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Le Van Chien, Nguyen Duc Thang, Pham Kien Trung

APPLICATION OF SWOT MATRIX IN ENVIRONMENTAL MANAGEMENT OF COAL MINING ACTIVITIES IN VIETNAM

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Abstract: *Coal mining activities in Vietnam have been causing negative impacts on the environment and society, such as dust pollution, noise, water pollution, ecosystem degradation, adversely affecting the health of workers and people living around the mining area. Although, in recent times, coal mining enterprises have applied many environmental management measures, ecological pollution issues in coal mining activities are still inadequate. Therefore, it is necessary to assess the advantages and disadvantages of the environmental management of coal mining activities and, on that basis, propose solutions to improve environmental management in mining activities. The report uses the SWOT matrix to analyze: Strengths, weaknesses, opportunities, risks in environmental management practices of coal mining enterprises, to show the advantages and disadvantages arising from inside and outside coal mining enterprises when performing ecological management. Thereby proposing some recommendations and solutions to strengthen the environmental management in coal mining activities in Vietnam today.*

Keywords: *SWOT, Environment, Environmental management, Coal mining activities*

1. INTRODUCTION

Currently, the exploitation and supply of coal to the domestic market include units such as Vietnam National Coal - Mineral Industries Group (Vinacomin), Dong Bac Corporation, 319 Corporation, Vietminco (FDI enterprise), etc. In particular, Vinacomin accounts for a significant proportion with an average output of 30 million tons per year. The coal mining industry is an important economic sector of our country, providing the main fuel source for other sectors such as production of electricity, construction materials, chemicals, domestic fuels and export. In recent years, the coal mining industry has been developing strongly to meet the increasing demand for domestic consumption and export. However, this activity also causes negative impacts on the environment and society, such as dust pollution, noise, water pollution, ecosystem degradation, adversely affecting the health of workers and people living around the mining area.

According to a view on the development of coal industry, "Coal industry development associates with environmental protection and improvement; harmonizes with tourism development, minimizes impacts on cultural preservation areas; makes positive contributions to socio-economic development, associates with the task of consolidating and strengthening national defense and security in the area; and ensures safety in production" (Decision No. 43/QĐ-TTg, 2016). To achieve the above objectives of the coal industry, environmental management in the coal industry in general and ecological management in coal mining enterprises in particular play a vital role. Although coal mining enterprises have applied many ecological management measures, they have not overcome environmental pollution. The outstanding issues may be due to the internal causes of the enterprise and also the external impacts, so it is necessary to have measures to assess the environmental management of coal mining activities to find out the advantages as

well as the outstanding issues on that basis, measurements can be built to improve environmental management activities.

SWOT analysis is an analysis tool on an object based on systematic principles, in which: Analysis of strengths (**S**-strength), weaknesses (**W**-weakness) is an internal assessment, self-assessment about the capacity of the system (object) to achieve a goal, taking the goal as a standard to rank a particular feature of the internal environment as a strength (supporting the goal) or a weakness (obstructing the goal); Analysis of opportunities (**O**-opportunities), threats (**T**-threats) is the assessment of external factors that govern the development goals of the system (object), taking the goal as a standard to rank a particular feature of the external environment as an opportunity (supporting the goal) or threat (obstructing the goal).

SWOT analysis can be a useful tool for strategic planning of environmental management activities. According to Lozano and Valles (2007), "SWOT is widely recognized and forms a essential basis for assessing the current situation and developing strategies in the future." The use of this method has several advantages and disadvantages as follows: The advantage of this method is straight forward and everyone can use it without advanced knowledge or external technical support. The disadvantage of this method is that the analysis is quite subjective and straightforward, and the data is fixed. The application of SWOT to analyze the advantages and disadvantages of environmental management activities is to answer four questions: 1. What are the strengths of organizations when conducting environmental management activities? 2. What are the weaknesses of organizations when conducting environmental management activities? 3. What are the opportunities for organizations when implementing environmental management activities? 4. What are the threats to organizations when

conducting environmental management activities?

Due to the need to assess the environmental management of coal mining and the benefits of SWOT as analyzed above, the application of SWOT in the environmental management of coal mining activities in Vietnam is vital to analyze the internal strengths and weaknesses, external opportunities and threats to find out the advantages and disadvantages in the environmental management of coal mining enterprises in Vietnam today.

