Eco-efficiency in Six Small and Medium Enterprises in Mexico

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This paper documents the process and results of six small manufacturing firms in the Valley of Mexico, which participate in an eco-efficiency program designed by the government agency SEMARNAT (Ministry of the Environment and Natural Resources). The objective of this SEMARNAT program is to become a leader in helping small and medium businesses achieve competitive advantages through mechanisms of environmental management with emphasis on waste control, energy and water efficiency. Each industry prepared its eco-efficiency project, seeking economic gains and ecological efficiency. This study explores the advantages of implementing the SEMARNAT methodology by evaluating the results of the six participating industries.

1.INTRODUCTION

The environmental challenge has acquired greater relevance among the general public, because resources are depleting and the quality of life is dangerously threatened. A vision in which nature is seen as in inexhaustible source of resources and a waste disposal must transit towards corporate responsibility and sustainability. Companies need to understand that *doing business as usual* has no place in today's world, and governments must present an appropriate legislation for this transit to happen. In this context there is a pressing need to integrate an eco-efficient perspective into small and medium enterprises (SMEs). In Mexico, micro, small and medium enterprises constitute more than 90% of all business units, constituting 72% of employment, and contributing 52% of the GNP (INEGI, 2009). SMEs, (small and medium enterprises) represent 33% of business units in México, and tend to ignore the environmental challenge, believing that the adoption of eco-efficiency measures is a costly investment and *out of their league*.

2. THEORETICAL FRAMWORK

2.1 Background information

The current debate on climate change has two main strands: adaptation or mitigation. The first rests on the premise that damages to the ozone layer are irreversible, and that the impact of extreme forces of nature have always had their effect, hence the current challenge is merely an adaptation to new scenarios. The second strand presses for the cleaning and preservation of the environment, claiming that pollution is reversible through voluntary and costly mechanisms that should to be paid by the polluter. It is said that voluntary actions in favor of the preservation of the environment are commendable, but a system of penalties and rewards based on national and multinational environmental policies are fundamental. The present suggestion is not only compliance to the regulatory framework, but the surpassing of it. Thus, this second perspective contemplates the implementation of financially viable mechanisms for all countries, through market-based solutions, as suggested by Stavins (2009).

Much of the accumulation of CO2 in the atmosphere is due to emissions in industrialized countries. However, the emissions attributed to developing countries increase each day, as noted by Fullerton since the nineties (1998). The bottom line is that climate change is a social problem which requires the participation of every individual, business and country. Every year that redirection toward a sustainable path is delayed, will increase by the billions the cost of corrective actions in the future. The way of doing business nowadays has changed and this demands an outlook based on profitability with social responsibility and sustainability.

2.2 Mexico's position

Mexico is twelfth in the emission of greenhouse gases (WRI, 2007), (WCSC 2007), which is why in recent years many programs and laws have been created for environmental protection. The Mexican Government has implemented specific policies to achieve sustainable development. In this sense, certain national territories have been declared to be protected biospheres. Furthermore, action has been taken in favor of wastewater treatments, waste management and reforesting for the conservation of ecosystems. Additionally, Mexico has acquired in-

ternational commitments at summits such as the Kyoto Protocol (Japan, 1997) whose main objective was to reduce carbon emissions by 5%. Also, Mexico is committed with the Special Climate Change Program (Gallegos, 2011) to reduce greenhouse gas contamination by 8% per year. The private sector has expressed discontent with Mexico's international commitments. They argue that more environmental regulations harm their profits. This goal of reducing carbon dioxide emissions by 8 % implies the reduction of 640 million tons per year, which is considered too costly for the industries involved. They claim (CCE, 2009) that such drastic reduction in emissions would threaten the country's economic growth. Companies directors avoid committing because they say that, compared to the rest of the world, Mexico's emissions are insignificant. This is an important motive for creation of the Environmental Leadership for Competitiveness Program by SEMARNAT. The following section presents the methodology of this program, followed by the results obtained by 6 small companies in Mexico.

3. METHODOLOGY

3.1 *Environmental Leadership for Competitiveness Program by SEMARNAT*

The methodology of this program was designed to create specific and differentiated solutions for companies, depending on their capabilities. It helps to exploit opportunities and neutralize risks, allowing companies to implement their own project, according to their challenges and possibilities. It is especially aimed at SMEs that want to improve their competitiveness in value chains, through environmental management with emphasis on eco-efficiency, 450 SME's in the country were invited to enter the program.

This study was done by Anahuac University Business Accelerator during 2009-2010 based on the results of six small firms. It provides a documented answer to the research question that enquires about the efficiency and feasibility of this program, exploring the possibility of its adaptation by similar industries.

3.2 Characteristics of participating industries

Table 1 shows the characteristics of the 6 participating industries in the study: Type of industry and its size are expressed in number of employees and annual sales in pesos. This sample has 5 manufacturing small industries and one medium company (a gas LPG distributing company). In the last columns *critical points* and *possible competitive factors*, are those identified by the six small company directors in Module 1 of the intervention.

