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Causes and Countermeasures for the Failure of Mining Land Use Policy Reform: Practice Analysis from China

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Abstract: The current supply method of land acquisition for mining land in China is not conducive to the sustainable use of land resources, resulting in a large amount of wasted land resources and causing many conflicts. The new model of temporary land use policy for mining solves the long-standing problem of the livelihood of expropriated farmers that has plagued local governments, and also helps to alleviate the conflicts between enterprises and farmers. However, the temporary land use policy is in the practice stage, and the policy failure has resulted in low land reclamation rates. This research is a systematic survey for large and medium-sized mining enterprises, relevant government departments and research institutions nationwide. From the survey we analyze the problems in the implementation of the current temporary land use policy for mining and the causes of the policy failure, and propose an effective implementation mechanism for the future policy. The study showed that: (1) the temporary land use policy for mining was enacted with wide acceptance, but the implementation of the policy was ineffective; (2) the conditions for the application of the temporary land use policy for mining are unclear, the review and supervision by the competent authorities are not strict, and enterprises do not pay attention to land reclamation resulting in a very low rate of land reclamation; and (3) The implementation mechanism of the temporary mining land policy in practice is not perfect, and the proposed implementation framework based on “conditions, approval, implementation, supervision, acceptance and withdrawal” is scientific and feasible. It provides a reference for the management and innovation of strict protection of arable land, land conservation and intensification, and land reclamation in mining areas in China.

Keywords: temporary land use for mining; land use policy reform; policy failure; land reclamation; mining areas



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1. Introduction

Land reclamation in mining areas is an important part of the construction of ecological civilization in China [1]. Coal accounts for about 70% of China's primary energy consumption structure, and it will still have an important strategic position in China's energy system for the next 30 years [2–4]. However, while coal mining has achieved economic development it has caused a certain degree of damage to land and ecology; the area of arable land is plummeting with it, and media exposure of mining damage abounds [5–8]. According to the 2019 China Remote Sensing Monitoring Survey, China currently has 3,610,500 hm² of land damaged by mining (1,459,300 hm² of excavated land, 1,306,700 hm² of occupied land and 844,500 hm² of collapsed land), accounting for approximately 0.37% of the country's land area. Among them, 1,340,400 hm² of land was damaged by production mines under construction and 2,270,100 hm² was damaged by abandoned mines [9]. However, the average annual ecological restoration area of mining areas in China is about 44,800 hm², but the average annual destruction area is about 82,600 hm²; mine destruction

faces the problem of “old debts” not yet repaid and “new debts” owed. The rate of land reclamation in mining areas in China was only 25% in 2021, which is far below the level of reclamation in developed countries [10,11]. At present, more than 80% of China’s industrial raw materials are derived from mineral resources and the demand for mining land will only increase in the future, so land acquisition has become an important factor limiting the production of mining enterprises and sustainable land use [12–14].

The mineral resources ownership system implemented in most foreign countries is separated from land ownership in which the mining land system involves various legal and social issues, especially from the legal form to determine the mining land. The procedure for mining enterprises to apply for mining land in foreign countries is more cumbersome, and the law also limits the application for mining land to strict conditions; the approval system and implementation mechanism are more effective [15–20]. However, most countries are almost unanimous in the aspect of mining land application that the consent of the landowner is required for the enterprise to apply for mining permission [21,22]. The duration of land lease application for enterprises is also clearly defined in the law, and if the land is not reclaimed or returned within the limited period a huge fine is given [23–26]. China’s land system is divided into two basic patterns of land ownership: “state-owned land” and “rural collective land”. Mining enterprises that require mining land must use state-owned land in accordance with the law in the form of concessions for a fee. If rural collective land is used, the collective land must be converted to state-owned land through state expropriation, and then the land use right must be acquired by means of paid use, such as transfer [27,28]. According to the survey, 46.2% of the land in China is peasant collective land. However, most of the land to be used for mineral resources mining belongs to peasant collective land, and once the mineral resources are mined the mining enterprises basically use up the value of mining land [29,30]. Although the enterprise continues to have the right to use the land, they lack the incentive to reclaim it, resulting in a lack of timely reclamation, long-term idleness and desolation so that it becomes abandoned land. Therefore, the current single land supply approach for mining land constrains the sustainable use of land to some extent [31].

The national authorities are also actively exploring new ways of supplying mining land. In 2005, the former Ministry of Land and Resources (now renamed as “Ministry of Natural Resources”) approved the Guangxi Branch of Aluminum Corporation of China to carry out a pilot reform of temporary land supply for open-pit mining in Pingguo County, where the enterprise leases land from farmers, reclaims the land after mining, and finally returns the land to the farmers [32]. In 2012, the seven-year bauxite mining land use reform pilot project in Pingguo County passed the summary acceptance of the Ministry of Land and Resources. This new model of mining land has fully taken into account the interests of farmers, enterprises, government and other parties, and has better solved the contradiction of land use and realized the sustainable use of resources and the harmonious development of mining land and local economy and society; this is a major innovation and breakthrough in the reform of mining land supply [33,34]. In 2010, the Ministry of Land and Resources (MLR) expanded the pilot reform of the mining land use method and approved the supply of land in the form of temporary land use for a total area of 37,944.727 hm² in 19 prefecture-level cities, including Ordos in Inner Mongolia, Shuozhou in Shanxi, Kunming in Yunnan, Hezhou in Guangxi and Fushun in Liaoning. The policy of temporary land for mining has changed the practice of applying for the use of state-owned land, adopting the practice of “phased implementation, phased land supply and return at the end of the term” and using the collective land of farmers in the form of temporary land for a period of five years. To date, most coal mining companies have been unable to reclaim and return land as scheduled. The imperfection of the reform system has resulted in less than 50% reclamation and land return rate of temporary mining land and less than 20% reclamation acceptance rate, so the temporary mining land policy has failed to deliver [35–37].

Based on the background discussed, this study investigates the degree of recognition and implementation of the current mining temporary land use policy in China, uses a

quantitative approach to determine policy failures, analyzes the causes of mining temporary land use policy failures based on the findings, and proposes strategies to promote the effective implementation of mining temporary land use policy in mining areas.

The remainder of this paper is as follows: Section 2 provides a systematic introduction to the traditional mining land supply methods and the reformed mining land supply method. In Section 3, a questionnaire was used to conduct a policy implementation survey for relevant units nationwide in response to the low rate of reclamation of temporary land for mining after the reform. Section 4 systematically analyzes the current status of policy implementation and the causes of policy failure based on the survey results. Section 5 analyzes the need for continued implementation of the temporary land use policy and the coping mechanisms that will enable effective implementation of this policy in the future. Section 6 summarizes the conclusions and recommendations for future reforms.

2. Policy Background Introduction

2.1. Land Acquisition: Traditional Mining Land Supply Method

According to the “Land Management Law”, any unit and individual construction or the need to use land requires an application for the use of state-owned land in accordance with the law where the use of the process should be paid for by the grant and other means of use. This kind of paid use, such as transfer, includes two cases: if the mining land to be used by the enterprise is state-owned land, it will obtain the land use right by means of paid use, such as transfer, according to law; if the mining land to be used by the enterprise belongs to the rural collective land, it needs to go through state land acquisition and then obtain the right to use the land owned by the peasant collective in the form of granting and other paid use.

