

# Research on strategic environmental cost management: based on environment and sustainable development

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**Abstract.** Environmental protection and sustainable development have become the consensus of the international community. International "green trade barriers" and China's increasing efforts on environmental protection have gradually increased the environmental costs, environmental factor has already become an important part of business management. In the context of the economic development under the guidance of environment and sustainable development, this paper presents the concept of strategic environmental cost management based on strategic cost management, and establishes the framework of strategic environmental cost management based on environment and sustainable development from three aspects: environmental analysis, green value chain analysis, strategic positioning analysis and strategic environmental cost drivers analysis.

## Introduction

Based on the theory of corporate social responsibility, "enterprises should link the social responsibility of enterprises with the various responsibilities of business operators to meet consumer needs"[1], and environmental protection is a part of corporate social responsibility. Enterprises are faced with environmental pressure imposed by stakeholders, such as government, customers and suppliers, and environmental factors will gradually become one of the core elements of business development, more attention should be paid to the environmental cost management which should be elevated to strategic level, that is strategic environmental cost management. At present, there is not much research on strategic cost management based on environment and sustainable development, this paper puts forward the concept and proposition, and tries to establish a framework of environmental cost management based on environment and sustainable development.

## Overview of strategic environmental cost management

**Overview of strategic cost management.** The term "strategic cost management" was first proposed by British scholar Kenneth Simonds[2], and he discussed the importance of combining cost management with enterprise strategy. Later, Professor Michael Porter, an American scholar, proposed that cost management should be improved to a strategic level. On this basis, in 1992 the American scholars V. Govindarajan and John K. Shank put forward the strategic cost management framework, including value chain analysis, strategic positioning analysis and cost drivers analysis[3]. It is a masterpiece of strategic cost management, which has been widely recognized by the academic circle. This is the famous Shank Model which most of the strategic cost management theories are based on after that.

The main contribution of contemporary scholars in China is to introduce strategic cost management into China, Xing Wang and Pingfan Li (1998) are representatives, they introduced the basic contents of strategic cost management[4]. Yuehua Jiao and Tianrong Yuan (2001) constructed the framework of strategic cost management comprehensively based on the Shank Model, which enriches the content of strategic cost management research[5]. Wei Qiao and Qiaogen Feng (2011) put forward the concept of low-carbon strategic cost management, and the calculation of invalid resources consumed by exploitation of resources, production, transportation, recycling and so on should be incorporated into the cost accounting system[6]. It is a classic study of cost management in low carbon production and green business operation. After that, Yuan Zhou and Xiangjun Lu (2014) concentrated on the strategic cost drivers under the low carbon economy, including structural cost drivers and executive cost drivers[7].

**Strategic environmental cost management.** By reading literatures above, the author learned that the core elements of the traditional strategic cost management mainly consist of strategy, cost, profit. The environmental cost management strategy is put forward to meet the needs of the strategic management of the environment and sustainable development, is a combination of environmental cost management and strategic management, is a kind of adaptive change of strategic cost management to environment change and its requirement, and is the environment cost management for enterprises to obtain and maintain lasting competitive advantages. It aims to adapt to the internal and external environment, and adopt the environmental cost management strategy and tactics that match the overall strategy of the enterprise, and make the environmental cost information run through the whole cycle of environment and sustainable development strategy management, and finally seek a lasting cost competitive advantages through comprehensive planning, decision-making, control, accounting, evaluation and improvement of enterprise environmental cost, structure, driving factors, target, process, performance and behavior.

**The main characteristics of strategic environmental cost management.**

**The characteristics of overall situation.** Strategy is a series of systematic solutions from goals to implementation measures. Strategic environmental cost management is based on the overall development strategy of the organization, and thus the overall cost management effect of the organization is pursued. Managers develop cost strategies on the basis of analysis of the internal and external environment of the organization and implement strategies in coordinating local activities. The strategic environment cost management plan generally includes the strategic intention, strategic principle, strategic goal, strategic step, strategic emphasis, strategic measure and so on. The overall situation is expressed in space as well as in time. It runs through all stages and the entire process of planning, design, implementation, accounting and evaluation of environmental cost management.

