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Status Investigation and Countermeasures of Green Development of Black Talc Industry Chain in Guangfeng District, Jiangxi Province

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Abstract Through the investigation on the status quo of the green development level of black talc industry chain in Guangfeng District, Jiangxi Province, it is found that there are obvious problems in the fields of production process and industrial structure. In view of the problems, from the perspective of optimizing the whole production process and improving the industrial structure, it is necessary to explore the establishment of a new green development model, and realize the sustainable development of black talc industry chain in Guangfeng.

Key words Black talc, Green development, Path optimization

1 Introduction

China is rich in black talc mineral resources, which are mainly distributed in Guangfeng District, Jiangxi Province, Nantong District, Chongqing City, *etc.* Among them, the black talc mineral resources in Guangfeng are the most abundant, and the known reserves of black talc resources are over 200 million t^[1]. According to the research of Qin Wenli *et al.*^[2], it is found that after deep processing of black talc, the whiteness is as high as 95%, and it has good properties such as fire resistance, insulation and adhesion. It has been widely applied in the fields of polymer dyeing, electromagnetic wave absorbing materials and pollutant adsorbents, and the market prospect is considerable. However, for a long time, black talc enterprises in Guangfeng had many problems in the whole production process, industrial structure, market environment, *etc.* Microscopically, there is a lack of relatively perfect deep processing technology of black talc in the production field, and some production enterprises still adopts traditional coal-fired calcination process, which has low efficiency and low quality of finished products, is easy to produce air pollution from SO₂, and causes great damage to the ecological environment. On a macro level, the industrial structure needs to be transformed and upgraded, and the added value of finished products is low; the upper and lower industrial chains need to be expanded deeply.

In view of this, it is necessary to investigate and study the green development level of black talc production in Guangfeng. In this paper, based on the cognition of the green development connotation of industrial production, a reasonable index evaluation system was established, and the current situation of the green development of black talc in Guangfeng was investigated. Besides, some suggestions for the problems existing in the survey were put forward to provide opinions and reference for realizing the sustainable development of black talc industry chain in Guangfeng.

2 Connotation of industrial green development

In the short term, the connotation of industrial green development changes dynamically with the implementation of the country's green economy, but in the long run, its ultimate development goal is to achieve the coordination between industrial development and resource and environmental consumption.

"Green production" is the core link of industrial green development. Therefore, the research on industrial green development should focus on the "green production" link of the industry. It is necessary to establish an evaluation system of green development level focusing on resource consumption and pollutant discharge, reflect the resource consumption and pollutant discharge in the production process of black talc industry, provide suggestions for industrial green development according to the actual results, and promote the transformation and upgrading of black talc industry in Guangfeng.

3 Investigation of the current situation based on the green development of the industrial chain

In order to more accurately understand the status quo of the green development level of black talc in Guangfeng, a statistical analysis of 25 related literatures in recent years was firstly conducted. As shown in Fig. 1, in recent years, the number of research literatures in the field of black talc in Guangfeng has shown a fluctuating upward trend. The literature records began in 1983, which is lagging behind the production time of black talc in Guangfeng, which is in line with the publication regularity of literature research.

Through the integration of relevant literature and the actual situation of black talc production in Guangfeng, it can be seen that the production of black talc in Guangfeng has obvious deficiencies as follows.

3.1 Whole process of industrial production The status quo of the green development level of black talc production in Guangfeng was surveyed in the early stage and the middle and late stages of black talc production. In the early stage of production, for a

long period of time, there are a large number of black talc mining enterprises in Guangfeng, and the scale of each enterprise is small; the geographical distribution is scattered, and there is a lack of unified and centralized management. In the mining of black talc resources in the mining area, there is a phenomenon of indiscriminate mining, which has caused a great waste of limited resources, and caused serious damage and pollution to the ecological environment. At the same time, most enterprises use traditional mechanical drilling rigs for mining, which has large disturbance to the hole wall and core of the mining ground and low drilling efficiency.

