



STUDY ON THE RELATION BETWEEN THE CAPITALIZED RESOURCES MANAGEMENT AND MINE ENVIRONMENT OR RESOURCES PROTECTION

ID 045

Ying-hong WANG

China University of Mining and Technology
Xuzhou, Jiangsu, CHINA

ABSTRACT

At first, an example is given to explain that the resource economy evaluation method which takes the capital time value into account results in favor of the project exploiting profitability coal resources prior. Based on this, the standard of protecting inferior coal resources has been put forward. Then, the theory and method for evaluation of coal resource value and environment damage are analyzed. A method for economically feasibility evaluation of coal resources taking the values of coal resource and environment impact into consideration is brought forward, and compared with the traditional method. The result shows that the fundamental factors for the resource protection during coal mining are to make the rationality of the income difference between inferior coal mining and high-grade coal mining, and the rationality of coal products price. The conclusion which the capitalized resource management will be more suitable to coal resource protection has been testified in theory. However, it should be pointed out emphatically that the capitalized resource management could not substitute normal resource management in coal exploitation and mining. At the same time, the effect and insufficiency on protection of mining environment and resources about the Chinese system of mining tax have been analyzed, some betterment advice has been given, too.

Key words: coal resource, capitalized resource management, resources value, mine environment, resources protection.

*Supported by the 111 Project (Project No.B07028)

INTRODUCTION

It was estimated principally that the latency value of Chinese resources assets is about RMB 128,000 billion by related expert who organized by ministry of technology, PRC. As one of important resources assets, mine resources assets are provided with properties of finite and cannot regeneration, and take a very important action in country economy. It has been come to an agreement about that putting capitalized resource management in practice, exploiting and using mine resources and protecting environment in reason, coming true sustainable development of country economy. Whereas various reasons, colligation utilize ratio of mine resources in China is about 30 percent only, it far off under developed country

or even under world average. It have severe questions also that environment destroy in exploiting mine resources. It is the important problem which we must settle currently How constitute logical policy, criterion and law, and how adopt scientific, applied management methods and means to protect cannot regeneration mine resources by mine enterprise self-knowledge. In this paper it is discussed that criterion of mine resources protection in the condition of market economy and relations between resources capitalized management and resources and environment protection.

ECONOMY CRITERION AND INFECTION FACTORS OF MINE RESOURCES PROTECTION

There are many methods of mine resources protection evaluation, such as fee-benefit and increment benefit method. For the sake of research convenience, a predigested case of coal mine will be used. We supposed that: there are A and B coal seam, their reserves are Q_1 and Q_2 , their net income are w_1 and w_2 , and $Q_1 = aQ_2$, $w_1 = w_2 + b$, $a > 1$, $b \geq 0$ (that is to say the reserves of coal seam A is great than coal seam B, and the benefit of coal seam A is more than coal seam B), their annual output holds the line. If the fixed number of year of coal seam A is n_1 , then the fixed number of year of coal seam A and coal seam B will be prolong to $n_1 + n_2$. Commonly, the three projects can be accepted by mine enterprise: a) the coal seam A and coal seam B are mined at the same time; b) the coal seam A is mined only; c) the coal seam A is mined at first before the coal seam B is mined. To make a economy decision, the net present value of three projects are calculated:

$$NPV_a = \sum_{t=0}^{n_1+n_2-1} \frac{q_1 \cdot w_1 + q_2 \cdot w_2}{(1+i)^t} = \frac{ab + a w_2 + w_2}{1+a} \cdot q \cdot \frac{(1+i)^{n_1+n_2} - 1}{i(1+i)^{n_1+n_2}} \quad (1)$$

$$NPV_b = \sum_{t=0}^{n_1-1} \frac{q_1 \cdot w_1}{(1+i)^t} = (b + w_2) \cdot q \cdot \frac{(1+i)^{n_1} - 1}{i(1+i)^{n_1}} \quad (2)$$

$$NPV_c = \sum_{t=0}^{n_1-1} \frac{q \cdot w_1}{(1+i)^t} + \sum_{t=n_1}^{n_1+n_2-1} \frac{q \cdot w_2}{(1+i)^t} = \frac{(b+w_2)(1+i)^{n_1+n_2} - b(1+i)^{n_1} - 1}{i(1+i)^{n_1+n_2}} \cdot q \quad (3)$$