**The characteristics of seeing problem long.** Strategic management is a kind of management that based on the present and the future. "It is not only the reaction of enterprises to seek long-term development requirements, but also the overall plan for enterprises to survive and develop for a long time to come"[8]. Strategic environmental cost management "should not only manage the current environmental cost, but also the future"[9]. Accordingly, in the formulation of the strategy, the internal and external environment and resource constraints of the enterprise should be comprehensively investigated, as well as the changing trend of the internal capabilities and market environment in the future, so a long-term environmental cost strategy that can be applied to the current and applicable over a long period of time can be formulated, ultimately for enterprise to strive for long-term development, and to bring long-term environmental cost reduction.

**The characteristics of environmental adaptability.** The adaptability of strategic environmental cost management to environment contains static adaptability, dynamic adaptability

and critical adaptability. First of all, environmental cost management has taken into account the current and future important environmental factors in the formulation of strategy, within a given time frame, the strategy does not need to change on condition that the change in the environment does not deviate from expectations, the management continues to follow the established strategy. Secondly, environmental changes are set within the strategic framework of the enterprise[10], the dynamic change of environment determines that the choice of environment always develops dynamically. Finally, while in the formulation of strategy, enterprises will predict future environmental changes for a longer period of time, but with the extension of time, the change of environment will gradually surpass the expectation, it is necessary to innovate and develop environment cost strategy to improve its adaptability to new environment.

### The basic framework of strategic environmental cost management based on environment and sustainable development

**Overview of basic framework of strategic environmental cost management.** Environmental cost management strategy framework is composed of environmental analysis, strategic positioning analysis, green value chain analysis and cost drivers analysis. As shown in Figure 1, environmental scrutiny is the analysis of the external environment in which the enterprise is located, is the foundation of strategic environmental cost management; Green value chain analysis breaks through the scope of cost management, extends the scope of environmental cost management from the inside to the outside of the enterprise; Strategic positioning combines environmental cost management with strategy on the basis of green value chain analysis, to achieve the optimization of environmental cost and the promotion of enterprise strategy; The analysis of strategic environmental cost drivers aims to investigate the causes of environmental costs, is the concrete expansion and application of optimizing green value chain and strengthening environmental cost management function under the strategic positioning.

