

Theory and practice of environmental management accounting

Experience of implementation in China

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Abstract

The theory and practice of environmental management accounting (EMA) have emerged in recent decades as a response to the growth of environmental problems. EMA can be defined as the identification, collection, estimation, analysis, internal reporting, and use of materials and information relating to energy flow and environmental and other costs for both conventional and environmental decision-making within an organization. It is now a widely used tool in balancing the interaction between the economic, social and technological factors in the development process to achieve the conditions for sustainable environment. The rapid growth in the number of companies that are awarded ISO 14001 certificates has enhanced the development of EMA all over the world. Many governments are involved in promoting EMA. In China, the government and companies are doing their best to keep pace with the global trend of environmental protection. The main problems of EMA relate to the specification of environmental accounting information, the allocation of environmental costs, legislation issues and the lack of environmental accounting standards. Among all the available policy instruments governments could use, the paper argues that regulatory or market-sensitive instruments would be more suitable for China. It is also possible for the Chinese government to direct companies in establishing environmental reporting and environmental auditing systems.

Keywords

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Article text

Introduction

Environmental issues have emerged in recent decades as a major aspect of the discussion of the problems of economic growth and development. Such issues have taken, *inter alia*, the form of global warming; atmospheric, soil and water pollution caused by industrial activities; the quick decline of forest areas; noise pollution; and radioactive and chemical wastes being dumped into oceans and rivers. All these problems are generally associated with industrialisation and economic growth; but is it a necessary condition of economic growth that the environment has to suffer? Not so, it is argued, where prospects of sustainable development are in sight. Consequently, the pursuit of sustainable development as an object of policy is now much in vogue; and governments of different countries have long been engaged in setting up regulatory, voluntary, incentive-based, informational and cooperative instruments of policy geared to promoting sustainable development (Li 2001). This policy trend has heightened concern about environmental accounting theory and practice worldwide.

The social benefit of popularizing environmental accounting is widely known. The environmental reports of business enterprises reveal their inputs and outputs and the extent of their commitment to environmental protection. Stakeholders normally supervise firms to comply with prevailing environmental protection laws. They would also be keen to have a comprehensive understanding of the firm in terms of not only the conventional accounting information, such as the firm's financial position, but also the wider social, economic and environmental implications of its operation. All this helps to direct the flow of social capital. However, it is not so easy to establish a whole set of environmental accounting systems for recognizing, measuring, recording and reporting. First of all, an environmental management system should exist in an enterprise, so that the objectives of environmental accounting could be incorporated into traditional accounting practices. Secondly, the internal management accounting system should be transformed into external reporting of environmental information, so that environmental results could form part of a firm's annual report in addition to the financial results.

Basic concepts and frameworks

Environmental accounting

There is to date no generally accepted concept of environmental accounting. Some people believe it is the accountant's particular contribution towards preserving the integrity of the environment.

Gray, Bebbington and Walters (1993) define environmental accounting as a management tool addressing all areas of accounting that may be affected by the response of business organizations to environmental issues, including the new area of 'eco-accounting.' For Burritt and Lehman

(1995), 'environmental accounting is the generic name to the field of study highlighting the interrelationships between accounting, accountants, and the ecological.'

There is a more comprehensive concept in China that states all the characters of environmental accounting. It is a new branch of accounting which is under the direction of sustainable economic development goal, using the basic accounting theory and method to recognize, measure and report the environmental management system and the environmental impact of economic activities of a business. The basic objective of environmental accounting is to realize the correspondence among economic, environmental and social benefits. The specific objectives of environmental accounting include organizing the accounting procedure, recognizing and measuring economic gain or loss in relation to environmental issues during a certain period of time, and providing sufficient environmental information.

Since accountancy is a very practical science, it is of vital importance to clarify the relative position of environmental accounting in the whole accounting system and its relationship with the conventional financial and management accounting systems. Parallel to the main categories of accounting, environmental accounting has also two branches. These include:

1. Environmental Financial Accounting (EFA), which focuses on reporting the cost of environmental liabilities and other significant environmental costs, and provides related environmental financial information to external stakeholders; and
2. Environmental Management Accounting (EMA), which, as part of management accounting, addresses mainly to the information about material and energy flow, and provides information for internal decision makers of a corporation.

