

## REDUCING FOOD WASTE IN ORDER TO BECOME THE ZERO HUNGER GENERATION

Diana Elena CAPRITA <sup>1</sup>

<sup>1</sup> PhD Student, The Bucharest University of Economic Studies, Faculty of AgriFood  
and Environmental Economy, Romania,  
email: diana.caprita@gmail.com

### **Abstract**

*This paper aims to analyze the phenomenon of food wastage by identifying the generating factors, pointing the solutions and examining the benefits of efficient waste management. The research also reviews the economic, social and environmental side effects trying to provide integrated solutions to reduce it. Starting with awareness campaigns, the right use of advertisements on labels (such as best before and use by) and also by reducing losses in the value chain, wastage will become history. Each of the contributing factors of wastage, represented by impairments during the manufacturing process distribution, packaging, storage or marketing, causes a huge disequilibrium in the distribution of resources, with tragic consequences: more than 800 millions of people suffer from malnutrition and hunger. The conclusion of the research is very clear: shortening the supply chain, improving logistics through superior transport conditions and proper packaging are mandatory. This paper aims to signal the need of preventing and reducing food waste, in order to meet the European objective: reducing by half the total amount of waste, until 2025. Otherwise, the outlook is bleak: escalating waste with 40%, reaching 126 million tons by 2020, with tremendous consequences on environment, global economy and, most important, people who will continue to starve to death.*

### **Keywords:**

*Food waste, environment, resources, pollution*

### **Introduction**

The 21st century faces multiple challenges, characterized by highly advanced technologies and mechanisms designed to improve the quality of life in all its aspects. Unfortunately, same 21st century is tolerating hunger, extreme poverty and food waste. This paper aims to examine the global dimension of the food waste phenomenon by analyzing the generating factors and by identifying efficient solutions that can be implemented on the short, medium and long term, so that the objectives set by international organizations, regarding the significant decrease of waste values, to become reality as soon as possible. Also, we will present the side effects of food waste, given the fact that food waste generates both economic and social consequences, and also environmental challenges. This paper is intended to research the importance that food waste management has in the sustainable development strategies, both at European and global level (most of the sustainable development objectives can be linked with food wastage). Given the environmental, economic and social implications, food waste should become a top priority for every UN and EU member state. In this regard, the European Union's has decided the target of reducing by half the total amount of food wasted in the entire production chain, and it must be achieved by 2025. However, achieving the common targets set by the European Commission depends on the individual performance of each member state. Although, at European level, there is no official, perfectly harmonized definition of "food waste", this concept has a mutual significance -the total amount of food that has been removed from the supply chain as a result of impairments (aesthetic, packaging, marketing or as a result of approaching expiration date) although they are still edible and could be still used or

recovered. Their withdrawal from use causes significant financial losses and environmental consequences. When referring to environment, for example, waste is associated with irresponsible consumption of resources and pollution (90 million tons of wasted food, produced each year by EU Member States, pollute the atmosphere with the equivalent of 170 million tons of CO<sub>2</sub>). Also, we cannot neglect the significant financial losses of economic agents, or the inequitable distribution of resources, leading to social imbalance phenomena: on the one hand we have 1 billion people suffering from obesity, on the other hand, one billion people are affected by malnutrition. We are tempted to believe that only countries with underdeveloped economy, located in a particular area of the globe, are experiencing hunger and chronic anemia for children from early ages, but this is just a cliché. Paradoxically, developed countries meet this side of everyday reality, with significant segments of the population exposed to poverty and starvation. Although one of the most important objectives of the Europe 2020 strategy is the removal of at least 20 million citizens from the category exposed to extreme poverty and social exclusion, in 2014 approximately 122.3 million people, meaning 24.4% of the population in the EU -28, were at risk of poverty or social exclusion (compared with 24.5% in 2013) (Eurostat – Statistics Explained, 2015). Despite these figures, 50% of all food produced in Europe is thrown, scattered or turned into scrap. Every day, consistent quantities of food are discarded, although perfectly edible, causing huge financial and environmental losses. Instead, with a proper legislative framework, and also with economic advantages for the retailers, this food items could be donated to disadvantaged, thus streamlining resource consumption. In some European countries, there are legislative proposals aimed at creating the legal framework needed for food on the verge of being phased out, but are still edible, to be used for the benefit of disadvantaged houses of children, elderly, social cases people homeless, the poor canteens, etc.

