Environmental Cost Management from the Perspective of Supply Chain

Jian-ping LV*
Nanjing University of Science and Technology, Xiaolingwei 200, Xuanwu District, Nanjing, Jiangsu, China
*Corresponding author

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Abstract. The traditional environmental cost management model only focus on the monetary capital appreciation, neglects the balance between monetary capital and ecological capital, which does not conform to the sustainable development of the enterprises. Because environmental costs involve product development, production, usage, sales, and scrap, they requires enterprises to rise from the internal manufacturing link to the environmental cost management under the whole life cycle perspective, thus achieve a more effective management and control of environmental costs. The paper will make a detailed analysis of the supply chain environmental cost management, and try to put forward a preliminary theory framework and application methods from the perspective of supply chain, combined with the whole product life cycle and supply chain synergy.

Introduction
Under the background of the implementation of ecological civilization construction, one of the key points for enterprises to realize sustainable development is to maintain the natural environment. Due to the combined effect of external supervision and internal sustainable development, Chinese enterprises begin to explore and fulfill their social responsibilities to the environment actively. In this process, what we want to discuss is how to grasp the balance and win-win of monetary capital appreciation and ecological capital. Therefore, enterprises need to use advanced and standardized means to manage environmental costs.

Supply chain cost management is the inevitable result of enterprise cost management development. The management of environmental cost should rise to the perspective of supply chain as a matter of course. The supply chain of product and its life cycle coincide to a certain extent, which is conducive to the improvement of environmental cost management model in the perspective of supply chain. But the research on this aspect is limited. So this paper makes a concrete analysis of supply chain environmental cost management, and tries to put forward a preliminary application method based on the theoretical framework and application flow of environmental cost management from the perspective of supply chain, combined with the whole product life cycle and supply chain synergy.

An Overview of Traditional Environmental Cost Management Models

The Connotation of Environmental Costs
Environmental cost refers to the value of natural resources and related ecological factors consumed by an economic organization (such as an enterprise) in the course of its sustainable development as a result of economic or other activities. And other costs incurred in implementing environmental objectives and requirements. In terms of the specific requirements of environmental cost measurement, environmental cost measurement can be divided into natural resources cost and environmental pollution cost.

On the one hand, enterprises will inevitably cause the consumption of natural resources in the process of production and resource regeneration. This consumption will lead to the degradation of natural resources, the change will affect the quality of the environment, so we should reconstruct, restore and maintain natural resources. On the other hand, enterprises will inevitably release a large
amount of waste into the environment in the process of production and consumption of products. Enterprises must pay the cost to control the discharge of these pollutants within the scope of environmental capacity.

The Characteristics of Environmental Costs

Compared with the traditional production cost, the environmental cost has the following characteristics:

First of all, environmental cost has obvious "lagging". The environmental expenditure does not occur in the product production process in the same equilibrium as other cost items (such as production materials), which makes the environmental cost have a certain "vacuum" in time and space. Once quantitative reaches qualitative change, the damage to the environment is inevitable.

Secondly, environmental cost has "continuity". In the measurement of environmental cost, the whole life cycle of product should be accounted, not only in the production process or the sales process. In other words, environmental cost occurs continuously in every life cycle.

Finally, the environmental cost also has the "potential" characteristic. The environmental activity has its particularity, the influence of the enterprise's production and management activities on the environment may have to go through a period of time before it can be released and displayed gradually, it will not appear immediately with the occurrence of economic activities.

Therefore, the three main characteristics of environmental cost determine the complexity of environmental cost management.

The Characteristics of Traditional Environmental cost Management Model

Under the influence of the traditional economic model, few enterprises carry out environmental cost management in our country. Even if it was adopted, they adopt "bottom administration", that is, grow first, clean up later. Enterprises aim at maximization of profits, they only consider immediate interests, ignore the long-term development and the social responsibility to protect the environment.

The “bottom administration” doesn’t effectively controlled its adverse effects on the environment, Therefore, enterprises should not only see immediate interests and ignore the long-term development, integrate environmental protection into business activities, manage environmental costs from the whole life cycle of products and the perspective of supply chain.

Defining Environmental Costs from the Perspective of Supply Chain

The Basis of Defining Environmental Cost from the Perspective of supply Chain

The enterprise is an important part of the social eco-economic environment system. Optimizing the environmental cost management of the enterprise not only meets the environmental requirements of the society, but also minimizes the environmental cost expenditure of the enterprise.

The Definition of Environmental Cost from the Perspective of Supply Chain

Specifically, enterprises are faced with both internal and external environments. In the process of environmental cost management, enterprises should take the supply chain as the guide, and give a comprehensive consideration of the consumption of resources and the impact on the environment in all aspects of the supply chain. In general, the product life cycle can be divided into R & D, procurement, production, sales, usage and scrap, the supply chain-based cost circulation links with the product life cycle to a certain degree, so the environmental costs in the supply chain can be defined on this basis.

