Academic Journal of Humanities & Social Sciences

ISSN 2616-5783 Vol. 2, Issue 5: 101-111, DOI: 10.25236/AJHSS.020514

Construction of Enterprise Environmental Accounting System

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ABSTRACT. *At present, the environmental cost of China's rapid economic growth is relatively large, and the implementation of the sustainable development strategy has put forward a series of new requirements for Chinese enterprises. Environmental accounting not only provides environmental information to the outside world, but also guides companies to take the path of sustainable development. This paper summarizes the three development models of environmental accounting in the world. By comparing the advantages and disadvantages of the three models, and combining China's actual construction of the Chinese enterprise environmental accounting system, the basic content and methods of environmental accounting in China are presented. Provide reference for the establishment and development of China's environmental accounting system.*

KEYWORDS: *environmental accounting; material flow; environmental cost.*

1. Introduction

Since the reform and opening up, China's economic development has achieved outstanding performance and paid a heavy environmental cost. Focusing on the future, China needs to change the way of economic growth and deal with the relationship between the economy and the environment, and the most important ones must be implemented at the enterprise level: To achieve this transformation, we must rely on various external requirements or internal dynamics. To encourage enterprises to incorporate environmental factors into the entire management and decision-making process; As the most important economic information system of enterprises, the expansion of enterprise accounting must embed the environment into the accounting process and provide information about the environment.

Traditional accounting is based on traditional economic and management theories. It systematically reflects the process and results of economic activities inside and outside the enterprise according to certain models. It focuses on financial information measured in monetary terms, focusing on individual or partial economic purposes, emphasizing the micro-efficiency, direct benefits and immediate interests of enterprises, especially investors, ignoring the unpaid occupation and pollution of social resources, leading enterprises to At the expense of environmental quality in

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exchange for local interests. Traditional accounting masks the existence of these environmental problems, making the cost of accounting information unrealistic, the profit is inflated, exaggerating the financial status and business performance of the enterprise, and increasing the risk of accounting information users. As the impact of business on the environment has intensified, corporate environmental activities and environmental transactions have become an important element of legal and reasonable business operations.

The traditional accounting mainly reflects the economic activities of a certain enterprise, ignoring the environmental impact and response of the enterprise. On the one hand, the environmental impact caused by the enterprise will not be confirmed, recorded and reported; on the other hand, the environmental protection activities of the enterprise itself The use of vague accounting methods in environmental transactions is generally recorded in related subjects such as cost and expenses, and it is difficult to directly reflect the impact of environmental costs that have occurred on business results. Therefore, from the perspective of the implementation of sustainable development strategy, traditional enterprise accounting is flawed. In particular, it is necessary to modify its model and include environmental factors to provide supplementary information. This is called environmental accounting.

How to embed environmental factors into traditional corporate accounting is a very complicated and arduous task in methodology. The research on environmental accounting in the international scope has a certain foundation, but it has not yet formed a clear and unified model. The implementation methods and implementation levels of enterprises in different countries are also very different. Generally speaking, corporate environmental accounting is still an area of research and exploration. In recent years, China has made progress in corporate environmental accounting research, and it has also been reflected in accounting practice, but the overall level is relatively lagging behind. It is in this context that this paper fully absorbs the existing research results of environmental accounting, and draws on the ideas and methods of macroeconomic and economic accounting, environmental science and monitoring and evaluation, trying to establish an enterprise environmental accounting system that is in line with China's national conditions, for the environment of China. Provide a basis for the establishment and development of the accounting system.

2.Different Development Models of Environmental Accounting and China's Choice

How to embed the unique theme of the environment into traditional accounting, the extent to which the environment can enter the accounting of environmental accounting depends not only on subjective wishes, but also on the current conditions and the degree of fit with traditional accounting. In the process of research and exploration of enterprise environmental accounting, different backgrounds and different focuses have led to different environmental accounting practices. Summarizing these different practices, combined with the existing organizational structure of corporate accounting—divided into two parts: financial accounting and

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management accounting, the current corporate environmental planning can be divided into the following three modes: 1、Environmental financial accounting – through environmental costs Environmental liabilities, environmental assets and environmental benefits reflect the impact of environmental issues on the company's financial position and operating results. 2、 Environmental Management Accounting—Collect environmental impact information and environmental related financial information by constructing physical, value or cross-type environmental performance indicators. 3、Environmental accounting – pay attention to the cost and benefits of environmental protection activities of enterprises. Summarizing the above three modes can roughly outline the basic framework of environmental accounting, as shown in Figure 1. The difference between Mode 3 and Mode 1 and Mode 2 is mainly the difference in the scope of the accounting objects. Mode 3 mainly focuses on the environmental protection activities implemented by the enterprise, regardless of the environmental impact of the enterprise. The reason why it appears as a model may be to limit the accounting. The scope of the object reduces the difficulty of accounting - this is inevitable in the beginning of a thing. From a method perspective, Mode 3 can be seen as a variant of Mode 2 because the environmental issues documented in environmental accounting are already included in environmental management accounting.