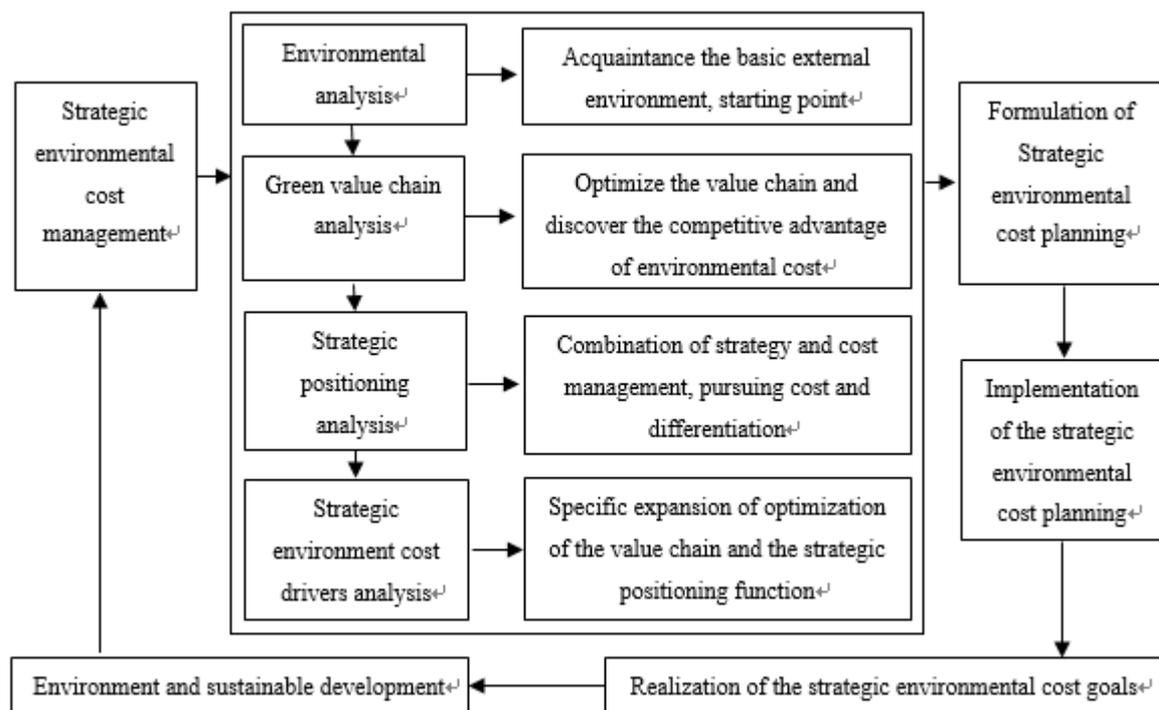


Fig 1: Framework of strategic environmental cost management

### **Analysis of the elements of strategic environmental cost management framework.**

**Environmental analysis.** Environmental analysis is the starting point of strategic environmental cost management. Companies can discover and use external opportunities avoiding the threat of the environment by analyzing the status and trends of the environment, what enterprises primarily analyze is the external environment for survival and development, environmental analysis contains macro environmental analysis, industrial environmental analysis and competitive environment analysis.

**Green value chain analysis.** Green value chain is a new value chain model based on Michael Porter's theory of value chain and integrates the concept of green, which meets the needs of modern and sustainable economic and social development. Based on the concept of sustainable development, enterprises should attach equal importance to "environmental benefits" and "economic gains"[11].

*a. Green industry value chain analysis.* Enterprises should learn to create value and obtain competitive advantage by integrating the industry chain strategy and linking the green value chain of each enterprise effectively. The traditional industry value chain refers to a set of enterprises that have a cohesive relationship based on a core technology or process to provide a utility system that meets the needs of consumers[12]. Instead, green value chain emphasizes sustainable concept more, the green value each link in the chain increases, so cooperation between the enterprises will be based on the link of green value. In the process of industry value chain analysis, enterprises have to collect environmental cost information of upstream and downstream enterprises of the same type, carry out comprehensive analysis, select suppliers with low environmental costs, and finally integrate industries and access into a green industry value chain system. After the establishment of the green strategic alliance, the enterprises and the trusted strategic cooperation partners share the environmental information highly, and jointly reduce the environmental costs and share the environmental benefits.

*b. Analysis of enterprise green value chain.* In the background of the concept of green development, the enterprise value chain system is different from the traditional, it is a closed loop system with the goal of maximizing the green value and starting with the recovery and reuse of the product and integrating with the green value. The enterprise green value chain is a collection of value operations that can create a green value maximization, enterprises have to collect the environmental cost information of each activity, improve or simplify the action with the high cost of the environment or give it up if necessary. Based on the theory of limited resources, enterprises should focus their limited resources on those activities which can create economic and environmental value, outsource those activities with low environmental benefits and high environmental costs to specific enterprises, in order to achieve the optimization of green value chain and reconstruct the green value chain of enterprises.

*c. Analysis of green value chain of competitors.* The analysis of green value chain of competitors is not only the need for enterprises to examine themselves, but also to find new space of value creation. Enterprises should collect the environmental cost and revenue information of competitors in an all-round way, including their social responsibility performance, social (brand) reputation and target position of consumer groups, to find out the advantages of competitors in reducing environmental costs. The purpose of analysis of green value chain of competitors is obtaining information of green value creation in every aspect of the value chain of competitors and comparing them with enterprises. For the core or important part of the competitor's internal value chain, once ability and market space permitting, enterprises should regard the competitors as

reference objects and benchmarks, to improve the relative weakness of their own green value chain, otherwise they can adopt a way of avoiding competition and open up new blue-ocean.

**Strategic positioning analysis.** In the strategic environmental cost management, the method of material flow analysis (MFA) is used to analyze the flow of material between the environment and economic system, it can find the direct source of environmental stress by “revealing the flow characteristics and transformation efficiency of matter in a particular area”[13]. The way of value creation is to pursue the cost leadership strategy and differentiation strategy at the same time, instead of following the Potter competition strategy, either choosing differentiation strategy or choosing cost leading strategy. Green products have met the "difference" requirement, can bring higher utility value for customers, if the cost structure can be improved, the two will form a vast space for value creation, which is the result of the combination of differentiation and cost optimization.

The following paths can be used to achieve cost leadership strategy and differentiation strategy at the same time: a) Views of “across alternative industries”. Alternatives refer to products or services that have different functions and forms that are different from substitutes[14]. Green product is a kind of an alternative product, can provide a more healthy and environmentally friendly user experience, enterprises should maximize the creative potential of green ideas, treat customer demand as the starting point of strategic pricing, derive cost from price to achieve cost structure optimization and effective cost control; b) View of “Cross different strategic groups”. Enterprises should break through the narrow view, distinguish the determinants of customer choice, for example, they can abandon those designs that will not change the customers' choices, thus saving the material consumption and reducing environmental pollution; c) Redefinition of industry buyer groups. The buyer group is a buyer's chain consisting of buyers, users, and influencers. A product and service are bound to attract the largest customer groups if they can meet the needs of different groups, thereby broadening the road of enterprise specialization; d) Enterprises should cross over the industry function and emotional oriented from the seller, and find new space of function and emotional of existing industry.

