

Discussion on the Application of Environmental Management Accounting in China

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Abstract

As the deterioration of the environment has caused more and more harm to people's lives, environmental issues have received more and more attention. Due to the limitations of traditional accounting systems in environmental factor accounting, the introduction of environmental management accounting system has become an inevitable objective requirement of enterprises, and an important aspect of the introduction of environmental management accounting system is the application of environmental management accounting methods in enterprises. This paper explores the issues related to the application of environmental management accounting methods by theory and practical methods. On the basis of summarizing and summarizing the research results of relevant content at home and abroad, it clarifies the main application methods of environmental management accounting in China and how to use big data to achieve more efficient application, and analyzes how Tsingtao Brewery combines actual implementation of environmental management accounting. Finally, the paper analyzes the limitations of current application of Chinese enterprises and proposes improvement measures, and makes a simple prospect for the application of environmental management accounting methods in China. The research of this paper aims to strengthen the self-conscious awareness of the application of environmental management accounting in China, verify the feasibility of introducing environmental management accounting methods, and provide several methods for environmental management accounting that can be used as a practical reference for enterprises. Accounting has made a little effort and contribution from the theoretical implementation to the implementation level and accelerating the implementation of environmental management accounting application in China.

Keywords

Environmental issue; environmental management accounting; application method; practical application.

1. Introduction

1.1. Research Background

1.1.1. Research Status Abroad

The United States leads the world in both research and application of environmental management accounting. In the article "Stakeholder Action Agenda: A Studio Report on Accounting and Capital Budgeting for Environmental Costs", the central question of the research is raised and the general direction of the research is determined.

Thereafter, follow-up work will be carried out in two directions: one is theoretical research to provide basic guidance for enterprise application; the other is the summary of practical experience, including case study and benchmark study; the other is the summary of practical experience.

In Britain, the government also vigorously develop environmental management accounting, in 2000 published the "Announcement of Environmental Policy" in the UK environment agency is preliminary illustrates the attitude to environmental management, and the United States is different, accounting professional organization in the development of environmental accounting and practice played an important role, including a prize, electronic communication, proposed research published reports, etc.;

Victoria, Australia the epa to implement environmental management accounting item in 2002 completed the four case studies, in the same study also is in a leading position, now Australia's wheat Gary university has established the environmental liability in the Asia Pacific center, its research areas include: the environment and sustainable development of management accounting, environmental auditing, environmental liabilities, etc.;

In France, environmental management accounting is booming, the French scholar s. Schaltegger solved in the "Link Environmental Management Accounting", environmental management accounting and the problem of existing and missing link between ecological sustainability, think that the environmental management accounting focuses on the natural environment, so you need to be included in the under the background of sustainable ecological problems, should not because bypass the social problems, and other sustainability issues.

1.1.2. Domestic Research Status

The study of environmental management accounting in China mainly reflects the characteristics of delayed start, marginalization, complex research content and lack of system. But in recent years, China has also begun to develop environmental management accounting.

In 2006, the Ministry of Finance published the accounting Standards for Business Enterprises for the first time, and the relevant environmental accounting module was promoted in 2007, emphasizing that listed companies should provide public information about the environment in the "information and environmental information disclosure". In 2014, the Ministry of Finance issued the Guidelines, etc. The promulgation of these policies shows that environmental issues are getting more and more attention from the state.

However, due to the late introduction of environmental management accounting in China, there is still a big gap between China and developed countries.

At present, quite a few enterprises have not realized the seriousness of environmental problems, nor have they been conscious of environmental protection, nor have they established a scientific system of environmental management, nor have they taken environmental management accounting as a tool for measuring and managing environmental performance.

Zhang Yalian, a scholar, pointed out in "The current situation of The Implementation of Environmental Management Accounting in Chinese Enterprises and Its Countermeasures -- Based on the Questionnaire survey of middle and senior managers in enterprises" that "people's understanding of sustainable development is mostly limited to the connotation of environmental protection and fails to make sustainable development a strategic objective of enterprise internal management". "In PEST Analysis of China's Environmental Management Accounting, Xu Yang also put forward a similar view" Due to the lack of systematic environmental management accounting theory and scientific and effective methods for guidance, China's environmental management accounting has not played its real role.