Most of the current mining land is acquired by eminent domain, but this mining land use method has revealed many drawbacks over time and mining enterprises, local governments and farmers are trapped in many aspects with many conflicts. From the farmers’ side, land expropriation changes the nature of land ownership where land is transferred to enterprises and farmers lose the land on which they depend [38,39]. From the enterprise side, land acquisition has increased production costs and constrained development. Moreover, after the completion of the reclamation of mining enterprises more and more land is hoarded (resulting in a large amount of idle land), and the management and care of the reclaimed land at a later stage also makes the enterprises carry a heavy burden that seriously affects the mine production and the sustainable development of the enterprise economy. From the government side, more and more farmers need to be properly resettled after land acquisition, the government is under increasing pressure, and social instability is gradually increasing. The current method of land acquisition and concessions of mining land is ostensibly a relationship between land, minerals, and people’s livelihood; but in essence it is a relationship between the interests of farmers, enterprises, and the government, which are intertwined and inextricably linked [40,41]. Therefore, the search for a new model of mining land that can solve multiple conflicts and protect the interests of the government, enterprises and farmers has become a common desire of the natural resources departments, local government and farmers.

2.2. Temporary Land Use: Reform of the Current Mining Land Supply Method

The national authorities are also actively exploring reforms in the way mining land is supplied. In 2005, the former Ministry of Land and Resources approved Guangxi Branch of Aluminum Corporation of China Limited (hereinafter referred to as Pingguo Bauxite Mine) to carry out a pilot project to reform the mining land use method in Pingguo County, Guangxi Province. The connotation is that the mining company leases land from farmers, reclaims the land after mining is finished, and finally returns the reclaimed land to the farmers (Figure 1). The reform changed land acquisition to land leasing, and this innovative model of land supply has transformed a multi-party problem into a multi-party win-win situation: enterprises reduce production costs, farmers do not lose their land but receive

more economic compensation, and local governments reduce the pressure of resettlement of farmers, which also promotes the protection of arable land and the economical and intensive use of land. In April 2012, Pingguo Aluminum mining land way reform pilot successfully passed the acceptance of the former Ministry of Land and Resources. The major reform of mining land supply mode of Pingguo Aluminum provides experience for similar mines mining land in Guangxi and even in China.

Mining temporary occupation of rural collective land	
Supply method 1. Temporary lease of land, not the implementation of land acquisition 2. Each phase of land use period is 2 years, the maximum time is 5 years.	Approval System 1. County-level natural resources department review 2. Municipal people's government approval of land
Compensation method Refer to the local land acquisition compensation standards	Land Withdrawal 1. Complete land reclamation after the end of mining 2. Acceptance meets the standards and return to farmers

Figure 1. Basic content of the current temporary mining land use policy reform.

Drawing on the successful experience of reforming the mining land use method of Pingguo Aluminum, the former Ministry of Land and Resources expanded the pilot reform of the mining land use method in 19 prefecture-level cities, including Erdos in Inner Mongolia, Shuozhou in Shanxi, Yulin in Shaanxi, Kunming in Yunnan, Hezhou in Guangxi and Fushun in Liaoning, and approved a total area of 37,944.727 hm² to be supplied as temporary land use. There are also some requirements in terms of supply methods: in the pilot area, mining land occupying rural collective land, no longer implementing expropriation, no change in land use, and the nature of land ownership does not change. Adopt a “phased implementation, phased land supply, return land” approach. The basic idea is to “apply for temporary land for mineral resource extraction, and then promptly reclaim the land and return it to the farmers after the extraction is completed.” Each phase of mining temporary land for a period of no more than two years, to complete the implementation cycle of mining and land reclamation shall not exceed five years. It can be interpreted as a three-year mining period and two-year reclamation period, but so far, most coal mining companies have been unable to reclaim and return land as scheduled. According to the survey, the rate of reclamation of temporary land for mining is less than 50% and the rate of acceptance of reclamation is less than 20%.

3. Research Design and Methodology

3.1. Respondents and Study Area

China's coal resources are mainly distributed in North China, northwest and southwest China, of which about 60% are located in Shanxi, Shaanxi and Inner Mongolia provinces, where large open-pit coal mines exist and are the key areas for future coal mining in China (Figure 2). Due to the huge consumption of land by open-pit mines, they are coupled with a series of social problems arising from land acquisition. The Ministry of Natural Resources approved the supply of temporary land for mining in Inner Mongolia Erdos, Shanxi Shuozhou and Shaanxi Yulin as pilot implementation. According to the survey of government departments, the effectiveness of the reform of the temporary land policy is not optimistic. We know that policy implementation relies on the participation

of multiple subjects. In the process of implementing the temporary land use policy for mining, mining enterprises bear the main responsibility for land reclamation after the development and utilization of mineral resources. The government has macro-control and supervisory responsibilities in land reclamation and assesses and accepts the process of policy implementation and the effectiveness of implementation. Research institutions engaged in land reclamation and ecological restoration in mining areas are involved in land reclamation-related activities through certain channels and indirectly carry out supervision of policy implementation. Thus, it appears that government departments and mining enterprises act as the direct implementers of the temporary land use policy, and research institutions engaged in mining land reclamation and ecological restoration act as the indirect implementers of the mine land reclamation policy. Therefore, this questionnaire takes the survey data of three types of subjects: government departments, mining enterprises and research institutions, as an important basis for the implementation of the temporary land use policy for mining.



Figure 2. Statistical Map of Coal Resources Distribution and Land Damage in China.

The survey received strong support from Chinese ministry research institutes, provincial and municipal governments and natural resource departments, and universities that assisted in distribution and ensured that our questionnaires reached mining companies directly while local governments and experienced research institutes filled out the questionnaires and provided feedback and suggestions. After several months of survey and

feedback, a total of 235 samples were returned and 220 valid questionnaires were obtained after data screening with a sample efficiency of 93.62%. The survey distribution geographically includes all provinces, autonomous regions and municipalities directly under the central government, mainly in Shanxi, Anhui, Shandong, Inner Mongolia, Henan and Shaanxi (Figure 3). Among them, 49 samples were surveyed by government departments, accounting for 22.27% of the total number of samples; 110 samples were surveyed by mining enterprises, accounting for 50.00% of the total number of samples; and 61 samples were surveyed by research institutions, accounting for 27.73% of the total number of samples. Based on the number of surveys, data distribution and the proportion of units, the survey sample can effectively reflect the general view of the country regarding the implementation of land reclamation policies and meets the research requirements.

