

# The Social, Economic and Environmental Benefits Research of Mine Environment Governance Project

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**Abstract:** The exploit of mines has destroyed the geological environment of our country, which has seriously restricted the sustainable development of the economy and society. This paper carried on the attribute location to the mine environment management project, and elaborated the related theory foundation. Then according to the economic effect, social effect, natural resources effect and the ecological environment effect, we constructed a social economic and environmental benefit evaluation index system, in order to provide the reference for the mine management project.

**Keywords** Mine; Environmental management; Benefit evaluation; The indicator system

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## INTRODUCTION

The environmental law put environment protection as a basic national policy of China, which also pointed out that we must respect nature, comply with nature and protect natural, "put the construction of ecological civilization in prominent position, blend it into all aspects and the whole process of economic construction, political construction, cultural construction and social construction, striving to build a beautiful China and realizing the sustainable development of the Chinese nation." At present, resources and environment are becoming constraints to China's economic and social development. The geological environment management and project evaluation of mine with serious pollution and the destruction of its landscape and vegetation, is to adjust the industrial structure, also to improve the regional environmental capacity, and to realize the sustainable development of mining.

Mine ecological environment problems are gradually serious in recent years, but due to regional differences in geographic conditions and mining methods, China has not establish a comprehensive, unified evaluation index system of mine environmental governance project. The existing evaluation model is given priority to qualitative indicators, lacking of quantitative indicators. Understanding differences also lead to different assessment results with poor objectivity. In order to reduce investment risk, improve project efficiency and realize the optimal decision, establishing a scientific, reasonable evaluation index system with applicability is imperative, which has the very vital significance to standardizing and guiding the mine ecological environment protection and recovery management.

## THE ATTRIBUTE LOCALIZATION OF MINE GEOLOGICAL ENVIRONMENT MANAGEMENT PROJECT

Villages and towns are responsible for the mine geological environment management project and are the main source of its funds. The nature and essence of government determines the two basic goals of its invest-ment: efficiency and fairness. First of all, from the economic point of view, within the scope of the market mechanism's effective operation, the government and enterprises' investment in the field of environmental protection, can promote the efficient allocation of resources and regional economic growth. For areas where economic is less developed, considering that pure government investment is difficult to meet demand, government and enterprises are gradually establishing relations of cooperation, in order to build a mining relics tourism model called PPP (Public Private Partnership) . This model can be used to make a balance between the tourism resources management and the environment projects which can not make profits, such as the governance project in Loudi, Shandong Province.

Secondly, from the perspective of the social development and national strategy, to achieve social justice and raise the level of people's material life and spiritual life is the basic duty of the government. Mine geological environment governance project has obvious commonality. The project can prevent and control geological disasters and mining pollution, also can promote local political stability, distribute to justice, and improve the people's living conditions and health level. To carry out the mine geological environment governance is not only for the construction of socialism ecological civilization and promoting the local economic sustainable development, but also the need of making a balance

between human and nature, and building a harmonious society.

Mine geological environment governance project is more than the pursuit of a single target of efficiency or fairness, but both. This requests us should not only pay attention to the return on investment or identify and measure the economic benefits in the process of evaluation, but also consider the influence of social environment, natural resources and ecological environment.

### **THE THEORETICAL BASIS OF THE EVALUATION OF MINE GEOLOGICAL ENVIRONMENT GOVERNANCE PROJECT**

Mine geological environment management project evaluation is relatively complex, involving resources economics, investment theory, sociology, environmental engineering, and other subjects. Among them, the project economic evaluation, which is also called the technical and economic evaluation, adopt modern analytical methods to evaluate the economic effect of the project scheme in the calculation period. The technical and economic evaluation of the project, according to evaluate the difference of the Angle, can be divided into national economic evaluation and financial evaluation. In accordance with the principle of rational allocation of resources, national economic evaluation considers national income and expenses of the project and the assessment of economic rationality. Financial evaluation is focused on the profitability after the completion of the project, from the angle of the project plan itself.