From formula (1), (2) and (3), we can easily find that: $NPV_c \geq NPV_a \geq 0$ and $NPV_c \geq NPV_b \geq 0$ that is to say the project ‘c’ is the best. But to choose the project ‘c’ has precondition which the coal seam B is not destroyed if the coal seam A is mined at first. In fact, such case is less. If the coal seam A is mined at first, the coal seam B will be destroyed or the safeguard must be taken, the project ‘c’ is not the best consequentially because all fee of the safeguard must be detracted when NPV_c is calculated.

To make decision-making of project ‘a’ and project ‘b’, we must compare and analyze concretely. From formula (1) and (2) we can acquire:

$$NPV_a - NPV_b = \frac{ab + aW_2 + W_2}{1+a} \cdot \frac{(1+i)^{n_2} - 1}{i(1+i)^{n_1+n_2}} \cdot q - \frac{b}{1+a} \cdot \frac{(1+i)^{n_1} - 1}{i(1+i)^{n_1}} \quad (4)$$

To keep $NPV_A - NPV_B \geq 0$, the following formula must be contented:

$$b \leq \frac{(a+1) \cdot \left[(1+i)^{n_2} - 1 \right] \cdot W_2}{(1+i)^{n_2} \left[(1+i)^{n_1} - 1 - a \right] + a} \quad (5)$$

Actually, the formula (5) is the economy standard whether coarseness resources are mined by mine enterprise, so we analyze farther:

- 1) Because the dynamic economy evaluation must avail to the project which the excellent resources are mined first, so the project which the excellent resources are mined first is the best if to mine the excellent resources do not affect to mine the coarseness resources;
- 2) When the coarseness resources will be destroyed if the excellent resources are mined first, we must analyze concretely: the project which the excellent resources and the coarseness resources are mined at the same time must be accepted if the safeguard of coarseness resources are not taken into account and the formula (5) is content, otherwise the project which the excellent resources is mined only must be accepted; if the coarseness resources can be safeguarded and the safeguard fee is not greater than increased benefit of mining coarseness resources the excellent resources and coarseness resources must be mined simultaneously, too;
- 3) The value of ‘b’ of the formula (5) is smaller or the net benefit discrepancy between mining the excellent resources and mining the coarseness resources is smaller, the benefit of mining the coarseness resources is greater, that is to say to be propitious to resource protection. Expressly, when $b=0$, the payoff of mine enterprise holds the line even though the coarseness resources is mined first before the excellent resources is mined;
- 4) Whether economy benefit is better to mine the excellent resources and coarseness resources simultaneously, the proportion of the excellent resource reserves and coarseness resource reserves, the size of discount rate and other factor must be consider, too. Commonly, the excellent resource reserves is greater, the discount rate is bigger, the status of resource protection become bad and bad.

THEORY OF COAL RESOURCES ASSETS VALUE

It is agreed that coal resources should be considered as assets and they are valuable, but there are also many different voices on the value composition of coal resources assets, The main difference is whether resources asset should include the expenditure of prospecting coal resources, the expenditure of proving environment during exploiting colliery, the tax and differential benefit II. The discussion will be given as follows:

- 1) The tax given to the government during exploiting resources mainly contains business tax and income tax. Because income tax relates to the techno-management level of the

corporation, we usually don't consider it into resources assets value. Business tax is imposed according to business income, but the business income of mine includes one from resources value and the other from non-resources value. Wherever to invest the money(it is also possible that people invest the money in no place), the part of business tax from non-resources value must be handed up to the states, so it shouldn't belongs to resources asset value; but the part of business tax from resources value should belongs to resources asset value. Actually, resources assets tax also includes resources tax and resources compensating expenditure which are both being imposed at present. But if the exploiter has paid for resources value, he shouldn't pay for resources tax and resources compensating expenditure.

