STUDY ON PACKAGING WASTE PREVENTION IN ROMANIA

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Abstract *This paper presents on the one hand, the packaging waste management in our country, and on the other hand the packaging waste – most of them disposable - prevention mechanisms. The study provides useful information regarding the quantities of the packaging waste, the capitalization methods and their impact on the environment and population.*
Preventing waste means reducing the amount of waste generated, reducing the hazardous content of that waste and reducing its impact on the environment. The importance of waste prevention is nowadays fully recognized and generally considered as a priority within EU, as well as national and regional authorities' waste management strategies and plans, but many efforts still need to be made. In practice, local and regional authorities will have to prepare their own waste prevention plans. They will have to take into account that the waste hierarchy established by the Waste Framework Directive puts waste prevention as the top priority. Waste prevention plans shall in particular include a series of actions aimed at reducing the amount of waste to be managed and treated by public authorities.
The current national environmental policy is based on the concept known as "waste hierarchy". In an ideal situation, this means that the waste quantities should be prevented and the waste which cannot be prevented should be reused, recycled and recovered as much as possible, avoiding landfilling.
The uncontrolled landfilling is the most disadvantageous option for environment meaning resource losses with negative impact on the environment. The goal is to move forward to a society of recycling and recovery, meaning to climb the hierarchical scale, moving from landfill to recycling and recovery.
It is very important to mention that individuals and businesses can often save a significant amount of money through waste prevention: waste that never gets created doesn't have management costs (handling, transporting, treating and disposing of waste). The rule is simple: the best waste is that which is not produced.

Keywords*: waste prevention, packaging waste, recycling, sellective collection, environmental protection*

JEL classification: *Q53*

1. Introduction

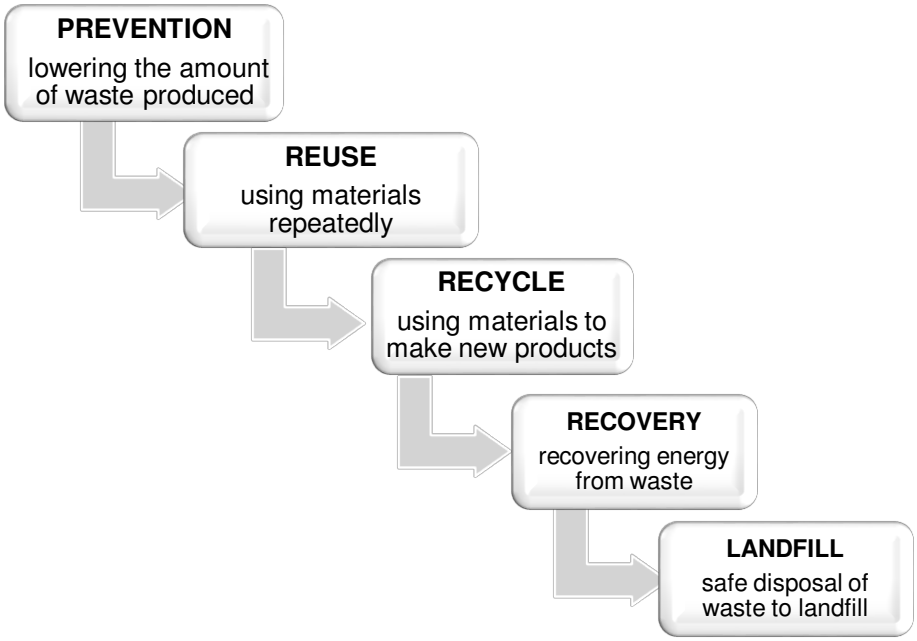
Waste generation is a particularly important issue because, on the one hand, it affects the environment and the human health and on the other hand, it is a reflection of the inefficient use of natural resources by the society. At the beginning of XXI century, we believe that not us, but generally people do not have the required education to treat waste problem as something serious that can influence decisively our future existence.

