

## ECO-EFFICIENCY – THE NEW DIMENSION OF ECONOMIC EFFICIENCY

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**Abstract.** Over the past decades, human activity has changed the world’s environment more extensively than ever before. Slowly, the people became sensitive to the needs of our environment. Nowadays, it is clear: in order to be sustainable, economic development must respect the environment. All over the world (but especially in Europe), people, companies and governments attach an overwhelming importance to protecting the environment. At macroeconomic level, more and more policies focus on environment protection. At microeconomics level, in order to have success in the long-run, companies cannot neglect the environmental dimension of business development. More and more companies use environment friendly technologies and present them as a strong competitive advantage, in their commercials and advertisings. The *World Business Council for Sustainable Development (WBCSD)* developed the concept of eco-efficiency. This concept covers a wide range of measures by which companies have reduced their environmental impacts and also their costs. The use of eco-efficiency indicators allows us to avoid the traditional problem referring to the fact that environmental performance indicators might fluctuate as a result of changes in production volume and thus hide real changes in environmental performance. The paper analyses the way Europeans see sustainable development and their initiatives oriented towards achieving the symbiosis between economic development and environment protection. From these initiatives, we focus especially on the micro-economic measures. We investigate the ecological way of doing business, and we measure the eco-efficiency of several well-known companies, trying to outline the solutions that work best, solutions that could be used by the Romanian companies in order to increase their eco-efficiency.

**Keywords:** eco-efficiency, sustainable development, environmental performances

### 1. Introduction

Over the past decades, human activity has changed the world’s environment more extensively than ever before. The use of natural resources has advanced human development, but at a growing environmental cost. The UN Development Programme has estimated that if the whole world’s population were to enjoy a lifestyle similar to that of the industrialized countries today, it would require resources several times bigger than the ones we have on Earth.

In 2005, a report of the international Millennium Ecosystem Assessment (MEA) group, involving 1.360 experts worldwide, revealed dramatic deterioration in ecosystem services. These include the provision of resources (such as fuel and food), processes such as climate regulation, and the aesthetic and recreational values of nature. The MEA found that two-thirds of these services were being degraded or used unsustainably, and described global warming as the change with the greatest potential to alter the natural infrastructure of Earth.

Many of the world’s natural resources are not owned by anyone or assigned a value. They represent common goods, and failure to halt their depletion is sometimes referred to as “the tragedy of the global commons”. Slowly, the people (and the companies they formed) realize it is imperative to reverse this trend and operate within the carrying capacity of the earth. Also governments become sensitive to the needs of our environment and their policies reflect their concerns. Encouragingly in this area, it seems that businesses are beginning to find the ways and the means to turn responsibility into opportunity. But it will take long before doing this on a scale that has an impact at the global level.

Nowadays, it is clear: in order to be sustainable, economic development must respect the environment.

At macroeconomic level, more and more policies focus on environment protection. Governments engage in a competition trying to reduce the negative effects of economic development on the environment. Public

authorities as well as NGOs are encouraging environment-friendly technologies.

At microeconomics level, in order to have success in the long-run, companies cannot neglect the environmental dimension of business development. While for the moment some companies are still successful, even though the waste a lot of scarce energy and don't care about polluting the environment, this situation will soon change. Because the public becomes more sensitive towards the needs of the environment and the consumers will ask companies to act responsively. Corporate responsibility gets a new dimension.

Already more and more companies use environment friendly technologies and present them as a strong competitive advantage, in their commercials and advertisings.

## 2. Eco-efficiency

Because companies are more and more interested to realize and demonstrate real competitiveness through the environment impact control of their activities/ products/ services, they usually make remedies and audits, but these alone are not sufficient for assuring a real organizational performance that are correlated with the national and European legal requirements. The support activities as training and consultancy become key elements for eco-business.

In February 2006, *World Business Council for Sustainable Development (WBCSD)* – an international coalition from 180 international companies, from 30 states and 20 major industrial sectors – published a document (*From Challenge to Opportunity. The Role of Business in Tomorrow's Society*). It assesses the main challenges the businesses are facing today, one of them being the responsibility towards the environment.

It is reminded that one of the WBCSD's early steps was to develop the concept of eco-efficiency, based on the principle of "doing more with less" (actually, WBCSD has been credited for inventing the term eco-efficiency). This concept covers a wide range of measures by which companies have reduced their environmental impacts and also their costs. Eco-efficiency initiatives have become increasingly substantial and sophisticated.