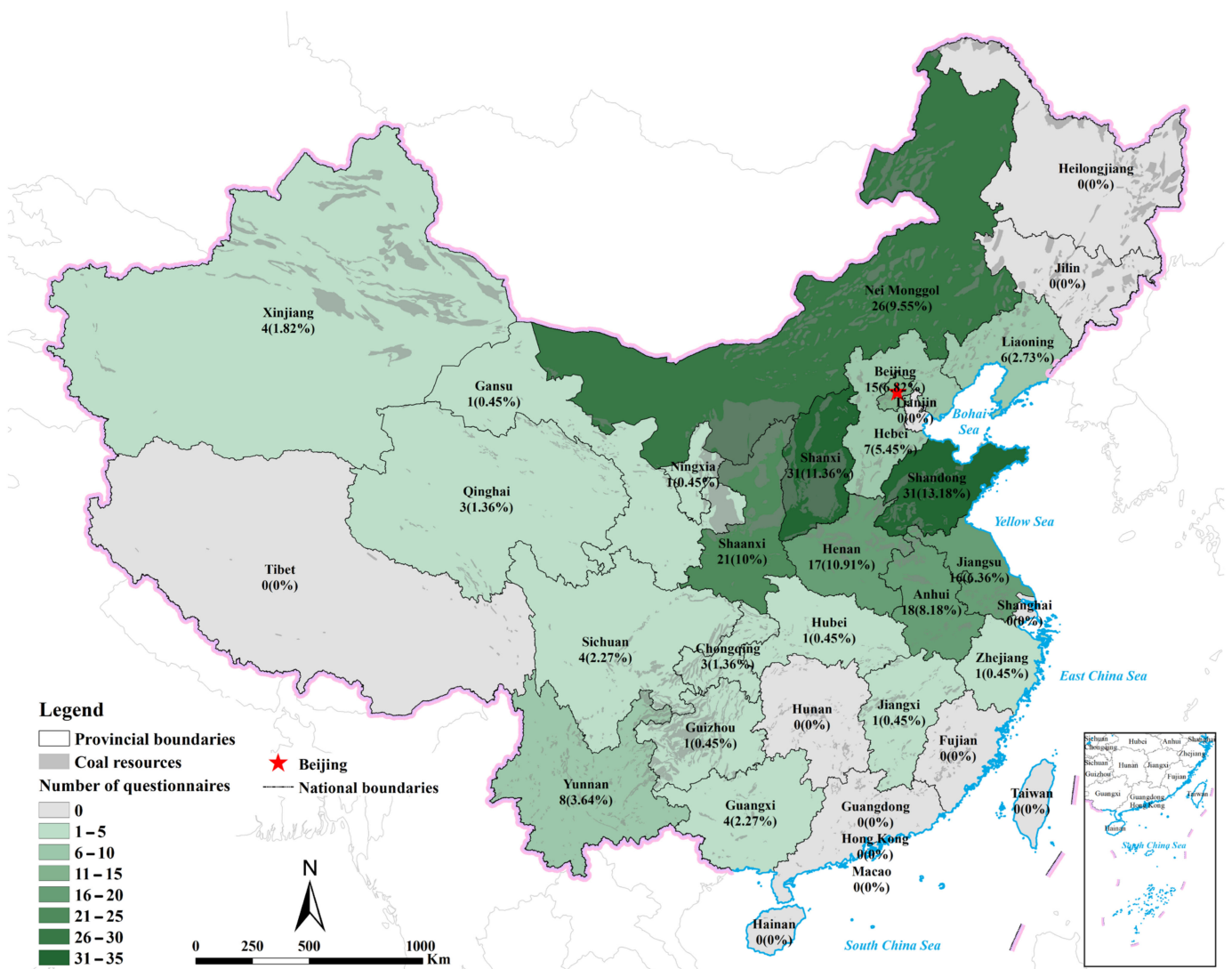


Figure 3. Questionnaire sample distribution.

3.2. Study Design and Data Collection

The main content of the questionnaire consists of 4 parts: Part 1 is a survey on the degree of policy approval (single-choice items are set in 3 categories, i.e., A. approve, B. disapprove, C. imperfect). Part 2 is a survey on the extent of policy implementation (single-choice items are set in 6 categories, i.e., A. fully implemented, B. 80% implemented, C. 60% implemented, D. 40% implemented, E. 20% implemented, F. 0% not implemented, where the option not implemented also requires giving the reason for not implementing). Part 3

is a survey of policy implementation behavior (enterprises' awareness of and attention to land reclamation, government review and supervision methods, compensation for land use and farmers' cooperation, pre-deposit and use of reclamation costs, acceptance of reclaimed land and land withdrawal, etc.). Part 4 is to improve the policy recommendations (open-ended, fill-in-the-blank). Considering the convenience of the survey respondents to fill out the questionnaire, it was mostly set up with multiple-choice items. In addition, this survey is based on the principle of extensive listening and objective factuality, and the reason and suggestion columns in the questionnaire are open-ended fill-in-the-blanks. The basic content of the survey questionnaire is shown in Table 1.

Table 1. Basic content of the questionnaire.

Survey Type		Survey Content
1	Degree of policy approval	Agreement with the policy, e.g., A. approve, B. disapprove, C. approve, but the policy is not perfect
2	Degree of policy implementation	Implementation of the policy, such as A. 100% implementation, B. 80% implementation, C. 60% implementation, D. 40% implementation, E. 20% implementation, F. 0% no implementation
3	Policy implementation behavior	Enterprises' awareness of and attention to land reclamation, government review and supervision, compensation for land use and farmers' cooperation, withdrawal and use of pre-deposited land reclamation fees, acceptance of reclaimed land and withdrawal from land use
4	Improve policy recommendations	(Open fill in the blank)

4. Result Analysis

4.1. Temporary Land Use Policy for Mining Is Widely Accepted

Figure 4 represents the survey on the level of agreement with the temporary land use policy for mining. The percentage of government departments in favor of this policy implementation is 46.94%. The percentage of those who think this policy needs to be improved is 53.06% and there is no "disapproval", which shows that government departments support the temporary land use policy for mining. The government believes that the new land supply model has solved the long-standing problem of the livelihood of expropriated farmers that has plagued local governments. With the temporary land supply method the collective and farmers still have land ownership and land use rights, and they lose only five years of income from the use of agricultural land but receive compensation fees equivalent to more than ten times the average annual production value; this is much higher than the local compensation level for land expropriation, achieving a win-win situation.

The proportion of mining enterprises in favor of policy implementation is 70.97%, the proportion of those who think "imperfect" is 22.58%, and the proportion of those who "disapprove" is 6.45%. Most companies say that the temporary land policy has reduced the cost of mining, eased the burden, and mining land is acquired faster than before, enhancing the competitiveness of enterprises and contributing to their sustainable economic development.

The proportion of research institutions in favor of policy implementation is 21.31%, "disapprove" is 6.56%, and the proportion of "imperfect" is higher at 72.13%. The majority of investigators from research institutions believe that: the ownership and use of temporary land for mining remains basically unchanged; farmers do not lose their land; the pressure on government resettlement is reduced; the production input of enterprises is lowered; and enterprises have developed, which can substantially increase local fiscal revenue, feed agriculture and promote local economic development and new rural construction. However, the indirect benefits of this policy to the government are greater, and this policy is conducive to alleviating the contradiction between man and land, mining and land, and has positive practical guidance for the strict protection of arable land and land conservation and intensification.

