

Value of Green Mining for Some Industrial Polluted Area Based on Policy of Chinese Government

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ABSTRACT

The development of mining industry in China has boost the economy in recent decades. However, large scale of mining has led to severe environmental issues such as soil erosion, surface subsidence. This paper summarizes how Chinese government has come up with policies to advocate Green Mining which is to improve the mining sector economic at a low environmental cost. It also illustrates some successful examples of mining industry and focus on the methods they reduce the impact on environment including comprehensive utilization of tailing resources, optimizing systems of technology for purify the emission before releasing. In addition, new method to reprocess mine tailings and put them into luxury market should be explored as an innovative way to transform waste into useful resources. These ways combined together will assist to achieve the goal of green mining effectively.

Keywords: Green mining, government policy, tailings, environmental protection, luxury market

1. INTRODUCTION

In recent years, new technologies have been applied to increase the efficiency of mining industry significantly. Meanwhile, reducing the environmental impact has been recognized as a key component for sustainable development strategies for the mining industry. According to China's president XI "Clear waters and green mountains are as good as mountains of gold and silver". In short, the concept of green advocates to improve the mining sector's economic with a relatively low environmental cost.

The environmental problems have come into surface due to the deep exploitation of resources in recent years. There are variety of issues related to mining industry especially for coal mining. Problems include: soil erosion, mine drainage, greenhouse effect, deforestation, land subsidence, water pollution and air pollution. To propel the implementation of green mining technologies more effective policy has been applied by the Chinese authorities. Closure of unqualified mining industry plays a significant role in propelling the sustainable development of mining industry in China [6].

The purpose of this study is to analyze the value of green mining for some industrial polluted area based on policy of Chinese government. A strategic objective pursuit by China is to develop a clean, sustainable environment in its mining industry. The paper constructs the real condition of China's mining enterprises and relevant countermeasures and policy implications supporting the green mining achievement. The remainder includes the empirical study based on some real successful examples of green mining enterprise and some innovative method to process the mining waste [3].

1.1. Literature Review on Major Consequences Caused by Iron ore Industry

The exploitation and purification of ore is detrimental to the environment. Iron ore is one of the most polluted one which will cause the following issues:

1) Air pollution is one of the major consequences caused by iron ore industry. For instance, some harmful gas, dust and other harmful substances are emitted during the process of mining development and transportation [2]. As a result, industrial waste gas emissions of sulfur dioxide and nitric oxide increase significantly in some mining area. In order to reduce the air pollution, some treatments are carried out correspondingly. For some open-pit mining, the dust collecting suction system for a rock drilling apparatus should be installed. Other major preventive measures include rock dust barriers, concrete stoppings and different forms of pressure relief vents [8].

2) Water pollution is also another side impact of development of mining industry. The development process can produce a large amount of wastewater. In the process of open-pit mine production and construction, some harmful substances from tailing pile would be dissolved by rain and hence damaged the underground water system and the soil.

To release the harmful effect, water circulation system should be constructed. Sewage pumping station should be established to centralize the treatment of sewage in the process of resource exploitation. The purified water then would be used in the ore dressing process after natural precipitation and clarification, thus improve wastewater usage efficiency.

3) Some ecological regions are threatened by iron ore exploration and purification. The main harms include

debris flow, landslide and other natural disasters. The local river channel changes due to ore resource exploitation. Terrestrial acidification, photochemical smog and particulate matter formation also damage human health and ecosystem quality to great extent due to the waste product from mining industry.

Many components in the tailings could be recycled and fully utilized again. With advanced technology and empirical experiences, minerals in tailings could be collected back and converted into useful resources. In this way, the waste product can be effectively controlled and thus reduce the detriment of ecological systems.

