierarchy structure of evaluation system is analyzed and compared to establish judgment matrix, and calculate weighting of each evaluation index. For index hierarchy structure of four hierarchies, pairwise comparison is adopted to hierarchy to hierarchy determine relative importance between indexes. In this paper totally 12 judgment matrixes are established, matrix calculation and consistency check (second



**Figure 1.** Overseas mineral resource investment and development risk evaluation system

order matrix constituted by two indexes is always consistent without the need of check) are respectively done to finally derive weighting and single hierarchical arrangement and hierarchy general ordering of each level index.

Through above evaluation process it can be seen that, among constitution of overseas mineral resource investment and development risk, external risk accounts for a very great proportion. Among external risk, political risk ranks first, in turn is macro economy risk and legal risk. Among 23 indexes, political stability of host country under investment is most critical. Therefore the enterprise shall do well political risk evaluation in advance when conducting overseas mineral resource development, then risk prevention work [13] shall be done as per relation of each index.

### 5. The Detailed Measures to Enhance Risk Control for Safety of Overseas Mineral Resource Investment and Development

Through evaluation to overseas mineral resource investment and development safety risk evaluation system and combining with current safety situation of mineral resource investment and development, as well as experience and method of developed countries for ensuring mineral resource safety, some detailed measures are proposed.

(1) Positively conduct “resource diplomacy” and enhance exchange and coordination with related countries for issues of mineral resource. The resource import country shall establish all-sided close bilateral relations with resource export country, potential resource export country, and incorporate the exchange and communication with these countries into key agenda of national foreign affair work, through mutual exchange, communication and understanding among countries, strategic partner or economic coop-

eration partner relationship shall be established with related country, to make a good political foundation for enterprise in abroad conducting mineral resource investment and development.

(2) The enterprise shall enhance consciousness of overseas insurance cover. The political risk is the one with biggest impact to enterprise making investment in abroad, once it occurs, the enterprise shall suffer great loss. When the enterprise makes resource investment and development in the resource country with fairly great political risk, it shall have the consciousness of insurance cover at overseas. For example, China PICC Property Insurance Company, Export and Import Bank of China, China Export Credit Insurance Company have established overseas investment political risk insurance business[14], When Chinese enterprise conduct mineral resource development in abroad, it can buy insurance from these financial institutions to avoid political risk.

(3) Perfect overseas merger and acquisition financial support system, help the enterprise to minimize investment and financing risk. Overseas merger and acquisition usually involves great amount of money, sometimes the acquirer has the difficulty of solely undertaking large scale cash payment. Therefore resource import country shall establish and perfect financial support system of overseas merge, encourage the bank in domestic to customize the professional financial product with pertinence by aiming at enterprise overseas merge characteristic, furthermore, the domestic financial market shall be greatly developed, to create multi-element financing channel and financing tool, so as to reduce financing cost of merge enterprise and disperse investment and financing risk[15].

(4) Widen channel for democracy, establish scientific resource project investment and development

democracy decision mechanism. The enterprise shall establish scientific and democratic decision program, when reviewing overseas project investment, the feasibility research report of project group shall be comprehensively listened, the review and evaluation comment of experts of technical, financial, risk and legal expert groups shall be listened, on the basis of which the enterprise decision layer shall finally and collectively make decision, the hasty decision and arbitrary decision, etc shall be strictly prevented and avoided.

(5) Pay attention to safety management and environmental protection work. When the enterprise executes the overseas mineral resource project operation and management, the safety work shall draw high attention, to timely make and perfect mine project building and production safety management regulation and rewards and punishment measures, which shall be linked with performance evaluation and management staff employment. Furthermore, environment protection work of the project construction located region shall draw high attention, pragmatic and feasible measures shall be taken to protect the environment in the periphery of mine area, and the safety civilization, first class environment, harmonious community shall be deemed as main target of project construction in abroad.

(6) Do well responsible investigation, feasibility research and organization execution work prior to project investment. Prior to executing resource project merger and acquisition, the professional institution shall be entrusted to conduct detailed survey and understanding to politics, economy, laws and rules, taxation, environment evaluation, etc of the country where the intended merge project is located, to strive to acquire the most authoritative data of each aspect; scientific project feasibility research analysis program shall be established, for various data acquired by project group via responsible investigation, related experts and technical staffs shall be timely organized to seriously analyze, research and review it. After the project establishment of project under investment is let pass via deliberation by enterprise decision layer, the project design and construction, supervision, completion acceptance and put-into-production, etc shall be seriously done well.

(7) Speed up cultivation of internationalization operation talents. Make talent acquisition and cultivation plan, necessary professional knowledge of international investment, finance and trading, etc shall be mastered well, international conventions, international environment and international market shall be known well, the host country history, culture background, political environment, law system, economy

situation, etc shall be understood, and these contents shall be the standard for talent acquisition and cultivation, to provide human resource support to overseas investment of enterprise.

(8) Enhance contacting and communication with local government and crowd. The enterprise making investment in abroad shall observe the customs of the place, in details know about folk culture of host country, and conduct systematic training to employees of enterprise, such as host country custom, religion belief, value idea, culture background, basic law system, etc. According to requirement of enterprise production operation and development, the enterprise shall to the greatest extent employ the local personnel, to effectively reduce the culture difference risk and cost of trans-national operation of enterprise, and further draw near the relation with host country government and local crowd, so as to reduce the policy restriction and inimical emotion of host country to foreign investment.

### 6. Conclusion

Generally speaking, mineral resource internationalization is the inevitable course of enterprise in abroad participating in international competition, while enhancing overseas mineral resource investment and development safety risk control is more critical, the resource import country and enterprise in abroad shall modestly learn and refer to experience of other country and enterprise for safety risk prevention and control of mineral resource investment and development, through practice of investment and development of overseas mineral resource the experience shall be absorbed together with gradual innovation, to do well safety risk prevention and control for investment and development of overseas mineral resource enterprise, and pragmatically guarantee the smooth execution of internationalization operation strategy target of overseas mineral resource enterprise.

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## Numerical simulation and inflow prediction by the outflow test of coal mine

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### Abstract

This article, by using the east mining area outflow water test data of No. 5 coal mine in Fengfeng coal field, presents the numerical simulation of groundwater flow and the prediction of drainage. First of all, according to the hydrogeologic condition, the groundwater seepage numerical model of this mining area is established. Then, the