The purpose of eco-efficiency is to maximise value creation while having minimised the use of resources and emissions of pollutants

(Michelsen, 2006, p.290).

Eco-efficiency calls for businesses to achieve more value from lower inputs of materials and energy and with reduced emissions. It applies throughout a company, to marketing and product development as much as to manufacturing or distribution.

The WBCSD has identified seven elements that businesses can use to improve their eco-efficiency:

- Reduce material intensity
- Reduce energy intensity
- Reduce dispersion of toxic substances
- Enhance recyclability
- Maximize use of renewables
- Extend product durability
- Increase service intensity

Governments can (and should) implement a policy that fosters economic growth and favours reduction of resource use and avoidance of pollution with incentives for eco-innovation.

Such policy measures to can include the following:

- Identifying and eliminating perverse subsidies;
- Internalizing environmental costs,
- Shifting tax from labour and profit to resource use and pollution,
- Developing and implementing economic instruments (e.g. emissions trading as an incentive for companies to implement eco-efficiency measures),
- Promoting voluntary initiatives and negotiated agreements.

Governments could also develop national plans to make their economies more eco-efficient. These plans should include measures and programs which involve all sectors of society.

Several countries and regions have already developed national and regional action plans and made dramatic progress as a result.

Measuring eco-efficiency is important in order to measure the decoupling of economic growth and environmental pressure. In most cases, eco-efficiency is expressed by the ratio:

$$Eco - efficiency = \frac{Product\_or\_service\_value}{Environmental\_impact} \quad (1)$$

Usually, while calculating the eco-efficiency, absolute values for the product value and environmental influence are used.

The same formula can be used for measuring

eco-efficiency at macroeconomic level, using macroeconomic indicators (e.g. GDP, GNP) instead of product value.

The use of eco-efficiency indicators allows us to avoid the traditional problem referring to the fact that environmental performance indicators might fluctuate as a result of changes in production volume and thus hide real changes in environmental performance.

### 3. Environmental issues in Europe

According with statistics data, Europeans attach an overwhelming importance to protecting the environment. During a research conducted at

the end of 2007 (a special Eurobarometer on the environment), almost everybody says that it is very or fairly important to them (96%) and they are inclined to rank the issue as *very* important (64%) rather than *fairly* important (32%).

Respondents who say that environmental protection is *very* important outnumber those who say it is *fairly* important in every country except Finland. There are very few people who regard environmental protection as not important: the highest figure is recorded in Austria and Romania (8% both), while in most European countries this percentage was below 3%.

Question: QF1. How important is protecting the environment to you personally?