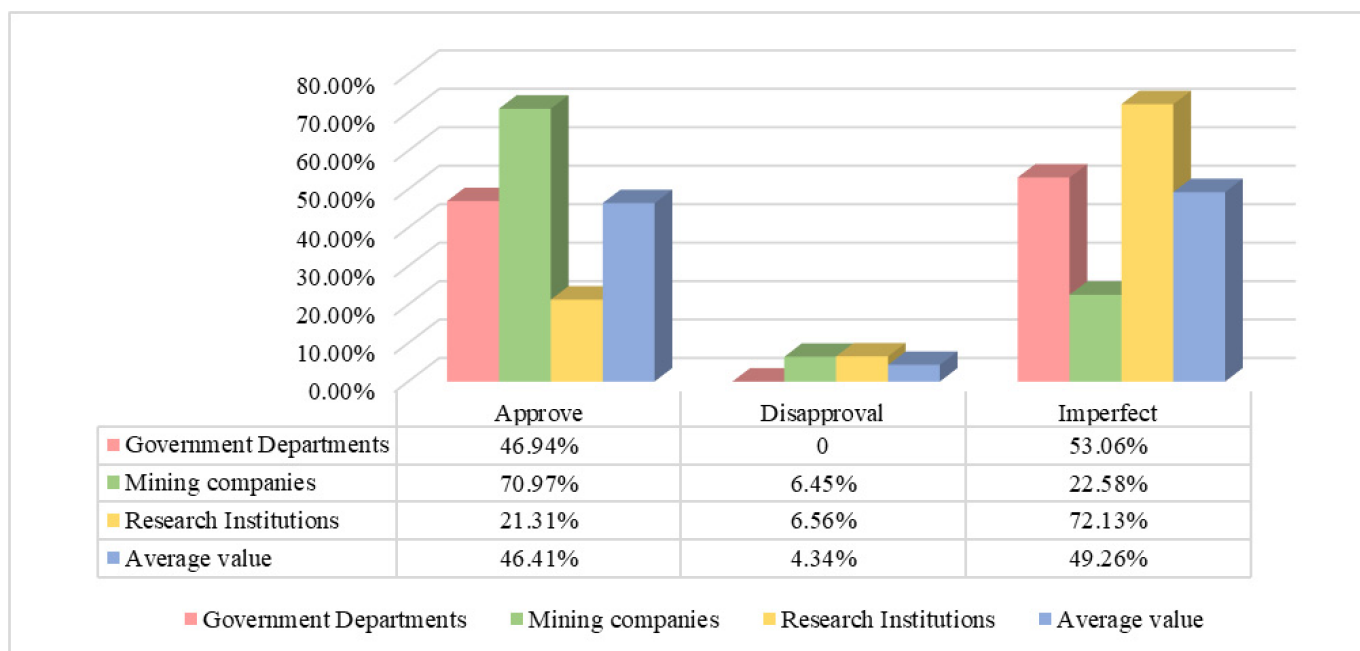


Figure 4. Survey table of the percentage of approval of temporary mining land policy.

Based on the average value of the survey of the three types of objects, the total proportion of “approval” and “imperfect” is 95.66% and the proportion of “disapproval” is 4.34%. Therefore, the promulgation of the temporary land use policy for mining has been widely recognized.

4.2. Ineffective Implementation of Temporary Land Use Policy for Mining

Figure 5 shows the survey of the degree of implementation of the policy on temporary land for mining. The government departments believe that the implementation of the “temporary land for mining” policy by the enterprises in their jurisdictions, “100% implementation” and “80% implementation” are 6.12% and 8.16%, the effective implementation rate is less than 14.29%, of which “20% implementation” is higher than 59.18%, and there is 2.04% of “no implementation”. Government investigators believe that some local governments have weak supervision and oversight and unsound policy implementation mechanisms, leading to lax reclamation efforts by enterprises such as the 139 temporary land use pilot open pit mines in Erdos, where the reclamation completion rate is only 46.19% after 5 years including a reclamation acceptance rate of 16.96%.

Mining enterprises “80% implementation” and above accounted for 9.68%, while 35.48% of the sample proportion feedback for “20% implementation” more, of which 22.58% of the proportion of almost no implementation. Most of the mining enterprises believe that the temporary land use period is too short, coupled with the large size of the mine and the difficulty of mining, so disputes are likely to arise over compensation for farmers, hindering the implementation of reclamation so that the mining-reclamation plan cannot be completed within the limited period of 5 years.

Only 4.92% of the research institutions have “80% implementation” and above, 35.93% of them think that the implementation rate of enterprises is only “20% implementation”, and 29.52% of them think that enterprises do not implement it at all. The researchers believe that the temporary land use policy lacks specific normative conditions, resulting in enterprises blindly applying for temporary land use without following the reality of the mining area and thus failing to reclaim the land beyond the deadline.

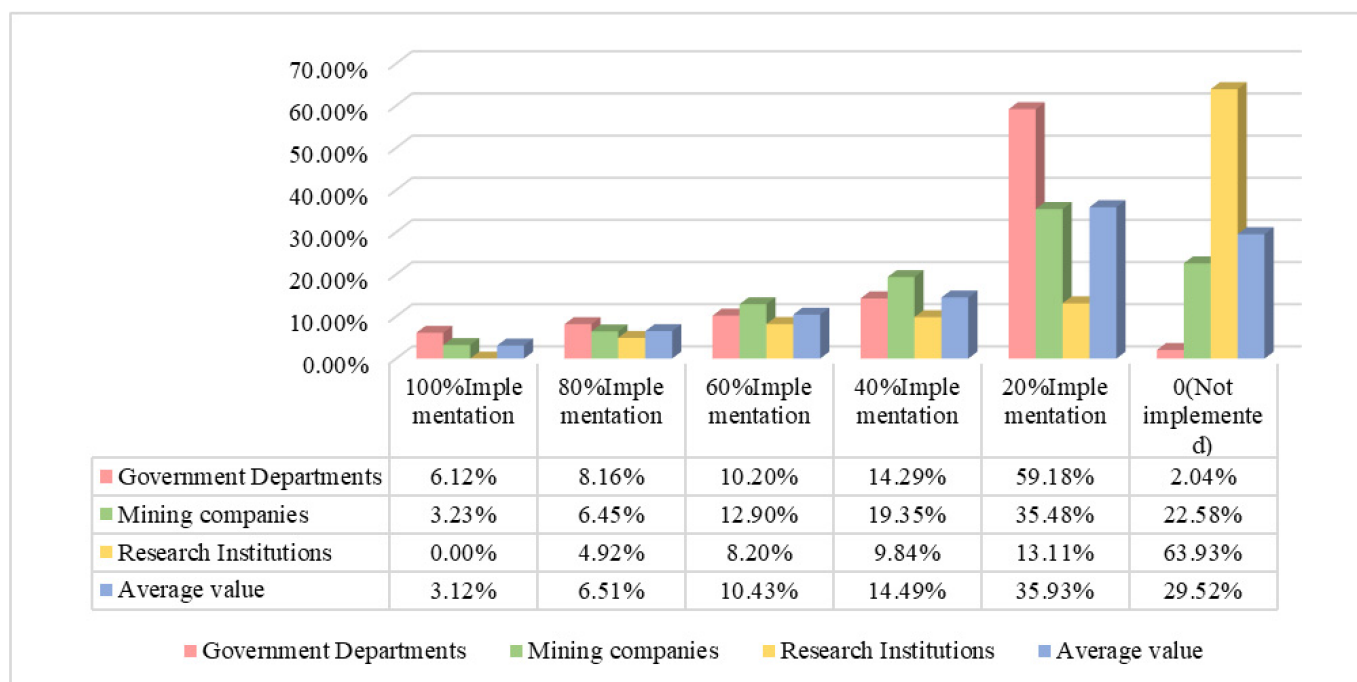


Figure 5. Survey table of the implementation ratio of temporary mining land policy.

Given the special situation of low land reclamation rate in China and the fact that the policy reform is still in the experimental stage, the average of the 0–60% implementation rate of the survey results of the three categories is used as the criterion for judging the failure of this policy. Based on the average of the three categories of respondents, the total percentage of “0–60% implementation” is 90.37% and therefore the failure rate of the temporary mining land use policy is 90.37%.