- 2) The expenditure on proving environment should counts in the cost of exploiting resources, but not resources value. In the condition that environment is destroyed due to resources exploitation and isn't fathered, we think the mine corporation should take the expenditure to improve environment, but it is not reasonable that this part counts in resources asset value, because it is the loss caused by exploiting resources, not the proceeds actually. We can prescribe in the form of law that mine corporation must father the destroyed environment, or imitate some western countries: before probing and exploiting coal resources, the exploiter must pay for some accounts of the expenditure of proving environment in advance, and if he didn't destroy environment or has fathered the destroyed environment, the money would be returned, other else would not.
- 3) Whether the expenditure of prospecting environment should include the resources value depends on the given situation. If the owner of resources prospected resources and the exploiter didn't turn the cost over to the owner when he obtained resources assets, the expenditure of the prospecting should account in resources assets value; if the exploiter prospected resources or he has handed this expenditure up to the owner, it should be the composition of resources value. But both of them exits at present in China, so we must treat it differently when evaluating coal resources value.

Some scholars hold that, to account the expenditure of prospecting in resources value may lead to the abnormal phenomenon that the more complicated prospecting condition is, the more cost we will invest, and the more resources value is. In fact, because of the influence of resources condition in the prospected area, there is differential benefit in the stage of exploring, and it should belong to resources value, in other words, the expenditure of exploring accounted in resources value should be the expenditure of prospecting coarseness resources(the addition of the exploring costs invested actually and differential benefit in the stage of exploring), not the exploring costs invested actually, so we can consider that resources value is composed of the costs of prospecting coarseness resources and mine rent in mining stage(not include differential rent II. usually).

- 4) Judging from the definition of differential benefit II.: Differential benefit II. is mainly from the subjective condition (called non-resources condition) such as the technical equipment and the quality of resources exploiter's management, not from the endowment advantage of non-resources (called resources condition), so it shouldn't be considered into resources value, but it should be divided according to the principle that the investor gets the benefit. However, because excellent resources can often attract more capital and is good for raising productivity, some scholars think it is reasonable

that the owner should impose part of differential benefit II. In our country, for some reasons of our history, the differences of technical equipments between parts of mine corporations owns to the differences of government investment, not of its own investment, so the part differential benefit II. should belong to the states. But at present, mine corporations (includes state-run corporations) are all independent in management and in losing and gaining, and they get government’s investment in the form of loan. In this condition, differential benefit II. shouldn’t be the resources value, but the benefit of the corporation.

In short, we should definite the composition of resources value according to the existing situation while evaluating coal resources value. Usually coal resources value includes poor resources value and mine differential benefit I:

$$\text{Coal resources value} = \text{poor resources value} + \text{differential benefit I.} \quad (6)$$

THE METHOD OF RESOURCES WORKABLE EVALUATION WITH COAL RESOURCES ASSETS VALUE AND ENVIRONMENT VALUE

The standard of economically workable evaluation usually is that the net present value of one unit resources is not less than zero, namely

$$NPV_j = \sum_{t=0}^n NCF_t / (1 + r_0)^t \geq 0 \quad (7)$$

Here: NPV_j is net present value when mining the j th coal face; NCF_j is the flux of mining the j th coal face in the t th year; n is the total years of mining the j th coal face; and r_0 is datum discount rate.

In practice, the mining hours of evaluating unit resources is not long, and the difference of the index such as price and cost during mining resources is not much, so we can compute it approximately as

$$p_j - c_j - d_j \geq 0 \quad (8)$$

Here: p_j is the average price of coal resources in the j th coal face, c_j is the mining cost of one unit coal in the j th coal face, d_j is the investment of mining one ton coal in the j th coal face

If we consider the paid use of coal resources or the return of coal resources assets value, the formula (8) will be changed into (9)

$$p_j - c_j - d_j - a_j \geq 0 \quad (9)$$

Here: a_j is the depreciation of resources assets with mining one ton coal in the j th coal face, we can get it according to the resources recovery in the j th coal face. If Q_{R} is the

economically recoverable reserves in the j th coal face, and Q_{jT} is the total mining quantity. $a_j = a \times Q_{jT} \div Q_{Rj}$

Obviously, the main difference between the method of resources workable evaluation with resources assets value and it with resources free use is that we should consider the depreciation of resources assets as costs.

