

ENVIRONMENTAL CHALLENGES AND OPPORTUNITIES FOR EUROPEAN MANUFACTURING SMES

S. Mitchell¹, P. O'Dowd¹ and A. Dimache¹

1. Department of Industrial and Mechanical Engineering, Galway-Mayo Institute of Technology, Dublin Road, Galway, Ireland.

ABSTRACT

Many owner/managers of Small and Medium Enterprises (SMEs) do not believe that their business operations have a negative impact on the environment. However, cumulatively their effect is considerable; the SME sector is responsible for an estimated 60-70% of pollution related to manufacturing, and 70% of industrial waste production in Europe.

This study reports on research carried out by the FutureSME project, a Framework 7 programme sponsored by the European Union. The study was carried out on 11 manufacturing-related SMEs from Italy, Ireland, Turkey, Czech Republic and the UK. The aim of the survey was to gain an overview into their environmental practices, to determine what challenges they faced and to see whether they considered there were opportunities in the environmental area. Following the initial survey, interviews took place with two of the SMEs.

The findings indicated that the SMEs surveyed viewed legislation, large customers and competitors as the main drivers of environmental change. Energy and waste are considered the most important issues. The majority of the SMEs measured some cost-related environmental indicators. However, most did not use tools and techniques to measure the entire life cycle impact of their products. The majority of the SMEs could see opportunities related to environmental issues, such as the design of new products and greener manufacturing processes.

KEYWORDS: Small Medium Enterprise (SME), environment, FutureSME

1. INTRODUCTION

The goal of this study was to investigate environmental regulatory threats and opportunities currently facing SMEs in Europe. It aimed to explore SME challenges in relation to current and future environmental issues.

The primary objective was to ascertain from SME owner managers, their major environmental issues in relation to their products, processes and business. The commonality of the survey group is that they are all manufacturing-related businesses. They all operate in different industries such as aviation, plastics and engineering design. They all come under the generalised description of an SME, and they are all operating their business in Europe.

The survey was not intended to audit, measure or benchmark the companies in their environmental performance.

The research is being carried out as part of FutureSME project (www.futuresme.eu) funded by the European Union under the Seventh Framework Programme (FP7). The primary aim of the project is to develop a set of tools and methodologies for manufacturing SMEs in Europe, which will enable them to adapt to the changing economic environment and will lead them towards a sustainable business model.

1.1. Background

The standardised description of an SME is, any type of business from a sole trader, to one having 250 employees. A *micro* enterprise has fewer than 10 employees, a *small* enterprise has

no greater than 50 employees, and a *medium* enterprise is defined as having a headcount between 50 and 250 employees [1].

A recent survey conducted in the UK indicated that the majority of businesses operating there believe that their operations have no effect on the environment. However, when questioned further, 46% of the businesses surveyed, actually did carry out business related activities that were harmful to the environment [2]. When SMEs are viewed as a group, the cumulative effect they have is considered to be quite significant. In the EU, the SME sector is responsible for an estimated 60-70% of pollution related to manufacturing, and 70% of industrial waste production [3] [4] [5].

1.2. Importance of SMEs in Europe

SMEs play a fundamental role in the European economy and are the backbone of European society. In Europe, SMEs make up 99% of businesses operating within the member countries, and account for 67% of total employment [6] [7]. The 23 million SMEs that operate in Europe act as incubators of entrepreneurial culture, and provide 100 million jobs [8]. SMEs also provide a wide range of products and services [9].

1.3. Difficulties faced by SMEs with regard to environmental issues

Smaller companies can suffer from disadvantages that larger companies do not. The major disadvantage is a shortage of resources, both human and financial. Small businesses cannot be managed in the same way as larger ones. The organisational structure of a large company is commonly departmentalised into areas such as finance, human resources and so on. In an SME, the owner manager tends to have responsibility for all areas [10]. This includes environmental issues and compliance to regulation.

Regulation is an issue that can have an adverse effect on a small company, due to its resource poverty. As well as health and safety, industry-specific regulations and tax compliance, there is a glut of environmental legislation that SMEs must comply with. The first step in ensuring compliance is in understanding which legislation the business must comply with. This investigation phase alone requires resources; either financially by hiring a consultant, or utilising a staff member to carry out the investigation. Both of these options are reliant on resources the SMEs have in short supply [10]. The burden of environmental compliance is equal across the board, and does not depend on the business size. However, it can be up to ten times more costly to carry out administrative activities in an SME relative to a large organisation [11].

