



ECOEFFICIENCY:

ENVIRONMENTAL PERFORMANCE x ECONOMIC PERFORMANCE

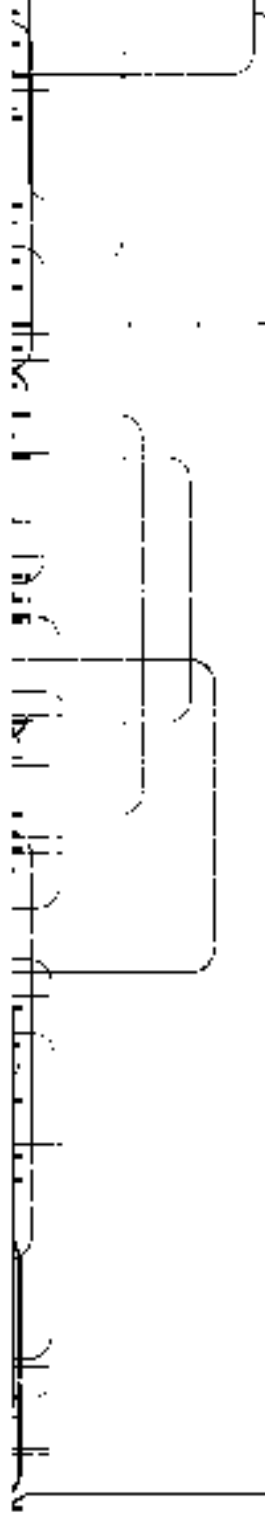
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MAIN OBJECTIVE:

Examine across empirical evidences if environmental improvements affect the economic efficiency in mineral industry in Spain.

*Environmental improvement is measured by values weighted from five important pollutant substances (CO, CO₂, NO₂, SO₂ and PM₁₀). (<http://www.prtr-es.es/>) Spanish register of emission and pollutant sources.

*Economic efficiency is represented by the cost efficiency estimation and the profit efficiency estimation of the selected companies.

HYPOTHESIS:

The adoption of eco-efficiencies strategies improve the competitive position of the companies.

“Pollution is equal to inefficiency”,
Porter and Van Der Linde (1995).

H0: Environment responsibility is positively related to the economic efficiency.

HYPOTHESIS:

Eco-efficiencies strategies can save costs to the companies by better/more use of their resources, while decreasing the negative impact on the environment.

H1: Environment responsibility is positively related to the reduction in costs in the companies.

HYPOTHESIS:

The companies will also be able to differentiate easier on the market if they offer “green” products or respectful services with the environment.

H2: Environment responsibility is positively related to an improvement of the company income.


THE MODEL:

Important concepts of economic efficiency are the cost and profit efficiency, because they are based on the economic optimization of the companies as reaction to the prices and competition of the markets and not just on the use of a certain technology;

These two concepts of efficiency answer in turn to two important economic aims: minimization of the cost and maximization of benefits (Berges and Mester, 1997; Maudos, Pastor, Pérez and Quesada, 2002).

THE MODEL:

Respectful behaviour with the environment.




Maximizing performance.



"Profit efficiency is not necessarily correlated positively by the cost efficiency" (Berger and Mester, 1997).

THE MODEL:

“Different composition from vectors of production or benefiting from the power in the market prices derived from their specialization” (Maudos, Pastor, Pérez and Quesada, 2002).



This idea might lead us to the possibility of producing major costs of production on introducing environmental improvements in the company, it would not necessarily mean a decrease in its performance.

THE MODEL:

The concept of cost efficiency

- Can be defined as the difference between how a company might potentially use the resources versus their current utilization.

The concept of profit efficiency

- Is much wider than the concept of cost efficiency because consider the effects of the selection of the vector of production both on the costs and on the income. If the selection of the market and/or competitive strategy is erroneous there are produce profits inefficiencies.

EMPIRICAL ANALYSIS:

Parametric method is used because it adjust better to the concepts of cost and profit efficiency as discussed previously.

The database that is in use in this research is composed by **124** companies of the sector of **mineral products manufacture**, which compete by offering similar products and using similar production factors. The study is realized for the year **2003 to 2006**, inclusively, and the used information has been obtained of the database SABI (Financial company information and business intelligence for companies in Spain and Portugal).

THIS MODEL ANALIZES COSTS AND PROFITS EFFICIENCY THROUGH VARIABLES:

Outputs

- y_1 = Net sales
- y_2 = other operating income

Inputs

- w_1 = personal expenses / number of employees
- w_2 = materials/ average total assets
- w_3 = depreciation of fixed allocation / average total assets
- w_4 = other operating expenses / average total assets

Z = index of pollution

- Estimated from the weighted sum, agreement with its dangerousness for the human health, of the following 4 gases CO, CO₂, NO₂ and SO₂ and the material particular PM₁₀

C = Total cost

- Materials + staff costs + other operating expenses + depreciation of fixed strength

P = Profit

- Operating profit

Translog (Christensen, Jogerson and Lau, 1973):

The most common functional form in the literature checked for the estimation of cost and profit efficiencies is the Translog, (Christensen, Jogerson and Lau, 1973), that for the case of two output and four inputs, it comes expressed as shown in the following formula:

$$\begin{aligned} \ln C_i = & \alpha_0 + \sum_{i=1}^2 \beta_i \ln y_i + \sum_{j=1}^4 \gamma_j \ln w_j + \frac{1}{2} \sum_{i=1}^2 \sum_{j=1}^2 \lambda_{ij} \ln y_i \ln y_j \\ & + \frac{1}{2} \sum_{j=1}^4 \sum_{k=1}^4 \rho_{jk} \ln w_j \ln w_k + \sum_{i=1}^2 \sum_{j=1}^4 \delta_{ij} \ln y_i \ln w_j + \varepsilon_i \end{aligned} \quad (7)$$

RESULTS:

Average of the cost efficiency and benefits efficiency *

	EC**	EB**	EC***	EC****	EB***	EB****
MODEL 1	0,77	0,30				
MODEL 2	0,80	0,24	0,82	0,78	0,22	0,315

* Level of truncation of 5%

** N=124

*** N=20 less pollutant companies of the sample

**** N=20 more pollutant companies of the sample

EC= cost efficiency

EB= benefits efficiency

CONCLUSIONS:

according to our sample and years of analysis on this field.

Companies less contaminated are in average 5,13% more efficient in costs in relation to the most pollutant.

Consistent

H1: Environment responsibility is positively related to the reduction in the costs in the companies.

CONCLUSIONS:

according to our sample and years of analysis on this field.

Less pollutant companies are 43,2% less profit efficient than the most pollutant ones. The explanation of this result can be in that the mineral market in Spain is not conscious enough to pay a surcharge for a "ecoproducts". The reduction of costs and/or the increase of the productivity of the resources are consequences of the ecoinnovation, demonstrates that the product or service can lose transitorily competitiveness. Consistently, it is possible that, at least temporarily, the less pollutant companies are more inefficient in profits.

Not consistent

H2: Environment responsibility is positively related to an improvement of the company income.

CONCLUSIONS:

according to our sample and years of analysis on this field.

Partially consistent

General hypothesis: Environment responsibility is positively related to the economic efficiency.

Thank you very much!