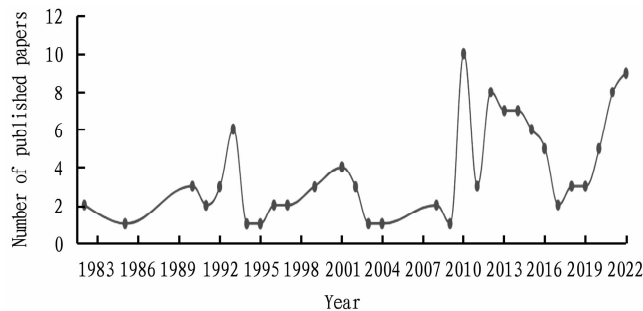


Fig. 1 Overall trend of published papers of black talc from 1983 to 2022

In the middle and late stages of black talc production, due to lack of sufficient funds to invest in the upgrading and transformation of production technology, enterprises mostly use traditional earth kiln calcination technology, which has high production cost, low efficiency and poor quality of finished products. Meanwhile, due to the use of coal as the main energy source, harmful gases such as CO_2 and SO_2 are easily generated during the production process, which seriously pollutes the environment. In the later stage of production, there is a lack of rational treatment of the mine waste accumulated in the mining area after production, which has caused secondary pollution to the ecological environment.

3.2 Industrial development structure Due to the lack of perfect deep processing technology of black talc, most production enterprises only sell the mined black talc minerals as raw ore or primary processed mineral products, with weak market competitiveness and low economic efficiency. At the same time, there is a lack of effective links between upstream and downstream industries, and it is difficult for each industry to give full play to its comparative advantages in the fields of raw materials and technology; the industrial chain system needs to be improved.

4 Research on the improvement paths based on industrial development

4.1 Optimizing the whole process of industrial production In order to improve the green level of black talc industry production, the whole process of industrial production is explored, such as green investigation in the early stage of production. For the exploration of black talc ore, it is necessary to insist on centralized and orderly mining, and use portable full-hydraulic core drilling rigs, UAV aerial survey and other technical equipment to carry out sur-

vey and construction; through environmentally friendly technical processes, advanced equipment selection, scientific survey plans, *etc.*, remarkable results have been achieved in improving the rate of core mining, shortening the survey cycle and reducing environmental pollution^[3]. In the middle stage of production, it is necessary to innovate the raw ore processing technology, transform the original coal-fired calcination system, learn from the production methods of domestic related mining enterprises, innovate the use of fully environmentally friendly automatic computer-controlled black talc calcination tunnel kilns, and improve the quality of talc products and reduce air pollution through deep processing technology, such as low-temperature calcination purification technology, composite nanomaterial preparation and other technologies. Besides, it is needed to actively develop black talc deep processing technology, expand the field of black talc use, extend the industrial chain, and increase the added value of products.

Finally, in the later stage of production, it is possible to actively carry out external cooperation by promoting the construction of comprehensive utilization projects of mine waste rock, introduce advanced environmental protection technology and equipment, use ore solid waste for reproduction, and manufacture new wall components for prefabricated buildings, so as to realize the "change of post-production waste into treasure" and reduce air and solid waste pollution after ore mining. Meanwhile, it is necessary to research and develop green mining technology, improve the level of geological exploration, increase the technical investment in the production of black talc, promote the rational treatment of solid waste after ore mining, ultimately improve the green level of black talc production in Guangfeng, and realize the sustainable development of the industry.