2. CURRENT SITUATION OF ENVIRONMENT MANAGEMENT IN COAL MINING ACTIVITIES AT ENTERPRISES OF VINACOMIN VINACOMIN

2.1. Environmental management plan

Based on the guiding documents of Vinacomin and the reality of production and business, enterprises make an annual environmental management plan with the main contents of environmental protection measures and the implementation costs. The cost of serving the environmental protection of enterprises is from the cost of coal production. However, there is no mechanism to allow/ enforce enterprises to set aside capita to actively spend on environmental protection. It is worth noting that since 2018 Vinacomin had to cancel the concentrated Environment Fund. The current maximal spending is deducted to 1.5% production costs. The limited funding source for environmental protection drove many urgent projects to be delayed. The environmental quality in coal mining areas, hence, cannot be improved.

2.2. Organization of environmental management

- Environmental management apparatus in enterprises: The environmental management apparatus of enterprises has been gradually

built, including the team, group, and workshop. Enterprises also organize a department in charge of the environment. However, due to funding and staff qualification, etc., the effectiveness of environmental management has not been fully promoted. In addition, at present, some enterprises have an environmental management division in other technical departments. The environmental management division is a small-scale one with 3-5 people, mostly mining engineers with additional training of environment. Therefore, the division is insufficient in terms of human resources for environmental management.

- Environment management system in enterprises: most of the enterprises in Vinacomin are gradually building and organizing the environmental management system, so it has a significant impact on some contents such as the quality of environmental inspection, the process of monitoring the performance of environmental works, and the result of technical solutions on the environment, etc.

- Quality assessment system for environmental management in enterprises: although enterprises have implemented many different ecological protection measures in coal mining activities to reduce negative impacts on the environment, however, at present, there is no model or method for assessing the quality of environmental management in enterprises, so enterprises and managers do not know the results of ecological management implementation of enterprises with achievements and remains.

2.3. Inspection and supervision of environmental management

Inspection and supervision activities of environmental protection at enterprises are currently conducted by a division in charge of the environment (environmental group). Still, the quality of these activities is limited. There is a lack of sanctions to handle violations of

environmental protection within enterprises. In some cases, the division in charge of the environment is not objective when organizing the implementation of environmental protection measures and inspecting and supervising environmental protection.

3. APPLICATION OF SWOT TOOL TO ANALYZE ENVIRONMENTAL MANAGEMENT IN COAL MINING ACTIVITIES IN VIETNAM

In this section, the authors focus on analyzing the strengths and weaknesses to identify the internal advantages and disadvantages, and external opportunities and risks when performing environmental management in coal mining activities. Through practical research, the strengths, weaknesses, opportunities, and threats in the ecological management of coal mining enterprises are showed, including:

3.1. Determination of strengths (S-strength)

- Cost reduction: Good management help reduce operating costs of enterprises in the long term, such as: reducing the cost of energy and raw materials used, reducing the cost of the amount of production waste.

- Productivity improvement: Well-implemented environmental management activities will help to recover resources and save input materials, thereby improving the productivity of enterprises.

- Development and innovation: Good environmental management means enterprises must invest in new, environmentally friendly production technologies or technologies to treat air, water, and dust pollution, etc. These technologies are beneficial for the image, profit, and competitive position of enterprises.

3.2. Determination of weaknesses (W-weakness)

- The source of costs for environmental management is limited: The fee of

environmental protection of coal mining enterprises is deducted from production costs. The perspective of Vinacomin is to prioritize financial resources, only spend 1.5 to 2.0 % of production costs for environmental protection. Among them, the cost of regular environmental protection for environmental protection activities in the production areas is 0.5%, and the rest is approved by Vinacomin. This fund is to serve primarily for ecological protection works in residential areas adjacent to the production areas of enterprises.

- Quantity and qualification of the staff: According to the current regulations, coal mining enterprises do not have their environmental management department, but organize an environmental management division in other technical departments, management staff of this division is usually only from 3 to 5 people, including mainly mining engineers trained in the environment, so there is not enough quantity and quality in terms of human resources for environmental management. Also, the education level of workers in enterprises is still low, leading to difficulties for training and propaganda to raise awareness of environmental protection in production.

- Compliance with legal policies on environmental protection faces many difficulties: There are too many administrative procedures, regulations are impractical, there are no strong enough policies to create incentives to promote recycling and reuse of waste, the decentralization of management in the field of environmental protection is not apparent, there are overlaps, regulations on environmental protection taxes and fees for mineral exploitation are still too high, reducing financial resources for production technology innovation as well as for environmental protection of coal mining enterprises.

