



## **Use of eco-efficiency practises for improving company success**

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### ***Abstract***

*Eco-efficiency is a widely quoted term and it has been discussed and referred in many situations when speaking about sustainable development but relatively few companies know what eco-efficiency really means. Even less companies use eco-efficiency models in their practices. Companies have not realized what business benefits and possibilities it can give. It can be claimed that eco-efficiency is an unknown possibility.*

*Eco-efficiency practices are in most companies unattached from management and production processes. Ecological perspective can give new insight and open new possibilities, even new innovations, for business. In practice eco-efficiency is an excellent way and method to improve economic competitiveness and at the same time considerably decrease environmental impacts.*

*Key words: Eco-efficiency. Management.*

*Tema 4 – Gestão Ambiental na Indústria.*



## 1 Introduction

The contents of this article have been partly taken from the author's doctoral dissertation and conference articles.

Climate change, smelting glaciers, lack of fresh water, polluted soil and energy consumption are major issues of our time. These phenomena are often considered to be related to industrial activities and their ecological consequences.

Sustainable development has become a widely quoted policy in this context as it combines social, economic and environmental/ecological development. Eco-efficiency is in the centre of this phenomenon, and it has developed into an extensively recognized method for integrating ecological and economic considerations into core business processes. The basic contribution to sustainable development is eco-efficiency (Holliday et al. 2002).

The application of eco-efficiency concentrates on integrating environmental and life cycle cost factors into core business processes. Eco-efficiency means producing goods and services with less energy and fewer raw materials, which results in less waste, less pollution and less cost (UNCTAD 2001). Schaltegger and Sturm first described the concept of eco-efficiency as the aim of environmentally sound management to increase eco-efficiency by reducing the environmental impact while increasing the value of an enterprise (Scaltegger and Sturm 1989).

Eco-efficiency combines the essential components of business, monetary and ecological improvements, which are necessary from the viewpoint of economic prosperity to increase efficient use of resources and to prevent emissions (Verfaillie et al. 2000).

The most important departure of the sustainability concept from orthodox management theory lies in its realization that economic sustainability alone is not a sufficient condition for the overall sustainability of a corporation (Galdwin et al. 1995). The most broadly accepted criterion for corporate sustainability constitutes a firm's efficient use of natural capital. At present most managers have accepted corporate sustainability as a precondition for doing business (Hedstöm et al. 1998, Holiday 2001). Combined interest in competitiveness and ecological responsibility often leads to innovations that would not otherwise be realized. These innovations result in more ecologically benign products or processes for which there are gains in efficiency or marketing, or products or processes that are superior in other ways (Bansal et al. 2005). Adoption of eco-efficiency can thus give viewpoints for new ideas and business opportunities. According to Bansal et al. (2005) competitiveness is the potential of ecological responsiveness to improve long-term profitability. According to the respondents in their study, ecological responses improved competitiveness. These responses included energy and waste management, source reductions resulting in a higher output for the same inputs, eco-labelling and green marketing, and the development of 'eco-products'. It is crucial for enterprises to optimise their strategies in order to build unique competencies.

A considerable part of ecological problems and environmental risk potential are caused by resource consumption and handling of material flows. Thus it can be understood that material flows play a major role in industrial enterprises and thus eco-efficient optimizations of material flows can also reduce costs.

Small and medium size enterprises (SMEs) play an increasingly important role in economic growth, employment and local development. SMEs are a major source of technological innovation and new products which can have noticeable relevance in the ecological effects of products and production. SMEs also play an essential role as subcontractors in the downsizing, privatization and restructuring of large companies. SMEs account for over 95 percent of enterprises and nearly 70 percent of employment in OECD economies. SMEs also generate a large share of new workplaces. As they have such a



remarkable role it is of great importance to get SMEs to participate in promoting sustainable development and eco-efficiency.

The strategic foundation of Eco-efficiency and most concepts lay on Life Cycle Assessment / Life Cycle Analysis (LCA). This consists the whole cycle from natural resources extraction to production to use to ultimate disposal. The development and use of eco-efficiency concepts has a lot of limitations and challenges in companies. First of all understanding the terminology is difficult and secondly the needs and benefits of incorporating eco-efficiency are not clear to most companies who don't have trained personnel.

