

ECO-EFFICIENCY RECYCLING OF ORGANIC WASTE IN ROMANIA

Cristian Silviu BANACU¹, Vasile ZECHERU², Bianca Georgiana OLARU³

¹ Professor, Bucharest University of Economic Studies, email: cristian.banacu@gmail.com,

² Associate Professor, Bucharest University of Agronomic Sciences and Veterinary Medicine, email: ahile_z_verescu@yahoo.com,

³ PhD Student, Bucharest University of Economic Studies, email: biancageorgiana.olaru@gmail.com

Abstract

In this article we propose the approach of an important subject concerning the efficient recovery of materials from organic waste which may present numerous benefits both economically, but also environmentally friendly. In European countries, eco-efficiency is an issue of national importance and this can lead to improved productivity of natural resources without environmental degradation. In this regard, experts look for effective solutions which may to combat current practices that harm the environment and human health as well as future generations. Researchers in this field are looking for methods based on economic indicators to develop a good alternative, so it is desirable that the Romanian state institutions to implement and develop an environmentally friendly society.

Keywords:

Eco-efficiency recycling, organic waste, Romanian legislation, productivity, economic indicators, environment

1. Introduction

1.1. General terms of eco-efficiency

For more accuracy is required now, in the beginning, a minimal definition of eco-efficiency, both in terms of the overall size of the indicator, and in terms of recycling organic waste and, especially, in terms of investment in this field.

Moreover, we find it necessary to remind, previously, some considerations concerning effectiveness as a compulsory step in a natural way to a better understanding and definition of eco-efficiency. Thus, the literature states that, in terms of investment, "... economic efficiency expressed in a comprehensive, the results obtained in an economic activity, measured in terms of resources consumed for conducting that activity. Therefore, ... efficiency identifies the relationship between volume and quality efforts, as factors generating of effects and results are obtained within a certain period, as a consequence of efforts to achieve (Vasilescu, I., I. Romanu, and C. Cicea, 2000). Overall, on this indicator maximum comprehension characterizing the performance in the economic field, it can be concluded that, in general, "... efficiency expresses a relation between positive and negative effects of a decision." (Moller, A., Schaltegger, S., 2005).

One of the main indicators used in determining the economic efficiency at the macro level, according to Muller and Sturm (2001), is expressed by the following formula:

$$\text{Energy efficiency} = \frac{PIB}{CTE}, \text{ CTE is the total energy consumption.}$$

On the other hand, in order to discuss about eco-efficiency should be understood that in fact it is "... a feasible solution in order to exploit the Sustainable Development Strategy" (Ma, S., Hu, S., Chen, D., & Zhu, B., 2015). Therefore, in recent decades, interest of specialists has grown to assess the eco-efficiency in the studies of impact investment. For some

clarifications concerning the status of the area as a term economic and social eco-efficiency has not yet currently defined very precise and very well defined in terms of theoretical and practical. Sometimes, the ecological efficiency has been defined in the literature with regard to the application in environmental problems, as being "... *the ratio of value added economic and environmental damage ...*" (Kuosmanen, T., & Kortelainen, M., 2005). Referring to this approach, but there may be not fully appropriate in the sense that it can not be applied in all fields and somehow ignores the issue of resources used in production.

$$\frac{\text{Environmental costs}}{\text{Economic output}} = \text{eco-efficiency}$$

From another perspective, the indicator entitled "*eco-efficiency*" can be defined as the ability to reach the highest economic value while reducing the negative impact that a specific activity such investment can have on the environment. Therefore, according to experts, *eco-efficiency is "the ratio a weighted sum of the results (products, services and environmental protection) to the weighted sum of resource input / original."* (Hollingsworth, B., & Smith, P., 2003). Efforts researchers to identify a definition accepted unanum are remarkable, but, however, has not yet come to a consensus. However, it supports the increasingly evident that the eco-efficiency could be defined as "the ratio of a company's financial performance and its environmental performance" (WBCSD, 2000).

$$\frac{\text{product value}}{\text{environmental impact}} = \text{eco-efficiency for business}$$

Through the procedures applicable for determining the indicator, it was agreed that eco-efficiency "... *is the most common methods for assessing eco-efficiency are represented by: (i) the calculation the ratio of economic value added and environmental damage, (ii) cost-benefit analysis, (iii) life cycle assessment and data*" (Arabi, B., Munisamy, S., Emrouznejad, A., & Shadman, F, 2014).