4.3. Causes of Policy Failure of Temporary Land for Mining

4.3.1. The Applicable Conditions for Meeting the Temporary Land Use Are Unclear

A high total of 96.45% of enterprise survey respondents believe that the current policy provides for a shorter period of use. In the actual mining process of open pit mines, “stripping–extraction–disposal” generally takes about 5 years while “reclamation–maintenance” takes about 4 years, so the whole cycle is about 9 years. Most of the currently approved temporary mining land pilot mining scale is unrealistic: deep ore body; coal seam thickness; long mining years; coupled with differences in mining technology; resulting in the use of more than the maximum number of years of temporary land; and 5 years to complete the “mining–reclamation–land return”. In contrast, the burial depth of Guangxi Pingguo bauxite mine is about 2–5 m, the mining cycle is 1–2 years, and the use of temporary land is used for a short time. The burial depth of the currently approved open pit mine is about 100 m. For example, the burial depth of the pilot open pit mine in Ordos can be about 170 m. Moreover, the size of the area occupied is huge, and the hardness of the surface rocks is high, which makes mining difficult.

Therefore, while mining temporary land to maintain the temporary nature the current conditions of approval should be clarified, and in the pre-approval it should meet the conditions of the pilot enterprises to prepare the strict review of the land reclamation plan.

4.3.2. The Administrative Department Is Not Strict Enough to Review and Supervise

A total of 89.44% of the respondents of the research institute said that the administrative department is not strict in approving temporary land use, and the application materials submitted by enterprises are simply filed as attached materials and will not be strictly examined. Among them, 86.95% of the government survey respondents said that in

the existing policy approval, the existence of the “emphasizing approval and neglecting management” phenomenon means that some are approved regardless of the very serious problems. The current approval and management of temporary mining land involves the coordinated work of many departments, but in practice, each department tends to work in its own way, with insufficient work connection, scattered supervision, and insufficient supervision in the implementation process. Moreover, governments and management departments at all levels have not established strict management assessment for temporary land reclamation in open pit mines; daily inspection, technical guidance and tracking and monitoring are insufficient.

Only 52.73% of the respondents said that most government supervisors conduct reclamation inspections “once every six months”, 28.18% only once every three months, and 8.18% once a month. There are different ways of supervision, including 33.64% of supervisors to the site supervision and 58.18% of supervisors who just notify the enterprise to submit materials for the record or organize meetings to listen to the enterprise reclamation report. Such submissions or meetings for inspection often do not directly reflect the land reclamation situation, which results in falsehoods on the part of enterprises that the government will not actually verify in order to save time. There are even 8.18% of cases where the government does not supervise the situation if it is requested by the higher level to regulate, and in general the competent authorities will not take the initiative to supervise.

4.3.3. Mining Enterprises Do Not Pay Attention to Land Reclamation Implementation, and the Preparation of Reclamation Plan Is Not Very Operable

The amount of 55.10% of government respondents believe that the current law is not binding enough for corporate responsibility due to small penalties, with the number of fines faced by enterprises being much smaller than the amount of reclamation; this is due to profit-driven enterprises having weak awareness of responsibility for reclamation, and the degree of importance being gradually reduced. In total, 70% of the respondents of the research institute think that the legal responsibility is not specific and that there is a lack of specific provisions for the legal responsibility of enterprises not to reclaim; there is also no provision for the government to punish enterprises for violations. The small penalties have led to a low level of attention to reclamation and a weak awareness of reclamation among enterprises.

In addition, 80.91% of the surface mining enterprises do not pay enough attention to the preparation of the land reclamation program, and the enterprises prepare the program in order to obtain the temporary land use permit for mining or to cope with local inspections, so the preparation plan is perfunctory and the content does not match the reality; this is coupled with the fact that the approval is not strict and the expert review is also a passing phase that is not implemented after the review is approved. The implementation rate according to the land reclamation program is between 40% and 60%, and there are also enterprises that do not implement the program. The actual implementation rate according to the land reclamation program in the enterprise survey is mostly 60%, especially the principle of “Concurrent mining and reclamation” proposed in the policy, which is not realized by almost all mining enterprises.

Land reclamation plan as a specific plan to guide and regulate the work of temporary land reclamation is not strict due to the lack of mandatory legal binding, coupled with the poor plan review system, the ineffective plan implementation of supervision and other factors, resulting in the lack of effective implementation of the plan.

4.3.4. Difficulties in the Extraction and Use of Land Reclamation Costs, and Inconsistent Compensation Standards for Temporary Sites

A total of 67.27% of the enterprises think that the process of withdrawing the pre-deposited land reclamation fees at the time of reclamation implementation is cumbersome, and some enterprises can barely withdraw the pre-deposited reclamation fees. In total, 68.85% of the survey respondents at the research institution similarly found it difficult to withdraw the reclamation costs pre-saved by the enterprises and difficult to invest in

reclamation work due to difficulties in production capital turnover. The lack of funds for land reclamation has resulted in a reclamation rate of only 40% for enterprises.

In addition, there is no clear compensation standard for the current temporary land use policy. At present, most of the local regulations on the temporary occupation of agricultural land for mining are in accordance with the average annual production value of 2–3 years to give compensation, but for the occupied land for construction it should be how to compensate and other issues inevitably lead to disputes among villagers. An amount of 74.19% of business survey respondents said that the temporary land after 2 years must have re-occupation procedures, but also to renegotiate with the villagers' compensation program as the current compensation is mainly in the form of monetary compensation. However, with the development of the market economy and the continuous improvement of living standards, the majority of farmers who lost their land are no longer satisfied with a single monetary compensation and neither are individual villagers who put forward employment and resettlement requirements, resulting in difficulties for both sides to reach agreement on compensation for temporary land. Farmers impede the reclamation of the land after signing the lease agreements, which undoubtedly greatly increases the cost of the enterprise and extends the land period resulting in the inability to complete the reclamation and land return plan (as scheduled) after the end of mining.

4.3.5. Difficulty in Acceptance after Temporary Land Reclamation and Lack of Land Withdrawal Mechanism

The current temporary land use policy lacks a land exit mechanism. A high figure of 98.18% of enterprise surveyors said that after enterprises reclaim temporary land the relevant departments do not actively organize expert acceptance as the land after the end of mining enterprises are no longer used, resulting in many idle enterprises after reclaiming land. Among them, 96.36% of the enterprises have reclaimed the land as arable land when returned to farmers, and some farmers are willing to compensate but unwilling to cultivate; even if the quality of reclaimed land has reached the standard, farmers are still unwilling to accept. A total of 95.08% of the respondents of the research institute said through practical experience that most farmers are generally unwilling to accept reclaimed land because of its quality, and some farmers balance the compensation income as far more than the cultivation income due to a lack of understanding of the quality of reclaimed land; this results in the situation of "no one to plant, no one dares to plant".

The willingness of the people to reclaim land for agricultural production after temporary land reclamation is not as strong, or maybe they are even unwilling to accept it. In particular, farmers believe that reclaimed land does not always have the capacity to retain water and fertilizer to meet the needs of agricultural production. Due to the lack of normative guidance for the withdrawal of mining land, farmers are reluctant to accept reclaimed land, the government is under pressure to resettle farmers who do not farm and does not take active acceptance measures for reclaimed land, which eventually leads to reclaimed land being left unattended and gradually abandoned.

