Eco-Efficiency: A New Challenge for Romanian SMEs

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Abstract: The eco-efficiency concept makes reference to the process that looks for maximizing the effectiveness and efficiency of the managerial activity and minimizing their impact on the environment. Traditionally it has been thought alone in the negative effects on the costs of being responsible with the environment, forgetting the important advantages of productivity that counteract those costs and that can be obtained thanks to the innovation. The paper deals with the question: in which ways the concept of eco-efficiency can make a valuable contribution to the environmental knowledge for Romanian SMEs?

Keywords: eco-efficiency; knowledge; contamination; environmental

JEL codes: Q56, K32, O13

1. Introduction

The second half of the XXth century was characterized by a growing interest of global reach, of the rhythm of economic growth and its impact in the environment (Club of Rome, 1968; Limits of the growth, 1973; Formless Brundlandt, 1987; Conference of United Nations on Environment and Development, 1992; etc). As a consequence, it has arisen the eco-efficiency concept that is an administration philosophy which connects environmental excellence with managerial excellence (Desimone and Popoff, 1997) and, in general terms, he has as purpose to achieve the economic growth at the same time that it provides environmental quality.

With the work of Schmidheiny (1992), the noun 'eco-efficiency' becomes broadly diffused in the managerial environment, considering its importance and necessity of the adoption of strategies, eco-efficiency on the part of the directive with the objective of making that; the productive processes are more efficient in the use of the resources and administration of residuals, cooperating with the conservation of the environment and, simultaneously, creating managerial value.

In accordance with the numerous studies that they have made, the relationship between environmental responsibility and economic efficiency (Shrivastava, 1995; Russo and Fouts, 1997; Murty and Kumar, 2003; Al-Tuwaijri et to the., 2004; Burnett and Hansen, 2008) and the adoption of environmental improvements are related with the efficiency of the company in measuring that:

- They contribute to the development and installation of strategies that improve the use of the inputs (they foment the conservation and renovation of the energy and natural resources) and outputs (they contribute to the decrease of the emissions, those poured and residuals).

- They develop productive processes that minimize the negative impacts on the environment. The products and/or resulting services of this process are obtained in the market. Also, the differential characteristic of the segment of ecological products generates bigger negotiating power in the derived market prices of their specialization.

The negative impacts in the environment can be considered as inefficiencies signs in the productive processes. According to Ekins (2005), the companies don't usually operate in the frontier of the economic efficiency as for the use of the resources, the elimination of residuals and the emissions.

Moreover, in accordance with Porter and Van der Abuts (1995), the contamination is a type more than inefficiencies, suggesting that those poured into the environment, whether noxious substances or energy forms, are a sign that the resources in an inefficient way are using, that something flaw in the design of products and processes. When considering the contamination like inefficiencies, we achieve that environmental variable is taken as strategic variable for the increment of the economic efficiency in the company.

However, most of the companies continue considering the environmental topic as an extra difficulty for the attainment of their objectives. That vision managerial static, clouds opportunities of improvement in economic and social aspects impede the evolution of the ecological efficiency in the productive processes. In that sense, the intervention of political public can help to accept and to overcome this vision, promoting the innovation, the productivity of the resources and the competitiveness through the development of some correctly conceived legal norms (Porter and Van der Abuts, 1995; Mohr, 2002).

The objective of the environmental laws is to improve the environmental quality and to impel the managerial innovation. In order to be beneficial for the companies, this law should be flexible, facilitating them the incorporation of the best available techniques adapted in particular to the conditions of each company. The innovation stimulated by the execution of the environmental law can take to the adoption of practical environmental that will be profitable for the companies, what is denominated guided eco-efficiencies, being also called win-win paradigm / hypothesis of Porter. The society and the companies are beneficiaries of the execution of environmental laws; to see Porter and Van der abuts, 1995; Ekins, 2005; Burnett, 2008.

In that sense, the law (which influences exercised by the environment) comes to motivate the innovation of the productive process and of the creative thought. Eco-efficiency the process of administrative control integrated in the strategy of business of the company by its directive free decision that has as objective to reduce negative impacts caused by its activities to the environment and, at the same time, to reduce costs and to create managerial value.

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2. Literature review

Some authors have centered their investigations in contributing empiric evidences of the eco-efficiencies.

Burnett and Hansen (2008) examine the environmental normative, as it can be beneficial for the company from the point of view of the economic efficiency. Their results confirm the existence of guided eco-efficiencies, ratifying in this way Porter's hypothesis (1995) that "contamination is similar to inefficiencies". However, in other investigations (Al-Tuwaijri et to the., 2004) we find results that they point that a company which makes voluntary eco-efficiency obtains better results than the companies which make guided eco-efficiencies; probably because the voluntary eco-efficiency is better integrated in the strategy of business of the company. To that type of corporate posture Aragon Belt (1998) considers it a strategy proactive or anticipatory.

However, at the present time the empiric evidences of the benefits of being responsible with the means set that they are still scarce and not very conclusive.