**Strategic cost drivers analysis.** This paper incorporates the environmental factors into the traditional theory of strategic cost drivers, and then redefines the content of strategic cost drivers, including structural environmental cost drivers and executive environmental cost drivers. *The structural environmental cost drivers* include the scale of green management, the scope of green business, the investment in environmental protection facilities, and the experience. Structural environmental cost drivers are ex ante cost drivers, have a decisive influence on the basic economic structure of an enterprise, can't be changed in a short time for its long-term stability. a) In scale, toward the green scale economy development, enterprises should promptly eliminate large plants, machineries and equipment with high pollution emissions or energy consumption, expand the scale of environmental protection management until achieving economies of scale, in order to achieve high efficiency and quality of production and operation and the best condition of low environmental cost, high environmental revenue and economic revenue; b) The scope of business. Enterprises should analyze the scope of business and take themselves as the cores, analyze the vertical and horizontal value chain, and adopt the strategy of forward, backward or horizontal integration based on the advantage of obtaining environmental cost; c) Investment in environmental protection facilities, including tangible and intangible facilities, one of the most effective ways to control environmental costs is increasing investment in environmental protection facilities before production which can effectively reduce the cost of environmental compensation later, so enterprises should incorporate the concept of sustainable development in to the initial stage of

production design and choose production facilities and design techniques with minimal damage to the environment; d) Experience. Enterprises should treat the concept of green management as part of corporate culture, organize related training activities to teach staff green management procedures and methods, finally the experience will be formed after repeated operations, the consequence of which is the reduction of the cost environment. Learning spillover effect will be produced gradually with the green business model matures[15], at this time, the strategic cooperation enterprises in the industry chain can strengthen the green management staff team through the use of learning effect.

**Executive environmental cost drivers** are the guarantees of effective operation of all operation procedures, they belong to the middle stage of cost control, the purpose of which is supervising and maintaining the normal operation of environmental protection facilities in the daily operation of enterprises, and escorting the realization of environmental protection targets. There are three chief parts of executive environmental cost drivers: a) Environmental awareness and action mean that enterprises and their employees cultivate and improve the awareness of environmental protection during the whole life cycle of products, and fully implement environmental protection activities; b) Total quality management is the whole process of quality management, and all staff are involved in, and pursue both high quality and low cost. Consumers are increasingly concerned about the safety, energy efficiency, and ecological nature of the products they use. Consequently, environmental factor will become an important factor in the quality of management. Quality management is involved in the process of environmental management, all staff are not only responsible for quality responsibility, but also environmental protection responsibility; c) Stakeholder management in green value chain system, a value activity related to environmental cost will always be affected by other activities, so it will become a source for enterprises to obtain environmental cost advantages provided that they can coordinate the interaction activities among stakeholders. In the enterprise green value chain system, relationship management includes coordination between basic activities, coordination between support activities, coordination between basic activities and support activities. The management of the relationship between enterprise and other stakeholders in external value chain system is very important and related to the survival and development of enterprises, including the relationship between enterprises and upstream enterprises, and the relationship between enterprises and downstream enterprises. They should attach great importance to cooperation with other related enterprises in strategic environment and cost management, reduce environmental costs and share environmental benefits, maintain the stability of strategic alliances, reduce the environmental costs of the whole industry supply chain, and obtain competitive advantages of low environmental costs with them.

## Conclusions

Stepping into the ecological society, it is no longer contradictory between development of human society and environmental protection. Environmental protection and sustainable development are the common choice of human society. In this context, the study of strategic environmental cost management has certain theoretical and practical significance. This paper incorporated environmental factor into Shank model, put forward a creative framework of strategic environmental cost management in which environment is regarded as one of the core elements, including environmental analysis, green value chain analysis, strategic positioning analysis, and strategic environmental cost drivers analysis. The author will study the strategic performance evaluation system based on environment and sustainability, in order to further deepen and improve the strategic environmental cost management system.

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