In socio-community lately, it may notice a "... *growing number of companies that are interested in environmental sustainability into their business strategies, having a well-defined, namely, the integration of environmental business operations and interactions with stakeholders.*" (Albino, V., Balice, A., & Dangelico, R. M., 2009). Therewith, "*Albino and his collaborators (2009) have discussed the reasons that attract firms by choosing eco-efficiency, and these are divided into three categories: legitimacy, competitiveness and social responsibility*".

Also in this context, researchers "*have underlined the strategic role of organic products (ie goods or services that lead to reduction or elimination of environmental impact throughout the life cycle) for companies oriented towards sustainability.*" (Albino et al. , 2009).

However, due to several studies have examined the concept of "eco-efficiency", and researchers reported that "*eco-efficiency had a positive impact on economic performance and value of companies in the United States*" (Guenster et al., 2005). In this regard, scientifically can also be substantiate that eco-efficiency "*revealed an increase in efficiency of business processes and reduce environmental impact.*" (Sinkin, C., Wright, C. J., & Burnett, R. D., 2008)

Towards all these research and trends, in our study, we propose overall objective is to contribute, on the one hand, this more general process of clarifying theoretical and methodological for determining and assessing the eco-efficiency and, secondly, to identify peculiarities arising from the practical use of this indicator in organizations that have the field of organic waste recycling and environmental protection. The main purpose of realization of this article was to highlight the importance of eco-efficiency and applicability in organic waste recycling activities.

1.2. General principles of eco-efficiency

The main targets on the use of eco efficiency in investment performance characterization of environmental activities could be:

- (i) reducing natural resource consumption and minimizing use of energy, raw materials, etc.;
- (ii) reducing the negative environmental impact, including reducing / eliminating waste;
- (iii) increasing the value of goods or services taking into account the requirements of consumers and achieving the desired objectives by them.

From conceptual point of view, it is necessary to take into account that an important role in the sustainability effort of obtaining an eco-efficient corresponding may have some items associated with a higher degree of generalization, such as sustainable development, efficiency, economy, efficiency. Sometimes, the economic profit can be the key to success and that is why it is necessary to put the first human condition needs to take into account the preservation of natural resources and improved quality of life. They even said that in this century, "... *achieving of profit without affecting directly / indirectly to the environment is a major challenge.*" (WBCSD, 2000).

Therefore, it appears increasingly clear that in principle there is no proven method to measure infallible leading eco-efficiency. In these circumstances, the only possible approach is to conduct a thorough analysis prior to the actual start the action, analysis to identify the best solutions and to conclude on ways most appropriate action. Therefore, the principle of measuring eco-efficiency could be "*the ratio of product / service value and their influence on the environment, but everything must be quantified.*" (Michelsen, O., Fet, A. M., & Dahlsrud, A., 2006).

In the view of raising awareness and operationalizing these elements, an appropriate and necessary solution could be consistent promotion of sustainable development. Only then, the effort to achieve a score performance in terms of eco-efficiency can internalize added value within the organization that actioneaza in the field and, on the other hand, can cause noticeable positive effects in hopes of environmental protection. View to raising awareness and operationalizing these elements, an appropriate and necessary solution could be consistent promotion of sustainable development. Only then, the effort to achieve a score performance in terms of eco-efficiency can internalize added value within the organization that acts in the field and, on the other hand, can cause noticeable positive effects in hopes of environmental protection. Currently, the overall trend only target the most efficient use of natural resources, this reality with strong historical and economic roots. For example, we specify in what follows, a number of principles, as follows: (i) market demand for organic products; (ii) attraction of employees to environmentally responsible companies, and thus resulting in higher productivity; (iii) the institutions / companies who act responsibly towards the environment more easily obtain certain benefits, such as lower cost of capital and insurance; (iv) the environmental performance could lead to social benefits; (v) focusing on improving environmental performance leads to innovative solutions and new opportunities; (vi), creating competitive advantage through cost reduction environment.