3.3. Determination of opportunities (O-opportunities)

- Reducing pressure from regulators and the community: The main reason coal companies need to perform environmental management well is related to complaints from the community about environmental pollution from coal mining activities. Besides, if the environmental pollution situation exceeds the prescribed standards, enterprises will also be administratively sanctioned by the State management agencies, forced to overcome pollution issues. Coal mining may be forced to stop if the situation is more serious.

- Opportunities for new market development and competitiveness are higher for mining companies with appropriate environment perspectives. Coal mining enterprises can attract domestic and foreign customers, given the increasing green consumption trend. Thereby their competitiveness in the market can improve.

- Advanced financial opportunities come from good environmental management. Coal mining enterprises ensure sustainable development, thereby attracting financial resources from investors, shareholders, and financial institutions. For example, enterprises can access the "green credit" loan package with the criteria of better lending and preferential interest rates of banks currently applied or may be given priority to access capital from funds such as Science and Technology Development Fund, Environmental Protection Fund, and National Technology Innovation Fund, etc.

3.4. Determination of threats (T- threats)

- Impact on the annual budget of enterprises: To effectively manage the environment in coal mining, enterprises are required to implement many solutions both before, during, and after mining. These activities need to be improved continuously, which will cost enterprises more and affect their annual budgets.

- Strict legal requirements in the future: Vietnam increasingly integrates more deeply into the world, requiring the changes of our environmental protection legislation following the global practices, thereby showing that when integrating with the world, the ecological regulation framework will become more and more stringent. The strict compliance with these regulations may affect the formulation of operations and other essential strategies of coal mining enterprises.

- Lack of environmentally friendly customers: There is a small number of consumers who are conscious of using eco-friendly products, especially industrial customers. Hence, managers have less consideration to invest in improving environmental quality. However, the main focus of enterprises is still determining the future needs for eco-friendly products or in foreign markets.

4. SOLUTIONS AND RECOMMENDATIONS FOR IMPROVING ENVIRONMENTAL MANAGEMENT IN COAL MINING ACTIVITIES

4.1. Some solutions for enterprises of Vinacomin

4.1.1. Organization of the environment management apparatus in enterprises

To effectively implement environmental management programs for all coal mining and processing activities, enterprises need to have good organizational and personnel structure for environmental management.

Enterprises should set up a unit in charge of environmental management (Environmental Management Department), specialize in environmental management staff to avoid the situation of a team holding multiple job titles, resulting in insufficient time and capacity to perform the assigned task.

4.1.2. Organization of the environment management system in enterprises

The organization of the environmental management system set regulations and rules related to the environment and consistency in implementation through resources, responsibilities, and the ongoing assessment of procedures and processes. Consequently, these activities create the basis for environmental management and set out the rules forcing people to comply on-site to reduce the impacts on the environment. According to the provision of Article 25 of Decree No. 19/2015/NĐ-CP, establishments conducting production, business, and service activities must certify the environmental management system for the first time within 12 months from the effective date of this Decree. Therefore, the organization of a strict environmental management system also helps enterprises comply with legal requirements.

4.1.3. Development of a method for assessing the environmental management quality in enterprises

The assessment of ecological management in coal mining provides managers appropriate information on the advantages and disadvantages of environmental management. In addition, the results of the environmental management quality assessment will help managers to adjust the organization and implementation measures, etc. to achieve the objectives of the environmental management. The evaluation of the environmental management quality needs to be based on the purposes of the environmental management towards sustainable development, so it is necessary to make an overall assessment based on three items: environment, economy, and society, in which the most crucial objective is the environment. The proposal of the method for assessing the environmental management quality in enterprises is our next research direction.

4.1.4. Improvement of the human capacity for environmental management

Enterprises need to have a plan of specialized knowledge training for staff, meeting the requirements: understanding of the company operations, technical knowledge as well as legal documents, the capacity of science, technology, and environment, the understanding of the environmental standard system, etc. Besides, they are also capable of operating treatment systems, analyzing, and testing the level of assurance of environmental standards of products and wastes. They can assess environmental impacts throughout the production process. Also, the participation of consultants, economic analysts in environmental management such as research, planning, and formulation of environmental policies is required to both achieve financial goals and ensure ecological and social goals. For employees, enterprises need to organize short-term training courses for all employees, to consolidate and propagate knowledge about environmental protection. Enterprises need to maintain and expand ecological protection movements, going deep into quality rather than just stopping at the formal level.