4.2 Improving the development structure of the industrial chain Optimizing the development structure of the black talc industry chain in Guangfeng is of great significance for promoting the realization of 100 billion yuan output value of black talc. From the perspective of mining enterprises themselves and the implementation of government policies, feasible suggestions for improving the development structure of the industrial chain are proposed further. First of all, for black talc mining enterprises in Guangfeng, in order to realize the transformation and upgrading of the industrial chain, they should actively promote the optimization of the whole process of industrial production and improve the quality of black talc finished products, which has been described in detail in the previous article. At the same time, it is necessary to distinguish the types of black talc ore, expand the potential application market of black talc, shift the focus of production from low-end market competition to the production of high-end talc products, accelerate the transformation and upgrading of black talc ore industry, and expand the market application scope of black talc in ceramic industry raw materials, plastic coatings, marine polymer fillers and other fields, and develop new talc products.

In order to realize the transformation and upgrading of the black talc industry chain in Guangfeng, it is necessary to promote the transformation of the original low-end industrial ecosystem and reconstruct new industrial ecosystem. On the one hand, government departments can regulate the mining order of mineral re-

sources, retain the mining and operation rights of legal non-mining development enterprises, establish new mining rights, and allow state-owned enterprises to obtain mining rights and management rights through bidding to form a mining rights structure in which the orientation of state-owned enterprises and the vitality of private enterprises encourage each other. On the other hand, while helping state-owned enterprises to attract investment, they should help private enterprises to resume work and production, develop green finance, provide financial support for enterprise development, encourage enterprises to jointly promote the industrialization transformation achievements of black talc mining in Guangfeng, and expand the sales market with the help of exhibition halls sponsored by the government.

5 Conclusions and suggestions

By sorting out the relevant theories and research results of the connotation of industrial green development, the connotation of the green development of black talc industry was accurately grasped. Through the investigation of the green development status of the black talc industry chain in Guangfeng, the specific problems were found. According to the problems found, it is clear to improve the green development level of black talc industry. That is, under the constraints of resources and environmental carrying capacity, technological innovation in the entire production process should be conducted. Specifically, it includes the development of green mineral exploration technology in the early stage of production, the improvement of the original calcination system in the middle stage

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of high-end skilled talents engaged in the production of *P. grandiflorus*.

4.3 Implementing crop rotation or intercropping *P. grandiflorus* has a long growth cycle, and it takes about two years from sowing to harvesting. Moreover, it has high requirements for soil nutrients. After the land has been planted several times, it is necessary to rotate crops and recuperate to avoid repeated planting. *P. grandiflorus* and pepper intercropping can reduce the incidence of *P. grandiflorus* root rot and improve product yield and quality. Zhang *et al.*^[6] found that when *P. grandiflorus* was planted in the plots that have been continuously cropped for 3 years, the intercropping of *P. grandiflorus* and pepper with row ratios of 4:2 and 5:2 increased the taproot yield and total yield of *P. grandiflorus*, improved the intrinsic quality of *P. grandiflorus*, so the intercropping advantage was obvious.

4.4 Intensifying the promotion of technology It is necessary to actively organize and observe demonstrations of high-yield and efficient cultivation techniques for *P. grandiflorus*, hold training courses on new varieties and new technologies of *P. grandiflorus*, and encourage vegetable farmers to apply new technologies such as high-ridge cultivation and integration of water and fertilizer. Experts should be organized to regularly visit the park base to answer

of production, and the recycling of waste generated in the later stage of production. It is necessary to promote the improvement of industrial development in quality and efficiency, and form production methods and industrial structures with low energy consumption, less pollution, high-tech content and high resource utilization efficiency, so as to achieve coordinated development of industry and environment.

Finally, from the perspective of different subjects, the specific measures that each subject needs to take were clarified. For example, enterprises themselves need to pay attention to improving the quality and efficiency of products and extending the industrial chain. Government departments can develop the green financial industry and provide financial support for the green development of black talc industry. With the joint efforts of all parties, it will help to promote the green and sustainable development of the 100 billion industrial chain of black talc in Guangfeng.

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questions and solve problems, and break through difficulties, blockages and breakpoints in production. Relevant local standards should be formulated in the production and processing of *P. grandiflorus* to provide reference and basis for the development of *P. grandiflorus* industry.

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