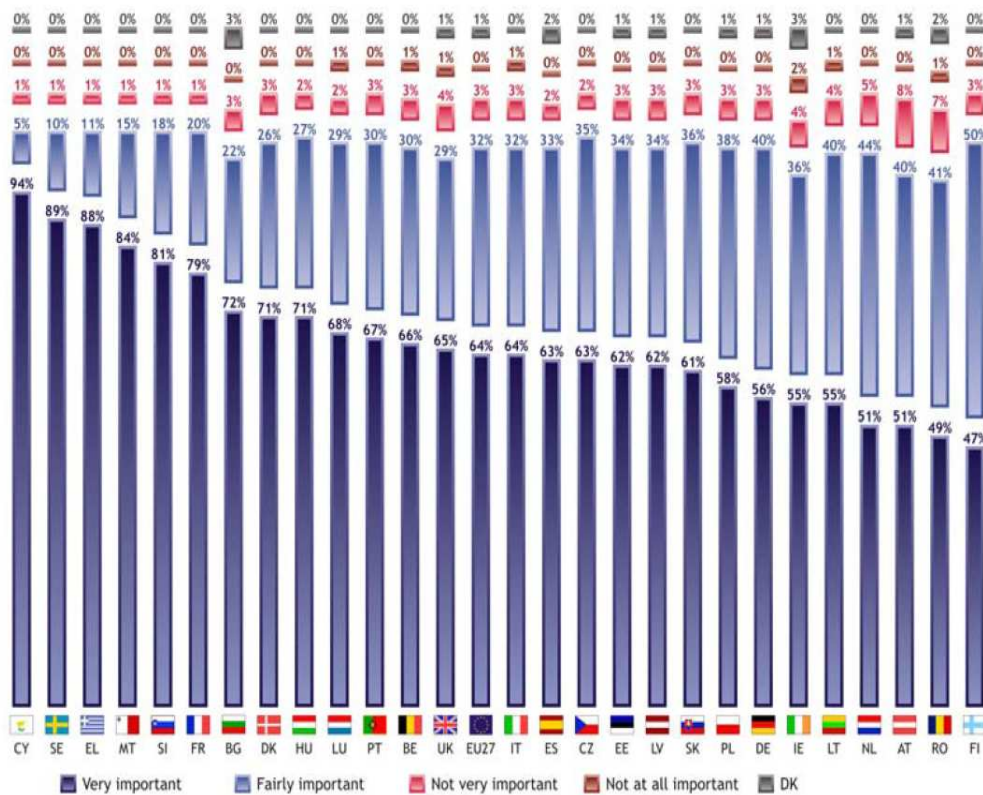


Figure 1. Europeans attitude toward the environment

Europeans tend to see environmental protection as a joint responsibility: 90% of them agree that the primary responsibility should lie with the biggest polluters, while 86% believe that they, as individuals, can play a role in protecting the environment in their countries.

There can be observed a slight divergence in the intensity of opinion: while around three in five respondents *totally* agree that big polluters should be held liable, this is the case for only two in five respondents concerning the responsibility of individuals. The interpretation that is the most

realistic in this case is that Europeans think that everybody can do something to protect the environment but they are still more inclined to support the “polluter pays principle”, based on the idea that different parties should be held responsible in proportion to the environmental damage they cause.

It should also be noted that policies and measures aimed at protecting the environment are seen in Europe as an element encouraging companies to innovate (by over 60% of citizens). In 2007 only 16% of respondents considered that

policies aimed at protecting the environment are rather an obstacle for the economic performances (compared to 20% in 2004).

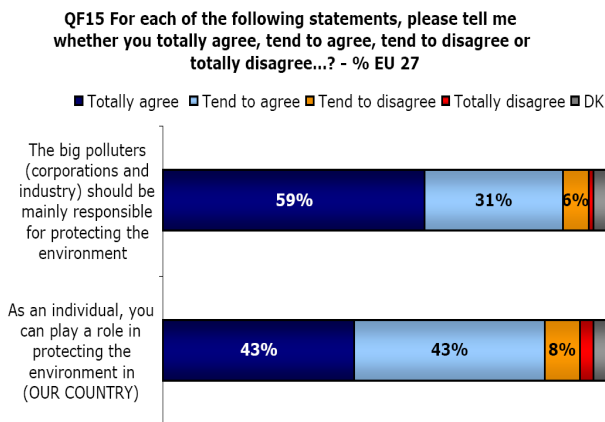


Figure 2. Responsibility for environment protection

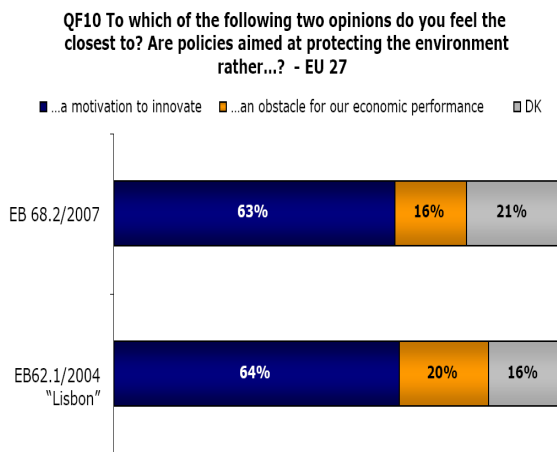


Figure 3. Environment protection and economic performance

With European Partners for the Environment (EPE), supported from the European Commission Directorate General for Enterprises, the WBCSD launched the European Eco-efficiency Initiative (EEI) in 1998.

The European Environment Agency (EEA) has adopted eco-efficiency ratio indicators for countries. Both the EEA and the WBCSD are working toward matching headline indicators for nations and generally applicable indicators for corporate reporting.

#### 4. Measuring the eco-efficiency – case studies

More and more companies are focussing on improving their eco-efficiency. Economic efficiency and profits ceased to be the only

objective for companies with solid strategies, long-term oriented.

Toyota is one example of company concerned with the environmental effect. The company adopted in 1992 Toyota Earth Charter (revised in 2000), and embodies the comprehensive approach to global environmental issues. Based on this Charter, Toyota has made environmental responses a top management priority, and took on the challenge of achieving zero emissions at all stages (production, utilization, and disposal).