### **1. Literature review**

Food wastage represents a global threat, a phenomenon that has been rigorously analyzed in many specialized papers, by appreciated authors of the scientific community. In elaborating this paper, many of this study were consulted in order to properly review the work that has been done in this subject. For instance, information from Lipinski, B., Hanson, C., Lomax, J., Kitinoja, L., Waite, R., & Searchinger, T., from the paper called “Reducing food loss and waste” were very useful for systematizing the data into tables and figures. Also, for a better understanding of both context and perspectives for implementing healthier principles of sustainable development in Europe, as far as the 2020 Strategy is concern, a very useful paper was consulted in elaborating this paper, namely “Europe 2020 Strategy–towards a smarter, greener and more inclusive EU economy” written by Savova, I. All the data included in this research were collected from official sources, both international (World Bank Report, Eurostat, European Parliament plenary session documents) and national/Romanian (Romanian Senate, Romanian Ministry of Regional Development and Public Administration). By reducing food waste, together with other strategies such as increasing cropping efficiency and also balancing agriculture expansion, the quantity of food produced with minimal impact on environment. (Foley, 2011). Fighting food waste has to become a vital objective for both developed and developing countries, with associated strategies. Thus, in choosing the methods for fighting against food waste, mostly within food supply chains, it must be considered that in developing countries, losses are higher in the post-harvest period while for developed countries losses are consumers/households have the biggest contribution in generating the total amount of waste (Parffit, 2010) Since the problem has so many variables and unknowns, for the case study, this paper focuses on Romania’s efforts and struggle in the food waste war.

For an even more relevant conclusion, a questionnaire was conducted in the case study part of the paper. Thus, in an attempt to understand how people understand food waste, how they are fighting against it and how much are they willing to change their behavior in the near future, an online survey was conducted. 120 people responded the survey, and the results are very interesting. Answers show the interest on this subject is increasing but at the same time there is still a lack of information regarding the correct methods of fighting against food waste. Many people still believe that products should be used strictly before the expiration date even though there are situation in which the products are still eatable after that date. Preventing means educating and no law can be effective without the help of other actors which have to be involved in the educating process, especially civil society representatives. According to the survey, in Romania, although a special law against food waste was adopted in November, 2016, very few people know about it and even fewer about the alleged changes produced with it's implementation.

In Romania, as in all other European countries, the changing process is still going on. Each day, people can learn about the importance of reducing food waste by all means, so that the European target of reducing by hals the wastage until 2025 can become our future reality.

## **2. Fighting food wastage: a global war**

Within this work we can identify the efforts that are being made to counter the wastage phenomenon, through the implementation of effective strategies in order to combat the factors that generate it. Sustainable economic development is made based on respecting the principles of protecting the environment and also by ensuring efficiency and rationalization of exhaustible natural resources consumption. In September 2015, the UN member states adopted the 2030 Agenda for Sustainable developments. The document includes a clear set of objectives and measures to support the Governments and the subordinate institutions, and also civil society organizations, over the next 15 years. The 2030 Agenda includes implementing measures with a clear horizon, covering both developed countries and emerging economies, striking to create the necessary balance between the three main components of sustainable development: economic, social and environmental. On the long term, the main objective of this program is to eradicate hunger and, by 2030, this generation to become the "zero hunger generation" (FAO, 2016) eradicating poverty and hunger, food security, constant improvement of food quality and sustainable agriculture are the main priorities of the signatory states. The document includes a complete set of 17 essential objective (ODD) crucial for achieving inclusive development and eradicate poverty. Among the 17 key objectives, this paper will focus primarily on target 12: Consumption and Production in charge. Prosperity and welfare must not, at any time, regardless of technological or demographic explosion, contradict with environmental protection, or producing efficiently by doing more with less resources. By assuming this objective, the UN member states have formally recognized the importance of identifying and implementing effective policies to reduce the overall quantity of waste, resulted from economic activities, in each stage of the chain of production. At the same time, future society should encourage more recycling by organizing information campaign in order to stimulate the usage of smart materials and effective techniques of packaging (such as, for example, resalable packaging, made with environmentally friendly materials, which are also biodegradable) and also the increase of demand for organic products, which are certified as authentic About 1.3 billion tons of food is wasted, every year, worldwide. At the same time, hunger and malnutrition affects about 1 billion people. (Colintineanu, 2015) Also, 2 billions of people are considered overweight or obese. This is clearly the perfect definition of disastrous management of natural resources, with huge effects on people, global economy and environment. Clearly, the consumption of resources is huge, because