The right information can be vital to the success or failure of a business. If one key piece of information is missed or misjudged in importance, such as a new law or regulation, the success of the company could be at risk. [12].

This definition of an SME tends to obscure the diverse nature of these businesses. SMEs simply see themselves as a business. Hillary [5], suggests they should be defined by their sub-groups (micro, small and medium), or by their sector, as this would give a better understanding of their behaviours [13].

The main reasons SMEs do not get involved in positive environmental activity is that they are unaware of their impact on the environment, and of the relevant legislation pertaining to it [2]. They are also unaware of the importance of sustainability, are cynical of the benefits of self-regulation and environmental management tools. SMEs are also considered to be difficult to engage with in relation to the environment [5]. Other issues include a view of the environmental issues as not being a core part of their business [14] and the perception that green issues only come at a cost and they are not a competitive advantage [15].

1.4. Advantages of positive environmental practices

The “win-win” of corporate environmentalism is a growing popular trend, and it is based on the belief that when a business addresses improvements environmentally, there are also economic benefits. This “win-win” is also termed “eco-efficiency” [16]. The term eco-efficiency dates back to 1990, with the key message being the idea of “producing more with less” [17]. Eco-efficiency practices are beneficial to SME sustainability, however large and medium sized enterprises have more developed eco-efficiencies than smaller ones, due mainly to the availability of specialised roles within larger firms [18] [17].

To encourage green practices within SMEs, initial approaches to SMEs should focus on cost savings and competitive advantage, together with demonstration of successful cases from their peers. The supports should be targeted specific to the industry sector the SME is in [14].

There are many support organisations available to SMEs, from government support agencies to private consultants. Many environmental resources are provided online by the European Commission. These include SME dedicated websites such as ECAP (<http://ec.europa.eu/environment/sme>) and EcoSMEs (www.ecosmes.net). Other supports are provided on a national and regional basis in each country in the European Union. Environmental management systems (EMSs) can be the best way to ensure compliance. However, many SMEs do not use these as many of them are scared off by EMSs, and by the resources required to implement them. Most SMEs do not implement an EMS without some external help [19] [20].

2. METHODOLOGY

This study aims to present a view of SMEs’ behaviours and opinions in relation to environmental issues. It asks specific questions to find out if this group of SMEs views environmental issues as an opportunity, or a threat.

As a pre-cursor to this study, informal face-to-face meetings took place with all of the SMEs that participated. The reason for this was to gain an overview of the SMEs’ operations, their attitudes to environmental issues and to present them with the authors’ research objectives. These meetings were also used to build up relationships with the companies, in order to gain a mutual trust, thus increasing the chance of obtaining a richer response, and discuss the possibility of further interviews.

The study was carried out in two stages. The first stage was to perform a survey on 11 SMEs. The second stage was to complete a more in-depth interview with two of the SMEs in question. These two SMEs were chosen based on the facts that they were in the same country and were willing to participate within the required timeframe.

The design of the survey was based on a literature review and the initial meetings with the SMEs. The survey was conducted online using surveymonkey (<http://www.surveymonkey.com>). This survey aimed to identify the drivers present in the SMEs’ decision making and their actions in relation to environmental issues. The survey was designed to capture the inputs of manufacturing SME managers, on three key areas:

1. The SME and the environment in general
2. Are environmental issues viewed as an opportunity or a threat?
3. Do the SMEs plan future strategies in relation to the environment?

The second stage in the methodology was to do a more in-depth interview with two of the SMEs. The interviews in both cases were not highly structured. The reason for this was to enable the person being interviewed to feel more at ease, as it has been reported that it can be difficult to engage with SMEs in relation to environmental issues [17]. Therefore, the interviews took place

at the SMEs’ place of business, so as to generate a natural conversational interview, rather than a formal questions and answers session.

3. RESULTS

Of the 13 SMEs that were asked to participate, 11 responded. The SMEs were from Italy, Ireland, Turkey, Czech Republic and the UK. Two of the companies are classed as micro (18%), five of the companies are small (45%) and four of the companies are classed as medium (36%).

3.1. The SME and the environment

The main drivers, from the SME owner/managers’ business point of view, in response to environmental issues can be seen in Figure 1 below.