The environmental accounting calculations to be established by Chinese enterprises can not only provide environmental information to the outside world, but also guide enterprises to follow the path of sustainable development. It is necessary to learn from the three development models of environmental accounting and establish a model suitable for the development of Chinese enterprises. Because environmental problems are largely “foreign objects” for enterprises, it is more difficult to “survive” in a rigorous and unified financial accounting system, but they can “take root” in the soil of management accounting, because the latter The flexibility you have is more inclusive of environmental themes. Therefore, it is more suitable to deal with environmental problems in enterprise accounting, starting with environmental management accounting, and then transitioning to environmental financial accounting based on value-type environmental information (such as environmental costs, environmental benefits, etc.), gradually confirming, measuring, recording, Report other environmental accounting elements (such as environmental liabilities, environmental assets). In this sense, the establishment of China's environmental accounting system must start with environmental management accounting and finally implement environmental accounting.

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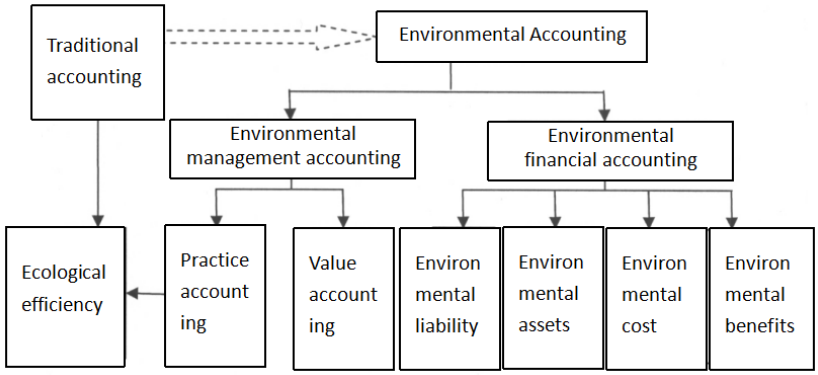

Figure1 The basic framework of enterprise environmental accounting system

3.Contents and methods of environmental accounting for Chinese enterprises

(1) Basic content

In order to promote the disclosure of environmental information of Chinese enterprises and improve the sustainable development of enterprises themselves, promote the practical application of environmental accounting in China, and ensure the operability and enthusiasm of environmental accounting within the enterprise, reduce the cost of actual operation, and reduce the future due to the future. The degree of influence of uncertainty on the collection of environmental accounting data, this paper has made necessary simplifications in establishing the basic content of environmental accounting, which mainly includes the following aspects:

① Preparing a material flow balance sheet to collect physical environment information;

②Calculation The eco-efficiency indicator mainly targets the eco-efficiency indicators of water, energy and major pollutants;

③Accounting value-type environmental information, which mainly includes environmental costs, environmental benefits, environmental investments, environmental assets, and temporarily does not consider environmental liabilities.

(2) Accounting methods

①Prepare a material flow balance sheet. The preparation of the material flow balance table (see Table 1) is a better way to collect information on the physical environment of the enterprise. It mainly records the amount of substances flowing in and out of the enterprise during a certain period (generally one year) according to the principle of material flow balance. In theory, the substances flowing into and out of the enterprise should be balanced. In general, the materials flowing into the enterprise include materials, water and energy, and the materials can be subdivided into raw materials, auxiliary materials, commodity materials, packaging materials

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and business materials; substances flowing out of the enterprise include products (including by-products) and non-products. Out (waste and emissions), the entire production process of an enterprise can be seen as the process of converting materials, water and energy flowing into the enterprise into products (including by-products) and non-product outputs (wastes and emissions). The material flow balance table records the whole production input and output of the enterprise by recording the material information of the input and output of the enterprise. In the actual process of compiling the material flow balance sheet of the enterprise, due to the different methods of measuring each input and output material, the measurement units of various substances are also different, and there are various errors in the actual measurement process, and the material flow balance It is difficult to achieve a true balance between the input and output sides of the table.

