Research of the Influence Factors of Mine Enterprise Environmental Management Implementation in China

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Abstract

Environmental management runs through the whole processes of business activity. This paper expounds the necessity of carrying out the strategy of environmental management of mine enterprise, using the method of econometric analysis, and analyzes the influence factors of mine enterprise environmental management. Then, the paper evaluates environment operating condition of mine enterprise, and puts forward some suggestions for improving environment management level of mine enterprise in China.

Keywords

Mine Enterprise; Environmental Management; Green Production; Influence Factor.

1. Introduction

The rapid development of industrial economy enlarges the development efforts of mineral resources, brings the economic benefits, and at the same time, it also causes a great disturbance and destruction to the local ecological environment. One of the causes of these environmental problems is that mine enterprises do not take the environmental management in the process of its development. Thus, it is very important to introduce the concept of ‘environmental management’ to mine enterprise of heavy pollution in China, and it is of great realistic significance for the future development of the enterprise, the recovery of the ecological environment and the improvement of environment management.

2. The Necessity of Mine Enterprise to Carry Out the Strategy of Environmental Management

2.1 The Implementation of Environmental Management is a Realistic Choice to Mine Enterprise Under the Limit of Resource

Destruction of ecological environment caused by the large-scale mining of mineral resources and the machining process due to the enterprises is one of the foremost reasons causing increasingly serious mine ecological problems, and on the condition of the resource constrain, carrying out environmental management is the most effective choice to escape the dilemma of mine enterprise. Through control the total mining reasonably, optimize the configuration of mineral resources and mining layout, increase the intensity of structural adjustment, promote the structure of optimization and upgrading, improve the control, integration ability and the comprehensive utilization of the limited mineral resource, in this way the ecological environment pressure of excessive mining can be alleviated.
2.2 The Implementation of Environmental Management is the Inevitable Choice to Solve the Problem of Ecological Environment of Mine Enterprise

Mine enterprise can gather the science and technology personnel to implement environmental management, take advantage of its expertise in the field and help enterprise to raise the ability of research and introduce the recycling technology, push forward the adjustment to technical structure, improve the level of dealing with "three wastes", prompt the cycle development of mining and reduce the ecological environment destruction in the process of mineral resources exploitation. It also can bring more cycle and economic benefits, kill two birds with one stone at the same time.

2.3 The Implementation of Environmental Management is a Fresh Choice to the Development of Mine Enterprises

Ecological mine construction and sustainable development has gained increasing concerns of the mine enterprise. Through the implementation of environmental management to establish and perfect the corresponding mechanism of mining and mineral resources database management system and ecological information system, enterprises provide powerful data to support the enterprise of the future ecological environment development, and then the enterprises can learn its own mineral resources, ecological protection and environmental governance processes, so that the enterprise can better solve the problem of the existing ecological environment.

3. The Influencing Factors of Selection and Regression Analysis

The study of mine enterprise environmental management start relatively late in China compared with abroad, and the development is not very mature. Relevant scholars analyze the affecting factors of mine enterprise environmental management is also quite a few, and not have a unitary definition. This paper argue that geological prospecting investment and total energy production, total energy consumption and capital to control mine geological environment are the most important factors in the implementation of mine enterprise environmental management. The analysis of the relationship between the four factors above and enterprise environment information disclosure situation can be used to evaluate the condition of mine enterprise environmental management in China at present.

3.1 Variable Selection

X1: Geological exploration investment is used to investigate rock, mining geology, hydrology, topography and other information in the mine, which provide geological data for mining construction designing.

X2: The total primary energy production at a time can reflect the gross index of the level, scale, constitution and development speed of energy production.

X3: The total energy consumption at a time, which reflect national or all region of the total primary energy consumption level, and energy consumption will have certain influence to the environment.

X4: Mine geological environment governance funding are the mining engineering expenditure and other related expenses, which is used to restore and governance of geological environmental damage caused by mining activities of mining engineering expenditure and other related expenses.

Y: Enterprise environmental information disclosure will be evacuated according to release detailed degree for assignment of environmental information disclosure by mine enterprises.

3.2 Data Selection and Processing

This paper select nearly 10 years of statistical data of mine enterprise in China from 2006 to 2015. The explanatory variables of the index data are from the national land and resources of bulletin and mineral resources of land and resources, to ensure the actual reliability of selecting data. At the same time in order to facilitate calculation, the explained variable data are carried out the unit conversion. The explained variable data mainly come from the annual report of listed mine enterprises in Shanghai
stock exchange and Shenzhen stock exchange. The environmental information of mining companies in China has been evaluated and rated personal subjectively. Though the score has certain subjectivity, but it completely conforms to the actual situation from the trend of the whole data development.