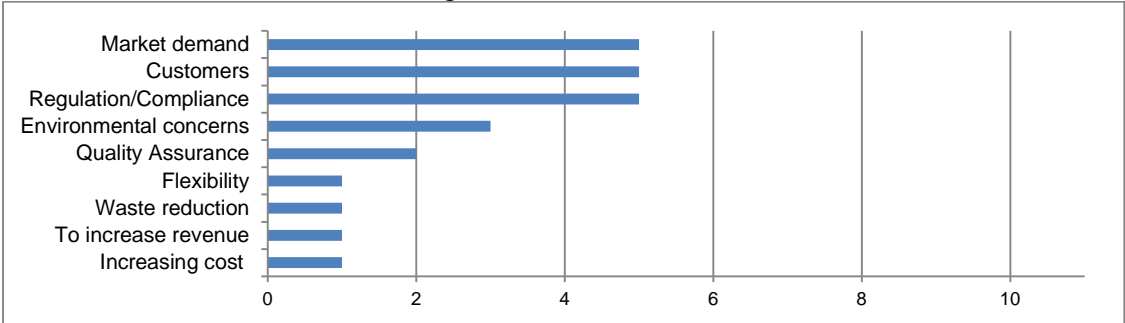


Figure 1: Main drivers in response to environmental issues

The most pressure externally comes from: *government/legislation* and *customer/market demand* followed closely by *competitors*. See Figure 2 below for a full list of external pressures.

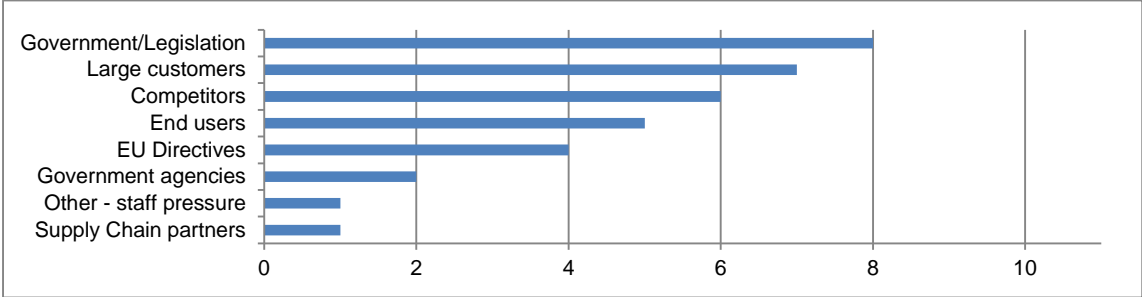


Figure 2: Where the external pressure for environmental change is coming from

The group of SMEs surveyed consider *energy* and *waste* the most important environmental area for their organisation. See Figure 3 below for all responses given.

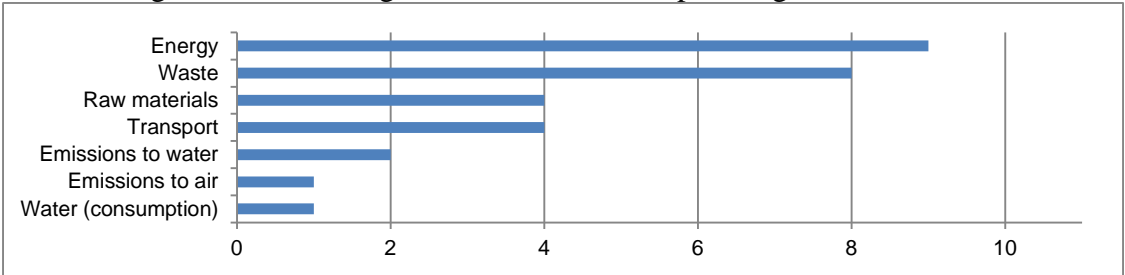


Figure 3: The most important environmental area for the SMEs

The most important environmental legislation or standard mentioned was *ISO14000* (36%).

Most companies (72%) stated that environmental change caused an *increase in cost* on a day to day basis. See the other effects in Figure 4 below.