The basic information needed by EFA relies on the proper recognition and summary of environmental cost, which is also the core component of EMA. So we can conclude that EMA plays a decisive role in the whole system of environmental accounting. The discussion in the remainder of this paper will focus on EMA, including recent perceptions of the EMA framework and the experience of its application in developing countries with reference to the case of China.

Environmental management accounting

EMA can be defined as the identification, collection, estimation, analysis, internal reporting, and use of materials and energy flow information, environmental cost information, and other cost information for both conventional and environmental decision-making within an organization. It uses a series of comprehensive methods to enhance the effective utility of materials, and to reduce the environmental impact and the environmental protection costs by processing the data from financial accounting, cost accounting and material flow balances. The basic measurement used by

EMA includes physical units for the consumption and final disposal of materials and energy; and the cost, savings and benefits (in monetary units) arising from environmental related activities.

The basic idea in the definition of EMA relates to EMA's particular focus on internal costs. External costs are not included because these are not the legal responsibilities of the corporation. EMA however attaches importance to environmental cost accounting. Besides environmental cost and other cost information, the disclosure of physical flows and disposal of materials and energy is also needed. EMA information can be used for most of the internal management activities and decision-making of a business, and is particularly useful for environmental management activities.

EMA has been developed for overcoming the limitations of traditional management accounting in respect of management activities and regarding decisions involving environmental issues such as environmental costs and impacts. In internal decision-making procedure, conventional management accounting practices might not give the environmental costs adequate consideration. This happens as a result of failure to disclose some environmental costs, albeit possibly without intention. For instance, specification of the process line often lacks accuracy, so that sometimes, variable environmental costs are wrongly characterized as fixed costs and vice versa. The inaccurate accounting for quantity (and thus value) of wasted materials and energy, and the significant environmental costs thereof are sometimes totally ignored in the accounting records. This practice of inaccurate accounting, which arises chiefly from traditional management accounting at work, poses a serious challenge for environmental management. Hence the need for the adoption of EMA by establishing a new management and environmental cost accounting system.

Environmental management calls for some regulatory control or incentive policy instruments essentially geared to promoting long-run economic development. For business organizations, EMA is an effective tool, which, if properly applied, would enable them to reduce cost and maximize profit, while at the same time minimizing the environmental impact of their activities. The physical and value information provided by EMA can thus help business organizations to make decisions that impact both their environmental and financial performances.

Recent improvement of EMA

The internationally accepted environmental management criteria is the ISO 14000 standards series issued in 1993 by a special committee of International Standards Organization (ISO). It covers environmental management systems, environmental auditing, environmental performance evaluation, environmental labelling, life-cycle assessment and environmental aspects in product standards. The standards apply to all types and sizes of organizations and are designed to encompass diverse geographical, cultural and social conditions. Companies adopting ISO 14001 (entitled 'Environmental Management Systems'), can decide and document the

extent of coverage. Through years of use, it has been shown that the standards have brought a worldwide focus on the environment, encouraging a cleaner, safer and healthier world. According to the survey made by ISO up to the end of 2002, at least 49,462 ISO 14001 certificates were awarded in 118 countries - an increase of 49,205 certificates over the end of December 1995 when the total stood at 257 in nineteen countries. The rapid growth of ISO 14001 certificates has enhanced the development of EMA all over the world.

Many governments are now involved or interested in promoting EMA. In 1998, an Expert Working Group in Improving Government's Role in the Promotion of Environmental Management Accounting was organized at the session of the United Nations Commission on Sustainable Development. The Expert Working Group's first publication, entitled 'Environmental Management Accounting - Procedures and Principles' (2002), establishes some basic concepts of EMA and provides a set of principles and procedures. Based on the generally accepted financial accounting methods and a common understanding of EMA, it is agreed by the members of the Group that the principles and procedures could help to minimize the cost of introducing EMA to interested applicants.