The material flow balance table keeps track of the various substances invested by the enterprise, making the consumption of different materials transparent, which provides a feasible path for the management of the company to save costs. Not only that, but by comparing the input and output values of the material flow balance table, it is mainly to compare the material input with the product output or the non-product output quantity, improve the use efficiency of the enterprise materials, improve the business performance and improve the business. The environmental performance of the company.

Table1 The basic structure of the enterprise material flow balance sheet

Material input	Material output
Raw material	Product output
Auxiliary material	Core product output
Commodity material	By-product output
Packaging material	Non-product output
Business materials	Exhaust gas
energy	Sewage
water	Solid Waste

②Calculate eco-efficiency indicators. The eco-efficiency indicator is a simple way to combine environmental accounting with traditional accounting. It is the ratio of environmental variables in environmental accounting to financial variables in traditional accounting. The purpose is to reflect the economic results per unit of a certain period of time. The environmental cost of paying. In addition, by comparing the eco-efficiency of the same enterprise in different periods, it can reflect whether the environmental performance of the enterprise is improved. By comparing the eco-efficiency between different types of enterprises, the level and difference of environmental performance of each enterprise can be evaluated. Since the eco-efficiency index is an inverse index, the smaller the value is, the better the ecological efficiency is. When the dynamic analysis is performed, the eco-efficiency changes

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direction is “+” ", indicating that the company's environmental performance is worsening rather than improving.

Accounting for value-type environmental information. The enterprise value type of environmental information (see Table 3) is a form of currency that expresses the relationship between the enterprise and the environment, including the productive activities of the enterprise, the control of pollution activities, prevention and management activities, and research and development activities. Wait. Relative to the physical information of the physical type, the stakeholders of the enterprise, especially the management, pay more attention to the value of environmental information, because the environmental accounting elements expressed in currency can not only reflect the impact of corporate activities on the external environment, but also reflect the environment. The impact of factors on the company's own finances. Environmental cost is the most important concept in many value-based environmental information. It is the hub connecting environmental management accounting and environmental financial accounting. In environmental management accounting, environmental cost is the further deepening of enterprise physical material flow accounting, which can better reflect the environmental cost of corporate activities. In environmental financial accounting, environmental cost is a prerequisite for calculating environmental benefits, environmental assets and environmental liabilities. Therefore, the key to accounting for enterprise value-type environmental information is to calculate the environmental cost of the enterprise.

The environment provides natural resources and absorbs waste to enterprises. The two central words involved in broad environmental costs must be “natural resources” and “waste”. Enterprises with “natural resources” as raw materials have fewer production activities, and their cost accounting methods are also relatively simple. The main reason is the natural resource purchase cost, which is the material cost of product output. Obviously, this kind of environmental cost is special. Only enterprises that convert resources into part of the product will exist. Other general-type enterprises can ignore the material cost of product output.

The activities related to “waste” are more complicated. First, the waste is the same as the product produced by the enterprise. It is also the result of the production activities of the enterprise. It also needs to pay the productive cost, which is the material cost of non-product output. Secondly, the enterprise In order to eliminate the waste produced by itself, it is possible to adopt the method of tail end treatment, the cost of controlling pollutants and emissions, and the method of comprehensive treatment (such as cleaner production), and preventive environmental costs occur; Carry out some management activities indirectly related to waste, such as measuring pollutants and emissions, environmental accounting and other activities, and environmental management costs; Finally, the company will also carry out research and development activities for waste, and research and development costs occur. Therefore, the general type of corporate environmental costs can be divided into the following categories: (1) material costs for non-product output; (2) control costs for waste and emissions; (3) prevention and other environmental management costs; (4) Research and development costs.