5. Coping Strategies

5.1. Policy Demand: The Need for Continued Policy Implementation

Most Chinese government officials, as well as most academics, advocate reform of mining land use practices, particularly by encouraging the use of temporary land use policies. According to the current land acquisition policy it is not conducive to the sustainable use of land, and mining enterprises must not only obtain land use rights by way of concession but also bear the task of reclamation of the mining area after the end of mining. Mining land has the characteristics of temporary occupation, and occupies a short period of time, generally no more than a few years or even less than a few months, once the mineral resources have been exhausted. After the mining enterprise is finished, although the enterprise continues to have the right to use the land it has lost its use value for the enterprise, resulting in the mining land reclamation not being timely, long-term idle,

barren, and becoming abandoned land. However, for the land that has been requisitioned by enterprises for state ownership, the land requisition fee paid by enterprises partly includes the cost of land reclamation (such as arable land occupation tax); if enterprises are required to undertake the dual task of “land requisition and reclamation” it is not only inappropriate in theory, but also in practice it is more difficult for enterprises to complete the dual task of “land requisition and reclamation” and as a result, the investment of enterprises in land reclamation is seriously affected making it difficult to implement the task of land reclamation.

If the land supply policy of temporary land for mining is continued, farmers only temporarily lose five years of agricultural land revenue but get a higher compensation fee. The government’s indirect benefits are greater. The new land supply model solves the livelihood problems of the expropriated farmers that have long troubled local governments, helps to alleviate the conflicts between enterprises and farmers, and is a realistic guide to strict protection of arable land, land conservation and intensification, and the government’s macro-control of land. Moreover, the policy of temporary land use for mining can also help to reduce the economic pressure of enterprises and ensure the use of reclamation funds. Generally speaking, the sum of “compensation fee” and “reclamation fee” in the temporary land use policy is only 1/3 of the “land requisition fee”, which frees enterprises from the heavy land requisition fee and improves the ability to use the reclamation fee. If the company does not reclaim the land in a timely manner, it will pay more compensation for the increased use period and face penalties. This will enable the enterprise to achieve “Concurrent mining and reclamation” while securing funds. It is also conducive to reducing land disputes between enterprises and farmers and accelerating the reclamation process of mining areas.

However, if the policy does not have a strict enforcement mechanism, enterprises may use various reasons to avoid or delay the responsibility of compensation and land reclamation for land use rights holders. Therefore, a matching enforcement mechanism must be established to ensure the effective operation of the policy.

5.2. General Framework

Based on the results of the current mining temporary land use policy survey and the causes of policy failure, this paper proposes a framework for the effective implementation of the mining temporary land use policy, including six aspects of temporary land use: “application conditions”, “administrative approval”, “land use implementation”, “implementation supervision”, “land reclamation acceptance” and “withdrawal of temporary land use system”. Before the approval of temporary land use, the administrative department assesses whether the conditions for temporary land use application are met based on the application materials submitted by the enterprise and conducts a strict review of the temporary land use plan and land reclamation plan prepared by the enterprise, supervises the enterprise to pre-deposit land reclamation costs, and compensates farmers in a timely manner. Then, establish a special competent department and monitoring system, establish a strict government supervision and assessment system, timely supervise and record the implementation process of enterprises according to the land reclamation plan, and encourage the public to participate in the supervision so as to find violations in time. After the mining operation is completed, the enterprise must complete the land reclamation within the specified time limit. The competent department should actively organize experts to conduct on-site acceptance and filing of the quality of the reclaimed land, coordinate the farmers’ awareness of accepting the reclaimed land, and finally return the land that meets the quality standards to the farmers and return all the land reclamation fees deposited by the enterprise. The implementation framework of mining temporary land policy is shown in Figure 6.

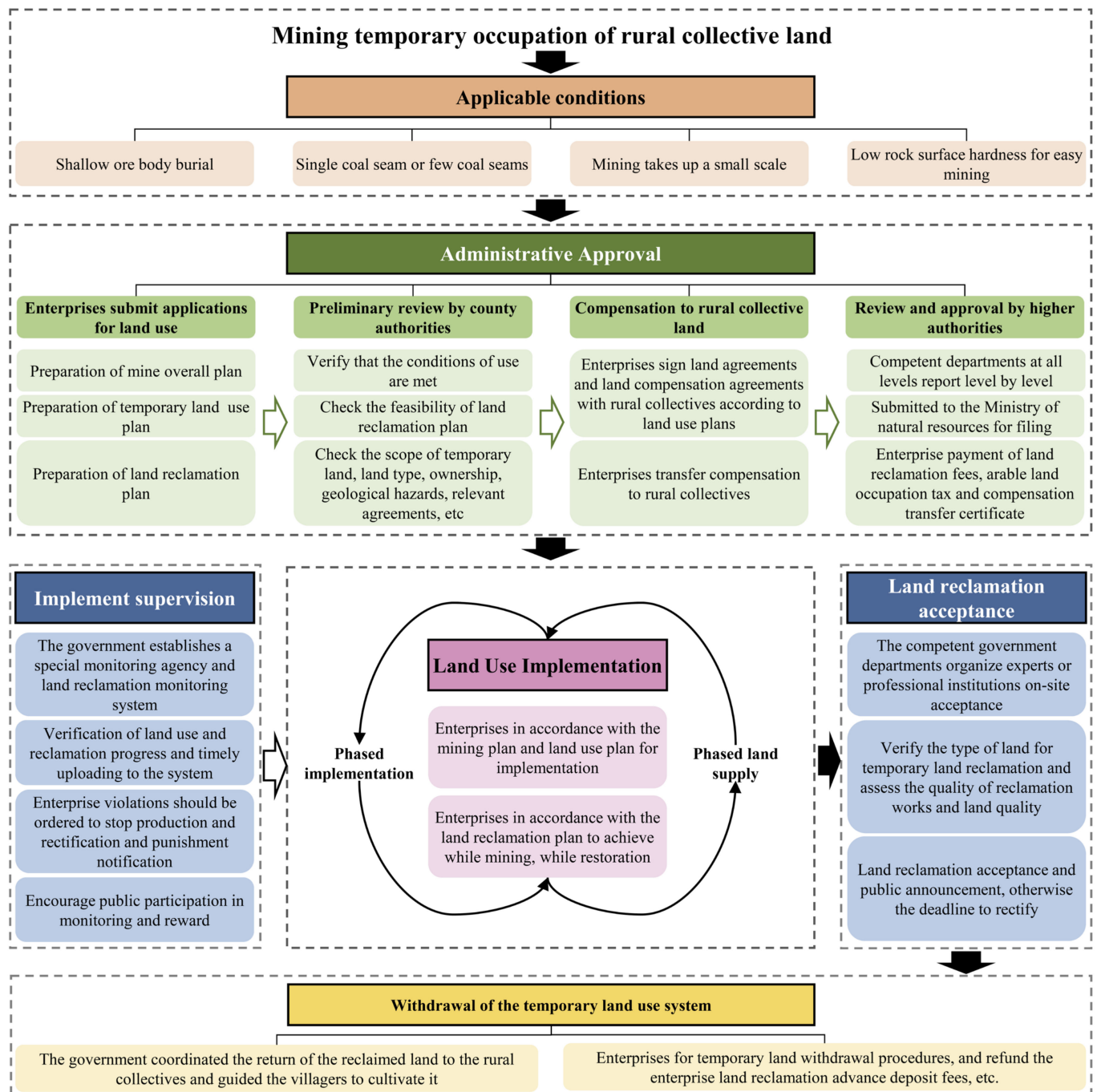


Figure 6. General framework of the implementation mechanism of the temporary land use policy for mining.