A fundamental question when measuring the efficiency is to decide what concept we use. In this sense, we consider that the two more important concepts of economic efficiency are the efficiency of costs and the efficiency of benefits, since they are based on the economic optimization as reaction to the prices and competition in the markets and not so much in the use of a certain technology; in other

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words, these two concepts of efficiency respond in turn to two important economic objectives: minimization of the cost and maximization of benefits (Berges and Mester, 1997; Maudos, Shepherd, Pérez and Quesada, 2002).

The idea that a company maximizes its yield adopting a respectful behavior with the environment can be possible following the demonstration by Berger and Mester (1997) that the efficiency of benefits is not necessarily correlated positively with the efficiency of the cost, a fact which suggests that the companies that incur in bigger costs like consequences of adopting measures to reduce the environmental contamination can compensate that apparent inefficiencies reaching a bigger yield than the competition when using a composition different from production vectors or benefitting from the power in the derived market prices of their specialization (Maudos, Shepherd, Pérez and Quesada, 2002). That investigation line leads us to the possibility that in case it took place bigger production costs when introducing environmental improvements in the company, this would not necessarily mean a decrease in the yield.

3. Research methodology

A key issue when measuring efficiency is deciding which concepts should be used. Therefore, we can consider that the two most important concepts of economic efficiency are the efficiency cost and efficiency benefits, which are based on economic optimization in reaction with prices and market competition rather than the use of technology, in other words, these two concepts of efficiency respond in turn to two important economic objectives: cost minimization and profit maximization (Berger and Mester, 1997; Maudos, Pastor, Pérez and Quesada, 2002).

The idea that a company maximizes its performance by adopting a friendly behavior environment may be possible, according to Berger and Mester (1997) who agree that efficiency benefits are not necessarily positively correlated with cost efficiency, suggesting that firms incur higher costs as a consequence of the actions to reduce environmental pollution, which can compensate this apparent inefficiency reaching greater performance than the competition by using a different composition or production vector benefit of power in market prices resulting from specialization (Maud, Pastor, Perez and Quesada, 2002). This line of research leads to the possibility that the event which will produce higher costs of production to environmental improvements in the company will not necessarily mean a decrease in performance.

The inefficiencies of costs tells us how high they the costs of a company are in connection with the costs of the most efficient company that it takes place with the same output combination and price of the inputs, and the difference cannot be explained by a random error. The specification of a frontier of costs allows estimating a function of costs that relates the costs observed by a group of outputs, the prices of the inputs, a random error and the inefficiencies. This frontier can be expressed as:

$$C = C (y, p, u c, v c)$$

where C measures the variable costs, and it is the vector of the quantities of outputs, p it is the vector of prices of the variable inputs, u c represents the opposing inefficiencies and v c represents the random error. The factor of inefficiencies u c incorporates the inefficiencies so much, as a consequence of a non-good reaction to the relative prices of the inputs, p, as the technical inefficiencies, due to the employment of too many inputs to take place and to facilitate the estimation of the inefficiencies, it is assumed that the random error and the inefficiencies, v c and u c are detachable from the rest of the function of costs. In this kind of work, the efficiency of costs of the company i (ECi) is considered as the ratio among the necessary minimum costs to produce the output vector and the cost of the company i. The range of the efficiencies of costs is among (0-1) and it is similar to one for the most efficient company of those that integrate the sample. In the practice, the efficiencies are generally defined in relation to the more efficient company observed in the sector,

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more than in reference to the true minimum cost, since the underlying technology is ignored. Fortunately, for most of the economic hypotheses it is more appropriate to use the concept of relative efficiency instead of the absolute efficiency.

The concept of efficiency of benefits is much wider that the concept of efficiency of costs, since it considers the effects of the election of the vector of production which envelope so much the costs like envelope or revenues. In contrast with the function of costs, the function of benefit picks up as a dependent variable of the benefit instead of the costs and it maintains as exogenous variables the same ones that the function of costs. In this way, the variable quantity of output is constant while its price varies freely and it affects to the benefit. In this way, we define the function of benefit alternative as:

$$\pi = \pi \, (\, y \, , \, p \, , \, u\pi \, , \, v\pi \,)$$

where π is the variable benefit, and it is the vector of the quantities of outputs, p it is the vector of prices of the variable inputs, $u\pi$ represents the opposing inefficiencies that reduce the benefit and $v\pi$ represents the random error. To facilitate the estimate of the efficiency, it is assumed that the random error and the inefficiencies are detachable from the rest of the function of costs. The efficiency of benefit (EBi) is defined in this study as the ratio among the current benefit of the company i (πi) and the maximum level that would rot to reach the company.

The database used in this research is initially composed of 120 companies manufacturing sector of oil products, competing to offer similar products to their customers and similar use of production factors. However, the lack of data for one or more years has shown that the final number of 98 companies was analyzed. The study was performed for 2007, 2008, 2009 and 2010 and the information used was obtained from the PGARCH model and S&P CNX Nifty database.