Therefore, in the future research on environmental management accounting, Chinese scholars should pay attention to the following problems: pay attention to research techniques and methods;

Pay attention to the construction of environmental management accounting theory system and must be combined with China's national conditions; Focus on dynamic assumptions.

2. Overview of Environmental Management Accounting

2.1. Theoretical Basis of Environmental Management Accounting

The theoretical basis of environmental management accounting includes sustainable development theory, economic externality theory and environmental resource value theory.

The theory of sustainable development emphasizes that human beings must pursue development and economic efficiency by living in harmony with nature rather than by destroying and polluting the ecological environment, ignoring the green and healthy life.

Sustainable development theory provides a theoretical basis for the urgent development of environmental management accounting from the perspective of long-term human interests.

Guide people to save resources and improve economic benefits while protecting the environment by means of recycling.

For example, the implementation of returning farmland to forest not only protects the environment, but also guarantees the resources needed for human survival.

Economic externality theory refers to the use of force to reduce the adverse impact of people's economic activities to external environment, mainly countries should make corresponding laws and regulations standard enterprise behavior, make its corresponding social cost must be taken into account when making decisions, in the form of external force to urge its implementing environmental management accounting, such as the national compulsory measures to close the "ShiWuXiao" enterprise, to enterprise's sewage emissions and carbon dioxide emissions regulations and a series of actions.

Environment resources value theory refers to the environment and resources as a capital enterprise, which is pressing for environmental management accounting for its value accounting, such as using the direct market evaluation, market evaluation refers to the change of environmental quality directly affects the productivity and production costs, resulting in the change of the level of output and price, and then through the observation and measurement of output and prices, to evaluate the value of environmental resources.

2.2. Framework and Tools of Environmental Management Accounting

As shown in figure 1, the core of environmental management accounting goal is to achieve sustainable management, is based on financial data and non-financial data input, such as production costs, expenses, assets, liabilities, etc. During the financial data and environmental testing, environment evaluation, non-financial data, such as product specifications and documents, and then by the environmental management accounting system, to form a useful decision-making information. For example, analyze the financial report or income statement to obtain the data of consumed resources, and then study the whereabouts of energy and materials in the production process to correctly collect all costs. Conduct stakeholder value analysis, operation budget and control, performance measurement and other activities according to the information obtained.



Figure 1. Environmental management accounting framework

Tools commonly used in this framework are:

(1) Cost analysis: The main contents of cost analysis include life cycle assessment, activity-based costing and material flow cost accounting.

Any aspect of the production process can have a negative impact on the environment. Life cycle assessment is the assessment of all product activities throughout the life cycle from raw materials to final results. The full impact of the whole life cycle is cost calculated by means of monetary quantification. Since the technological process and production process of the product have been determined in the development link, the life cycle analysis should include the environmental cost of the whole process of the product from development to the final treatment.

Activity-based costing can be used in combination with life cycle assessment to allocate the environmental costs quantified through life cycle assessment to the corresponding projects and products according to their final scientific trend, rather than simply treating the costs of energy, water consumption and waste treatment as indirect costs. In this way, it is easier for managers to see these environment-related costs and make cost information more accurate, which not only helps managers to price products, but also helps managers to make decisions on cost cutting and carry out pollution prevention and control activities.

(2) Investment valuation assets: The investment evaluation tool mainly adopts the total cost method. The total cost method refers to a comprehensive and complete financial analysis of the total cost of the project when the enterprise makes investment. The total cost method incorporates all environmental costs into the capital budget analysis, identifies economic costs and savings from environmental pollution prevention in addition to traditional costs, and plans and controls pollution prevention in advance.

Enterprises should take environmental factors into full consideration when evaluating project investment, take environment-related costs and benefits as important factors in analysis and evaluation, and rationally evaluate environmental risks.