Table 1. Characteristics of Participating Industries

Industry	Size		Identified factors	
	Staff	Sales*	Critical	Competitive
1.Aluminium Railings	5	5,422	Bad lighting	Price,image, Raw materials
2.Plastic Packaging	344	72,979	Material waste	Tech,designs logistics
3.Cardboard & Paper	119	90,327	Energy costs	Innovation, recycling
4. LPG	129	237,427	Fuel costs	Quality Service
5.Scafolds & Construction	27	10,000	Paint & Energy	Competitive prices
6.Light fixtures& Bulbs	12	N/A	Energy costs	Customized designs

* Annual sales in million pesos
(1US dlls = 13.20 pesos approximately)

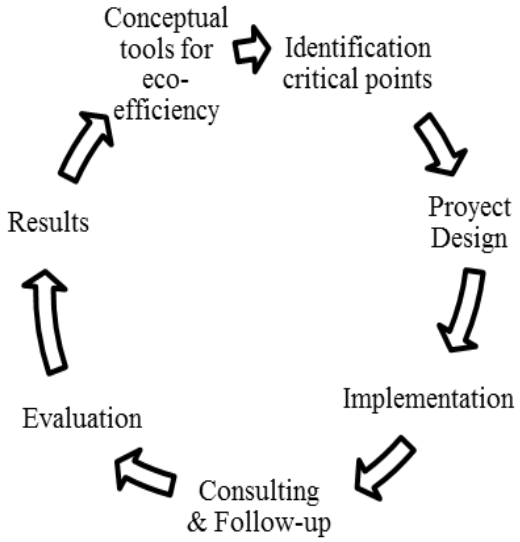
3.3 *The Intervention*

Six Mexican SME directors voluntarily participated in the Environmental Leadership for Competitiveness Program which consisted in 2 parts. The first provided the conceptual tools necessary for the development of eco-efficiency projects, such as the eco-map, value stream map, eco-balance, life cycle analysis, matrix MED, risk analysis and environmental auditing. With these conceptual tools the entrepreneurs themselves defined the company's standing faced to this issue, and identified environmental problems in aspects of planning, management and verification, among others. In this 40-hour workshop, participants applied eco-indicators to calculate costs of their inefficiency. After completing this workshop each director produced at least one eco-efficiency project. In the second part, each company implemented their eco-efficiency project. This phase was benefited by the support of consultants, both present and through a website. The objective was to implement the project that had been designed in the first part of the program and to measure advances with the eco-indicators.

The organizational performance of the companies was measured in economic and environmental dimensions. Water and energy consumption, as well as waste, were the main indicators evaluated before and after the intervention. The economic part was accounted as the total payment in pesos made for the consumption of water and energy. The environmental part for the energy indicator was measured as the number of kilowatts per hour consumed

by the companies. The water indicator was accounted for by the number of liters consumed. And waste reduction was measured by the number of kilograms of waste decrease for each company in the study.

Figure 1. Eco- efficiency Project Cycle



Paola Lozoya (2010)

4. RESULTS

Table 2 summarizes the gains obtained by each company after applying their own eco-efficiency project. It condenses the solutions which were proposed to tackle the critical points previously identified. In the same column, ROI (return of investment) is conveyed in the number of months the company had to wait in order to perceive economic gains after implementing their eco-efficiency projects. The next column represents the investment each director made or spent on the solutions. In the next, the economic gains, expressed in annual savings for the each company, are indicated. The last column indicates the environmental gains.

The six participating industries emit annually 101.77 tons of CO2 less than before implementing the program. They also saved 28,618 liters of gasoline and 122.95 tons of garbage waste per year. Their energy savings amount to 59,767.48 kWh, which suffices to provide 27 families with electric energy for a whole year.

Table 2. Economic and Environmental Gains

Industry	Solutions & ROI**	Investment*	Savings*	Eco-efficiency
1. Aluminium railings	Leds' bulbs 7.02	1754	3,276	1,450 KwH & 0.95 tons of CO2
2.Plastic Packaging	Cutting Molds & recycling 29	1000000	814700	122.95 tons of waste reduction
3.Cardboard & Paper	Ceiling Domes 9.2	116,256	106236	52,452 Kwh and34.29 tons of CO2
4. LPG	Gasoline substitution(LPG) 9	43,400	58,279	25,018 liters of gasoline & 54.79 tons of CO2
5.Scafolds & Construction	Training Courses, HVLP painting tools 4.3	10,743	57,200	3,600 liters of gasoline, 7.88tons of CO2 and 0.72tons of paint
6.Light fixtures & Bulbs	Leds' bulbs 15.3	7,820	20,599	5,865 KwH & 3.86 tons of CO2

* In pesos (1US dll = 13.20 pesos aprox.)
** In months

5. CONCLUSIONS

These economic and environmental gains demonstrate that the Environmental Leadership for Competitiveness Program produced great benefits for the participating industries. All implemented innovative methods which improved in the efficient use of water, heat and electricity, as well as waste disposal. Industries also developed capabilities for continuous economic and environmental improvements. As they increased their efficiency by reducing costs and

emissions of greenhouse gases, their reputation with stakeholders increased as they were recognized to be environmentally responsible companies. The latter promoted their growing and market permanence. The results speak for themselves. They demonstrate the scope and impact of a well-focused public policy, such as the Environmental Leadership Program for Competitiveness. This can also be described as an experience in dialogue between the public and private sectors which increased confidence and enthusiasm in directors of SMEs. It is expected that participating companies will continue to advance in eco-efficient strategies.

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