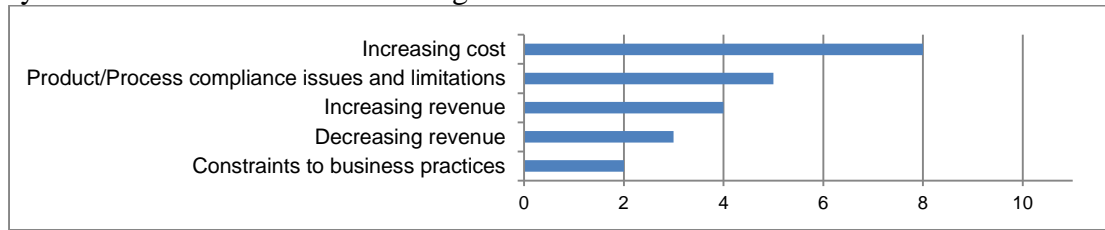


Figure 4: Day-to-day effects of environmental issues

3.2. Environmental change – an opportunity or a threat?

The majority (82%) of the SMEs considered environmental change as an *opportunity* in some way. None of the SMEs considered environmental change exclusively to be a *threat*.

All of the companies reported actions completed towards environmental change. These responses are summarised below in Figure 5.

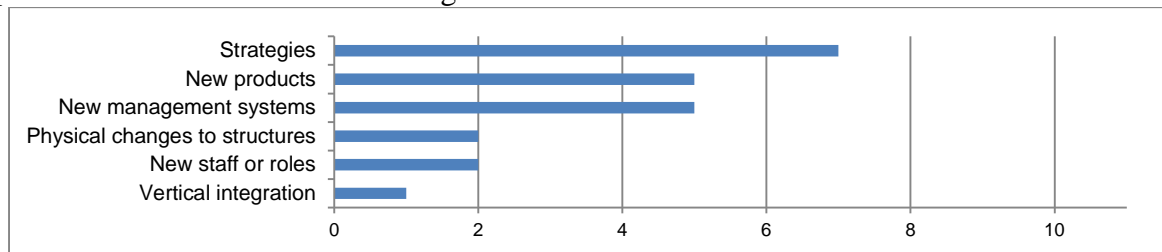


Figure 5: Responses to threats/opportunities of environmental change

A list of known tools and methodologies that are significant in measuring environmental performance was given to the SMEs. The responses, as to whether or not the SMEs used them, are summarised in Table 1 below.

Methodology	Response	We use this	don't use this/not sure/not answered
Life Cycle Analysis (LCA)		36%	64%
Design for the environment (Dfe)		27%	73%
Life Cycle Costing (LCC)		27%	73%
End of Life (EOL)		9%	91%
Product Service System (PSS) Offering		9%	91%

Table 1: Response by participants on use of tools to measure environmental performance

3.3. Future plans in relation to environmental issues

When the SMEs were questioned about benefiting in future from environmental factors, half of the SMEs stated that they had plans to benefit.

Only a minority (18%) of the companies surveyed had a broad environmental policy in their organisation related to global issues such as climate change or global warming. The majority (63%) of the SMEs surveyed were measuring some environmental indicators, such as *energy consumption, water, waste, gas and raw materials*. Many of the SMEs (56%) answered the survey, stating that they were fully aware of their organisations environmental impact.

The majority of the SMEs believed that *emerging technologies* (73%) would be the most significant environmental area in 10-15 years, closely followed by *rising costs* and *resource shortages*.

3.4. Interviews

Both the companies in which interviews took place were affected by the global downturn. Company A has now returned to operating at full capacity and is already seeing growth following the economic collapse. Both companies export the majority of their products, and believe that the global recession has had a major effect on their business. They both stated that environmental challenges are still important to them, but admitted the survival of the business is currently taking priority over all others.

It is clear that both the SMEs view energy and other environmental issues such as waste, primarily as an economic cost. This is evident from the fact that both companies have made significant reductions in energy bills in recent years. Company A did this by renegotiating the unit price they paid. It is planning to build a CHP (Combined Heat and Power) system to gain further savings. Company B moved to a new building, designed to reduce energy consumption.

Although Company A previously had a Life Cycle Assessment, this was completed as part of a funded project. There is no expertise, or perceived need to do this on a regular basis, as their product lines do not change significantly. Company B has never had such analysis on their products.

Company A was cynical towards self-regulation, and thought that more enforcement was required to enable companies with good environmental practices to trade on equal footing with those who may have more lax practices.

Company B also saw the value of regulation to some extent, but was disparaging of the focus on paperwork rather than practice. When discussing regulation, both companies displayed confusion over what regulations and standards applied to their companies, and which ones were mandatory. They were not sure where to get help on these issues and had not heard of the European Compliance Assistance Programme, which is an EC support specifically designed for such issues for SMEs.

4. DISCUSSION

4.1. Barriers, threats and opportunities

The cost of environmental compliance is a barrier when competing with larger companies. All the SMEs have eco-efficient practices in place to some extent, and are measuring cost-related environmental indicators in an effort to reduce them.