Toyota calculates eco-efficiency using the formula below and monitors the results in the form of the eco-efficiency index. The environmental impact is assessed in terms of CO<sub>2</sub> emissions volume and the volume of waste generated by the Production Group.

$$Eco\text{-}efficiency = \frac{Net\_sales}{Environmental\_impact} \quad (2)$$

Over 17 years, the CO<sub>2</sub> index has increased by about 110%, and the waste index by about 350%.

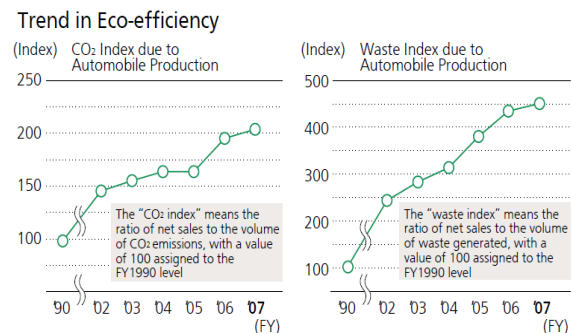


Figure 4. Eco-efficiency trend at Toyota

Toshiba has developed unique eco-efficiency indicator, called Factor T, (named after the initial T of Toshiba). Factor T is an indicator used for assessing the degree of improvement of eco-efficiency. For instance, Factor 10 is a well-known concept calling for a tenfold increase in resource productivity or, in the other words, a tenfold increase in eco-efficiency.

Factor T proposed by Toshiba consists of two elements: product eco-efficiency and business process eco-efficiency. Product eco-efficiency is calculated by dividing the value of a product by its environmental impact. Business process eco-efficiency is calculated by dividing the amount of sales by the environmental impact of the business process. Toshiba Group's objective is to double overall eco-efficiency,

which is the combination of product eco-efficiency and business process eco-efficiency.

Over 12 years (objectives for 2012, based on 2000 performance), Toshiba aims to improve product eco-efficiency 2.55 times and business process eco-efficiency 1.3 times. Procurement and usage account for 80% of the total environmental impacts of Toshiba Group products, with production accounting for the remaining 20%. The weighted average of 2.55 times for product eco-efficiency and 1.3 times for business process eco-efficiency is 2.3 times for overall eco-efficiency (2.55 times for product eco-efficiency × 80% + 1.3 times for business process eco-efficiency × 20% = 2.3 times for overall eco-efficiency).



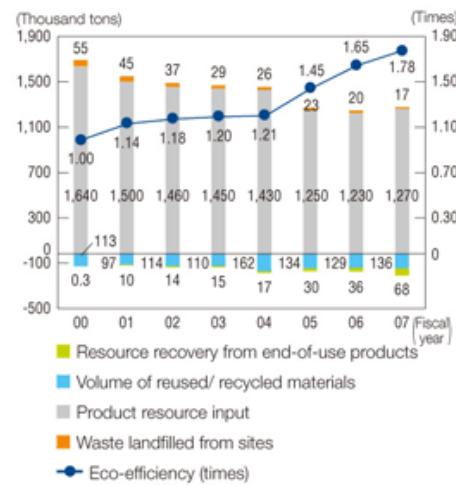
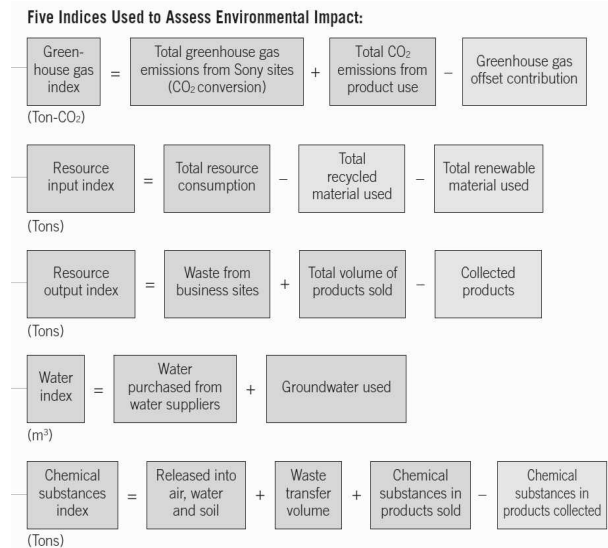
Sony is another company deeply concerned with its environmental impact. It established general indicators, namely, greenhouse gas and resource indices, to determine, where possible, the environmental impact of its business activities, products and services, over their entire life cycles. Sony uses the eco-efficiency equation shown below:

$$Eco\text{-}efficiency = \frac{Sales}{Environmental\_impact} \quad (3)$$

Sony aimed to raise eco-efficiency with respect to greenhouse gases and resource consumption by 1.5 times by fiscal 2005 and by double that by fiscal 2010, compared with fiscal 2000.

