ECONOMIC AND ECOLOGICAL ASPECTS IN WASTE MANAGEMENT. CASE STUDIES

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Abstract

This paper highlights the issues developed while trying to develop a procedure for linearizing waste management and also the economic and ecological aspects developed in the process. The authors try to underline as a general case study, the approach of the European Union through the European Commission on the subject of waste management and economic and ecological development on the long run, and also overview the impact had on humanity.

Key words: waste management, economic development, ecological development, cyclicity

JEL codes: Q53, Q56, Q57

1. INTRODUCTION

An objective of the EU's policies is to minimize waste production through better use of resources and more sustainable consumption patterns. The approach of the EU to waste management is based on the following principles: waste prevention, recycling and reuse and the optimization of final disposal and monitoring (Tascione, Raggi, 2011, pp. 129-140). The waste hierarchy is the basis for selecting priorities in waste management (Del Borghi et al., 2009). It gives top priority to prevention, then reuse, recycling, recovery and, finally, disposal follows. The waste hierarchy does not attempt to assess the environmental impacts of a specific waste management system but provides guidelines for the preferred strategy for waste management if the available data for an environmental assessment is very limited (Kirkeby, 2005).

In waste management, waste can be subjected to various processes, such as landfilling, incineration with energy recovering, recycling, composting, each of this with specific consequences in terms of environmental impacts.

In 1991 a task force of the UNECE (Economic Commission for Europe) published a Draft Regional Strategy in which there is a relevant definition of integrated waste management, which is defined as "process of change in which the concept of waste management is gradually broadened to eventually include the necessary control of gaseous, liquid, and solid material flows in human environment" (McDougall et al., 2003, Tascione, Raggi, 2011, pp. 129-140). Today the concept is broader and includes the use of different treatment technologies depending on situations, and overall approach being taken with respect to the analysis, optimization, and management of the whole system (Staniškis, 2005, Tascione, Raggi, 2011, pp. 129-140).

McDougall et al. (2003) define the integrated waste management system as a system of waste that has control over:

1. All types of solid waste material; □
2. All sources of solid waste;

And it would include: □Materials recycling; □

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- Biological treatment;
- Thermal treatment;
- Landfill.

To guarantee sustainable development regarding solid waste management three areas have to be ensured (Francke and McDougall, 1999):

1. Environmental sustainability
2. Economic sustainability
3. Social acceptance.

2. WASTE MANAGEMENT, ECONOMIC AND ECOLOGICAL PERSPECTIVE

Waste management has a crucial importance through its economic and ecological perspective in developing its sustainability. Eco-sustainability is the foundation for the following:

1. Health, quality of life and income of people, particularly of the poor and marginalized population;
2. The protection of the environment and the efficient and sustainable use of natural resources;
3. The mitigation of greenhouse gases and, thus, the protection of the climate.

2.1. SUSTAINABLE WASTE = SUSTAINABLE ECONOMIC DEVELOPMENT

Sustainable economic development and quantitative growth are unthinkable without proper waste management. Raw materials and energy are major cost factors for the manufacturing sector, particularly in developing countries (Bodislav, 2015, pp. 257-264). The economies of many industrializing and transition countries are already in a situation in which the inadequate supply of raw materials and energy on the one hand and the contamination of the environment as a result of uncontrolled waste disposal on the other hand are hampering economic development and energy efficiency of production processes is putting enterprises at risk of losing their competitiveness. Waste is a source of raw materials and energy that must be tapped through intelligent waste and resource management (Plaff-Simioneit, 2012).

In the long term, inadequate management of waste deprives enterprises of their production basis if production facilities and employees are contaminated by improperly managed waste. Market shares in industrialized countries, especially in Europe and the USA, are at risk of being lost if enterprises are unable to meet the clients' demand for compliance with environmental standards. Tourists are put off by rubbish dumps and prefer holiday destinations with environmentally sound waste disposal systems. Rubbish dumps and inadequate waste management signal to potential investors that the public administration is not very competent and not efficient. They prefer to invest their money where they encounter professional administrations.

Sustainable waste management is an important element of preventive health care. It is indispensable for orderly urban development and preservation of the natural resources.

Waste that is improperly disposed of compromises urban hygiene and poses health risks to the population. It forms breeding grounds for carriers of diseases and is a source of food for rats and vermin, creating ideal conditions for the spread of pathogens. This affects the poorer segments of the population most of all.