Technical creativity in waste recovery did not have the same place as the creativity in developing new products and adopting and implementing the technologies for achieving them. We believe that, viewed as an actual and future businesses, waste recovery will find its required technical capacity.
The packaged goods are part of our world and in many ways the packages make our life easier. Unfortunately, the volume of the packaging waste has increased dramatically in recent years.
For the generated waste, it is essential to start the selective collection of the packaging waste among the population, which must be informed, and having its awareness raised through environmental education. Selective waste collection benefits include the selection of valuable factions (paper/cardboard packaging, glass packaging, plastic packaging, metals packaging, textile packaging), avoid storing easily biodegradable waste in landfills, and increasing calorific value of waste remains.

2. The hierarchy of the waste management

In the current waste management strategies, the trend is an integrated system based on prevention of waste, minimizing waste quantity, recycling and reusing of waste, treatment with a large number of technology, and ultimately, waste remains disposal, also taking care of population and environment health.
The sustainability of integrated waste management refers to an appropriate management system that fits best for society, economy and environment and that everyone, regardless of the degree of development of the country, is entitled to an appropriate sanitation service.
The European Directive lays down the five-step hierarchy of waste management options, with waste prevention as the preferred option, and then in descending order, reuse, recycling, recovery (including energy recovery) and safe disposal.
Packaging waste prevention is closely linked with improving manufacturing methods and influencing consumers to demand greener products and less packaging. Waste prevention includes measures to reduce the adverse impacts of the generated waste on the environment and human health. Waste prevention can be achieved by reducing the quantity of material used in the creation of products and increasing the efficiency with which products, once created, are used.
Preventing waste by limiting unnecessary consumption and by de signing and consuming products that generate less waste are forms of strict avoidance of waste. Packaging waste prevention also encompasses actions that can be undertaken once a product reaches its end-of-life: rather than discarding the product, the final user should consider re-use or repair as options. Extending a product's lifetime or considering option like re-use is form of prevention. Re-use keeps products in the consumption sphere for a longer period and thus avoids the creation of waste. Re-use implies that a product is used again for the same purpose for which it was originally conceived.

MOST FAVOURED OPTION



LEAST FAVOURED OPTION

Figure 1: The hierarchy of the waste management
Source:http://www.preventandsave.ie/Introduction_to_Packaging_Prevention.html%20 (Adapted)

Reducing the hazardous content of waste, rather than impacting the total volume of waste, is considered as qualitative waste prevention and contributes to reducing human and environmental exposure to hazardous materials.
A waste prevention scheme has its origin in the waste management sector, its scope, however, comprises the whole economy, all material flows and products used by a nation, from their respective cradles to their discarding. Thus, a comprehensive waste prevention scheme should not only concern the waste management sector but also the mining sector and productive industries, designers and service providers, the public and private consumers. Consequently, all economic sectors may be stakeholders in the waste prevention scheme and its preparation.

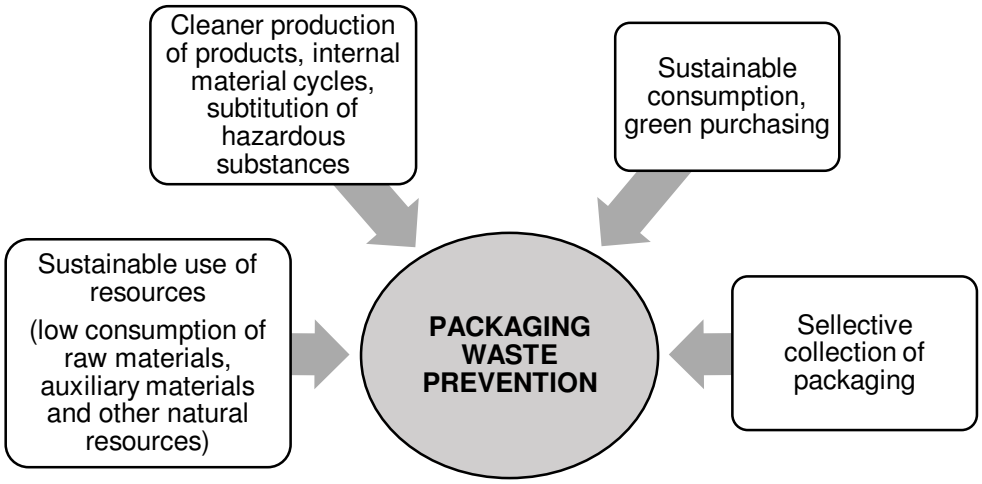


Figure 2: The main scope of the waste prevention
Source: EEA (2007): Chapter 6: Sustainable Consumption and Production and Waste Management