by wasting food we are actually wasting water and energy. About 30% of global energy production is used precisely in the food industry, for producing the food we waste. It is estimated that, in the absence of concrete results from the implementation of the new strategies of international organizations (EU, UN), respectively halving the total amount of food wasted, recycling, and increasing the share of organic waste (used in the process of obtaining energy) environmental consequences will become irreversible. Thus, Europe 2020 Strategy emphasizes the importance of protecting the environment by reducing greenhouse gas emission with 20% , compared with the 1990 level and also increase with 20% the level of renewable energy (Savova, 2005). According to the latest estimates made by FAO, about 30% of the food produced globally, not less than 1.3 billion tons of food, are wasted annually. The total amount of this loss is quantified at about 750 billion dollars. According to Eurostat statistics, the amount of losses is 6 times higher than the global financial aid, granted for development.

**Table 1 Evolution of poverty and malnutrition in developing countries**

<b>Year</b>	<b>Number of people affected by extreme poverty</b>	<b>Malnourished population in developing countries (%)</b>
<b>1990</b>	1.9 billions	23%
<b>2015</b>	830 millions	13%

Source: Based on information from Colintineanu, 2015.

### **2.1 The more we waste, the more we need to produce**

Food waste is the result of uneven disposition of wealth and resources in the regions, but also a consequence of the irresponsible consumerist behavior, which was encouraged over the years in all developed countries. It should be noted that waste occurs at different times in the developed versus emerging countries. Thus, in developing countries, over 40% of food losses happen after harvest and during processing, while in industrialized countries more than 40% occurs during the retail trade and after the food gets to the final consumer. The planet produces enough food, and yet a large part of the total quantity produced is thrown away each year. Paradoxically, waste increase, although by its eradication, would be provided full food requirements of the existing population. Total food requirements grow annually as a result of the influence coming from two main factors, namely: global population growth and alarming levels of food waste. In terms of a progressive world population, according to UN data estimated to reach 8.1 billion people by 2025, global food demand will increase significantly. According to current estimates food requirements will virtually explode, increasing by 60-70% by 2050. Every five days the world population increases by 1 million inhabitants, which leads naturally to an increase in food intake. In the absence of implementation of measures to combat waste, it is estimated that this could increase by about 40% (36 million tons) by 2020, totaling 126 million tons. In terms of production and consumption of cereals, FAO provides relevant data proving the upward trend of values. Thus, the 2016 production was estimated at about 2,543 million tons, 0.6% higher than in 2015, while consumption for 2016 is estimated at 2.546 billion tons, 0.9% above the 2015/16 estimate (FAO, 2016). In fact, with each passing year, we notice an average increase of cereal production by 25 million tons. Of the total grain production, 14% is lost immediately after harvest, and another 15% are lost along the way, in the process of distribution and as household waste. Based on these data, it is easy to understand why agriculture has been recognized as a strategic sector and food waste as a problem of food security. The estimate shows that the increased production of cereals is performed at a rate that provides the necessary nutrition of the population by 2050. What would happen if food waste would be stopped? Problems associated with hunger and extreme poverty should be eradicated with a huge number of beneficiaries. Basically, 3/5 of the total supply increase needed for the next 30 years could be provided only by avoiding waste.