Sony has formulated its own set of environmental indices for use in measuring the environmental impact of its business activities. Five indices are used as a benchmark for measuring the environmental activities within the Sony Group: the greenhouse gas index, resource input index, resource output index, water index and chemical substances index. This set of five indices was selected after carefully considering the life cycle of Sony's global business activities, and those factors that Sony is able to directly identify and control. Each index is designed to

quantitatively measure environmental impact, with lower numerical values indicating a lower level of impact. The degrees of environmental impact calculated using these indices are then compared with sales figures in order to define the eco-efficiency factor as shown in the diagram below.



Sony's resource index for fiscal 2007 shows that resources used during the period totaled approximately 1.08 million tons, while eco-efficiency was 1.78 times the fiscal 2000 level. This represents further improvement in eco-efficiency since fiscal 2006. Although sales increased considerably on the back of higher sales of LCD televisions and other products, the decline in sales of cathode ray tube (CRT) televisions resulted in a minimal increase in product resource input volume. Overall, the resource index has

declined steadily since fiscal 2000, while eco-efficiency has improved significantly since fiscal 2004, when the shift to flat-screen LCD televisions began in earnest.

WBCSD give many examples of companies enhancing their eco-efficiency and setting good examples to follow:

- Volkswagen Germany – the Lupo 3L TDI model),
- Lura, Croatia – the project of wastewater purification,
- Parmalat, Portugal – its participation, along with nine other companies from the Setúbal area, in a local eco-efficiency,
- Mobility, Switzerland – the car-sharing initiative,
- Carvajal, Columbia – the elimination of toxic solvents from its printing processes.

Eco-efficiency can be measured also at macro-economic level, using the macroeconomic indicators.

An international comparison shows us that Japan is far ahead the other developed countries in terms of eco-efficiency:

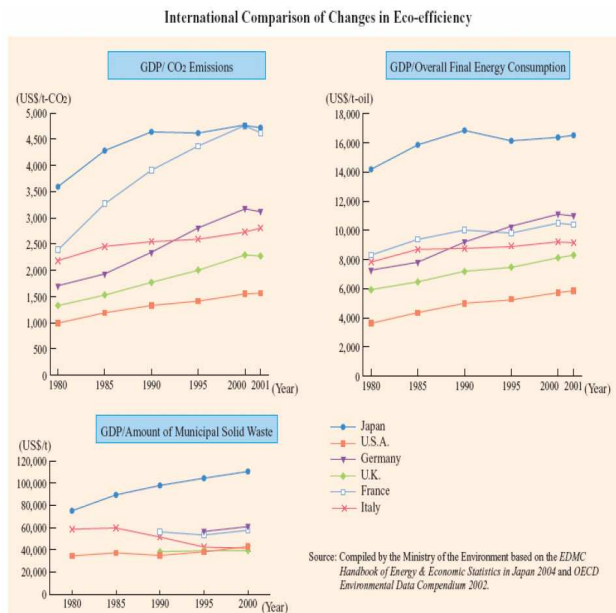


Figure 8. Eco-efficiency measured at macro-economic level – an international comparison

Recently, at the initiative of the Romanian Government a six-month project was developed in order to define, quantify and starting implementation of basic eco-efficiency and environmental indicators.

## 5. Conclusions

Eco-efficiency became a side of efficiency considered more and more by companies and governments, when assessing their success.

For now, Japan seems to be the incontestable leader in terms of eco-efficiency, at macroeconomic level, while Japanese companies such as Toyota, Toshiba, Sony, are leading at microeconomic leader, with extremely ambitious objectives and the proven ability to reach those objectives.

Europe is showing a lot of concern for the environment and many initiatives were taken in the field of eco-efficiency. These initiatives already proved to be efficient, and we can see the eco-efficiency improving in most European countries.

Romania begun to show some interest in the field of eco-efficiency, as a way to ensure sustainable development, but it lags far behind other European countries. Undoubtedly, the localisation of important multinational companies (e.g. Renault, Siemens, Alcatel, and Continental) in Romania contributed to raising corporate awareness in terms of environmental impact and will foster a positive evolution in the field.

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