In the social and environmental evaluation of projects, the environment resources value theory is the most important basis. According to the theory of environmental economics, environmental resource value is divided into use value and non-use value. Use value can be divided into direct and indirect use value and option value. In the mine environmental management projects, the mineral resources has the direct use value, which can be directly taken into the consumption and production; Indirect use value, including ecological function of environment resources, air quality, etc.; Option value refers to the willingness of contemporary human to pay to guarantee the use of mine environmental resource of the next generation. Non-use values is also called the existence value of environment, containing the environmental value which could be used and can satisfy the requirements of people, such as the natural landscape of mining area, wildlife species, etc.

In addition, the mine geological environment governance evaluation project also involves the neoclassical theory of welfare economics, the willingness to pay and consumer surplus theory,

economic external theory, environmental curve theory and sustainable development theory, etc.

### **THE CONTENTS AND INDEX SYSTEM**

According to the theoretical foundation and empirical research, this article summarized mine geological environment management project evaluation content in four aspect: the influence on economic development, social environment, natural resources and ecological environment, the evaluation indexes are as follows.

#### **The Influence on Economic Development**

The influence on economic development includes two aspects: the national economy evaluation and the financial evaluation.

1) National economy evaluation. From the perspective of the whole country, we use economic analysis parameters, such as social discount rate, shadow price and shadow wage to calculate the economic benefits of mine environmental governance project effectiveness and efficiency of resource allocation. The index includes economic net present value, internal rate of return and the analysis of the benefit-cost ratio.

2) Financial evaluation. Financial evaluation is based on the current economic laws and regulations. from the perspective of mine environmental management projects, We do financial benefit-cost calculation, analysis of profitability and solvency of the project, to evaluate the feasibility of the project financially. The index mainly includes analysis of profit ability, debt paying ability and risk ability.

#### **The Influence on Social Environment**

The influence on social environment includes six aspects:

1) Social employment. Mine environmental governance project can cultivate new economic growth point, such as Chengde City, which developed new green building materials, has obvious effect on pulling the direct and indirect local employment. It is important to note that the number of jobs is not the more the better. The appropriate weights should be determined on specific circumstances and local mining area labor supply-demand curve.

2) Social distribution. The index mainly reflects how net income of the mine environmental governance project distributes between the state, businesses and local residents. It also reflects the contribution to narrow differences between regions, urban and rural areas, and poverty alleviation effect, etc.

3) The impact on the population. Mainly includes the population changes, mining disease and accident incidence and mining area residents' living standards. The demographic changes can be considered as the

proportion of agricultural population and urban population, the sex ratio and age composition, etc.

- 4) The impact on the social order.
- 5) Improvement on the infrastructure of mining area.
- 6) Effects on technology progress.

**The Influence on Natural Resources**

The influence on natural resources includes the consumption of natural resources and the comprehensive utilization of resources.

1) The consumption of natural resources. Mine environmental governance can reduce resource depletion caused by extensive mining, extend the mine use fixed number of year, and also realize the recycling of resources and energy. The index can be reference for similar mineral resources development and energy consumption level in foreign countries.

2) The comprehensive utilization of resources. Based on the damage repair of mining area, we can develop horticulture, grains base and so on, which can make the recovery of land resources at a level that is available. The indicators should be based on the different ways of using reclaimed land and the targets of the government, evaluating the effect of comprehensive utilization of resources.

**The Influence on Ecological Environment**

The influence on ecological environment mainly includes four aspects, among which, the geological environment disasters is the most important.

1) Geological environment disasters. Mine geological disasters include earthquakes, ground fissure, landslide and debris flow, etc., the indicators are available for the effect of disaster monitoring and early warning, the reduction of natural disasters risks, etc.

2) Environment pollution. The mining area environment pollution is relatively complex, which is closely related to the mineral and mining methods. Environment pollution includes water pollution, air pollution, noise pollution and solid waste pollution, etc. Dealing with evaluation of mining area pollution of different types requires real-time monitoring and environmental quality index to determine whether a pollutant level is out of standard.

3) Soil and water conservation. Engineering and biological measures taken in mining area environmental governance projects can effectively control soil erosion, reducing the environmental pressure caused by human activities. The indicators can be combined with the degree of soil and water loss, and nature and local environment bearing ability, etc.

4) Wild fauna and flora. The recovery of the ecological balance is conducive to plant's natural regeneration, creating a good habitat for wildlife. The main evaluation index is the change which the wild economic plants and wildlife achieve.