It is very difficult to measure the waste prevention, but certain statistics can be reliable in charting progress on defined objectives. The following statistics are helpful in assessing the current status of waste prevention:

a. Quantities of collected packaging waste per person
b. Quantities of hazardous waste generated by each person
c. Public awareness of and declared actions for waste prevention
d. Use of waste preventing services e.g. repair and reuse centers, home composting
e. Consumption of ecolabelled products etc.

Eco labels, in particular the EU Flower, help consumers identify products that fulfil environmental criteria including material efficiency and limits on packaging and hazardous materials, thus providing waste prevention information directly to consumers at the time of purchase.
In addition to waste cycle data, information on national demographics, socio-economic characteristics, available infrastructure, reuse systems, trade and manufacturing activities should be collected.
Producer responsibility arrangements are in place throughout Europe, introducing measures relating to the prevention, reduction and elimination of pollution caused by waste and the management of packaging and packaging waste.

3. The importance of packaging for maintaining the product quality

Packaging refers to all materials whose purpose is the containment, protection, shipping or presentation of goods, from their natural condition to saleable form, as handled by the producer or the consumer. Packaging is often divided into three broad categories: primary packaging, secondary packaging and tertiary packaging.
Primary packaging is the packaging which contains the product and is sometimes called sales packaging. Well-designed primary packaging protects the product from

damage and deterioration, it also provides essential information about the product including storage and storage date information and nutritional values. Primary packaging allows manufacturers and retailers to identify their products through brand marketing.
Secondary packaging is the term for the packaging used to contain a number of items of the same product during storage and handling. Cardboards are the most well-known items of secondary packaging but special trays and shrink-wrap plastic are also commonly used.
Tertiary packaging is used between product manufacturers, warehouses and sometimes the storage facilities at large stores. It consists of pallets, shrink-wrap plastic, large cardboard boxes and re-useable packing materials. It rarely becomes household waste and much of it is already recycled or reused.
Packaging waste is generated at all levels of the supply chain, but principally by consumers as the end user. Packaging waste policies may address tertiary packaging use with distinct measures as it is involved in a specific phase of the lifecycle and may implicate different stakeholders.
The packaging meet many functions, on their way from the supplier, to the distributor and finally, to the consumer, as follows:

a. The packages preserve and protect the products;
b. The packages facilitate handling, storage and transport of products;
c. The packages promote the products and inform the consumer.

"In developing countries, the absence of the packaging or an inadequate packaging causes between 30 and 50 percent of the foodstuffs to decay before they even reach the consumers. In industrialized countries, product loss is only about two or three percent", points out Professor Dr. Dr. Günter Grundke from the German Packaging Institute. Packages therefore protects and conserves the products. The first function refers to maintaining of the packaged product in the initial parameters. The product must be protected from the environmental influence. In this context, there are physical factors, chemical factors and biological factors.
The physical factors include the mechanical shocks, sand, dust, light, temperature, pressure and so on. The mechanical shocks influence both the product and package. They can compress or settle the product inside the package canceling the protection of the package. The light causes discoloration and degradation of goods (vitamins losses). The light-sensitive products must be packaged in opaque packages. The temperature is one of the factor that affects the quality of the product. A temperature over 40^0C could determine deformation of products or change the taste and smell.
The chemical factors include the water, water vapor, oxygen, carbon dioxide, etc. The packaging should be a barrier to the action of these factors in order to avoid losses of flavors, dehydration of products, loss of gas introduced into the package etc.
The biological factors refer to the microorganisms, insects, rodents. All these can affect the quality of the packages and the products. The package must ensure a very high degree of hygiene.
According to the second function, the packaging should have a shape, a volume and some accessories to facilitate proper grip and handling. In case of the storage, the package must be easily stacked and be resistant to the storage conditions (temperature, humidity, pressure).