Generally, the total value of environment includes two parts: use value and un-use value, and use value includes direct use value, indirect use value and selective value. Direct use value is that we get directly from environment during production or consumption; indirect use value is the benefit that we get indirectly from kinds of functions which environment offer to sustain production and consumption; and selective value is equal to the insurance that people have prepaid to prevent from losing some environment resources in the future.

Total environment value= direct use value +indirect use value+ selective value (10)

Exploiting coal resources can bring various influence to environment, such as surface subsidence, waste rock depositing and grand pollution caused by the depositing and conveyance of coal, all of these must be considered in coal resources economical workable evaluation.

The method of coal resources workable evaluation with environment resources value is similar to the method of workable evaluation with resources assets value. We just need to consider the callback of environment resources assets value when we use formula (6). In other words, the standard of coal resources economically workable evaluation will be changed from (6)

$$p_j - c_j - d_j - a_j - e_j \geq 0 \quad (11)$$

Here: e_j is the depreciation of environment resources assets with mining one ton coal in the j th coal face. Because of the poor estimating accuracy of environment value, we can adopt the theory of linear depreciation.

THE RELATION BETWEEN THE CAPITALIZED RESOURCES MANAGEMENT AND MINE ENVIRONMENT OR RESOURCES PROTECTION

By comparing the formula (9) and (11) with (8), we will find that, the method of resources workable evaluation with resources assets value and environment resources value raise the standard of resources workability relatively, which may change economically recoverable reserves under the condition of resources free use into un-economically recoverable reserves, which is not good for resources protection. But after analyzing carefully, we will find that, actually, to evaluate economically workability is always to evaluate whether critical resources (generally it's poor resources) has economically workable value, and the profit difference between poor resources and excellent resources is an important factor which decide whether to mine poor resources(or resources price may be low

comparatively), if the net benefit of mining poor resources is equal to that of mining excellent resources, or even lower than to exploit excellent resources. Compared with the system of resources free use, resources capitalized management under the condition of resources paid use is propitious to resources protection, and here is the reason. Supposed that we define coal price according to the principle that to mine poor resources is to get average benefit, the net benefit with resources assets value and environment value will be changed from w to w' .

The theory price of coal= the unit mining cost of poor coal resources+ unit resources assets value+ environment value of unit resources+ average benefit of unit resources (12)

$$w = p - c - t = s_0 + R_0 + R_1 + R_2 + E \quad (13)$$

$$w' = p - c - t - (R_0 + R_1 + E) = s_0 + R_2 \quad (14)$$

Here: p is coal price, c is the total mining cost of unit coal, t is taxation, s_0 is the average benefit got by mining unit coal resources, R_0 is the value of unit poor resources, R_1 is differential benefit, R_2 differential benefit, E is the lost environment value of mining unit coal resources.

Compar equation (13) with equation (14), then we will find:

- 1) Compared with that under the condition of resources free use, the obtained benefit with resources assets and environment resources value doesn't include poor resources value, differential benefit and environment value, and differential benefit are the differential incomes caused by the difference of resources gift advantage, environment value is the differential incomes between the enterprises who rebuild environment after mining coal and that who didn't, so the benefit difference between enterprises with mining poor resources or excellent resources and attention to environment protection or no attention to environment protection is reduced while considering resources assets and environment value, which is propitious to resources protection.
- 2) the obtained net benefit with resources assets and environment value still includes differential benefit (the differential incomes caused by the differences of equipment and management quality because of the difference of investment), that excellent resources is propitious to mechanized production and raising productivity can bring more differential benefit to enterprises. So although we considered resources assets and environment resources value, there will exist the phenomenon of using excellent resources and abandoning poor to some extent.
- 3) If supply is higher than demand in the market, the price will be higher relatively and resources value and environment value which owe to the state won't be recovered, and the exploiters may run after high productivity for the sake of the short-term benefit, which leads to the waste of coal resources and the production accident.

So although we carry out the system of resources paid use and impose environment value, the phenomenon of wasting resources may still exist, in other words, resources capitalized management with paid using resources can not take the place of resources management

completely. Meanwhile, some questions should be taken close look at when we carry out resources capitalized management:

- (1) The profit difference between poor resources and excellent resources is mainly caused by differential benefit II while we consider resources assets and environment value, so we can consider a part of differential benefit II as resources value, and ascribe it to the states. Of course, we can't ascribe all to the resources value owner, or it is not good for arousing enterprise's enthusiasm to improve technique and raise productivity.
- (2) When we make deposit techno-economical evaluation and resources value evaluation, we must choose and adopt a reasonable price of coal.