As there are numerous alternatives for organizing production processes, it is very difficult, almost impossible, for SMEs to comprehensively assess the environmental impacts of their production and at the same time know all the economic implications which a change in their processes or inputs might have. Moreover, most SMEs are not always even aware of alternative production processes and accessible technologies which could help them meet the double target of producing in an economically viable and environmentally sound way.

In order to support SMEs in their efforts to meet international standards and improve their production processes, eco-efficiency programs and evaluation tools should assist in the development and optimization of production processes while considering commercial and environmental aspects at the same time. The objective of these tools should be on identifying production processes yielding the best environmental performance at the lowest possible cost. In this respect eco-efficiency programs and eco-efficiency analysis are strategic instruments, which can assist SMEs in their selection of the most cost-effective and environmentally sound production processes.

## **2 Results from a research in Brazil**

The writer participated as an European environmental expert at a Brazilian development project in Caxias do Sul coordinated by UCS, Universidade de Caxias do Sul in 2005. The aim of the project was to study the critical points of processes in furniture industry in order to find possibilities for improvements. It included economical-, quality- as well as environmental points of view. Some of the enterprises volunteered as pilot companies for the planned improvements.

The group of companies studied consisted of three big companies (over 250 employees), three medium sized (50-250 employees) and nine small companies (3-25 employees). The industry branch was furniture industry. The size of the company, processes, machinery, use of material (including energy and water), residues and waste, use of environmental management or eco-efficiency methods and use of methods for evaluating eco-efficiency and eco-efficiency indicators used were recorded.

The aim of the research was to increase knowledge on the applicability and adoption of eco-efficiency into strategic and operational management of industrial SMEs. The focus is on the role of eco-efficiency in strategic and operational management, adoption of managerial methods, and use of methods for adopting eco-efficiency, use of methods for evaluating eco-efficiency and on the role of material flow management as a link to eco-efficiency in industrial SMEs.

The development of methods and indicators for implementing and evaluating eco-efficiency still faces a challenge to make them attractive and applicable for SMEs. Environmental issues do not seem to be of high priority in decision making in SMEs. One major reason is that they are still mostly considered as cost resulting issues. Main reasons for uptake of environmental / ecological issues into decision-making and practice at SMEs are authorities, legislation and client demands. On the other hand many companies have already



focused and put effort on avoiding extra costs such as waste costs, optimizing material and water use and improving energy use to improve their profit. In most cases companies do not consider these improvements as ecological effectiveness; they are implemented for their economic benefits.

Most of the studied companies did not use the described methods for eco-efficiency; they did not even recognize them. An interesting point is that there does not seem to be a relationship between whether the company has an environmental management or eco-efficiency system or not, and the use of methods. Most companies did not have qualified personnel in these issues and so the understanding of needs and benefits, which can be achieved by using eco-efficiency methods and indicators, is not clear or known. Lack of consensus on methods and indicators to be used systematically worldwide may also have an influence on the recognition and uptake of them in companies. It is especially unclear for companies as to which method would be the most suitable one in their company and field of business. Companies find it also difficult or even impossible to measure or value an innovation that emerges from eco-efficiency considerations or reputation benefits.

To enhance the use of eco-efficiency evaluating issues, only a few indicators should be selected at the beginning to test the availability and use of data and understanding the philosophy behind evaluating eco-efficiency. Thus the first step to make eco-efficiency issues more understandable and important to companies could be to start with a few environmental indicators at materials and energy flow level and an economic indicator such as quantity of products provided to customers. These indicators are usually sufficient to identify existing optimizations and cost-saving potential. They are commonly accepted, clear, and straightforward indicators and they do not demand expertise to use them. The second step would be the uptake of an evaluating method. MIPS and Ecological rucksack could be advisable methods for evaluating eco-efficiency because they are relatively easy to carry out and understand.

One of the main objectives of increasing the uptake and use of eco-efficiency and related evaluation methods is to make them more widely known by authorities, public organizations and training institutes.