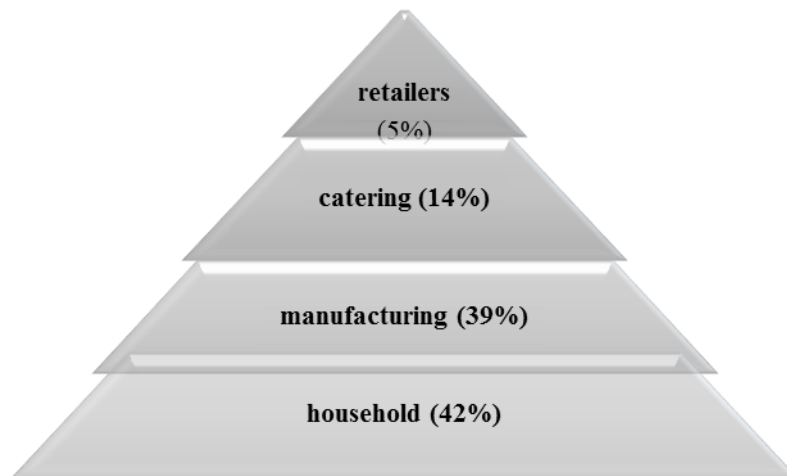
## **2.2 Main causes of food waste**

The main factors that influence the phenomenon of food waste are: deficiencies in the production process (overproduction) distribution (problem occurring throughout the supply chain) packaging (use of ineffective or inadequate packaging that allows deterioration or packaged product) storage (improper management of inventories) or marketing (strategies that do not generate the desired effect). Also, marketing strategies like "buy two for the price of one", standardization of portions in restaurants or promote an extremely high standard of product quality (which determines buyers from supermarkets, for example, to avoid a perfect product consumable, just because the packaging is not intact). It is well known that the excessive promotion of high standards, generates a perfectionist and very demanding behavior of consumers, who refuse perfectly edible products, because of superficial reasons, related to the package's appearance and not the intrinsic quality of the product. Mostly in the case of fresh fruits and vegetables (FVV's), both retailers and final consumers are demanding for "cosmetically perfect" products, which during the last decades has significantly increased waste (Parfitt, 2010).

Analyzing the generating factors, it is easy to understand that a shorter supply chain is mandatory. Logistic's performances will be improved by optimizing transport and appropriate packaging. The fear that emerging economies, China and India, could adopt the irresponsible, consumerist behavior from developed countries, increasing food consumption and emphasizing waste, is a legitimate one. According to a study conducted by the Institute for Climate Impact Research (PIK) this situation would exacerbate pollution because of CO<sub>2</sub> emissions would increase by 1.9-2.5 gigatons of CO<sub>2</sub>. Food waste phenomenon is also driven by the irresponsible behavior of citizens from developed countries, resulting from the cleavage between the low prices of the food products and the average income. Food waste is constituted precisely by adding these individual behaviors, which are irresponsible regarding the acquisition of food, coupled with a lack of state involvement in order to establish a proper regulation to discourage waste, but also a deficiency of awareness in the public debate, which can be attributed to civil society.

## **2.3 Food waste statistics. Efficient solutions for becoming "the zero hunger generation"**

According to statistics provided by Eurostat, 50% of traded food is wasted and, surprisingly, the highest share in this catastrophic result is being owned by households (42%). The remaining 58% of the loss is divided across the entire production chain, producers (39%), retailers (5%), catering industry (14%). It is estimated that more than half of the total waste generated by households (42% of the total waste) could be saved, by implementing information programs dedicated to promote responsible consumption. By analyzing the statistics regarding the total amount of food which is lost, and also the distribution of this phenomenon on a global scale, the causes and also the need of an immediate and efficient response will arise. Thus, annually, between 1/3 and 1/4 of the 4 billion metric tons of food is wasted.