5.3. Implementation Mechanism

5.3.1. Applicable Conditions

The temporary mining land has a significant short-term and localized character. Since the starting point of the State's temporary land policy is the short-term occupation of land, it should follow the short-term and temporary principles of the mining temporary land application conditions to ensure the effective implementation of the temporary mining land policy. We can compare the successful experience of the temporary land use pilot in Guangxi Pingguo bauxite mine to find that the mine has three unique characteristics: firstly, the ore and soil are symbiotic, and the ore only accounts for 1/3 of the bauxite; secondly, the ore layer is thin with a burial depth of 2–5 m and an average thickness of 4.48 m, so far

thinner than other domestic bauxite layers and the mining cycle is 1–2 years. Moreover, the mining process of Pingguo bauxite mine is characterized by fast mining progress and short land use time, with the cycle of “land acquisition–stripping–reclamation–land return” completed in 4–6 years on average, of which the mining phase is about 2–3 years and agricultural production can still be carried out after the mining activities are completed and the land is reclaimed. However, the policy has been applied very poorly in the case of the Pingshuo mine in Shanxi, which is also a pilot site for temporary land use. The Pingshuo mine is a very large open-pit coal mine, and the total area of temporary land applied for is 9333.30 hm². The geological structure in the area is too complex, the overlying rock layers are hard and about 135 m thick, and the maximum mining depth will reach 240 m after the end of mining; the number of coal seams is large, so it takes about 4 years to strip and mine and about 5 years to carry out the land reclamation project so it is not suitable to implement the temporary land use policy as it cannot be completed within the stipulated 5 years.

Therefore, drawing on the successful experience of the pilot and the current characteristics of the open pit, the approval of the future pilot temporary land use for open pit mining should meet the following conditions: first, the ore body is buried shallow; second, a single coal seam or coal seam less; third, mining occupies a small area, short operating cycle; and fourth, the surface of the rock surface hardness is low and easy to mine. In line with the above temporary land characteristics of the mining enterprises, these should be included in the scope of temporary land and to land specifications.

5.3.2. Administrative Approval

Enterprises to the county-level natural resources authorities to apply for temporary land, and the preparation of the overall planning of the mine site, temporary land use plan and land reclamation plan and other materials. County-level natural resources authorities verify the applicable conditions of mining land, the scope of mining land, the implementation of land reclamation plan and other materials, and organize rural collective organizations to sign land agreements and land compensation agreements with enterprises based on a temporary land use plan, and supervise the payment of land reclamation fees, arable land occupation tax and the transfer of compensation costs to rural collectives. County-level departments submit relevant supporting materials to the municipal authorities for review and approval, followed by the competent departments at all levels up to the final submission to the Ministry of Natural Resources for the record and audit and for the municipal people's government to issue a temporary land use permit for mining. They then notify the enterprises of the permission to use the land, following the basic principle of “phased implementation, phased land supply, and restitution on expiration”, to ensure “timely implementation, timely land supply, and timely restitution”. At the same time to improve the relevant legal system, clear penalty provisions are needed to strengthen the binding force of enterprises to fulfill the responsibility of reclamation.

In terms of compensation, the government should coordinate the relationship between the interests of enterprises and farmers, especially to effectively protect the legitimate rights and interests of farmers. Mining land use should provide for compensation cost standards, in accordance with the duration of mining and land reclamation and the average annual value of land to determine the compensation package. At the same time, under the unified organization and coordination of the local government, the enterprise and the rural collective organization shall sign a compensation agreement in accordance with the principle of equal consultation and make compensation as agreed. It is also possible to study multi-modal compensation methods, such as providing employment, developing new agricultural land and other area compensation to farmers and other non-monetary compensation methods, so as to solve the problem of farmers' future sources of livelihood and redevelopment.

5.3.3. Land Use Implementation

Enterprises should attach great importance to the preparation of the land reclamation plan. The land reclamation plan preparation unit should act strictly in accordance with national laws and regulations, preparation standards and norms requirements, and combined with the actual mine focus on the implementation of the plan preparation and as far as possible make the reclamation plan and all phases of the planned reclamation consistent, giving full play to the effective role of the plan, and in the process of land should be done in the interface between mining and reclamation. In the mining stage, topsoil stripping and reasonable storage should be done to be conducive to the restoration of reclaimed soil in the later stage. Secondly, according to the principle of “phased implementation and phased land supply”, the location of the topsoil discharge site should be selected scientifically to support the restoration while mining.

At present, China’s environmental protection system stipulates that the waste dump generated by mining after land supply must be treated. In this way, the waste dump in each phase needs to be backfilled into the pit after two years of treatment and the waste dump generated in each phase needs to be treated, resulting in a waste of enterprise management funds. Therefore, this paper proposes a “concurrent mining and reclamation” process under a temporary land use policy. The main process requires that during the first phase of land supply the waste dump shall be leveled, and the waste dump height, flat plate width and step slope angle shall be scientifically set to ensure the stability of the waste dump. After the end of the first phase of land supply the waste dump shall not be backfilled first, and after the start of the second phase of land supply the stripped rock, soil and waste shall be backfilled to the bottom of the first phase of the pit. When the backfilling reaches the elevation, the stripped topsoil is covered on the waste rock heap. By analogy, the rock and soil stripped in the third phase as well as the waste backfilled to the mining pit in the second phase, etc. Finally, the waste rock heap and topsoil of phase I will be backfilled to the final pit and drainage facilities will be built to meet the final acceptance standard (Figure 7). For filling material, Chinese scholars have used Yellow River sediment as filling material for land reclamation and developed a sandwich type of soil reconstruction method with Yellow River sediment where the yield of the reclaimed land is higher than the original land [42–45]. This kind of “concurrent mining and reclamation” at the same time can effectively reduce the pressure of enterprise reclamation and the investment of reclamation funds, and can effectively promote the policy of temporary land use.

Enterprises should establish innovative methods in many aspects, such as concepts, systems, management and technology, and resolutely abandon the decadent, backward and rigid traditional thinking; they should strengthen the concept of “source and process control”, follow the “concurrent mining and reclamation” code of conduct in the mining process, and promptly compensate farmers, effectively protecting the legitimate rights and interests of farmers and reducing the impact of subsequent reclamation implementation.

5.3.4. Implementation Supervision

The national competent departments should give full play to their regulatory role and constantly supervise the effective supervision of lower-level competent departments. Governments at all levels should coordinate the management responsibilities of functional departments, set clear regulatory agencies as well as specific management matters, promote coordination and cooperation between functional departments and mining enterprises, establish a sound information management system for land reclamation, continuously urge enterprises to fulfill their legal responsibilities, strictly implement regulatory responsibilities, and strengthen daily supervision and dynamic inspections. We will improve the inspection system, assessment system and public participation system of the administrative department, and also strengthen the management of the three stages before the approval of temporary land during the process and after the reclamation. The government should increase the prosecution of regulatory inaction and develop appropriate policies to encourage public participation in monitoring. At the same time, the state should include land

reclamation work in the performance appraisal system of government officials, evaluate it regularly, and inform them in a timely manner so that the government's performance and the promotion and reward of officials cannot be separated from the effectiveness of land reclamation.