As centers of economic development and population growth, cities face waste problems in a high degree, and health impacts are especially severe. The fast-growing mega cities and urban agglomerations in industrializing and developing countries must find solutions to their enormous waste problems. Already 40 % of Africa's population lives in urban areas. In Asia

the number of urban dwellers will almost double from 1.5 billion to 2.6 billion people by 2030 (Dehoust, et al. 2010). The municipalities, which are usually in charge of waste disposal, however, are hardly able to cope with the complex task of managing the waste. Waste disposal "devours" a large share of their scarce funds. Municipalities in developing countries are already using 20 % to 50 % of their municipal budget for waste collection and street sweeping alone. Nevertheless, a considerable portion of the urban population is not receiving reliable waste disposal services. Considerable parts of the waste is not being disposed of at all and remains near homes, which occurs mostly in the growing periphery-towns.

Further approaches aim to not only recycle 'traditional' reusable materials but to reuse as large a share of the waste stream as possible. Packaging, electric and electronic scrap, plastics, construction waste, refrigeration equipment and much more contain valuable and even rare resources that would otherwise have to be imported at a high cost. Organic wastes such as kitchen waste and food leftovers, garden waste, tree and bush clippings, market and slaughterhouse waste, sewage sludge, agricultural waste such as slurry, dung and harvest residue can be used to produce biogas and soil conditioners. Waste with high calorific value, separated and processed, can be used to generate electricity, for example in cement factories, thus substituting fossil fuels.

The establishment of waste management systems that are aimed at protecting resources and the climate offers outstanding opportunities for aligning economic, ecological and social objectives.

3. WASTE MANAGEMENT IN THE EUROPEAN UNION

Waste is an issue that affects us all. We all produce waste: on average, each of the 500 million people living in the EU throws away around half a tons of household rubbish every year. This is on top of huge amounts of waste generated from activities such as manufacturing (360 million tons) and construction (900 million tons), while water supply and energy production generate another 95 million tons. Altogether, the European Union produces up to 3 billion tons of waste every year (European Commission, 2010).

All this waste has a huge impact on the environment, causing pollution and greenhouse gas emissions that contribute to climate change, as well as significant losses of materials – a particular problem for the EU, which is highly dependent on imported raw materials.

The amount of waste we are creating is increasing and the nature of waste itself is changing, partly due to the dramatic rise in the use of hi-tech products. This means waste now contains an increasingly complex mix of materials, including plastics, precious metals and hazardous materials that are difficult to deal with safely.

EU waste management policies aim to reduce the environmental and health impacts of waste and improve Europe’s resource efficiency. The long-term goal is to turn Europe into a recycling society, avoiding waste and using unavoidable waste as a resource wherever possible. The aim is to achieve much higher levels of recycling and to minimize the extraction of additional natural resources. Proper waste management is a key element in ensuring resource efficiency and the sustainable growth of European economies.

This brochure explains how the European Union is working to minimize the negative impacts of waste while maximizing the benefits of good waste management, and the role individuals, households, businesses and local and national governments have to play(European Commission, 2010).

3.1. THE EUROPEAN UNION'S WASTE MANAGEMENT POLICY

EU waste policy has evolved over the last 30 years through a series of environmental action plans and a framework of legislation that aims to reduce negative environmental and health impacts and create an energy and resource-efficient economy (European Commission, 2010).

The EU's Sixth Environment Action Programme (2002-2012) identified waste prevention and management as one of four top priorities. Its primary objective is to ensure that economic growth does not lead to more and more waste (European Commission, 2010).

This led to the development of a long-term strategy on waste. The 2005 Thematic Strategy on Waste Prevention and Recycling resulted in the revision of the Waste Framework Directive, the cornerstone of EU waste policy.

The revision brings a modernized approach to waste management, marking a shift away from thinking about waste as an unwanted burden to seeing it as a valued resource. The Directive focuses on waste prevention and puts in place new targets, which will help the EU move towards its goal of becoming a recycling society. It includes targets for EU Member States to recycle 50% of their municipal waste and 70% of construction waste by 2020 (European Commission, 2010).

The Directive introduces a five step waste hierarchy where prevention is the best option, followed by reuse, recycling and other forms of recovery, with disposal such as landfill as the last resort. EU waste legislation aims to move waste management up the waste hierarchy.

Figure 1. Waste Hierarchy

Source: European Commission, 2010.