Some of the SMEs (36%) considered environmental change as a threat, but all of these SMEs also believed that environmental change had potential to realise business opportunities such as greener manufacturing processes, greener products and renewable energy. In total, 82% had believed there to be some opportunities in relation to environmental change

4.2. Regulations, directives and standards

When questioned about specific standards and regulations, the responses were quite varied. This was not surprising, due to the fact that the SMEs were all operating in different sub-sectors of industry. One of the SMEs interviewed needed assistance in this area, and did not know where to start in the process of gaining compliance. There is such an array of compliance issues that SMEs have to deal with, whether mandatory or voluntary, that the SMEs that were interviewed indicated that supports in this area would be more helpful if they were industry specific and available locally. Another company is concerned about bad environmental practices of other parties and does not believe that self-regulation is working.

According to the survey, Building Energy Rating was not considered by any company as being important or influential to them. As buildings are said to contribute as much as 40% of energy consumption and carbon emissions in Europe [21], this is a considerable oversight.

However, on the follow up interview, Company B reported having made improvements in this area by moving to a more energy efficient premises.

One of the SMEs surveyed highlighted the threat of new directives as being important. They went on to point out that much of the practicality of implementing new directives is not considered before they are put in place. This step can require research and development, which can be a burden on resources. In this scenario, the smaller the company is the more vulnerable, due to resource requirements, or shortage of specialised staff required to carry out this work. The SME manager did also say, however, that, as long as the directives are sensible in the long run, their implementation did not detract from their core focus.

4.3. Responses: Environmental tools and methodologies

The majority (63%) of the SMEs mentioned that new *strategies* were one of the responses made towards environmental change. However, it is not elaborated upon whether these strategies have been put into place, or whether they have had an environmental impact. There was a more tangible response shown by some SMEs that mentioned *new products, physical changes to structures, new staff roles, and green vertical integration* as the changes they have made.

Environmental management systems (EMSs) are not common place in SMEs. It has been reported that a mere 3-6% of SMEs have an EMS in place [19] [2]. ISO14000 is one system that many large companies use and is not specifically designed for SMEs. Four of the eleven participant SMEs (36%) however, mentioned ISO14000 as being important to them.

Many of the common methodologies used in manufacturing to measure and analyse the environmental impact of products and processes were either not known, or not used by the companies surveyed. One of the companies interviewed had previously carried out Life Cycle Analysis, but had not done so without external assistance and would not consider doing so in future without assistance.

Most of the environmental indicators that were said to be measured were cost related. None of the SMEs stated that they measured (currently) non-monetary related indicators such as carbon emissions, even though some of them stated in an earlier question that they use methodologies such as LCA.

One medium (almost large) company believes that keeping the production lines as flexible as possible will help them be adaptable to change in the future. Other plans include adopting eco-friendly solutions not only in their materials, but also in their operation process.

The majority of SMEs (56%) believed they were fully aware of the environmental impact they had. When this question is considered with the fact that none of the SMEs mentioned the use of an environmental indicator that can fully measure this impact (such as carbon footprint), it could be presumed that none of the SMEs surveyed could put an actual figure on the overall environmental impact of their activities or products.

5. CONCLUSIONS

The authors believe SMEs need low-cost solutions and easy access to:

- ways of measuring and maximising eco-efficiencies;
- sign-posting towards good information in the area of legislation and standards
- assistance in investigating business opportunities related to manufacturing and the environment
- Information on the life-cycle impact of their activities.

The FutureSME project group intends to carry out further research in this area and to deliver practical solutions for manufacturing-related SMEs in the environmental area.

6. ACKNOWLEDGEMENTS

We thank the European Commission for funding our research within the 7th Framework Programme FutureSME project (www.futuresme.eu).