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①The material cost of non-product output is mainly measured in the form of money to measure the negative impacts of the production process, while the control costs of waste and emissions, prevention and other environmental management costs, and research and development costs can be collectively referred to as corporate environmental protection. Activity cost is the monetary value of the company's environmental protection activities under environmental pressure. Obviously, there are clearly different motivations and attributes between these two categories of environmental costs. The above classification of environmental costs is mainly based on the different types of environmental activities of enterprises. In order to further refine the environmental costs and integrate them with traditional accounting terms, it is also possible to distinguish between depreciation, materials, labor, etc. under various environmental cost categories. project. Finally, in order to be consistent with the environmental statistics of government departments, and to clarify and guide the internal environmental management of enterprises, it is also necessary to allocate environmental costs according to different environmental areas. The allocation standard is mainly the environmental protection recommended by SEEA (2003). The Activity Classification Criteria (CEPA) simplifies it into air and climate protection, wastewater management, solid waste management, soil and water protection, and others. In addition, in order to reflect the impact of environmental issues on corporate finance, value-based environmental information also includes environmental financial accounting indicators such as environmental assets and environmental investment. Material cost of non-product output. The material cost of non-product output refers to the actual consumption value of materials converted into NPO rather than product output during the production process. According to the principle of material flow balance, most of the enterprises turn into product output after inputting materials, water and energy, but some will be converted into non-product output (NPO), that is, various wastes and emissions. Obviously, the existence of non-product output material costs is a concrete manifestation of ineffective production. Studies have shown that the cost of purchasing materials for non-product output is the most important component of environmental costs, accounting for about 40% - 70% of the total environmental cost. In other words, the waste and emissions produced by the company are also costly, and they are also invested in materials, water and energy, and they are paid more than once in the conversion of these inputs into waste and emissions. Transportation costs, management fees, processing costs, and processing costs. Calculating the cost of this part of the material is essential to guide the management of the enterprise to improve the efficiency of resource use and reduce the environmental impact; and the material cost of the non-product output is part of the production cost of the enterprise, directly related to the profit of the enterprise, and reduce the management of this part of the material. The layer is very attractive. In other words, reducing the material cost of non-product output is both environmentally beneficial and economical.

In the material flow balance sheet of the enterprise, no matter whether it is a physical material input or a value material input, there is no distinction between “material cost of non-product output”. The accounting for this part of the material cost can only be estimated from the total material cost of the enterprise according to

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a specific material loss. In addition, the material cost of non-product output, in addition to the purchase cost of various loss materials, should also include the various processing costs attached to the material's production process. The material cost accounting for such non-product output is mainly to solve the following two problems: (1) Estimating the proportion of losses; (2) Calculating the processing costs of waste and emissions.

②Control costs of waste and emissions. The cost of controlling waste and pollutants is primarily due to the company's pollution-removal activities, not the costs incurred for prevention purposes. Specific activities to control waste and emissions include equipment maintenance, internal waste disposal, waste and discharge disposal, off-site recycling, waste disposal, recovery of contaminated sites, and other pollution clean-up operations. Correspondingly, the company has incurred costs for the management, disposal and disposal of waste and emissions (such as equipment depreciation, operating costs, external services, processing fees, etc.). In addition, companies will pay for remedies and compensation related to environmental damage, compliance costs to control pollutants and emissions, and insurance and accrued environmental liabilities, which are clearly not for the prevention of pollutants and emissions. It should also be included in the cost of controlling waste and emissions. It can be subdivided into the following sub-categories: Depreciation of end-of-line equipment; business materials; water and energy; internal staff; external services; fees, taxes and licenses; fines; insurance; and remediation and compensation.

③Prevention and other environmental management costs. This part of the cost includes the preventive costs paid to prevent the generation of waste and emissions, as well as the cost of other environmental management activities that are not directly related to waste and emissions control. The former is mainly for preventive integrated production activities, such as active ecosystem management, on-site recycling, cleaner production, green procurement, supply chain environmental management, etc.; the latter mainly refers to general environmental management activities, such as building environmental planning and environment. Systems (environmental management systems, environmental financial accounting, environmental management accounting), environmental measurement (monitoring, performance auditing, performance evaluation), environmental communication (social group meetings, dredging government, performance reports) and other related activities (such as community environmental protection projects) Financial support).

The focus and difficulty of accounting prevention and other management costs is to estimate the preventive costs of waste and emissions. Preventive activities not only contribute to environmental protection, but also bring some economic returns by improving the efficiency of materials, energy use and waste reduction. Therefore, preventive costs are not all of the comprehensive production costs, but only a part of them. In actual accounting, they need to be allocated according to the specific proportion of environmental protection. The same prevention and other environmental management costs can be subdivided into: Depreciation; business materials, water and energy; internal staff; external services; and other costs.

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④Research and development costs. The research and development costs here must be related to environmental issues. The specific research and development costs include the cost of research on alternative toxic materials, the development cost of energy-efficient products, the cost of research using recyclable or renewable materials, and equipment with higher materials or energy efficiency. Research costs, etc.

⑤Environmental income. In general, corporate environmental benefits mainly come from environmental pollution control activities and environmental assets, covering a wide range, and in the actual accounting process, the estimated components are large. In order to reduce the subjective estimation error and ensure the consistency of the data collection process, only the actual income related to the environment is accounted for and named "environmental income". These include: sales revenue from waste or waste, excess capacity sales revenue from waste treatment equipment, insurance reimbursement income from environmental claims, and investment returns on environmental related equipment.