2. The importance of measuring eco-economic efficiency

According to specialists, "*it is necessary to present key issues now becoming generally accepted* (Andrea Blengini, G., & Shields, D. J., 2010): (i) *companies focus on innovation of environmentally friendly products to meet the expectations of the environmental quality desired by their customers eco-responsible,* (ii) *companies need reliable tools for the*

credibility of supporting the environment and to differentiate organizations and pursuing the objectives only for "washing of the image" through advertising, (iii) the tasks of the environment should be assessed and, subsequently minimized throughout the product life-cycle management." Finally, it can indicate that the issues above have resulted in the best economic and environmental practices.

Increased efficiency can lead largely to *"business development in all fields"*, as stated WBCSD (2000). Regarding the importance of eco-efficiency, it can come to *"help companies, individuals, governments or other organizations become more sustainable. However, this embodies the essential elements, namely, economic and environmental – which are required to increase economic prosperity with a more efficient use of natural resources and reduced emissions of substances that can have negative consequences on the environment."*(Verfaillie, H. A., & Bidwell, R., 2000).

2.1. Determining the necessity and opportunity of eco-efficiency

In the future, eco-efficiency aims to be a sustainable method applied in companies based on economic indicators and specific analysis. Opportunity to apply eco-efficiency is that can analyze the relationship between economic activities and those relating to environmental impact. However, eco-efficiency are needed to determine the normative acts of the environment to lead to a society with economic welfare. In Romania, in terms of setting the eco-efficiency method is needed to highlight the economic and environmental relations.

Eco-efficiency can have major advantages to increase efficiency resulting from improved environmental performance. *"Environmental organizations can produce profitable goods and services from the application of eco-efficiency,"* according to Heitger, D. L., Mowen, M. M., & Hansen, D. R. (2007).

Measuring eco-efficiency leads to a financial assessment of the organization useful to increase production, lower investments in fixed assets, reduce taxes, and minimizing the risk of insolvency / bankruptcy when unforeseen risks may arise.

2.2. The Government involvement in organic waste recycling activities

Management applied in organizations focused on environmental policies set at EU level, and they implement processes and products that are environmentally friendly. Moreover, *"the main role of organic products in transition to a new paradigm of growth and a better quality of life is clearly emphasized in the Green Paper on Integrated Product Policy"* (European Commission, 2001).

Currently, in Romania, recycling activities is a challenge, combining economic and ecological opportunities both at macro and micro level, but must be identified and implemented practical measures to enhance the action of implementation.

In a general sense, *"the costs to the state could reduce through minimizes / eliminates waste quantities"* (Bran et al., 2011) as waste reduction can lead to improved production and environmental performance of institutions / companies by increasing eco-efficiency.

In Romania, as part of waste management there are legislative directives and regulations which establish ways of management / waste disposal, but these are not concrete being in need of considerable improvement. The evaluation of eco-efficiency in waste recycling has clear standards regarding the achievement of specific indicators within the institutions / companies.

2.3. The importance of monitoring economic indicators in organic waste recycling activities

In order to measure eco-efficiency is recommended to analyze some important indicators for the environment, but also for the business, namely: (i) energy, (ii) the consumption of raw materials, (iii) water, (iv) emissions emissions, (v) the emissions of chemicals that diminish the ozone layer.

But more can be added and other indicators, and companies must identify the environmental factors within their activity as then, dependable performance indicators to improve the environment. At the same time, we can specify that the difference between economic efficiency and eco-efficiency of emphasis is given on the environmental aspects and application of green solutions.

According to McKinsey G. (2011) *"micro-level assessment is required because eco-efficiency indicators leads to the following advantages: (i) achieving environmental performance for the calculated value of eco-efficiency indicators, (ii) identifying strategies to reduce costs of production; (iii) determination of the development and research; (Iv) increasing competitiveness in the business market."*

In terms of energy, in order to determine eco-efficiency, and Sarkis, J., Meade, L. M., & Talluri, S. (2004) have identified a phrase that was based on "comparison of energy consumption by energy inputs, ie raw materials". Thus, the specific formula is:

$$E_k \frac{UE_k}{EN_k + L_k + SO_k + NO_k + CO_k}, \text{ where}$$

E_k – efficiency value

Uek – usable energy

Enk – Energy inputs (raw materials)

Lk – labor inputs

SO_k – emissions of sulfur

NO_k – emissions of nitrogen

CO_k – emissions of carbon

Environmental performance indicators to measure the effectiveness comparing organically and through all existing eco-efficiency measurements to quantify these performance desired.