One of the most important contributions of the publication is the specification of some concepts of EMA. The first one is the concept of environmental cost. The broad meaning of environmental cost includes all costs incurred in relation to environmental damage and protection, both internal and external, i.e. corporate and social. Of the various concepts used in EMA, we focus in this paper only on corporate environmental cost, which consists of two components: corporate environmental protection expenditure and costs of waste. Corporate environmental protection expenditure refers to those traditional well-known costs related to waste disposal and emission treatment, environmental management and pollution prevention. Costs of waste include the costs of wasted materials, capital and labour. From here we could address the concept of non-product output, i.e. part of the input that has not been turned into a marketable product. This part is easy to be ignored or hidden in overhead accounts. As such, it causes management to underestimate the extent and growth of such costs that might be a significant sign of inefficient production. By adding the purchase value of the wasted material and the production costs of waste and emissions, management can take all the relevant costs into account in the decision-making process. In a sense, EMA serves as an optimized management accounting that discloses some hidden or undisclosed costs by revising the calculation of production costs in terms of material flows.

The system of environmental reporting, which first appeared in the mid-1980s, has been in application since in some developed countries. In recent years, the requirement for the disclosure of environmental information has become increasingly rigorous on enterprises operating in all countries, including developing countries. According to an investigation made by some international accounting service, 65 per cent of the corporations

surveyed reported their environmental information in 1994; 77 per cent in 1995; and 85 per cent in 2002.

Environmental reports were produced in three forms: monetary environmental information report, physical environmental information report and environmental rating report. Monetary environmental information reporting is based upon environmental accounting and it measures company-related environmental impacts in monetary terms. Physical environmental information reporting, which reports on pollution, is mainly required of some industries that are known to be heavy polluters. Environmental behavior rating information is reported to the public by five colours representing different rating classes of a company's environmental status according to specific criteria. The five colours are green, blue, yellow, red and black. Green represents the company that has met the requirements of sustainable development whereas black represents the break down of the criteria. The other colours represent the transaction of different rating classes. Multinational corporations have firstly put the environmental reporting system into action in order to enhance their information quality. ABB set up its environmental protection objectives system in 1995, and then had it modified in 1997. Now the environmental report of its headquarter is translated into 22 languages and published on the Internet.

What is happening in China

Following China's membership in the World Trade Organization (WTO), a competitive international market has emerged and a lot of chances and challenges have been envisaged as a result. One of the most serious problems China confronts now is the 'environmental barrier'. Government agencies and business corporations have already been aware of this problem and are doing their best to keep pace with the global trend of environmental protection. By the end of 1997, only 22 certificates of ISO 14001 were awarded in China; but this number has been increasing rapidly each year, amounting to 2,803 in December 2002. This compares favourably with the figure for USA, which was 2,620 for the same year. Although the progress made in this respect appears remarkable, there are still many problems yet to be resolved.

Problems and strategies

Among the many environmental issues on the government's policy agenda, the setting up of an environmental reporting system has already been put into the schedule of a specific working group organized by the China Executive Management Institution (CEMI). The CEMI group has already offered some suggestions to the government about how to guide organizations to establish an environmental reporting system. The accounting system in China is in the process of being reformed and coherently established. The main problems in disclosing the environmental information of companies thoroughly and systematically include the following:

- *The proper measurement of environmental accounting information.* The lack of scientific quantitative measurement and data system of environmental accounting information makes it difficult to account for environmental assets and liabilities, environmental costs and revenue in monetary terms. And the diversity of measurements and disclosures could make environmental accounting information incomparable across cases.
- *The proper allocation of environmental costs.* Although there are theories and practices and some guidance about environmental cost accounting, and environmental costs are already accepted as part of the cost of enterprises, there is still a big problem with the accounting of social environmental costs. How much should an organization pay for the consumption of natural resources and damaged environment? Within the same environment, how should social environmental costs be allocated among different organizations? It is still hard to find a reasonable solution to this.
- *Legislation issues.* Although the Chinese government has already set sustainable development as a long-run strategy, it is still very hard for individual businesses to meet environmental requirements by sacrificing their own benefits. There is always conflict between social sustainable development projects and the short-term profit-maximizing objectives of an enterprise. Most businesses would not increase the environmental expenditure of their own accord to meet the needs of social sustainable development unless there is a strong legal requirement. Even though the expenditure has already increased, an enterprise would rather not have to disclose it to the public.
- *The lack of environmental accounting standards.* A new set of accounting standards is being established by the standard setting group of the Ministry of Finance during the recent years. But still, there are no regulatory standards for the environmental accounting practice. As a result, the environmental accounting objects and the form of disclosure cannot be united and cannot be adopted by companies. The lack of standards also causes the total neglect of environmental accounting information disclosure or gives rise to poor unsatisfactory information disclosure.

More effort would need to be put into improving the accounting reformation procedures, although, it must be noted, a lot has been done so far in China in this respect. Environmental accounting theory and practice are relatively new in China, having been introduced with increased vigour only in recent years. This shows the broad interest both from the academic authority and business enterprises. There are gaps to be filled, however. Firstly, before any new practice could be put to use, some basic theoretical foundations should be provided. Once the measurement related problems are solved, the practice can get into a significant progress. Secondly, the regulation system which has been improved dramatically in recent decades should take environmental issues into accounts - the sooner the

better. These include the law of the People's Republic of China on accounting, which was first issued in 1985 and then modified in 1999 in Accounting Standards for Business Enterprises (both Basic Standards and Specific Standards) and Accounting System for Business Enterprise, and other related regulations. Once a theory or practice becomes a legal requirement, organizations are forced to follow and new problems will arise. This, in turn, will improve the theory and legislation. Thirdly, a reasonable pricing system which clearly shows the price signal should be established. Since resources are limited, free access to their use could only cause the accelerated exhaustion of resources and the degradation of the environment, and it does no good to accounting information disclosure. The pricing system has the function of macro adjustments and control. The new pricing system, which represents the true costs of resources, is a basic condition for the development of market economy.

What the government could do

We have mentioned that governments employ different policy instruments to influence companies to enhance their environmental performance. In China, the introduction of market economy has led to an overwhelmingly rapid economic growth. What is now in question is the environmental impact of this rapid growth and how best to reflect the extent of the environmental problem caused by business activities in order to be able to deal with it. After years of planned economy, the government still has the ability to exercise a strong control over the economy. So, among all the available policy instruments governments could use, the regulatory instrument would be most suitable for Chinese government. Through command-and-control approach, specific regulation of the accounting practice could be developed or integrated into the existing environmental standard or legislation. Like most developing countries, China is at the early stage of the environmental movement. More effort should therefore be put on controlling pollution by regulating the emission and disposal of pollutants from business and industry.

The government should keep on popularizing internationally accepted environmental standards, especially the ISO 14000 series. The *Implemental Project of China's Sustainable Development in the 21st Century* published by Chinese government in January 2003, identifies the task of implementing ISO 14000, environmental management system and environmental symbol product recognition system, as important measures of environmental protection. The China Accreditation Committee for Environmental Management System Certification Bodies (CACEB) was established with the approval of the General Office of China State Council in August 1997. It is the only authorised body in China responsible for accrediting bodies operating Environmental Management System (EMS) certification. For better control of certification and environmental quality, its Secretariat has worked out a sound quality control system and accreditation criteria based on ISO/IEC Guides and IAF Guidance. As a result of

all this, an effective framework of EMS accreditation and certification has taken shape in China.

CACEB provides professional accreditation service to all applicants according to ISO/IEC Guide 61 with no additional requirements. With the aim to establish a good reputation, CACEB has valued impartiality, objectivity as well as the competence of its personnel from the very beginning. Being aware that accreditation would facilitate the development of trade and the economy as well as the improvement of environment, CACEB is seeking to be involved in the process of multilateral recognition, and also to cooperate and exchange information with organisations or individuals who also aim to protect the environment. CACEB has to date worked out some remarkable achievements and, with the help of the government, it is gaining increasing recognition.