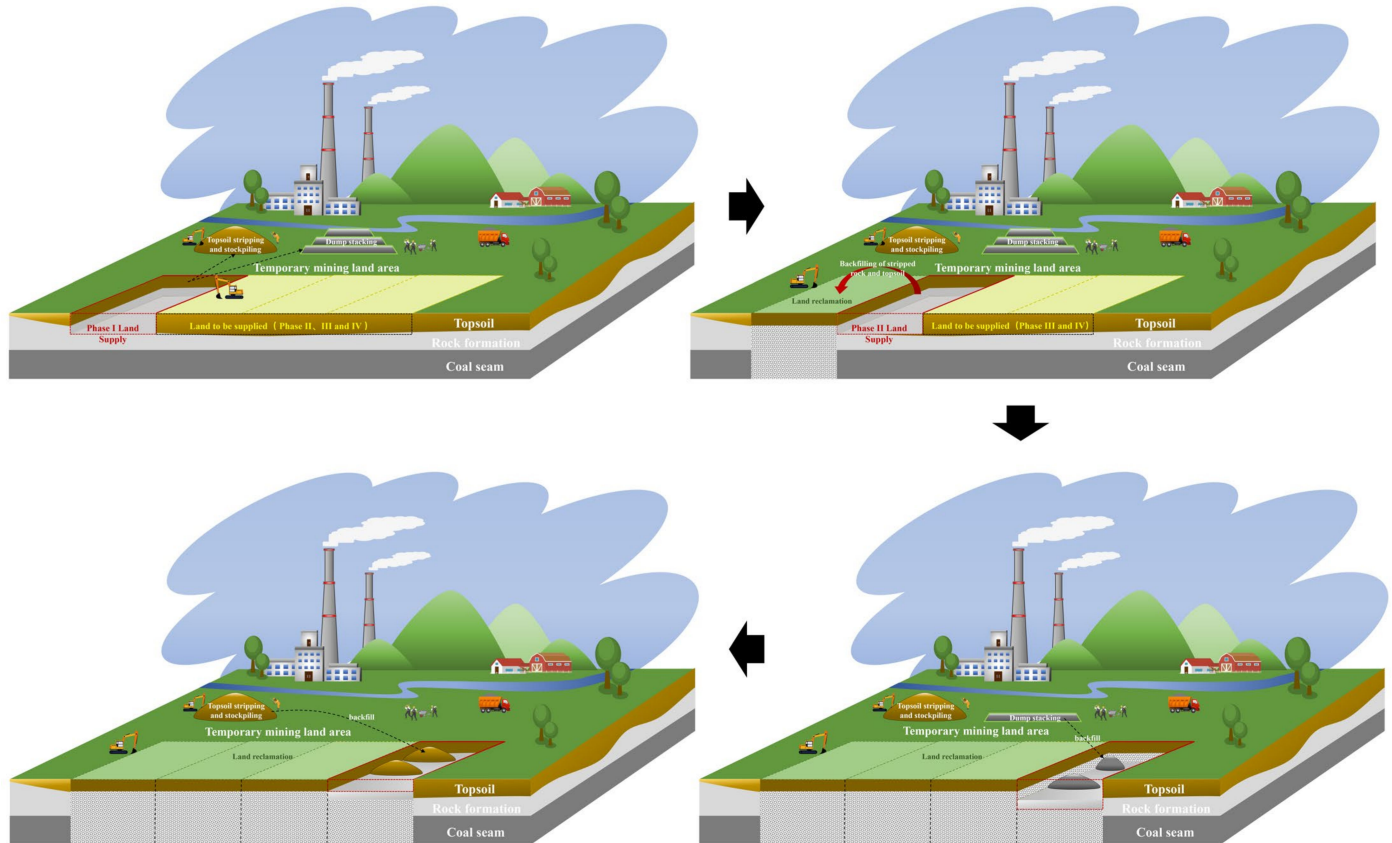


Figure 7. Schematic diagram of the process of temporary land mining and reclamation (concurrent mining and reclamation).

The government should increase publicity and education for farmers and social organizations to raise public awareness of land reclamation and ecological restoration and protection, and implicitly influence the way the public behaves in ecological protection. The public should have the right to know about the implementation of land reclamation, and the government should broaden the original channels of public participation in reclamation, establish a communication platform between the government and the public, guarantee a means of public participation in land reclamation, and solve the dilemma of no door for public participation. This can not only improve the ability and density of supervision, but can also address public opinion and solve problems at speed. Public participation in supervision can greatly reduce management costs and improve management efficiency.

5.3.5. Land Reclamation Acceptance

After the completion of mining operations, enterprises must complete reclamation of the land within the specified period and government departments should organize timely acceptance after the completion of land reclamation. For agricultural land reclamation, especially after restoration of the original use of arable land, acceptance of the main content should include: reclaimed land area, surface cover thickness, ground slope and drainage function, the physical and chemical properties of the soil are in line with the standards of arable land, and the failure to meet the acceptance criteria, should not pass the acceptance.

In the acceptance process the mining enterprises apply to the county and municipal natural resources departments in charge of organizing the initial inspection after passing

the initial inspection, and then once again report to the department in charge of organizing experts on the quality of reclaimed land for field acceptance and report to the Ministry of Natural Resources for the record.

5.3.6. Withdrawal of Temporary Land Use System

After the enterprise completes the land reclamation and the acceptance meets the standard, the land is returned to the rural collective organization and the land return agreement is signed; the government department then refunds all the land reclamation fees pre-stored by the enterprise.

The withdrawal of mining land should be established on a scientific basis to properly handle the interests of all parties and achieve a social balance between short-term and long-term interests. The withdrawal of mining land should also be regulated by national laws, and a scientific withdrawal mechanism should be established in order to effectively strengthen the protection of arable land, promote the economic cycle of land, and realize the ecological value of mining land.

6. Conclusions and Recommendations

The implementation of the policy of temporary land for mining is a good thing for the benefit of the country and the enterprises, and government and society agree on this approach. The previous supply method of land acquisition and concession in China was not conducive to the sustainable use of land resources, resulting in a large amount of wasted resources. The continuation of the temporary land use policy for mining is to meet the needs of national macro development and ecological civilization construction. However, the current reform of mining land is in the practical stage and the implementation of the policy is not effective. According to the results of the survey the starting point of the State's policy on temporary land use is the short-term occupation of land, so the application conditions for temporary land use for mining should be limited in accordance with the temporary principles. However, the conditions of use of the current temporary land use policy are not clear and can result in enterprises blindly applying for land and failing to complete land reclamation. The authorities are also not strict about administrative approval, and no effective regulatory system is established after approval. The mining enterprises do not pay attention to land reclamation implementation because of light penalties, and the preparation of the land reclamation plan is not readily operable. However, some enterprises willing to implement the policy have encountered many hindering factors in the implementation of reclamation, and the competent authorities have not taken measures to solve the problems, resulting in the land reclamation work not being carried out. Therefore, this study has completed a survey on the implementation of the current temporary land use policy, analyzed the problems and causes of the policy failure, and proposed an effective implementation mechanism combining "normative, binding and incentive".

The current reform and innovation of mining land supply in China not only meets the production needs of mining enterprises, but also solves the problems of tight construction land index, high land cost and idle land after mining and also protects the land rights of local farmers; this shows that the policy of temporary land for mining has positive significance for the sustainable use of land. However, in view of the shortcomings of the current temporary land use policy, we should further improve the management system and implementation mechanism of temporary land use, promote the collaboration among government departments, increase the supervision of government departments and the constraints of laws and regulations. The mining enterprises should introduce advanced mining technology, realize "concurrent mining and reclamation", improve the mining environment in time and accelerate the construction of green mines. At the same time, the government should also pay attention to the reclamation of abandoned mining areas and give new value to the use of abandoned land, so as to promote the construction of reclamation and ecological protection and restoration of damaged land in China's mines.

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