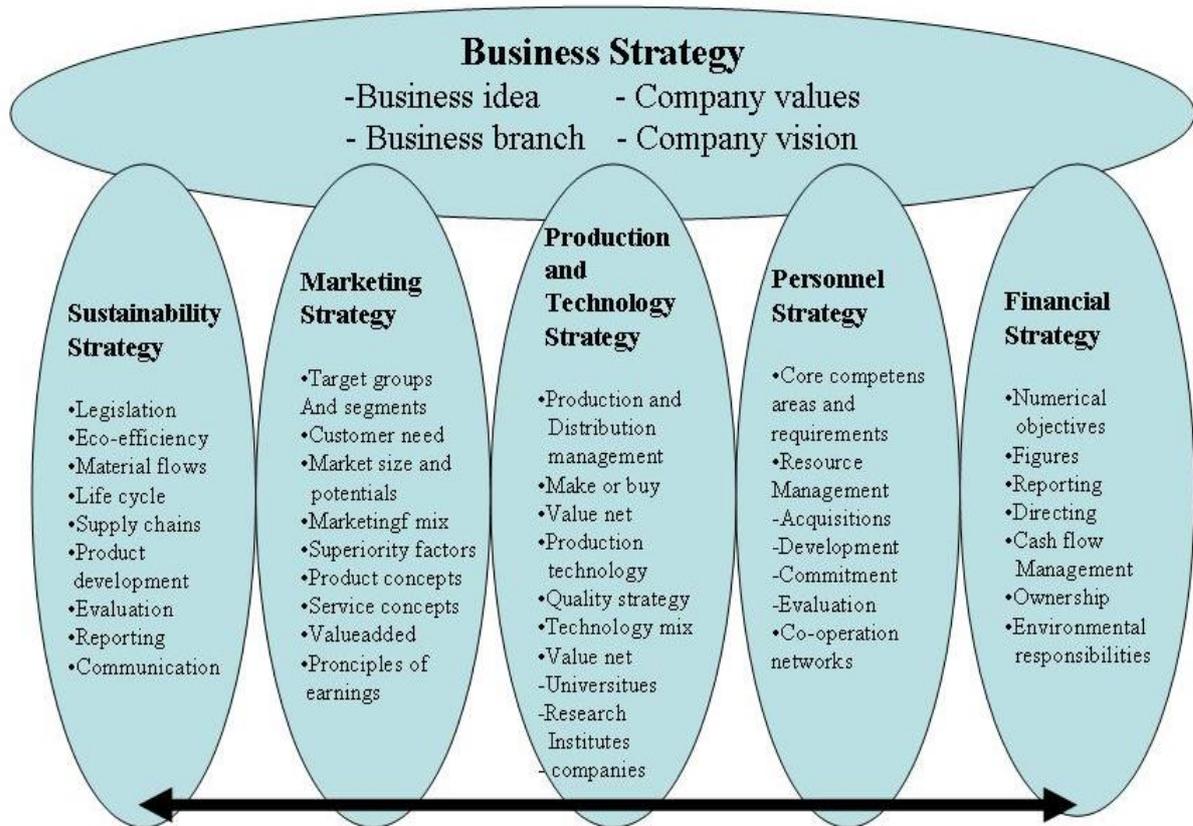
### **3 Developed frameworks**

According to the research results several frameworks for understanding eco-efficiency and its connections to production processes and management have been developed.

The first model shows the connections of eco-efficiency to other strategies, economic, production, human resource and marketing strategies. The next model shows aspects and possibilities in different processes. The Framework of sustainability and business strategy for SMEs connects sustainability strategy to other business strategies. As Michael Porter (1991) argues, there is a clear connection between environmental issues and strategic management. He describes that strategy is the act of bringing a company into line with its business environment to maintain a dynamic balance. The ecological dimension of sustainable development has become an important part of the global business environment, and thus the natural environment is a strengthening theme in strategic management. Sustainability strategy has become as important as other more traditional strategies, such as marketing strategy, production and technology strategy, personnel strategy and financial strategy. Sustainability and eco-efficiency considerations are connected to all other strategies in the business strategy as described in the figure below.