As we have panel data, we will use the distribution-free approach to estimate the efficiency. This methodology assumes that a constant efficiency exists along the time studied for each company, while the random error will spread to be compensated along the period, being its average, therefore, zero. In general, in the econometric models a comparison settles down among the different companies and it is said that a company is more or less efficient in function whether it shows that it is the best or the worst, respectively, after having eliminated the possible existent random error in the data.

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3. Results and conclusions

Most studies have paid attention to cost efficiency, disregarding possible inefficiencies on the revenue side. However, the studies that have analysed cost and profit efficiency by using frontier profit functions have shown the existence of higher levels of profit than of cost inefficiencies.

The results (figure 1 and figure 2) were calculated for different groups, and found that the level cost efficiencies and profit depended strongly on the chosen level of contamination, with the 5% more reasonable level as the increase that occurs when moving from 5 to 10% does not alter substantially this level. These results show that the studied companies are clean in half by 15, 12% more efficient and cost 9, 25% more efficient benefits.

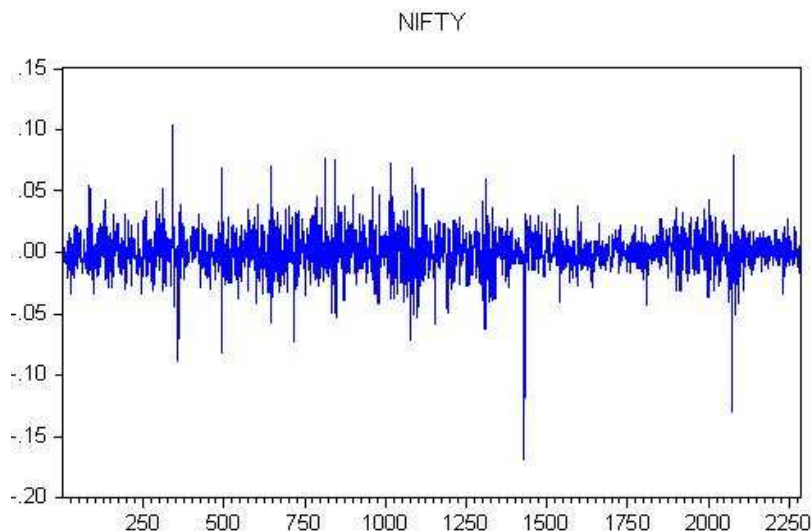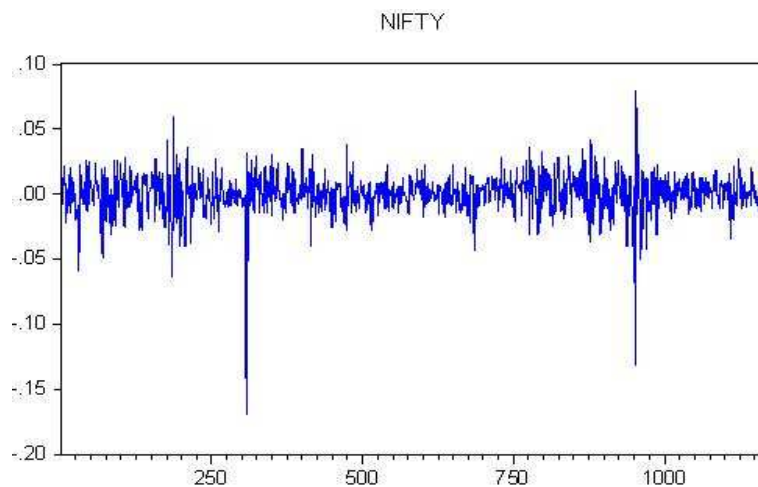**Figure 1. Level of contamination cost efficiency**

Figure 2. Level of contamination profit efficiency

According to this result, a proper evaluation of efficiency should not be restricted to cost efficiency because many times banks can have better returns from activities that are more costly and provide higher net returns.

Cost and profit efficiency definitions correspond, respectively, to two important economic objectives: cost minimisation and profit maximisation. Cost efficiency is the ratio between the minimum cost at which it is possible to attain a given volume of production and the cost actually incurred.

Both the cost and profit functions are assumed to take the logarithmic specification. To avoid negative values, we transform the profit variable by adding to all individual values a constant equal to the maximum loss experienced by any bank in the sample plus one.

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Last, but not least, this series of structural changes was reflected in changes in the structure of employment and employees in the economy, the private sector becoming the main creator of jobs in the economy. However, these advances in the period before accession shall be taken seriously through integration in the European economic structures, a process which will run until the beginning of the years 2013 - 2015.

There is a significant diversification of the SME business object, the services rendered to companies, construction, industry, information, transactions, health etc., mark of maturation of this category of economic operators, but also the emergence of SMEs having as object of activity coal, metal ores, hydrocarbons mining, tobacco products and metal processing industries, mining and preparation of radioactive ores; activities for private households.

In conclusion, the main problem in measuring inefficiency is separating what is genuinely inefficient behaviour from random circumstances affecting costs or profits for other reasons.

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