4.1.5. Improvement of financial capacity for environmental management

Enterprises need to find different sources to increase funding for environmental management, such as support policies of the Government and Vinacomin of the locality, from corporate funds, cooperation funds, or calling for investment ... For environmental protection activities and investment projects on prevention, remediation of pollution, degradation, and environmental incidents with significant influence, the company may get funding from concessional loans or apply for financing from Vietnam Environment Protection Fund. This fund has a financial support mechanism depending on the scale and scope of the project. The company makes deposits for environmental renovation and restoration to ensure financial resources for ecological renovation and restoration after mining.

4.2. Some recommendations on State policies

Through SWOT analysis on the advantages and disadvantages of environmental management in coal mining activities, the authors propose some recommendations as follows: (Table 1)

Table 1. Some recommendations for environmental management policies based on SWOT analysis

SWOT Analysis		Policy recommendations
Strengths:	Advantages and disadvantages arising from internal issues of coal mining enterprises	
- Reducing the cost		- Management agencies need to regulate the expansion of financial sources in service of environmental management
- Improving productivity		
- Developing innovation		- Organizing seminars for managers and employees on environmental management
Weaknesses:		
- Limited cost		- Regularly updating the appropriate environmental management policies
- Insufficient of human resources		
- Inadequate policies		
Opportunities:	Advantages and disadvantages arising from external issues of	
- Reducing pressure from management agency and the community		- Developing financial support solutions for enterprises in environmental management

SWOT Analysis		Policy recommendations
<div>- High opportunities for market development and competition</div> <div>- Improving financial opportunities</div>	coal mining enterprises	<div>- Developing plans on new regulations in environmental management</div>
<div>Threats:</div> <div>- Being costly</div> <div>- Strict legal requirements in the future</div> <div>- Lack of environmentally friendly customers</div>		<div>- Developing solutions to raise the awareness of consuming eco-friendly products</div>

(Source: Analysis and summary of authors)

- Authorities need to regulate the expansion of financial resources for environmental management. It is necessary to have mechanisms and policies to create capital for Vietnam Coal Environment Fund, as agreed with enterprises to determine a reasonable percentage of deduction on coal production revenue (besides of publicizing the plan of using the Fund with appropriate principles), collect fees from the benefit of coal mining activities: restoring areas with surface destruction during coal mining, dumping rocks and soils to the sea and marsh to create land for construction of residential areas, industrial parks, and other social needs, etc.

- Organizing seminars for managers and employees on environmental management: State management agencies, especially VINACOMIN, should regularly organize short-term workshops and classes with the sharing of domestic and foreign experts, require the participation of the environmental management staff of enterprises to learn from the experience and improve the quality of the team in charge of environmental management.

- Regular updating of the appropriate environmental management policies: Regularly reviewing and completing the provisions of the environmental protection legislation in the direction of reducing administrative procedures, enhancing

compliance monitoring in reality. Formulating mechanisms and policies, especially financial mechanisms (for example, setting up environmental funds from production costs) to create favorable conditions for enterprises, are a few measurements. These measurements help companies to take the initiative in environmental protection and encourage enterprises to invest in treating and recycling wastes.

- Developing financial solutions in environmental management: Authorities should design financial incentives such as granting support packages and other funds to enhance environmental management activities in companies. These policies are intended to assist enterprises to overcome financial barriers in environmental management.

- Developing plans for new regulations in environmental management: Management agencies should regularly review rules to innovate following international practices. Changes need to be planned in stages before implementation to avoid passive, causing difficulties for the performance of enterprises.

- Developing solutions to raise the awareness of using eco-friendly products: In recent years, issues such as green consumption and understanding of the consumption of eco-friendly products have gained generous social support. This trend will likely motivate coal mining

enterprises to improve environmental management activities to meet the requirements of consumers. The market for coal products does not make a product difference between enterprises, but rather a distinction based on environmental protection costs. However, many scientists believe that good environmental management can bring potential profits for enterprises in the stock market. Therefore, authorities need to propagate and improve public awareness of consuming eco-friendly products, to create a difference among companies and promoting them to focus on environmental protection.

5. CONCLUSION

Environmental protection has increasingly received the attention of the State, enterprises, and communities. Therefore, the introduction of solutions to improve environmental management in general and environmental management in coal mining activities, in particular, is even more necessary. However, the proposed solutions should be based on situations of mining companies, given their advantages and disadvantages arising from internal and external issues in performing environmental management. Through practical research, the article has applied SWOT tool to assess the ecological management of coal mining enterprises in Vinacomin. The assessment of strengths, weaknesses, opportunities, and threats has pointed out the internal and external advantages - disadvantages that affect the environmental management of enterprises.

From the results of the analysis, the article has presented several solutions and recommendations to improve the quality of environmental management in coal mining and minimize negative impacts.

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