Conclusion

In this article, we defined the concept of eco-efficiency and the importance of this important measure of environmental performance. At the same time, we would to reveal the theoretical integration in the course of recycling organic waste.

There were also highlighted eco-efficiency advantages regarding environmental improvement (achieving ecological balance and economic) at the same time, we should not overlook the need for a legislative framework for measuring ecological efficiency.

Governments, state companies and private stakeholders who are collecting, recycling and waste management) should be the main basis for reducing waste and thus pollution and improve quality of life.

References

1. Albino, V., Balice, A., & Dangelico, R. M. (2009). Environmental strategies and green product development: an overview on sustainability-driven companies. *Business Strategy and the Environment*, 18(2), 83-96.
2. Andrea Blengini, G., & Shields, D. J. (2010). Green labels and sustainability reporting: Overview of the building products supply chain in Italy. *Management of Environmental Quality: An International Journal*, 21(4), 477-493.
3. Arabi, B., Munisamy, S., Emrouznejad, A., & Shadman, F. (2014). Power industry restructuring and eco-efficiency changes: A new slacks-based model in Malmquist–Luenberger Index measurement. *Energy Policy*, 68, 132-145.
4. Bran, F., Radulescu, C. V., & Ioan, I. (2011). "Measures of Environmental Performance. *Review of International Comparative Management*", pp. 893-900.
5. Guenster, N., Derwall, J., Bauer, R., & Koedijk, K. (2005). The economic value of corporate eco-efficiency. Erasmus University.
6. Heitger, D. L., Mowen, M. M., & Hansen, D. R. (2007). *Fundamental cornerstones of managerial accounting*. Cengage Learning.
7. Hollingsworth, B., & Smith, P. (2003). Use of ratios in data envelopment analysis. *Applied Economics Letters*, 10 (11), 733-735.
8. Kuosmanen, T., & Kortelainen, M. (2005). Measuring eco-efficiency of production with data envelopment analysis. *Journal of Industrial Ecology*, 9(4), 59-72. vol. 9, no. 4, pp. 59–72.
9. Ma, S., Hu, S., Chen, D., & Zhu, B. (2015). A case study of a phosphorus chemical firm's application of resource efficiency and eco-efficiency in industrial metabolism under circular economy. *Journal of Cleaner Production*, 87, 839-849.
10. McKinsey G., (2011) "Resource Revolution: Meeting the world's energy, materials, food, and water needs", Global.
11. Michelsen, O., Fet, A. M., & Dahlsrud, A. (2006). Eco-efficiency in extended supply chains: a case study of furniture production. *Journal of environmental management*, 79(3), 290-297.
12. Möller, A., & Schaltegger, S. (2005). The Sustainability Balanced Scorecard as a Framework for Eco-efficiency Analysis. *Journal of Industrial Ecology*, 9(4), 73-83.
13. Müller, K., & Sturm, A. (2001). Standardized eco-efficiency indicators. *Aoyama Audit Corporation*.
14. Sarkis, J., Meade, L. M., & Talluri, S. (2004). E-logistics and the natural environment. *Supply Chain Management: An International Journal*, 9(4), 303-312.
15. Sinkin, C., Wright, C. J., & Burnett, R. D. (2008). Eco-efficiency and firm value. *Journal of Accounting and Public Policy*, 27(2), 167-176.
16. Vasilescu, I., I. Romanu, and C. Cicea. "Investments." (2000), Economic Publishing House, Bucharest, pp. 70-73.
17. Verfaillie, H. A., & Bidwell, R. (2000). *Measuring eco-efficiency: a guide to reporting company performance*. World Business Council for Sustainable Development.
18. ***European Commission. Directorate-General for Employment. (2001). *Promoting a European Framework for Corporate Social Responsibility: Green Paper*. Office for Official Publications of the European Communities.
19. ***WBCSD, "Measuring eco-efficiency: a guide to reporting company performance", Geneva, 2000.