Packaging must protect the product during transportation. If either the packaging or the product is damaged, this could lead to the whole pallet of goods having to be discarded as waste. The environmental impacts of overestimated packaging result only from the packaging itself. In the case of underestimated packaging, however, the environmental impact is significantly greater because the product also becomes waste.
According to the third function, the packaging is an important marketing tool. It makes products recognizable for the consumer. And it provides consumers with important product information (mostly required by law) on ingredients, additives, "best before" dates, producers, instructions for use, quality labels or recycling information. With the introduction of stricter requirements in respect of consumer protection and food safety, for instance, producers are increasingly being obliged to provide the necessary information and to ensure that their packaging has sufficient space to display it.
Packaging is an integral part of the product being offered to consumers. Packaging design must attract consumers in an increasingly competitive and quickly changing market while fulfilling the essential functions required for the extended supply chain.

4. Analysis data and interpretation

The main materials used for manufacturing of the packages include the following categories: cellulosic materials (paper and cardboard), glass, plastic materials, metallic, materials, textile materials, wood materials, other (complex materials).

Table 1: The amount of generated packaging waste in Romania (tones)

PACKAGING WASTE	2007	2008	2009	2010
Paper/Cardboard	386,855	352,100	271,560	265,982
Plastics packaging	375,308	332,600	293,800	281,145
Wooden packaging	213,172	215,500	188,350	211,875
Metallic packaging	75,891	75,700	126,760	55,214
Glass packaging	232,618	193,000	179,730	160,334
Other	3,176	1,800	1,870	390
TOTAL	1,287,019	1,170,700	998,690	974,940

Source: EUROSTAT (2013)

During 2007 – 2010, a quantitative increase of the plastic packaging and paper/cardboard is noticed compared to the other materials, which shows the direction in the consumer behavior.
Currently, Romania registers the increasing tendency of the generated waste quantities (similar in most European countries).
A considerable effort is needed to stop this growth and then to guide this dynamic trend towards a reduction in the generated quantities.
Therefore the main objectives of Romania are the following:

- Stopping the increasing of the generated waste quantities by 2015;
- Subtracting the quantities of generated waste with a minimum 5% / year (previous year) since 2016.

Waste generation is the indicator which best illustrates the interaction between human activities and the environment. Waste generation usually follows the

consumption and production trends. For example, waste generation (quantity/inhabitant) increases together with the income level. The increase in economic production, but also the inefficient management of resources, lead to the generation of huge quantities of waste.

Table 2: The amount of recycled packaging waste in Romania (tones)

PACKAGING WASTE	2007	2008	2009	2010
Paper/Cardboard	236,917	217,000	186,540	177,636
Plastics packaging	57,312	51,500	69,810	79,391
Wooden packaging	18,315	17,800	24,780	38,451
Metallic packaging	41,800	38,600	71,440	36,267
Glass packaging	38,579	66,900	86,550	91,031
Other	361	500	800	0
TOTAL	393,286	392,300	404,200	422,776

Source: EUROSTAT (2013)

Romania has a statutory producer responsibility regime for packaging. This places a legal obligation on businesses which make or use packaging (raw materials manufacturers, converters, packer/fillers and sellers) to ensure that a proportion of the packaging they place on the market is recovered and recycled.

Table 3: Total generated and recycled packaging waste in 2010 (Romania)

Packaging Waste	Total generated packaging waste (tones)	Total recycled packaging waste (tones)	EU target	Recycling rate
Paper/Cardboard	265,982	177,636	60%	66.78%
Plastics packaging	281,145	79,391	22,5%	28,23%
Wooden packaging	211,875	38,451	15%	18,14%
Metallic packaging	55,214	36,267	50%	65,68%
Glass packaging	160,334	91,031	60%	56,77%
Other	390	0	0	0

Source: Own processing using previously data

According to these data, Romania has fulfilled the recycling and recovery targets provided by the legislation in 2010, excepting the recycling rate for the glass packaging. This rate was under the value imposed by the EU.
Eco-Rom Ambalaje is the first organization in Romania which invests in the selective collection of packaging waste from the population in order to reduce the amount of the generated waste. Eco-Rom Ambalaje does not aim at making a profit from the package recycling activity, as its tariffs reflect the system operating tariffs. The operating profit is communicated in a transparent manner to all affiliated companies, and is fully reinvested in environmental protection: acquisition of selective collection infrastructure (containers) and development of educational programs (school handbook, campaigns etc.). Eco-Rom Ambalaje is the organization which holds the right to use the "Green Dot" mark on the Romanian territory. The presence of the