At present, environmental management accounting requires reasonable identification of environmental risks from the following three aspects: environmental risks under existing laws and regulations, environmental risks caused by changes in laws and regulations, and environmental risks that may be brought by new regulations.

(3) Performance management tools: After considering environmental factors, environmental indicators can be put into performance management tools, such as combining environmental indicators with the four dimensions of traditional balanced scorecard. This allows managers to fully control all aspects of performance with environmental considerations in mind, including the role of enterprise economic measures and environmental measures in customer

satisfaction, internal improvement, finance, research and training, and other strategic aspects, and ensures that enterprises' financial performance evaluation fully reflects environmental considerations.

3. Application Methods of Environmental Management Accounting

The method of environmental management accounting is a more scientific method based on the basic method of management accounting and combined with environmental factors after improvement and innovation.

3.1. Main Application Methods

The application method of environmental management accounting is based on the theory of environmental management accounting, combined with practical experience, and draw lessons from the existing research management accounting, environmental management methods summed up various application methods. It mainly includes environmental cost calculation and management method, environmental prediction and decision-making method, environmental planning and control method, environmental performance evaluation method, etc.

(1) Environmental cost calculation and management methods

This is the most basic step in the application of environmental management accounting. All relevant costs must be considered when making decisions, so environmental costs are naturally indispensable.

Environmental costs mainly include traditional costs, hidden costs, contingent costs and image-related costs, while environmental costs and management methods are to calculate, allocate and manage environmental costs scientifically to achieve corporate goals.

In order to confirm the environmental cost, it is necessary to combine the actual situation of the enterprise and find a confirmation method with strong operability, easy to measure and easy to compare. For example, consider the potential future environmental expenditure caused by the production of the enterprise in the project investment decision evaluation, including litigation and compensation. Internal costs incurred and external costs that can be monetized and should be borne in accordance with the law should be confirmed in accordance with relevant provisions in accordance with the accounting standards for Enterprises, reflecting the environmental costs already borne by enterprises, and included into the corresponding product costs or expenses according to their direction.

This cost can be divided into four types: waste and emissions treatment, prevention and environmental management, non-product output purchase price and non-product output processing cost. The main segmentation methods of environmental cost calculation are:

① Activity-based costing: Homework cost method based on "homework consume resources, product consumption operations" two basis, according to finish homework by the collection of these environmental costs and reasonably allocated to products, processes, and project to make up for the traditional method in environmental costs as the manufacturing cost of the collection, and then assigned to cost objects and distort the cost information that is not enough, to enhance the reliability of the cost calculation.

② The full cost method: The full cost method is to combine the internal and external environmental costs that have an impact on the environment produced by production and labor in the process of enterprise operation, so as to have more integrity. The internal environmental cost is usually allocated to each cost object through activity-based costing, while the external environmental cost is measured by the environmental impact assessment method and then allocated to the cost object according to the cause of the formation of the cost.

③ Life cycle cost method: Life cycle cost (LCC) is a method to identify the environment-related impacts of products in the whole life cycle, and to calculate and evaluate the environmental costs in the process of product design, development, use and scrapping.

It reflects the impact of environmental factors on the whole value chain of enterprises, provides a scientific basis for the selection and integration of enterprise value chain, and can help enterprises to achieve the overall and long-term sustainable development and operation. However, relative information cost is high, and reliability is sometimes not guaranteed.

④ Total quality cost method: Based on customers' demands for environmental protection, the total quality method regards the harmful impact of products or services on the environment as quality defects, and regards "zero defect" as the ultimate standard of enterprises. It continuously improves product quality and reduces environmental costs through PDCA cycle and other methods.

(2) Environmental predetermination and decision making methods

① Forecasting methods: Based on the past and present environmental and economic information, a scientific way to predict the future environmental and economic situation is the premise and basis of decision-making.

The main prediction methods are: environment prediction methods, such as regression forecast method, grey system forecasting method professional environment prediction methods, to the environmental development trend of pollutant emissions, and environmental impact of production and management, the development and change of the environmental policy, environmental protection technology development and so on carries on the forecast, the influence of non-financial information for environmental management; Environmental financial forecasting method, based on the conclusion of environmental status forecast, combined with market conditions and management requirements, the environmental impact factors as sales forecast, cost forecast and profit forecast as a measure of financial forecast, to provide financial information for environmental management.

