

The Extended of the Life Cycle Assessment on Corporate Environmental Performance

Xuan Chen¹, Weide Chun²

¹College of Economic & Management, Shanghai Ocean University, Shanghai, P.R.China, 201306

² College of Business, Chengdu University of Technology, Chengdu, P.R.China, 610059

Email: x-chen@shou.edu.cn, Thomas5127@126.com

Abstract: This paper attempts to extend the corporate social responsibility in environmental dimensions. The objective of the paper is to suggest an improvement of the most commonly used corporate environmental management tool—the Life Cycle Assessment (LCA). The current study includes two stages. First, more phases are added to the life cycle of a product. Second, some criteria that measure the investment in environmental protection are introduced. Moreover, upstream and downstream firms are considered in the assessment of environmental performance to extend the LAC further.

Keywords: corporate environmental performance; sustainable development; life cycle assessment

1 Introduction

There is a growing pressure for corporations to respond obligation from the social and ethical investing movement. Sustainable development is regarded as the development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.”^[1] As a result, environmental sustainable development is commonly interpreted as simultaneous economic and environmental development. It means the economic growth must be achieved through environmental conservation while enhancing the quality of human life. This clarion arouses the public have become more aware that the consumption of manufactured products and services offered brings some adverse effects on resources and the quality of the environment. Meanwhile, they realize that these effects occur at all stages of the life cycle but not just during manufacturing process. Since more and more requirement is put forward based on the sustainable development, the environmental performance is paid attention by managers in operation decision.

To meet the need of sustainable development, one of the most common tools, environmental life cycle assessment (LCA), can be used in business ethics. However, the LCA are not enough completely to fill the sustainable development deal^[2,3]. Since it has been the widely used tool in practical environmental policy and environmental management, the LCA tool has to be improved.

This article proposes to enrich the LCA methodology to integrate more phases and criteria, which is important to practice environmental performance management. The LCA assessment is extended in two ways. On

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the one hand, more phases must be added to the life-cycle, and on the other hand, some comprehensive criteria must be added to the current determining criteria so as to consider the investment in environmental protect throughout the various stages of its life-cycle.

2 The Traditional Environmental Life-Cycle Assessment

LCA was first developed as a methodology to evaluate the impacts of a product over its entire life cycle. Over the last ten years, there has been a rapid expansion in the demand for LCA studies to chart the environmental performance of products.^[4] Some people, such as environmental organizations, regulatory authorities, academics, politicians, consumers, and the general public, want to know how to assess the environmental quality of products and production process. As a results, environmental life cycle assessment is important tool in corporate environmental management for assessing and optimizing the environmental quality of a system over the whole life cycle^[5]. Life cycle assessment is the evaluation of the environmental impact of a product/service process, from its extraction of its raw materials to the elimination of its wastes and including its full period of use. The use of LAC is governed by an international standards organization with a series of environmental norms 14040, 14041, 14042 and 14043. Many articles have covered its application, for example Guine’e et al. (2001)^[6], Guine’e (2002)^[7].

The stages of a product’s life-cycle in the traditional analysis include^[8]:

- extraction of its raw materials,
- manufacture,
- packaging,
- storage,
- distribution,

- use,
- recycling-destruction.

Environmental criteria, calculated at each stage of its life with a spreadsheet, are the consumption of:

- consumption of energy,
- consumption of raw materials,
- consumption of water,
- production of polluting agents,
- production of toxic products,
- production of waste.

After filling in the spreadsheet, the corporation has a detailed and all-around picture of advantages and shortcomings corresponding to the given criteria. The use of this tool monitors the commitment of the company’s manufacturing system to environmental issues.

3 The Extended Environmental Life-Cycle Assessment

3.1 Steps to be added in the traditional LAC assessments

- R & D and Design

A product process can be sustainable only if this environmental component is considered right from the start of the innovation project that leads to its creation.

As a result, the step of “R & D and Design” should be added. R & D is conducted before the definition of the product and its manufacture should also serve the purpose of sustainable development. Eco-design, which has become a common notion now, in the LCA gives the executive more control over the design of the product and enables them to ensure its compatibility with the directives of the creation of a sustainable offer^[9]. That is to say, the application of environmental protection product design can be more effective when considered and carried out, not as a separate exercise, but as part of an environmental management approach covering the company as a whole.

- Maintenance

When we emphasize the sustainable development, the capacities of the product to be repaired, reused (i.e. not thrown away) and recharged are necessary to stretch its lifespan. The repair and recharge decrease the adverse environmental effect, caused by that eventually comes to an end. They create a relatively long-term relationship between the user and the product.

These new steps broaden the traditional LCA in two aspects: the beforehand of the product process and during the life-cycle of the product.

Table 1. The extended LCA

	R&D and Design	Extraction of Its Raw Materials	Manu- facture	Packaging	Storage	Distribu- tion	Use	Mainte- nance	Recling- Destruction
Consumption of Energy									
Consumption of Raw Mate- rials									
Consumption of Water									
Production of Polluting Agents									
Production of Toxic Products									
Production of Waste									
Investment in the Education									
Investment in the R&D									

3.2 Extended criteria in traditional LCA

The criteria listed in traditional LCA are quite insufficient in terms of sustainable development, because they only take the environmental impact of the consumption and production of product process into account. Therefore, it is necessary to extend the list of criteria so as to accommodate the all-around environmental impact.