**THE DECISION METHOD OF MINE GEOLOGICAL ENVIRONMENT MANAGEMENT PROJECT EVALUATION**

According to the organization of economic cooperation and development and the successful experience in other countries, this paper tries to use the form of currency to identify and measure the effect of mine environment management project, so as to determine the indicators of evaluation criteria. Specific indicators description and evaluation standard are shown in table 1 ~ 4 as below:

Table 1. The Influence on Economic Development

Index	Evaluation Standard
Net present value	The sum of present value of net economic benefit
Internal rate of return	The discount rate when present value of cumulative flow of Net Economic benefits is zero
Benefit-cost ratio	Benefits present value flow and cost flow ratio
Profit ability	Financial internal rate of return Financial net present value Investment payback period
Debt paying ability	Cash flow ratio
Risk ability	Sensitivity analysis

Table 2. The Influence on Social Environment

Index	Evaluation Standard
Social employment	New employment Employment industry distribution Ratio change
Social distribution	Income distribution efficiency State, local and enterprise income Distribution efficiency Effect of poverty alleviation
Population	Population change rate
Residents' living standards	Income growth
Mining disease	Changes in the number of casualties Casualty rate
Accident incidence	Death number
Social order	The incidence of criminal cases The incidence of cases on public security Residents' happiness index changes
Improvement on the infrastructure	Transportation, communication effect Medical, health care, education effect
Technology progress	Technological progress Technical personnel ratio changes in the population

Table 3. The Influence on Natural Resources

Index	Evaluation Standard
Consumption of natural resources	Consumption coefficients
Energy saving	Energy consumption coefficient
Land reclamation	Reclamation rate Effect of land reclamation

Table 4. The Influence on Ecological Environment

Index	Evaluation standard
Geological environment disasters	Geological disaster frequency change
Environment pollution	Environmental quality Comprehensive index
Oil and water conservation	Change of area
Surface vegetation	The vegetation coverage changes
Surface water and groundwater	The amount of water conservation
Wild fauna and flora	Wildlife growth The main reserves of wild plant and the economic growth rate

#### EVALUATION OF THE BASIC METHOD AND THE COMPREHENSIVE EVALUATION METHOD

Mine environmental governance project evaluation can be divided into four basic steps: the preparation, index selection, analysis and evaluation, options of the plan. in the process, some basic evaluation methods and comprehensive evaluation methods can be used.

#### Basic Evaluation Methods

Mine environmental governance project evaluation index system is complex, its attribute position determines the factors, which affect the efficiency of the majority is intangible and even potential, it is difficult to evaluate all projects at a certain dimension using the unified formula. Thus, this kind of project evaluation usually uses the method of combining quantitative analysis and qualitative analysis, We can choose evaluation models according to the actual mining area condition. At the same time, because mine environmental governance project usually lasts for a long time, the social and economic conditions of the study area may change. In the process of the project evaluation, we should eliminate the changes, investigate and predict the baseline within a certain time limit. In addition, We can use logical framework analysis to clear project goals and its internal and external relations, or we can analyze interest groups influence to set degrees for each group .

#### Synthesis Evaluation Methods

The comprehensive analysis of the mine environment management project evaluation methods are divided into qualitative analysis method and objective comprehensive evaluation method, the last one includes quantitative analysis, the Delphi method, matrix analysis method, analytic hierarchy process and level fuzzy comprehensive evaluation method, etc.

Evaluation can be chosen in one way or more. According to the policy objectives of the development of countries and regions, we should organize several experts, combining with the mine geographic conditions and social economic development, distinguish the grades of the indicators. The degree of importance determine its weight in the index system, then we can compute effects of the project and come to the conclusion by comparing the social, economic and environmental benefits.

#### CONCLUSION

Mine environmental governance project is one kind of public investment projects, the determination of standard mainly depends on the exploitation situation of mining resources and the local natural environment conditions, so the evaluation should focus on social benefits and environmental benefits. At the same time, we should respect the objective laws, and select related factors after thorough investigation. Also, we should adjust measures to adapt local conditions, which means one by one analysis of indicators does not required. For smaller, simpler mine governance conditions, the evaluation process can be simplified, focusing on the typical indicators which has larger influence on local economy, the people and the natural environment. In addition, evaluation of the project should run through the whole process of mine environmental governance. We should also do it in the middle of the project and feasibility study, in order to construct the ecological civilization.

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