7. REFERENCES

- [1] European Commission. <http://ec.europa.eu/enterprise>. <http://ec.europa.eu/enterprise/policies/sme/>. [Online] 1 Jan 2005. [Cited: 19 October 2009.] http://ec.europa.eu/enterprise/policies/sme/files/sme_definition/sme_user_guide_en.pdf.
- [2] NetRegs. NetRegs SME Environment 2009. netregs.gov.uk. [Online] 23 April 2010. [Cited: 17 May 2010.] http://www.netregs.gov.uk/static/documents/NetRegs/NetRegs_SME_Environment_2009_UK_summary.pdf.
- [3] *A cluster-based approach as an effective way to implement the Environmental Compliance Assistance Programme: evidence from some good practices*. Daddia, T., Testaa, F. and Iraldoa, F. 1, s.l. : Taylor & Francis, January 2010, Local Environment, Vol. 15, pp. 73-82. ISSN:13549839.
- [4] *Alternative models for environmental management in SMEs: the case of Ekoscan vs. ISO 14001*. Heras, Iñaki and Arana, German. no. 8, s.l. : Science Direct, May 2010, Journal of Cleaner Production, Vol. 18, pp. 726-735. ISSN 0959-6526.
- [5] Hillary, Ruth. *Small and Medium-Sized Enterprises and the Environment: Business Imperatives*. Sheffield : Greenleaf Publishing Ltd, 2000.
- [6] European Commission. *Putting Small Business First*. s.l. : Publications Office Publications.europa.eu, 2008. The mention of society is said by Günter Verheugen Vice-President of the European Commission.
- [7] Audretsch, David, et al. *First Section of the Annual Report on EU Small and Medium-sized Enterprises*. 2009.
- [8] European Commission. European Commission. *Enterprise and Industry Small and Medium Enterprises (SMEs)*. [Online] 25 June 2008-b. [Cited: 20 April 2010.] <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0394:FIN:en:PDF>.
- [9] *Barriers to Innovation among Spanish Manufacturing SMEs*. Madrid-Guijarro, Antonia, Garcia, Domingo and Van Auken, Howard. no. 4, October 2009, Journal of Small Business Management, Vol. 47, pp. 465-488. DOI 10.1111/j.1540-627X.2009.00279.x <http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=44133366&site=ehost-live>. ISSN 00472778.
- [10] Welsh, John A. and White, Jerry F. A small business is not a little big business. *Harvard Business Review*. July-August 1981.
- [11] Predescu, Antonio, et al. The changes brought by the financial crisis upon the interaction between the european union budget and small and medium sized enterprises. *Studia Universitatis Babeş Bolyai - Negotia*. 2010, 2.
- [12] *The problem of information overload in business organisations: a review of the literature*. Edmunds, Angela and Morris, Anne. no. 1, February 2000, International Journal of Information Management, Vol. 20, pp. 17-28.
- [13] *A factor analytic study of the perceived causes of small business failure*. Ricketts Gaskill, LiiAnn, Van Auken, Howard E. and Manning, Ronald A. Issue 4, October 1993, Journal of Small Business Management, Vol. Vol. 31, pp. 18-31. ISSN:0047-2778.
- [14] Ecotec Research & Consulting. *Report SMEs and the Environment [Report]* . s.l. : Report for the European Commission, 2000.
- [15] *Green Supply Chain Initiatives: Investigation on the Barriers in the Context of SMEs in Malaysia*. Wooi, Goh Chee and Zailani, Suhiza. 1, Penang : Medwell Journals, 2010, International Business Management, Vol. 4, pp. 20-27. ISSN: 1993-5250.
- [16] Jones, Oswald and Tilley, Fiona. *Competitive advantage in SMEs: organising for innovation and change*. Chichester : Wiley, 2003. pp. 1-12, 71-84. ISBN 0-479-84334-9.
- [17] *Eco-efficiency and SMEs in Nova Scotia, Canada*. Côté, Raymond, Booth, Booth and Louis, Bertha. no. 6-7, Halifax : Elsevier, 2006, Journal of Cleaner Production, Vol. 14, pp. 542-550. ISSN: 0959-6526.
- [18] *Eco-efficiency in the SMEs of Venezuela. Current status and future perspectives* . Fernández-Viñé, María Blanca, Gómez-Navarro, , Tomás and Capuz-Rizo, Salvador F. no. 8, s.l. : Elsevier, May 2010, Journal of Cleaner Production, Vol. 18, pp. 736-746.
- [19] ECAP. ECAP seminar "The green recipe for small business". [ed.] Imolo Bedo. [compl.] Sinead Mitchell. [Notes from an ECAP seminar]. Brussels, Belgium : s.n., 10 February 2010.
- [20] EcoSMEs. EcoSMEs. *EcoSMEs. Services for green products*. [Online] 2010. <http://www.ecosmes.net>.
- [21] *Directive 2002/91/EC of the European Parliament and the council*. European Commission. Brussels : s.n., 4 January 2003-b, Official Journal of the European Communities, pp. 65-71.