Green Dot mark on a packaging certifies that a financial contribution was paid for that type of package to a national packaging recovery organization, in accordance with the principles set out by European Directive 2004/12/ EC on packages and packaging waste. The Green Dot mark is a symbol of responsible companies, which have made a financial commitment that the packages of the products put on the national market should be collected selectively from the population, recycled and valorized in accordance with the objectives established by law.
Eco-Rom Ambalaje has fulfilled the recycling and recovery targets provided by the legislation in 2011.

Table 4: The recycling and recovery targets provided by the legislation in 2011

Packaging waste	Packaging released on internal market (tones)	Packaging waste recycled (tones)	Targets 2011 (legal)	Targets met by Eco-Rom Ambalaje
Glass	89,093	64,221	54%	72.08%
Plastics	196,757	93,653	22.5%	47.60%
Paper/Cardboard	174,956	136,226	60%	77.86%
Metal	33,466	24,309	50%	72.64%
Wood	118,905	36,586	15%	30.77%

Source: Annual Report Eco-Rom Ambalaje - 2011

For 2012, packaging recycling objectives for manufacturers was even higher than the previous year, reaching the maximum growth level, according to national and European legislation, as follows: the total recycling target grows from 50% to 55%; for targets per type of materials, increases are reported for PET packaging – from 42% to 55%, for glass – from 54% to 60% and for aluminum – from 17% to 21%. In 2011, achieving the recycling and recovery targets was possible due to the financial effort made by Eco-Rom Ambalaje, which last year invested about 8 million euros in packaging waste selective collection, about 17% more than the previous year. About 83% of this amount accounts for investment in services of collection, transport and selection of packaging waste from management companies – collectors and sanitation operators.
Selective waste collection is a solution easily available to everybody, and consists of the disposal of waste in specially arranged places, with a view to being recycled. Public institutions, associations, foundations and individuals have the obligation to collect selectively the packaging waste, in properly containers that are located in special places readily accessible to the population.

5. Conclusion

Analyzing the registered date, the capitalization degree of packaging waste is quite low at national level. Primarily, the low capitalization is due to the technical reasons (the absence of the infrastructure for the separate collection and sorting in many areas of the country, and the absence of the recycling capacity for certain materials types). Secondly, the low capitalization is due to the economic reasons (the absence of the financial instruments to stimulate / to oblige the sanitation operators to deliver the collected waste for processing/capitalization and not for final disposal).

Waste prevention includes avoidance of waste generation, qualitative and quantitative reduction at source, and reuse of products. It doesn't include materials recycling and separate waste collection. Waste prevention is a global priority to avoid the uncontrolled accumulation of the packaging waste.The conception phase holds the widest possibilities for prevention. The waste quantities can be reduced at every step of a product's lifecycle. The packaging shall be designed so that performing its functions with minimal environmental impact.
The use or optimization of reusable distribution materials can lead to notable waste reduction and financial savings. For example, the plastic materials are much more durable than the wood materials. Increasing the longevity, reducing the volume and eliminating the single use packaging we can provide waste prevention opportunities in very large quantities.
At consumer level, informational strategies motivating consumers to buy products with minimized packaging content are appropriate, as well as efforts to normalize the purchase of bulk products.
The local authorities play an important role in stimulating public awareness and interest in packaging decreasing or avoidance and can support national efforts by demonstrating the demand for lower levels of packaging to manufacturers. Local authorities also play an essential role in informing local residents about reuse activities: how packaging are collected, where they can be deposited, how to contribute materials in good condition, and where to purchase reused products.
In conclusion, the packaging and the product must be seen as a single unit. The environmental impact of this single unit must be reduced by investigating and initiating waste prevention measures during development. A reduction of the environmental impact and economic efficiency often go hand in hand. Reducing packaging weight and using recycled materials conserves raw materials and reduces costs.

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