② Decision method: It is a method of making production decisions, pricing decisions, operating decisions, financing decisions and investment decisions based on the information about environmental impact provided by the prediction and taking into full account factors such as the degree of risk and the length of time.

The enterprise can first calculate the internal cost and external cost through the full cost method, and use the activity-based costing method to allocate the environmental cost to the cost object, use the life-cycle cost method to determine the time range of product projects, and then comprehensively determine the satisfactory environmental investment decision scheme.

(3) Environmental planning and control methods

① Planning methods. The planning method is based on the objectives determined by the environmental management decision, and the specific implementation of the environmental management method. Including: business budget, environmental policy, environmental technology, environmental market and other environment-related factors and sales budget, production budget, procurement budget, production cost budget, operation and management cost budget, the environmental cost and environmental income into these budgets; Financial budget, cash flow budget, forecast income statement, forecast balance sheet, take environmental funds budget, environmental expenses and environmental income budget into consideration; Special budget, for some major or special environmental management decisions specifically set the budget.

② Control method. Control methods are audit and control methods used to ensure the successful realization of objectives. Including: manufacturing cost control, will be collected in the manufacturing cost of environmental cost as a part of the standard cost control, and then complete the formulation of environmental standard cost, environmental cost difference

calculation and analysis; Quality cost control, the loss of the internal environment and external environment before, during and after control, determine the appropriate environmental quality cost model; Inventory control, according to the environmental protection needs of enterprises, market conditions, relevant environmental policies and other factors to determine the order quantity of environmental protection materials and the production of all kinds of environmental protection products, and according to the importance of environmental protection inventory classification control and comprehensive analysis.

(4) Environmental performance evaluation methods

Environmental performance evaluation is to provide support for the decision-making of the enterprise, control the operation of the company, implement the staff evaluation mechanism and so on. Generally, enterprises will establish an environmental performance evaluation index system including financial and non-financial indicators according to their organizational structure, strategic objectives and operational characteristics and in accordance with the principles of importance, rationality and comparability, and integrate these indicators into the four dimensions of the BALANCED scorecard for comprehensive reflection. Environmental performance evaluation indicators generally include three categories:

① Environmental protection standard index. It mainly quantifies the factors related to environmental protection, such as the amount of pollution exceeding the standard, the number of violations of environmental regulations, environmental fines and so on.

② Indicators of environmental management efficiency and benefits. It mainly quantifies the economic and environmental benefits in the process of production and operation, such as recycling utilization rate of waste products, qualified quantity of environmental protection products, energy and material saving rate, etc.

③ Comprehensive performance indicators. Combine the environmental performance with the enterprise's financial performance, market performance, etc., and conduct comprehensive investigation, such as the ratio between the growth of environmental products and profit growth, the ratio between the utilization rate of recycled products and customer retention rate, etc.

Different companies divide environmental costs in different ways, but covering all important costs is the basis for scientific division. Only when all important environmental costs are included, can an enterprise's environmental financial performance be reasonably evaluated, and the relevant benefits and environmental savings be accounted for and compared.

Although now in China attaches great importance to environmental management accounting application methods of research and development, but on the application of environmental management accounting in our country has not yet formed a more efficient system, some problems still exist, at present, the domestic more attach importance to the study of environmental management accounting application methods, and ignores the exploration of environmental management accounting theory structure, which could cause environmental management accounting in the application methods on the lack of theoretical guidance and lead to its object and the target is unknown, functions and principles.

Therefore, it is an opportunity to explore how to combine the theoretical structure and application of environmental management accounting in a scientific way.

4. Practical Application of Environmental Management Accounting

Environmental management accounting covers many aspects of corporate governance. How to effectively implement environmental management accounting in business has become a very real problem. Below, this paper will take Tsingtao Beer as an example for comprehensive analysis.