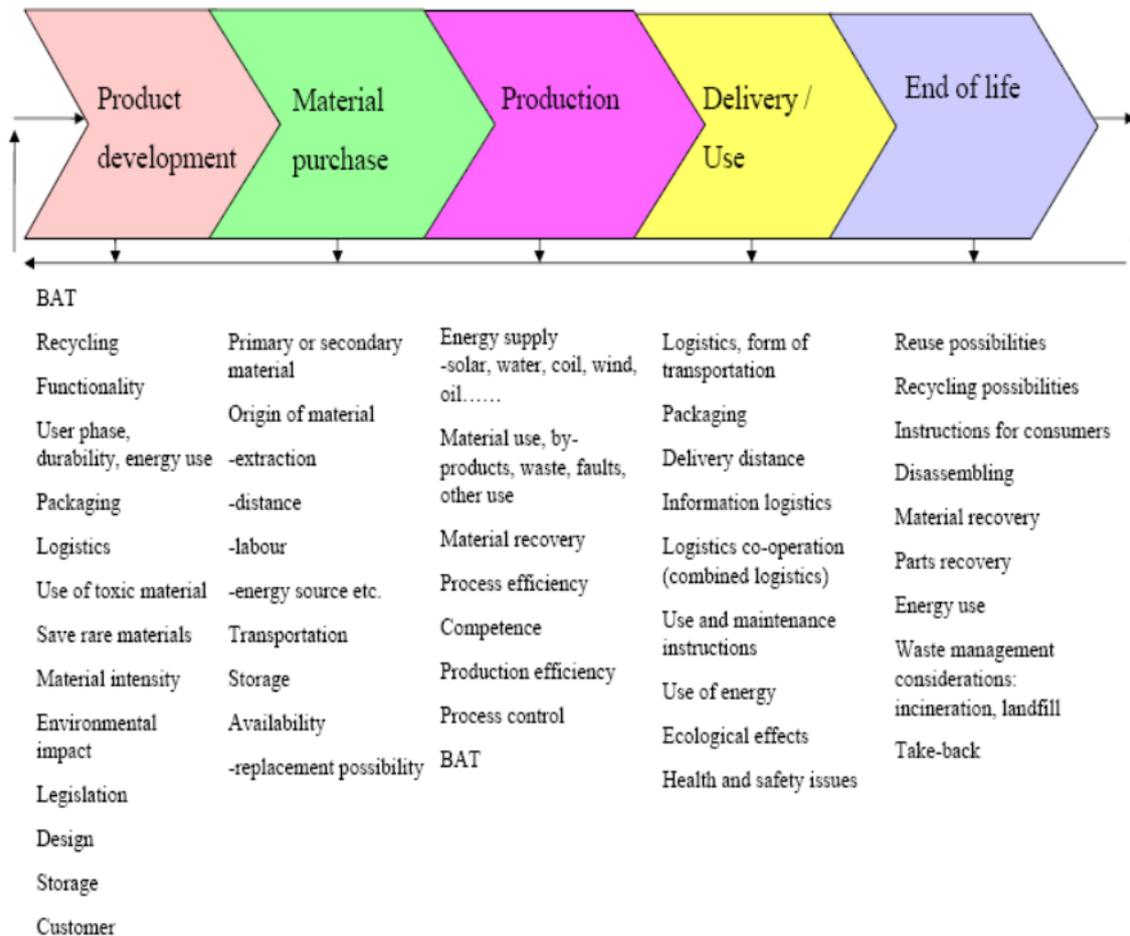
Image 1 – Sustainability and business strategy for SMEs.



Decision-making involves the analysis of different alternatives and their consequences, and the subsequent commitment to action, usually in connection with a commitment with resources (Janssen 1992, Kirkwood 1997). The second framework illustrates necessary considerations for different process strategies in the life cycle of production, from raw material extraction to production, use, and end of life of products.



Image 2 – Eco-efficiency considerations in different process stages in SMEs.



In order to support SMEs in their efforts to meet international standards and improve their production processes, eco-efficiency methods and evaluation tools should assist in the development and optimization of production processes, while considering commercial and environmental aspects at the same time. The objective of these tools should be on identifying production processes yielding the best environmental performance at the lowest possible cost. In this respect eco-efficiency methods and eco-efficiency analysis are strategic instruments, which can assist SMEs in their selection of the most cost-effective and environmentally sound production processes. A unifying concept, guiding both public and private decision makers, could foster sustainability more strongly.