“During the period of the 11th Five Year Plan (2006-2010), China’s total investment in environment protection will reach CNY1.4 trillion, two times the figure posted in 2001-2005, accounting for 1.5% of GDP in the period. Among the total, investment in treatment of industrial pollution CNY210 billion, investment in new environment protection projects CNY350 billion and investment in ecological environment protection CNY115 billion.”^[10]

It is known that the investment in environment protection pay an important role in promoting environmental performance. The investment in environment protection guarantees the long-drawn improving in corporate environmental performance. Generally speaking, the investment in environmental protection is presented in two aspects:

- Investment in the education on environment protection

The education on environmental protection helps employees enhance consciousness of environmental protection. They get to know why we must to protect the environment and how to protect the environment in the production process. Since employees take part in each productive step, the improving in subjectivity (or software) is absolutely necessarily.

- Investment in the R&D on environment protection

The investment in the R&D on environmental protection ensure objectivity (or hardware) improving. The advanced technology and new materials decrease the energy sources consumption and production waste. As a result, investment in the R&D on environmental protection should be included in the criteria.

In a word, the “extended” LCA is shown in table 1.

3.3 Extended LCA assessment to the upstream and down-stream

In addition, a systemic whole sustainable development should consider the environmental performance of upstream and downstream firms in the industry chain.

To ensure a good environmental performance, the product corporation should choice the “green” clients, suppliers, or distributors. For example, ISO 14001, the standard for environmental management, is one of the most important environmental developments affecting business. This standard is being increasingly adopted or considered by many companies worldwide. Some leading companies have adopted it to gain competitive advantage. For many companies, the standards may become a necessity as more and more customers come to prefer, expect or demand it from their suppliers.

When the assessment of clients, suppliers, or distributors is included, the traditional LAC is extended further. Of course, the environmental performance assessment on clients, suppliers, or distributors can be respectively implemented with the methods shown in table 1 (figure 1).

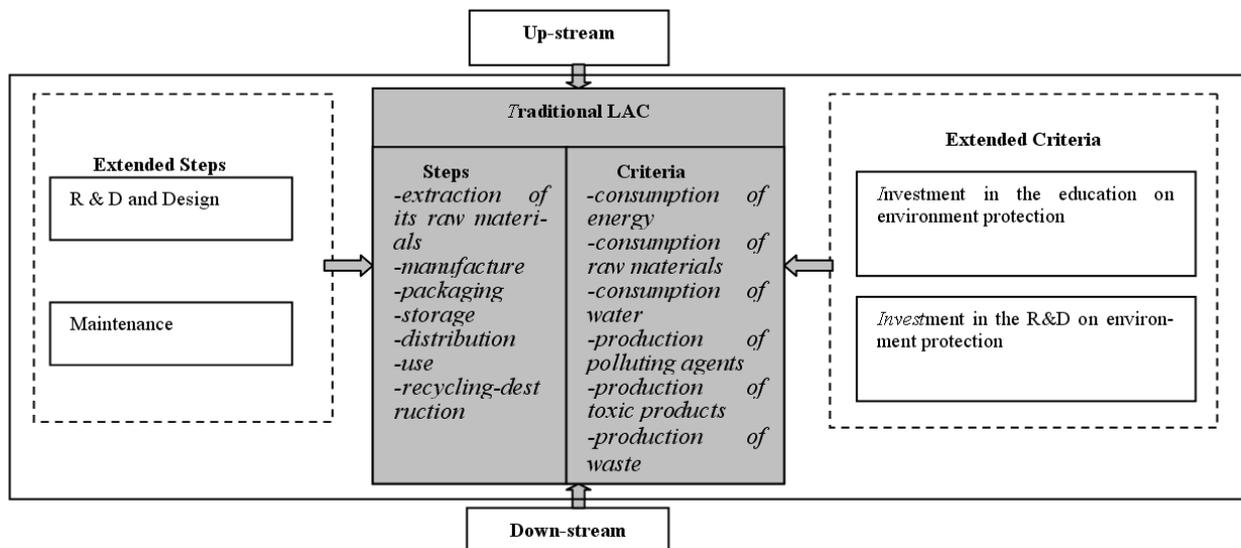


Figure 1. The further extended LAC: up-stream and down-stream

4 Conclusion

This paper has attempted to contribute to the emerging fields of implementation of business strategy of corporate environmental management. The fields are based on the concept of sustainable development. This article extends LCA for the purpose of sustainable development. This addition enables the environmental impact of the “R&D and design” and “maintenance” of a product to be considered. Moreover, the systematic assessment of environmental criteria, involving in the investment in environmental protect, upstream, downstream in the extended LCA can assist the company know its sustainable development status. The extend methodology, is used in the study, should be part of a dynamic approach. Its regular use will enable the executive to maintain the control of the sustainability of the product. Moreover, the systematic assessment of environmental criteria in the extended LCA can assist the company in editing its yearly reports to indicate its environmental performance. Hence the extend LAC is a tool for reporting too.

The extend LAC can be pursued in two paths: first of all, the environmental criteria can be concerns to include other more social criteria, such as health and safety at work, relation with various other stakeholders, to assessment the comprehensive corporate sustainable development responsibility. All this social criteria and environmental criteria are based on the concept of sustainable development. The second path is to adapt the methodology to the services sector. Though the extended LCA assessment on corporate environmental performance works well in industrial environments, however, it

perhaps less suite to the services industry.

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