4.1. Company Profile

Tsingtao Brewery Co., LTD. (Tsingtao), a Germanic brewery founded in Qingdao by a joint venture between German and British businessmen, is a long-established brewer in China. By the end of 2017, Tsingtao Brewery had 62 wholly owned and holding beer production enterprises and two joint venture and joint venture beer production enterprises in 20 provinces, municipalities directly under the Central Government, and autonomous regions in China, leading the domestic beer industry in terms of scale and market share.

As a beer manufacturer with a history of 114 years, Tsingtao brewery has always taken environmental protection as its mission and obligation, supported and complied with relevant laws and regulations, constantly promoted various environmental protection measures, and made efforts to achieve scientific application in the enterprise. Tsingtao beer insists on the belief that environmental investment is not cost but investment, and regards such investment as a strong guarantee for the green and sustainable development of the enterprise. Through a series of environmental protection measures, Tsingtao beer calls on everyone to stick to the green belief, remember the green development, and contribute to the green water, green mountains, blue sky and white clouds.

4.2. Measures Related to Environmental Management Accounting

The implementation of environmental management accounting is a systematic engineering, and government regulations of relevant laws and regulations, green consumerism and a series of external factors are largely promoted the implement and advance of environmental management accounting, but external cause only as a necessary condition, is not enough to only by external cause, internal cause is the make it of the rapid development of the fundamental motivation. The internal driving mechanism is one of the keys to the application of environmental management accounting in enterprise management.

In recent years, Tsingtao Brewery has been striving to establish an environmental management accounting system and apply it to enterprise investment, financing, product pricing and material procurement. The internal driving mechanism of its environmental management accounting is mainly reflected in the following aspects:

(1) Cultivating the values of sustainable development

In recent years, Tsingtao beer has been continuously developing its organizational culture, from organizational values to social values, from being responsible for the whole supply chain to the whole society, and striving to infiltrate the responsibility into every link of enterprise development.

In the business process, the idea of green development is integrated into technology research and development, production and manufacturing, marketing and other links to improve the ability of the overall sustainable development of the enterprise.

At the same time, the company's environmental ethics into every employee, employees consciously adhere to the ethics and code of conduct. The pattern of resource recycling is shown in Figure 2.

In the process of beer production, greenhouse gases will be emitted to a certain extent. However, Tsingtao Beer reasonably plans its budget, adopts energy-saving, consumption reduction, carbon dioxide recovery, greenhouse gas verification and other ways to build an environmental operation mode within the affordable scope, so as to reduce possible environmental pollution as far as possible.

Tsingtao beer adopts packaging materials that are easy to be recycled and adopts environmentally friendly transportation and storage, so as to save transportation costs and strengthen product maintenance to a certain extent.

Attaches great importance to the recycling, the beer on the carbon dioxide in the process of generating use recycling science and technology, and finally back to beer filling process, effectively reduce greenhouse gas emissions, such as Qingdao per thousand in 2012 liters of cold beer wort recycled carbon dioxide increased by 16.89%, compared to the equivalent of planting 1.16 million 30 year old fir tree.

4.3. Application Results

Through continuous research and optimization of environmental management accounting system, Qingdao beer to improve the environmental performance significantly, the pollutant discharge success rate 100%, at the same time unit of carbon dioxide, sulfur dioxide emissions is also weakened by 9.38% and 42% respectively of the previous period, Qingdao beer in environmental management and environmental development ability has gradually become the bellwether of beer enterprises.

In 2017, the coal consumption per unit product decreased by 5.08% compared with 2016, the comprehensive energy consumption per unit product decreased by 3.79% compared with 2016, while the carbon dioxide recovery of 1000l cold wort increased by 0.79% compared with 2016, and the comprehensive utilization value increased by 8.9% compared with 2016.

Over the past ten years, Tsingtao brewery has continuously increased its investment in waste gas and waste water pollution treatment facilities, and improved its emission index of pollutants, greatly reducing the emission concentration of all major pollutants. Enterprises in dust control and solid waste also added governance funds.