Abrahamson (1995) suggested that relationships between the user, the tool, and the context bring difficulties to strategy-tool use and this can make the choice of a suitable strategy tool challenging. Overall, in a dynamic social setting with changing markets and with different demands on tools, it is quite clear that no single strategy tool is adequate for every purpose. The task of finding just one, most suitable strategy tool, is therefore not appropriate. Rather the task is to compile a set of tools that jointly cater to different contextual needs and demands, and to support different forms of strategy work. Collecting a set of strategy tools, rather than just concentrating on individual tools, increases the freedom of choice. The set of tools selected should work together by complementing each other, supporting different viewpoints and facilitating work on issues that require special attention. Sahlin-Andersson et al. (2002) point out that it is not always clear when to use what tools in practice. The third framework, presents possibilities for choosing a suitable method for incorporating eco-efficiency in practice.



Image 3 – Eco-Efficiency methods and different aspects for choosing a suitable method.

ECO-EFFICIENCY CONCEPT	STAGE										
	Raw material	Pro-duction	Trans-port	Waste	Energy	Use	Eco-nomy	Society	Inno-vation	Ser-vice	Design focus
Biomimicry	(x)	x		(x)	x				x		x
CP	x	x	x	(x)	x		x		x		(x)
DfE	x	x	x	x	x		x	x	x	x	x
Eco-Controlling	(x)	(x)	(x)	(x)	(x)		x				
Eco-Design	x	x	x	x	x		(x)	(x)	x	x	x (*)
ECO-EFF.	x	x	x	x	x	x	x	(x)	x	x	(x)
Eco-Innovation	x	x	x	x	x	x	(x)	(x)	x	x	x
EMAS	(x)	(x)	(x)	(x)	(x)						
GP		x	(x)	(x)	x	(x)	x	x	x		
IE	x	x	x	x	x		(x)	x			
IPP	x	x	x	x	x	(x)	x	x	(x)	x	(x)
ISO 14001	(x)	(x)	(x)	(x)	(x)						
Lean Manufact.		x	x	x	x	x	(x)			(x)	
POEM	(x)	(x)	(x)	(x)	(x)						x
PP	x	x	x	(x)	x		x		x		(x)
RC	(x)	x	(x)	(x)	(x)		x	(x)			
WM	x	x	x	x	x	x	x		x		(x)
Zero Waste	x	x			x	x		(x)	x		(x)

x= included    (x) = indirectly included    \* = for existing products

#### 4 Conclusions

A considerable part of ecological problems and environmental risk potential are caused by resource consumption and handling of material flows. Eco-efficiency and sustainable development issues are, however, not commonly recognized by small and medium-sized enterprises (SMEs). Material flow management (MFM) is relatively unknown as a method though over fifty per cent of the studied companies have improved their processes and operations in respect to material flows. The main reason for this has been financial benefits.

The eco-efficient optimizations of material flows aim at reducing costs, which means that quantitative and financial accountings should also be considered. Several companies have evaluated and even calculated material flows, although they do not use any identified method or tool for accounting. Despite of this, SMEs are not aware of the many economic benefits that can be achieved with efficient MFM. Understanding these benefits could make MFM and eco-efficiency also more acceptable and more widely used. The main reasons for neglecting eco-efficiency or MFM issues are the following: Lack of time, lack of personnel to adopt methods in question, and methods are considered to be too complicated and exhaustive.

The research shows that economic considerations are no more enough to keep competitiveness. The ecological considerations are increasingly important in availability of materials as well as achieving economic savings. Eco-efficiency thinking will also give aspects to new ideas and business opportunities.

Small and medium size enterprises (SMEs) play an increasingly important role in economic growth, employment and local development. SMEs are a major source of technological innovation and new products which can have noticeable relevance in the ecological effects of products and production.

There are several methods for incorporating eco-efficiency considerations in business processes. Material Flow Management becomes central, as material flows, including energy flows, have an essential role in eco-efficiency and sustainable development ideology. Clearest



cost saving potentials of eco-efficiency practices can be obtained when focusing on the internal material and energy flows. Focusing on the material and energy flows serves also as a good and understandable starting for wider eco-efficiency considerations.

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