Table2-1 Index factors that affecting the mine enterprise environmental management
(explanatory variables)

<table>
<thead>
<tr>
<th>years</th>
<th>Geological exploration investment (Billion)</th>
<th>The total primary energy production at a time (Billion tons of standard coal)</th>
<th>The total energy consumption at a time (Billion tons of standard coal)</th>
<th>Mine geological environment governance funding (Billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>X1</td>
<td>X2</td>
<td>X3</td>
<td>X4</td>
</tr>
<tr>
<td>623</td>
<td>495</td>
<td>22.1</td>
<td>24.6</td>
<td>27.11</td>
</tr>
<tr>
<td>2007</td>
<td>623</td>
<td>23.2</td>
<td>26.3</td>
<td>40.59</td>
</tr>
<tr>
<td>2008</td>
<td>705</td>
<td>26.1</td>
<td>29.1</td>
<td>40.11</td>
</tr>
<tr>
<td>2009</td>
<td>830.6</td>
<td>27.5</td>
<td>30.7</td>
<td>59.37</td>
</tr>
<tr>
<td>2010</td>
<td>1023.6</td>
<td>29.7</td>
<td>32.5</td>
<td>85.05</td>
</tr>
<tr>
<td>2011</td>
<td>1118.2</td>
<td>31.8</td>
<td>34.8</td>
<td>96.99</td>
</tr>
<tr>
<td>2012</td>
<td>1296.8</td>
<td>33.2</td>
<td>36.2</td>
<td>122.55</td>
</tr>
<tr>
<td>2013</td>
<td>1223.8</td>
<td>34</td>
<td>37.5</td>
<td>142.9</td>
</tr>
<tr>
<td>2014</td>
<td>1126.9</td>
<td>36</td>
<td>42.6</td>
<td>92.17</td>
</tr>
<tr>
<td>2015</td>
<td>899.3</td>
<td>36.2</td>
<td>43</td>
<td>122.17</td>
</tr>
</tbody>
</table>

Data sources: China gazette of land and resources; China's mineral resources bulletin.

Table2-2 The situation of mine enterprise environmental information disclosure in China
(explained variables)

<table>
<thead>
<tr>
<th>years</th>
<th>Number of social responsibility report companies released</th>
<th>The number of detailed environmental information disclosure companies (0, 6)</th>
<th>Partially announced information company number (0, 4)</th>
<th>Total score Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>7.8</td>
</tr>
<tr>
<td>2007</td>
<td>10</td>
<td>10</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>2008</td>
<td>11</td>
<td>11</td>
<td>7</td>
<td>9.4</td>
</tr>
<tr>
<td>2009</td>
<td>11</td>
<td>11</td>
<td>8</td>
<td>9.8</td>
</tr>
<tr>
<td>2010</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>10.8</td>
</tr>
<tr>
<td>2011</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>10.8</td>
</tr>
</tbody>
</table>
3.3 Regression Analysis

Regression between explained variable Y and explained variable X1, X2, X3, X4 through Eviews7.2, obtain the estimated results. As shown in figure 1.

From the result of the regression analysis we can know that the explained variable X1 and X2 P>0.05, and it apparently didn't pass the t test. The multicollinearity existed in the result because the model is small while R2 is very big and the fitting degree reaches 98.9%. Thus, the model should be revised and regression analyzed again. The revised estimate results are shown in figure 2 below.

Data sources: the Shanghai stock exchange; The Shenzhen stock exchange
From the result of the analysis, we can know that each of the variable P<0.05 in figure 2, and it passes the test of t test, and the regression equation of fitting degree is higher which achieves 99.1%. Since this paper uses the sample data belonging to the time series data, which established the multiple regression models may have heteroscedasticity, and need to carry out the white test of the model. The figure 3 shows that P>0.05 and prove the revised model is not heteroscedasticity.

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Prob. F(4,5)</th>
<th>Obs*R-squared</th>
<th>Prob. Chi-Square(4)</th>
<th>Scaled explained SS</th>
<th>Prob. Chi-Square(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.018902</td>
<td>0.2300</td>
<td>6.175996</td>
<td>0.1864</td>
<td>1.514274</td>
<td>0.8241</td>
</tr>
</tbody>
</table>

**Fig.2-3 White test**

At the same time, the model also should pass the LM test to test the existence of autocorrelation model. The figure 4 shows that the revised model P>0.05, so the model does not exist autocorrelation.