At the same time, the enterprise to the coal yard to implement closed management, coal truck before leaving the factory use automatic car washing equipment for washing, clean before leaving the factory; Standardize the management of solid waste in the factory, outsource the drying and selling of yeast purees produced in the production process; All waste diatomite is exported to make bricks; The waste glass residue is collected and sent to the glass factory for reuse.

Under these strict controls, Tsingtao Brewery No. 5 was awarded the title of "Standard solid waste management unit" by the Environmental Protection Bureau in December 2018.

5. Existing Problems and Measures

5.1. Existing Problems

5.1.1. Lack of Scientific Quantitative Methods and Index System

Enterprises not only need to apply the environmental management system, but also need to identify and analyze the impact of various factors in the economic activities of enterprises on the environment and health and the extent of the impact, and according to the analysis results to develop countermeasures and measures conducive to the mitigation of adverse impacts.

However, the existing accounting system only provides quantitative data without considering qualitative analysis methods. In this way, there is no way to comprehensively and objectively evaluate the effect of the implementation of enterprise environmental accounting.

Therefore, it is unscientific and infeasible to use the index system without qualitative analysis in the evaluation of enterprise performance.

5.1.2. Lack of Implementation Policies to Internalize External Environmental Costs

Most of the environmental damage caused by enterprises is borne by the external society, which is an external cost for enterprises. However, there is no reasonable measurement standard for the conversion between external cost and internal cost.

One of the purposes of environmental management accounting is to internalize the external environmental cost scientifically so as to strengthen the attention and management control of environmental cost.

But the external environmental cost internalization will adverse impact on corporate profits, to enterprise consciously perform this hasn't been molding against the law of oneself is unrealistic, and, therefore, compulsory measures for enterprises implement "the internalization of external costs" is necessary, is also the current shortcomings in the process of implementing environmental management accounting.

5.1.3. Lack of Specific Codes of Conduct

At present, there is no scientific accounting standard for environmental management accounting. Therefore, a unified standard should be formulated by government agencies to constrain the internal management of enterprises. Only when there is certain pressure in external report and internal management, enterprises will pay attention to and consider environmental factors in decision-making, and then improve the impact of their operation on the environment through various management measures. The Chinese government can refer to the existing foreign environmental accounting guidelines, launch the environmental management accounting application guidelines combined with China's national conditions as soon as possible, and implement a set of scientific and complete environmental performance assessment indicators.

5.2. Measures to Be Taken

5.2.1. Enhance Enterprises' Awareness of Green Management

Green management consciousness refers to in order to reach the requirement of social and economic sustainable development, the enterprise environment management as an important part of the management behavior, is a new type of modern management consciousness, in the modern enterprise management into the concept of ecological environment protection, pollution control and resource conservation considered in every link of enterprise management, to achieve enterprise economic benefits, environmental benefits and social benefits of organic unity, so as to realize the sustainable development of enterprises.

5.2.2. Improve the Environmental Management Accounting System and Regulations

The implementation of laws and regulations related to environmental management accounting and the formulation of corresponding accounting standards and systems are important means to promote the implementation of environmental management accounting in business activities.

Through the development of environmental management accounting standards, enterprises are required to include the content of environmental impact into the accounting elements, and according to the characteristics of enterprises to establish the relevant environmental management accounting system, so that the environmental management accounting system is scientific and adaptive.

At the same time, the status of environmental management accounting is guaranteed by law, which makes it mandatory to some extent.

5.2.3. Promote the Pilot Study of Environmental Management Accounting

Accounting is an applied science that attaches great importance to practical operation, and the results of theoretical research must be able to be scientifically applied in practice. Therefore, China's environmental management accounting system cannot be completely imitated by foreign countries, and China's national conditions must be considered.

Establish environmental performance indicator system as soon as possible, conduct research on cost accounting and other aspects, complete the pilot of environmental management accounting in large enterprises first, and then promote and apply it nationwide.

In addition, leading enterprises in the industry can also cooperate with local colleges and universities to establish a joint education base integrating government, enterprises and colleges and universities. If the expected results can be achieved, this mode will be popularized to more enterprises and environmental management accounting will be gradually tested and popularized.

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