The internal environmental costs include the direct environmental costs in the process of R & D, procurement, production and sales, and the lagging environmental costs brought by the upstream suppliers through procurement. External environmental costs include the environmental costs incurred by upstream suppliers during the acquisition and procurement of raw materials, and the
potential environmental costs incurred by downstream customers in the purchase, usage and scrap phases. (Figure 3.1)

![Diagram of supply chain with environmental costs](image)

**Figure 3.1. Defining Environmental Costs from the Perspective of Supply Chain.**

**Internal Environment Cost Management Process and Method from the Perspective of Supply Chain**

**Internal Environment Cost Management Process from the Perspective of Supply Chain**

From the perspective of supply chain, internal environmental cost management refers to the accounting and management of internal environmental cost. Specifically, environmental cost management includes "green R & D", "ecological procurement", "cleaner production" and "environmental sales". Through the ecological design of the internal target environmental cost (Figure 4.1), the environmental cost management of the above four links can be designed and perfected.

First, in the "green R & D" phase, ecological design is the orientation. The ecological design refers to the design method that integrates the consciousness of protecting the environment into the ecological environment problems. It focuses on the prevention of pollution and minimizes pollution at the source, so that the designed products do not cause environmental pollution or only minor pollution during their use, and enable the materials to be reused to the maximum extent.

Second, in the "ecological procurement" phase, environmental protection materials should be chosen while taking account of economic interests, and environmental principles, quality principles and benefit principles should be followed. The environmental principle means the selected materials should be able to reduce the resource consumption and energy consumption; the quality principle means the materials should be able to meet the quality requirements of production; the benefit principle is refers to the expense investment minimum but the profit biggest. According to the above three principles, the selection of materials can realize the goal of the economic benefits of enterprises and environmental protection.

Third, in the "cleaner production" phase, apply the integrated prevention strategies to production processes and products in order to reduce risks to humans and the environment. This kind of production can not only meet the needs of people, but also make rational use of natural resources and energy resources and protect the environment.

Fourth, in the phase of "environmental protection sales", enterprises should adopt the means of green sales, carry out green publicity on products, advocate consumers to use environmental protection products, and arrange the routes of transport during the process of product transportation.

In the end, the environmental cost of each stage of the product is optimized by adopting the modern environmental management model, and the total environmental cost of the enterprise is also reduced to the lowest.

**Internal Environment Cost Management Method from the Perspective of Supply Chain**

The ecological design of the internal target environmental cost of the enterprise belongs to the pre-planning link, and the complete environmental cost management system should also include the
accounting and control in the event and the feedback and perfection after the event. ERP system is a powerful tool for enterprises to achieve this goal. Therefore, enterprises should take ERP system as the foundation, combine with "TS-ABC" cost management method to carry out the management and control of the internal environmental cost of the enterprise (Figure 4.1).

![Diagram of Internal Environment Cost Management Process and Method from the Perspective of Supply Chain](image)

**Figure 4.1. Internal Environment Cost Management Process and Method from the Perspective of Supply Chain.**

**External Environmental Cost Management Framework from the Perspective of Supply Chain**

As a member of the whole supply chain, the enterprise is not only limited to the management of the internal environmental cost, but the effective control of the external environment cost can also create considerable value for the enterprise.

**Analysis on Environmental cost Management of Upstream Suppliers**

Because the improvement of the upstream suppliers' environmental cost will indirectly affect the environmental cost of the internal circulation links of the enterprise through the purchasing link, and have an impact on the whole environmental cost management of the enterprise. The selection of upstream suppliers, especially strategic suppliers, is not only the starting point of enterprise integration strategy, but also the core of strengthening upstream environmental cost.

In order to select the best supplier, the enterprise shall comprehensively consider the environmental protection requirements, policies and key factors related to laws and regulations. In the process of evaluation, the enterprise shall conduct a corresponding evaluation and grading of target suppliers through questionnaires, field visits and credit evaluations, and adopt different procurement policies, seeks to minimize corporate environmental costs and maximize corporate value and realize the competitive advantage and value creation of the enterprise market.

**Analysis on Environmental cost Management of downstream Enterprises**

After strategic cooperation with upstream suppliers in the procurement process of external environmental cost management, the enterprises can realize cleaner production according to the requirements, the enterprises should effectively link up the green marketing with the downstream customers in the external supply chain, and realize the scientific and effective management of the environmental costs of the downstream enterprises.

Selecting suitable downstream enterprises, enterprises should integrate their own strength, marketing strategy, product market positioning and target customer group. In this way they can promote the products of enterprises through the establishment of green franchises and minimize the
environmental cost of the enterprise and achieve the win-win cooperation between enterprises and downstream companies in environmental cost management.

Through the strategic cooperation, the scientific disposal of wastes and the effective recovery of resources or the effective disposal of waste products can be promoted, and the environmental cost control of enterprises can be achieved, and the overall image of the enterprises can be enhanced, the value appreciation of enterprises also can be expanded.

Conclusion
By analyzing and innovating the traditional environmental cost management system, this paper puts forward the enterprise environmental cost management model based on the supply chain perspective. It breaks through the traditional model of environmental cost control, which is dominated by "end governance", and considers that the enterprise environmental cost management model is a combination of life cycle and upstream suppliers under the perspective of supply chain. The integrative cost control model of downstream customers can achieve the best combination of economic and environmental win-win effects by building this model. It not only has great benefits for the long-term development of enterprises, but also takes into account the realization of social environmental benefits, which is conducive to the realization of the dual objectives of economic and social environmental benefits of enterprises. Enterprises can build this model to achieve the best combination of economic and environmental win-win effect.

References