**Breusch-Godfrey Serial Correlation LM Test:**

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Prob. F(2,3)</th>
<th>Obs*R-squared</th>
<th>Prob. Chi-Square(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.138902</td>
<td>0.4285</td>
<td>4.315947</td>
<td>0.1150</td>
</tr>
</tbody>
</table>

**Fig.2-4 LM test**

Finally, it is concluded that the regression results established of the explained variable Y and explanatory variables X1, X2, X3, X4 are as follow.

\[
Y = -32.1 + 2.7E^{-47}X1^{15} - 30.9 \log(X2) + 42.2 \log(X3) + 5.62E^{-33}X4^{15}
\]

\[
(\begin{array}{cccc}
-11.26 & 2.60 & -5.35 & 8.16 & 2.70 & T值
\end{array})
\]

\[
R^2 = 0.991 \quad DW = 2.997 \quad T = 10 \quad (2006-2015)
\]

4. **Results Analysis and Countermeasures**

4.1 **Results Analysis**

To regression model, the results show that in the case of a significant level of alpha = 0.05, Y with the X1, X2, X3, X4 fitting is good and there is a certain relationship. Degree of mining enterprise environmental information disclosure and X1, X3, X4 exist positive correlation, while and X2 changes into the reverse relationship.

(1) Geological exploration investment and the enterprise environment information disclosure degree was positively to change, that means the more invested in geological exploration, the more the environment of enterprises will be improved, and this is consistent with actual situation. The geological prospecting investment directly affects the change of the ecological environment and has been one of the important factors that affect the enterprise environment management implementation.

(2) Total primary energy production and enterprise environmental information disclosure degree reversely change, and total primary energy consumption positively correlates with the enterprise environment information disclosure degree. The more the mining enterprises produce totally, the greater the damage caused to the enterprise and enterprise environment condition will be poorer and poorer, and at the same time it also suggests that the demand for energy and the increment of the energy consumption. The process of mining will damage the environment of the enterprise and influence enterprise environment, so the enterprise in the environmental information disclosure should be given more attention.

(3) Mine geological environment governance funding positively correlated relationship with the enterprise environment information disclosure degree, the more money is used in the mine geological environment governance, it displays that mining companies are more likely to value the recovery which has been damage to the environment, and corporate business performance is positive changes to
the environment, the enterprise in the environmental investment can produce certain influence to enterprise's pollution control effect.

4.2 Countermeasures and Suggestions

From the above results we can conclude that if mine enterprises want to develop further, they must pay attention to the implementation of environmental management and green production and cleaner production in the process of development, regulate the resource reasonably; conduct an environmental recovery and management, which constantly improve the enterprise of the current environmental management. Through promoting technology innovation and increasing financial security, the mine enterprises improve the ability of environmental management.

1) Attach great importance to green production, cleaner production and source control. The enterprises must proceed from the source, build up the idea of cleaner production, green production, reduce or eliminate the environment harm of the production from the source to change the status quo, and apply the integrated prevention and environmental protection in the process of enterprise production.

2) The measure of mitigate the ecological environmental impaction. In order to restore mine ecological function gradually, the land reclamation and greening play should be taken as the main mean, regional ecological environment protection and improvement should be taken as the direction, strengthen the law should be taken as the main measure.

3) Preventing and mitigating pollution. From the perspective of sustainable development of mining, develop circular economy as the main line, minimize the generation of solid waste, and improve the comprehensive utilization. Waste water emission achieve standard, and strive to achieve zero emission.

4) Mine enterprise introduce with independent research and development to promote technology innovation. Focus on multiple metallogenic information processing and comprehensive metallogenic prediction, strengthen the development and utilization of a total of (with) raw ore, lean ore, difficult to choose ore and clean energy, comprehensive utilization of resources and recycling, new materials development, ecological environment protection such as research, prompt the theory and technology innovation, prompt it into realistic productivity.

5) Strengthening the efforts of raising funds for environmental control for establishing the investment and financing channels, on the one hand, should continue to strengthen the vegetation restoration work in the production, urge enterprise to increase vegetation recovery funds. On the other hand, for the left over from history or enterprise cannot afford recovery management of mining abandoned land, actively strive for more state funds, and strengthen cooperation with department of water conservancy, environmental protection and farmland, gradually form diverse investment channels in mine land reclamation and vegetation restoration.

Facing the serious ecological environment problems, mine enterprise should be based basing on their own background, introduce the thinking of environmental management, attach great importance to the implementation of environmental management, find their own green business model and development road of sustainable development in order to improve the level of the enterprise environmental management continuously.

References