⑥ Environmental investment and environmental assets. The enterprise's environmental investment and environmental asset accounting are mainly for the capital expenditure incurred by the enterprise's environmental protection activities. In addition to the recurrent expenditures such as manpower and material resources, corporate environmental protection activities require some environmentally-friendly equipment. Generally speaking, the company's environmental protection related equipment includes the following two types: The tail end treatment equipment is generally an independent machine, equipment or building that is not needed in the production process of the enterprise, and its environmental related components are 100%, such as wastewater treatment equipment. Comprehensive cleaning production equipment, mainly refers to machines, equipment or buildings that produce less waste or emissions than the general technology at the same production capacity. These devices are generally more expensive and have a two-layered property of environmental and economic benefits. Evaluating the environmentally relevant costs of a comprehensive clean production facility is primarily based on its purchasing motive—whether it is fully considered before it is installed, and the investment cost is higher than other general equipment.

Accounting for environmental investment and environmental assets can not only reflect the company's efforts in protecting the environment and the actual ability to control pollutants, but also provide some basic data for environmental cost accounting. Environmental investment accounting can draw on SEEA-2003's meaning and accounting scope for capital expenditures for environmental protection activities. First, they are divided into two categories: (1) "management terminal" technical equipment expenditures for the treatment of wastes and emissions from production processes, with the aim of adding a facility at the end of the production process to move, convert or reduce Emissions of gas or sewage; (2) "Integrated investment" expenditures, also known as cleantech expenditures, are expenditures incurred in order to purchase or modify production facilities to make environmental protection an integral part of the production process to reduce or eliminate emissions.

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If the existing equipment is modified solely to reduce or eliminate the pollutants, the expenditure can be estimated according to the modification cost of the existing equipment; if the equipment is improved or purchased with both environmental considerations and economic considerations, then the pollution should be followed. Additional costs of control (costs of comparing "non-polluting or less polluting" equipment to economically equivalent but "contaminated or contaminated" reference equipment) Calculate expenditure. Finally, summarizing these two types of capital expenditures is the environmental investment of the enterprise.

The environmental assets of enterprises are different from the environmental assets in the macro sense. SEEA defines environmental assets as all the natural elements of a country utilized by economic processes. Obviously, environmental assets in the macro sense are centered on "environment" and emphasize the environment. The resources, receiving and ecological services of the economic system are divided into three environmental assets: natural resources, land and surface water, and ecosystem. Environmental assets in an enterprise is an accounting term that focuses on "assets" and emphasizes that assets are the result of cost capitalization, primarily for the environmental components of tail-end management equipment and integrated cleaner production equipment. Therefore, when accounting for the environmental assets of the enterprise, it is different from the environmental assets in the SEEA, and only the results of the enterprise environmental investment and equipment depreciation at a certain point in time are accounted for. The specific accounting formula is as follows: Final environmental assets = initial environmental assets + environmental investment - depreciation of environmental assets.

4. Organization and implementation of corporate environmental accounting

The implementation of environmental accounting requires not only the guidance of its basic theory, but also some objective factors to ensure that environmental accounting can and smoothly run in the enterprise.

First, before implementing environmental accounting, it is necessary to ensure that the management of the company fully recognizes the benefits that environmental accounting can bring to the enterprise itself. The management's attention and support are indispensable. The benefits of implementing environmental accounting mainly include the following aspects: improving resource use efficiency, reducing costs, increasing profits; helping enterprises to obtain environmental certification; establishing a good corporate image, increasing market share of enterprise products; identifying and reducing environmental risks of enterprises Design and implement an enterprise environmental management system; meet the need to disclose environmental information.

Second, there is a need to strengthen the links and communication between the corporate accounting department and other departments, especially the production and environmental sectors. The implementation of environmental accounting involves many aspects such as production, finance, and environmental impact. It is

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obviously impossible for the accounting personnel of the enterprise to complete. Employees in the production department of the enterprise have a better understanding of the use of water, energy and materials, while employees in the environmental department have a clearer understanding of the environmental impact of the company, but the technical language used by employees in the production and environmental sectors is different from the accounting language and cannot be used. Known corporate environmental issues are reflected in the accounting books, so the cooperation of the accounting, production and environmental departments of the enterprise is required to ensure the smooth implementation of environmental accounting.

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