1.2. Policies Established by Government for Supporting Green Mining

Many regulations have been established by Chinese government to tackle the above issues. According to the General Condition of Green Mine from MLR (Ministry of Land and Resources, P.R. China) in 2010, the number of developments for green mines increased to a total of 459. The thinking of mining ethics serves as an essential criterion for selecting Green Mines. Chinese mining ethics play the most important role in prevailing a sustainable development and requiring their social obligations for the country. Chinese mining ethics differentiate from the Western ecological ethics. These ideas cherish harmonious coexistence of man and nature, respect the nature and propose moderate development.

The most recent regulations set by the Ministry of Industry and Information Technology in 2010, mining facilities in China regulated the undisciplined, unpermitted mines to a certain extent in terms of environmental concerns [9].

1.3. Policies made by Ministry of Land and resources & Taxation Administration of China

Ministry of land and resources of China and State Taxation Administration of China are supporting the establish of green mining with various policies. According to China Mineral Resources 2018 [5], the state and local governments enact the law to protect the environment. The state creates the law and the local government enact their regulations and rules according to their own respective situations. These administrative regulations related to mining activities contains the Environmental Protection Law, Measures for the Control of the Soil Environment of Land for Mining and Industry and the Regulations on Environmental Protection Management for Construction Projects.

The Environmental Protection Law aims at protecting and improving the environment, promoting “ecological civilization” and facilitating sustainable economic and social development [10]. In terms of the Environmental compliance, it is mandatory to get an approval environmental impact report before any mining project is constructed [2] On the one hand, these laws focus on protecting the environment. On the other hand, it is obvious that propelling the green mining would greatly cater for the China’s government policy.

In addition, according to China’s Opinions on the Implementation of Accelerating the Construction of Green Mines Policy. Enterprise which has been recognized as green mines take priority to apply for the mining permit. Besides, the government will decrease the imposition of enterprise income tax by 15% for green mine corporations. State Taxation Administration of China also carries out the “Environmental Protection Tax Law”, which came into effect in 2018. The China’s government prescribed an environmental protection tax related to mineral resources according to different items and levels of pollutants, tax will be imposed per unit accordingly [5].

Table 1 Items and amounts of environmental protection tax related to mineral resources

Item	Unit	Amount	
Atmospheric pollutants	Per pollution equivalent	1.2 yuan to 12 yuan	
Water pollutants	Per pollution equivalent	1.4 yuan to 14 yuan	
Solid wastes	Coal gangue	Per ton	5 yuan
	Tailings	Per ton	15 yuan
	Hazardous wastes	Per ton	1000 yuan
	Smelting slag, fly ash, slag and other solid wastes (including semi-solid and liquid wastes)	Per ton	25 yuan
Noise	Industrial noise	Exceeding the standard by 1~3 decibels	350 yuan per month
		Exceeding the standard by 4~6 decibels	700 yuan per month
		Exceeding the standard by 7~9 decibels	1,400 yuan per month
		Exceeding the standard by 10~12 decibels	2,800 yuan per month
		Exceeding the standard by 13~15 decibels	5,600 yuan per month
		Exceeding the standard by 16 decibels or more	11,200 yuan per month

1.4. Regulations from Local Government to Support Xincheng Mining as an Successful Example of Green Mining

The north eastern of China is taking a lead in mining industry and also for green mining. The local government has made a significant contribution by setting up regulations. For instance, Liaoning Province, a province located in the northeast of China, which is famous for its abundant natural resources. Among the (number) mining corporations in Liaoning Province, Xincheng Mining is one of the models in terms of its great scale and environmental friendly production characteristics. The owner of the private enterprise follows Xi's advocate that "Clear waters and green mountains are as good as mountains of gold and silver", has been pushing for green development at a fast pace. Unlike the West Pit in Fushun city, which was shut down in 2019 after the country called for a more eco-friendly energy structure, Xincheng Mining Corporation plays a greener role in the following aspects:

1.4.1. Increase the Comprehensive Utilization Value of Tailings Resources

With the rapid expanding of business, the number of tailings has been increasing. To reduce the environmental pollution from a long-term view, Xincheng avail the tailings re-selection method to further improve the utilization of valuable elements. Studies have revealed that tailings contain mineral colloids which are active and highly energy efficient.(Yan, 2020) With comprehensive utilization of tailings, valuable elements are better screened out and thus exert a new role. Besides, tailings are currently used for backfilling the mined-out area under Xincheng's instruction. The mined-out area becomes unstable and easier to induce disasters such as landslides. By adding appropriate additives, tailings turn into a good filling material. In addition tailings are used as fertilizers to improve soil conditions. Tailings contain trace elements such as copper, iron and zinc, which can benefit the plant growth [1]. Xincheng re-selected the tailings meanwhile growing plants for food. The total values come from the

tailing is about 1.4 million yuan in recent years for the company.

1.4.2. Optimize Systems for the Technology Route to the Comprehensive Utilization of Mineral Resources

In order to improve the production and reduce the environmental cost at the same time, Xincheng Mining optimizes systems by applying high Technologies. These technologies include Solid backfilling technology as we have mentioned above, Caving method in zonal mining and Mineral processing water circulation system. Among them, the Caving method in zonal mining corporate with a lab in Northeastern University and already applied for patent. With the determination of the parameters of rock mechanics, the risk of falling hazards is significantly reduced. In addition, Mineral processing water circulation system allows recycling water with high concentrations of impurities. Hence, the quality of water exhausted is guaranteed.

1.4.3. Minimize the impact on the Ecological Environment

When it comes to the environmental impacts of a mine, there are two main issues to take into consideration. First, the erection of plant, and its ongoing influence for surroundings. Second, the rehabilitation of the site after the mine been decommissioned. The key achievements for Xincheng Miningg avails underground mining method which extract ore from below the surface of the earth safely. Hence, the waste is produced as little as possible which guarantees little air pollution. Besides, both the refilling of tailings and the Mineral processing water circulation system guarantee a low waste exhausted, which make Xincheng prior to the similar mining corporations. Moreover, the rate of forest cover is more than 90% in the past three years. Xincheng has invested millions yuan in planting more than 100 thousands trees. The Green Mining ethics is practiced by Xincheng literally and figuratively.

1.5. Innovative Way to Transform Tailings into Luxury Products

As we have discussed above that increasing the comprehensive utilization value of tailings resources is essential to Green Mining, new method could be explored to deal with tailings on top of those traditional ways. In another word, to use the mine tailings for some useful purpose is a great solution. In my opinion, reprocessing mine tailings into high-end products and put them into luxurious market is an innovative way to transform waste into useful products.

Nowadays, as the global economy booms and the middle classes in developing economies expand, purchasing of

luxury goods and experiences grow rapidly. According to the 16th edition of Brain & Company's 'Luxury Goods Worldwide Market Study', the global luxury market is estimated to have grown in a fast pace in recent years and spending increases across nearly all segments. Besides, a broader "millennial state of mind" is permeating the luxury industry that purchasing luxury items is more about self-expression rather than signifying their social status as previous generation did. It means that luxury items are not limited to cars, bags, clothes, and fine wines, instead, anything that caters for consumer's aesthetic standard, or creative could be things people willing to spend money on. All in all, if tailings can be reshaped into fine art and let people feel distinguished to buy, then there is no problem that "Tailing products" cracking their way into luxury market.

Another important aspect worth mentioning about transforming tailings into luxurious products is technique. A series of laboratory tests must be conducted to study basic physical and chemical properties of tailings, including specific gravity, particle size, pH values, etc. Based on the previous studies, the tailings are non-plastic except for the coal wash tailings. According to the values presented by Aubertin et.al(1996) the plastic limits for copper, gold and CT tailings were the same. (Qiu,2000) which further indicates performing some artistic carving on tailings product is possible to some extent. Previous studies have also shown that it is possible to transform mill tailings into quality bricks by adding appropriate additives [7]. Thereafter, new additives could be explored to make tailings suitable for aesthetic purpose.