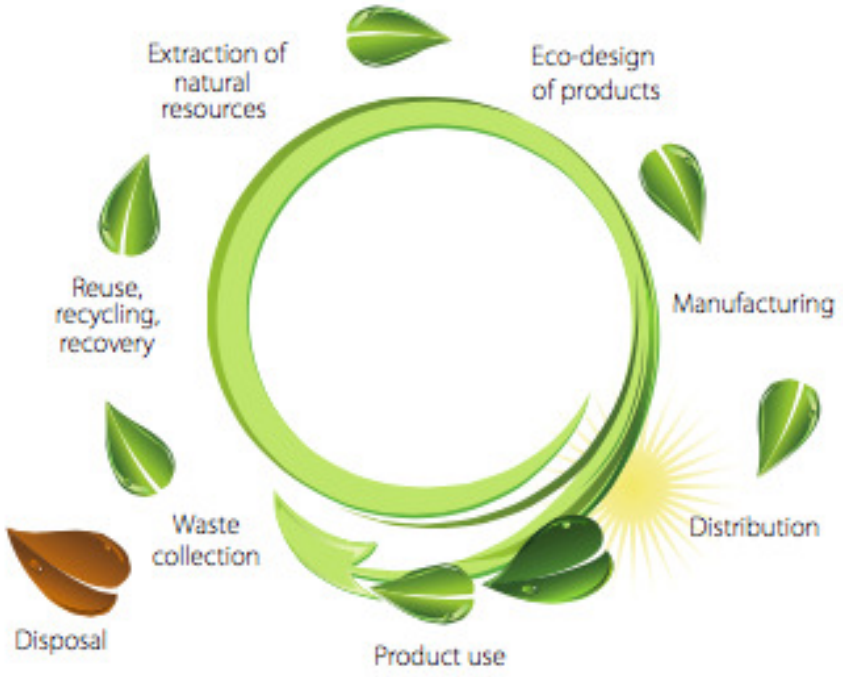
The Waste Framework Directive, revised in 2008, streamlines waste legislation, incorporating rules on a number of issues such as the management of hazardous waste and waste oils. Other pieces of EU waste legislation (European Commission, 2008, http://ec.europa.eu/environment/waste/legislation/index.htm):

1. The Regulation on waste shipments aims to ensure the safe shipment of all types

of waste, including hazardous waste; □

2. The Packaging and Packaging Waste Directive sets standards for the design of packaging and lays down specific targets for the □recycling and recovery of waste packaging; □
3. The EU's Landfill Directive and the Waste Incineration Directive set standards and limits for the release of pollution into the air or into □groundwater; □
4. The End-of-Life Vehicles Directive sets rising reuse, recycling and recovery targets and restricts the use of hazardous substances in □both new vehicles and replacement vehicle parts; □
5. Waste Electrical and Electronic Equipment (WEEE) legislation lays down collection, recycling and recovery targets for electrical goods; □
6. The Directive on the Restriction of Hazardous Substances in electrical and electronic equipment restricts the use of hazardous □substances in electronics; □
7. The Batteries Directive sets collection, recycling and recovery targets, thereby ensuring their proper waste management; □
8. Legislation also targets specific waste streams such as sewage sludge, batteries, polychlorinated biphenyls and polychlorinated□terphenyls.

Figure 2. Waste management cyclicity



Source: European Commission, 2010.

4. CONCLUSIONS

Across the EU, the proportion of waste being recycled is rising, while the amount sent to landfill sites is falling. The impact of waste treatment sites on surrounding areas has been minimized, more energy is recovered through incineration, and hazardous waste and illegal dumping are being monitored more tightly. A lot has been achieved, but much remains to be done.

The amount of waste we produce in the EU is still increasing. Yet the materials supplying

this growth in consumption are in scarce supply.

We need to ensure that our planet's resources are managed in a responsible way, which also considers the needs of future generations.

We need to design eco-friendly products and encourage prudent and environmentally responsible consumer behavior to reduce the amount of waste we produce.

And we need to improve recycling to increase the supply of raw materials to European industry.

Many Member States are making significant steps in this direction. However, it is clear a lot of work needs to be done to bring all EU countries up to the high standards currently being achieved by a small number.

We all have a role to play in ensuring that we get the best out of our waste. Householders can work to reduce unnecessary waste and separate waste to produce highquality recyclable material. Member States must continue working to design appropriate schemes to meet ambitious targets, ensuring the correct incentives are put in place for businesses and households. And the European Union must ensure that Member States have the support they need to comply with EU legislation.

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