Another option for the Chinese government is to direct businesses in establishing environmental reporting system. This will require regulation of the activities of companies with the view to minimizing the environmental impact. In this respect, the way forward is to begin with large businesses and listed corporations and with the view to including later, with the benefits of experience, small and medium-sized firms. To ensure that businesses develop the culture of environmental reporting, the Government would need to attend to at least the following responsibilities:

- Specify the content of the environmental report and state clearly what kind of figures should be treated as environmental management information;
- Oversee the objectivity, the extent of details, and the disclosure of environmental management information by businesses;
- Use incentive approaches to encourage businesses to adopt environmental reporting system and gradually apply punitive measures to those who do not report environmental information or fail in environmental management; and
- Change the traditional GNP figures into a new system which involves eco-resources and environmental factors.

Also, the government would need to establish environmental accounting and auditing system. Environmental reporting involves a lot of accounting techniques and needs to be matched up with auditing techniques. Environmental accounting creates a link between economic development and environmental resources based on related environmental laws and regulations, using monetary measurement in recognizing, measuring and recording environmental assets and liabilities, and analyzing the effects of the environmental efficiency of activities on the financial performance of business organizations. It is thus a combination of accounting and environmental economics, which coordinates economic development and environmental protection through effective value management. The basic problem is how to compensate the consumption of natural resources. The

accounting systems in China do not take into account expenditures due to environmental protection. It is far from enough to disclose environmental information to different stakeholders by just putting ‘emission expenses’ and ‘greening expenses’ under the ‘overhead’ category. There is growing awareness of the need to disclose environmental information to the public. At the same time, environmental auditing should play an important role in supervising the disclosure of environmental information.

The government should also guide the news media and the whole society to support the establishment and improvement of environmental reporting system. The media should report to the public all environmental improvements achieved by business enterprises and grant some free advertisements to popularize the environmental reporting system. The media plays an important role in promoting environmental awareness and in mustering social support for environmental protection.

Conclusion: future prospects

EMA has been shown to contribute to the individual business and the general environment in many ways, like:

- Decreasing the environmental impact, improving competition ability and long-term profitability through enhancing product design, production process and product packaging;
- Helping to make decisions about accepting, designing or rejecting a procedure or product;
- Identifying the opportunities to cut down the cost of regulatory alliance and the cost of operation;
- Cutting down the costs by saving resource and power, as well as lower the risk through proper management of product responsibility;
- Conforming EMA with the environmental management system in order to improve the general environmental performance of a company; and
- Benefiting natural and human environment by improved environmental performance achieved through proper environmental cost management.

Whether business organizations face recession or prosperity, the issue of environmental protection remains crucial for their long-term growth and for the sustainability of the economy in which they operate. Business organizations should, therefore, be regulated and encouraged to enhance their environmental performance. The environmental regulations set up by advanced countries have managed to achieve environmental protection goals through standardization or disallowance, which means those companies whose main transaction is exporting, could not enter the international market unless their products and manufacturing procedures are in line with the environmental protection rules. Other incentive-based methods are also applied to achieve environmental protection goals. The ISO 14000 environmental management system is a series of criteria for

supervising and monitoring the products, manufacturing sites and the processes of production. The effectiveness of policy is generally contingent upon the quality of information on which it is based. Thus, implementation of the EMA system, disclosing environmental-related costs, can provide useful information to various decision-makers.

Once environmental costs are properly traced back to product or service costs, governments can use the information to direct the market through taxation or other economic instruments instead of relying only on environmental legislation, which is anyway difficult to implement effectively. The market-sensitive, fiscal or incentive-based instruments would, unlike legal or control measures, prompt manufacturers to adjust the manufacturing procedures or prices in ways that would influence a change on the behavior of consumers. Whatever the policy options adopted, there is no doubt that in the final analysis, environmental policy would benefit from a successful EMA system. There is evidence of growing awareness to this effect in China, as the discussion of this paper vividly reveals.

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