To make customers really buy the product created from tailings, taking a lead in marketing is critical. There is more than one way for today's luxury brand sellers to influence the market. First, celebrity plays an essential role in leading customers by luxury products. It has been observed that celebrities can make a positive influence for celebrity endorsers in inducing the desired behaviour about advertisements. Findings from a survey of 514 consumers admit celebrity credibility is a key factor in expediting them to make a purchase of luxury goods [1]. Therefore, getting celebrities to buy our product and advertise it via social media is important to make our item prevailing in market. Moreover, sharing our success story to inspire luxury consumers can also boost the selling. Everyone loves a brand that has a story. Associating the brand's successful stories to consumers' own personal achievements is a great strategy to open the market. In addition, letting customers know what makes the luxury products unique is a good way for promoting them as luxury was once hand-made by craftsmen to the customer's specifications. In conclusion, promoting our products from tailings appropriately is inevitable no matter the tailing product is a jewelry or a simple handicraft.

1.6. Risks and Downsides for Transforming Tailings into Luxury Products

As there are potentials for tailing made product come onto the stage of luxury market from a positive perspective, there are still some risks and downsides about this industry.

1.6.1. Rules for the pricing activities of government

First, according to Order of the National Development and Reform Commission of People's Republic of China, there are rules for the pricing activities of the government. The rule aims at making the pricing activities of the governments more scientific, impartial and transparent, and protecting the legitimate rights and interests of consumers. Thereafter, there is a risk that the government might restrict the price on the tailing made products based on its material and cost. However, selling tailings made product is not only about the material itself. Consumers also purchase high quality and design from craftsmanship. In other word, it is hard to define a ceiling price for a handicraft artistic work.

1.6.2. Great investment is required

Secondly, to guarantee the quality of the products, a large amount of money required to investigate the technology of transforming tailings into qualified materials. There are previous studies about turning tailings into bricks and other usage but nothing demanding as artistic work. New laboratories need to be set up to create quality products that satisfy consumers' aesthetic standard. Another large investment for the business is advertisement since celebrity endorsement contribute a lot for luxury purchasing especially for young people. These investments add up to a considerable amount before making any profit. However, it would finally pay off when the product gains a firm foothold in the luxury market.

1.6.3. The stereotype image of domestic product

With the fast growing luxury market in China for the last two decades, it is a pity that few Chinese brands show on the track of luxury goods market. One reason that might explain the situation is that the impact of 'made in China', many people keep the stereotype of the past Chinese products which are cheap and low quality. Even local consumers make purchase overseas everyday [4]. To alter the old impression on domestic products, high quality and unique designs must be applied to the goods. Traditional Chinese culture tend to be modest and less innovative which might depress the creativity of designers. Nowadays, as the trend of globalisation, more and more world class

designers are to be explored and there must be a stage to show their talent.

2. CONCLUSION

In summary, the development of mining industry boosts Chinese economy in recent decades but also cause severe environmental problems. It is necessary to explore the comprehensive utilization ways of mine tailings to realize the goal of Green Mining. The regulations and laws from government of China is analyzed for supporting the carry out of Green mining. Current examples illustrated in the article also demonstrate that recycling mine tailings can create great values and reduce the cost for the environment. Among them, increase the comprehensive utilization value of tailings resources is one major solution. On top of that, optimizing systems for the technology is a route for the comprehensive utilization of Mineral Resources. In addition, minimizing the impact on the ecological environment is also another goal realized by Xincheng Mining. According to the current condition of tailings, new technology should be developed and new plan to put tailings product into luxury market should be made to maximize the value of mine tailings. Despite there are still risks and downsides exist, such as rules for the pricing activities of the government, great money required for investment and the stereotype image of domestic product, the future of transforming tailing into luxury products is still promising.

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