On one hand, for developed countries adopt resources low price policy, the coal price is generally lower in international market; on the other hand, both mechanization and productivity are lower in coal enterprises of our country, the production cost is greatly higher than the average of the world. For the composite influence of these two, the coal market price in our country has been greatly lower than the theory price fixed by margined production cost of poor resources. So if we adopt market price in the course of deposit techno-economically evaluation and resources assets evaluation. It may exist that a part of poor resources which should have been used are not exploited because of the low mining benefit, so now we can adopt the method that we adopt theory price in the course of deposit techno-economically evaluation and resources assets value and adopt sale price when we impose resources value to coal mining enterprises.

In the last two years, because of the fast development of our economy, and the demand on coal is becoming bigger and bigger; while the states decisively closed and annexed some small mines which waste coal resources seriously and operated very dangerously, all of which make coal price rise continuously, and there is another extreme- the market price of coal is higher than its theory price. In this case, if we adopt theory price in the course of deposit techno-economically evaluation and resources value evaluation, state-owned resources assets maybe run off, and if we adopt market price to evaluate resources value, resources value can increase seemingly, but the phenomenon that a part of resources value can't be returned when coal price tends to market price may appear because of the provisional nature of coal seller's market and the protracted nature of counting benefit years. So we hold that, because the relatively high price of coal is temporary, we can still adopt theory price to evaluate coal resources assets price, but the margin value between market price and theory price can be considered as the development fund of coal industry and it is managed by correlative administrative department of government or industry association, and it is applied in the given area; on other hand, it can be used as safe development fund to take good used of the favorable chance of coal market to settle the matter of normalized production and safe production in mine industry; on the other hand, it can be the sustainable development fund to settle the matter that the prospecting investment of coal resources is relatively short and to settle the matter that prospecting lags behind mining. In this case, not only we can make sure of the accuracy of the value of coal resources assets to promote the regularization of resources capitalized management; but also we can promote to settle the safe production matter existed long in our coal industry and the imbalance between prospecting and mining, and then achieve the sustainable development of coal industry.

CONCLUSION

Coal resources is the precious wealth of our country, it is our inevitable responsibility to use and protect coal resources reasonably which are not renewable. In order to make exploiters to protect coal resources self-consciously, it is necessary to adopt market-economically management, also it is effectual. So it will be better for spreading the scientific notion to make some necessary microcosmic analysis and research in the macroscopic framework of resources capitalized management, the view of scientific development and resources sustainable use. This article just study and analyze the method of resources workable evaluation with resources paid use and environment lost value, and there are much more works to do with basic theory and managing manner, so each coal exploiter ought to protect coal resources and environment self- consciously.

BIBLIOGRAPHY

- (1) Wang yun-jia, Huang zong-wen, Wang ying-hong. Mine resources evaluation and its application study [M]. China University of Mining and Technology, Xu Zhou. 1998.
- (2) Ma zhong. Conspectus of environment and resources economics [M]. High Education Press, Bei jing. 1999.
- (3) Chen yu-heng, Sun jian-ming. Mining economics[M]. China University of Mining and Technology press, Xu Zhou. 1989.
- (4) Wang li-jie. Study on the theory and the method of coal resources economically evaluation[M]. Coal Industry Press, Bei jing. 1996.
- (5) Tao shu-ren. Technique economics [M]. Economy Management press, Bei jing. 1999
- (6) Fu jia-ji, Tong yun-huan Industrial technique economics[M]. Qinghua University press, Bei jing. 1991.
- (7) Wang ying-hong. Theory of coal resources value and differential benefit, counting method and its model study- take Ping-ding-shan mine as an example.[Master's degree paper]. China University of Mining and Technology, Xu zhou, 2000.
- (8) Guo guang-li, He guo-qing, Wu kan. Forecast and evaluation of the influence coal mining sink to environment [J]. Mine Measure, 1995(1).