Source: Federation Europeenne des Banques Alimentaires

**Fig. 1 Waste generators in Europe**

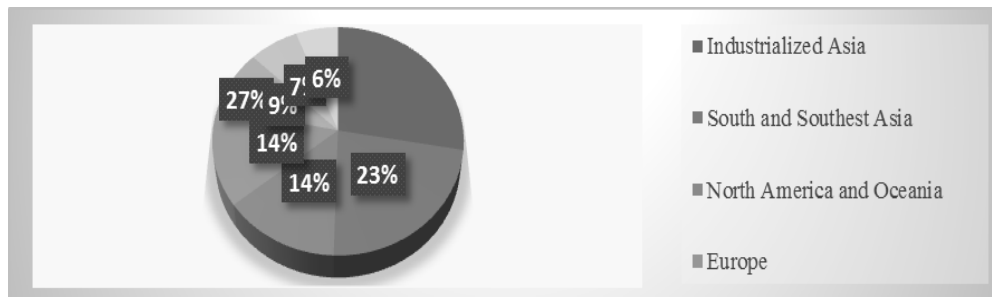
For this total waste, we can share the responsibilities between developed countries (56%) and developing countries (44%). The future evolution of food waste depends on this cleavage. So, every year, in developed countries the average food waste reaches almost 300 kg per capita (750-1500 kilocalories/day, while in developing regions the average is much smaller (between 120 and 220 kg/person/year (Gustavsson, 2011). Thus, the lack of infrastructure and post-harvest losses are the main reasons of waste in developing countries. At the same time, in developed countries waste is generated by the contrast between the low prices of food and the average income. Regarding the household food waste composition, studies have showed that the most perishable products are the most likely to be wasted. Fruits and vegetables are usually the most wasted items, closely followed by other perishable goods like milk, bakery products or meat (Parfitt, 2010).

**Table 2 The lost calories due to food waste per person in each of the world's regions**

Number of kilocalories lost per person (out of the recommended 2000)	Region
1520	North America + Oceania
748	Europe
746	Industrialized Asia
594	North Africa, West +Central Asia
545	Sub Saharan Africa
453	Latin America
414	South/Southeast Asia

Source: based on information from Lipinski, 2013.

Statistics show that developed countries are clearly responsible with the main part of the wastage. Industrialized Asia, South and Southeast Asia are leading the standings regarding waste generators, with Europe and North America on the 3<sup>rd</sup> place.



Source: based on information from Lipinski, 2013.

**Fig. 2 global distribution of waste/ developed regions vs developing regions  
Generating factors of waste. Potential solutions**

The main contributing factors to the increasing phenomenon of food waste are represented by impairments during the manufacturing process (for instance, overproduction), distribution (problems arising throughout the supply chain) packaging (use of ineffective or inadequate packaging, damaging or deteriorating the packaged product) storage (a mismanagement of stocks) or marketing (inefficient strategies)- like offering two products at reduced price, also known as “2 in 1 deals”.

The main factors that influence the phenomenon of food waste are:

1. Deficiencies during the production process (overproduction);
2. Distribution (problem occurring throughout the supply chain);
3. Inefficient packaging (use of ineffective or inadequate packaging that allows deterioration or packaged product);
4. Transport deficiencies: poor infrastructure and transportation with lack of refrigeration; Transportation losses during processing are estimated between 1-10%;
5. Storage (improper management of inventories);
6. Marketing (strategies that do not generate the desired effect, focused only on the economic benefits):
  - Obsolete marketing strategies (like offer 2 products at the price of 1, in retail)
  - Standardization of portions in restaurants without having the option for leftovers takeout;
  - Promoting an extremely high standard quality of the products (which determines buyers from supermarkets, for example, to avoid a good product due to the fact that the packaging is not intact). It is well known that the excessive promotion of high standards generates a perfectionist and very demanding behavior of consumers, who refuse perfectly edible products, because of superficial reasons, related to the package’s appearance and not the intrinsic quality of the product.
7. The very well-known warnings on packages, regarding the correct period of use: "best before" and "use by". Between 15-33% of food waste produced in households could be avoided if costumers would understand the real meaning of these warnings on packages.

#### **2.4 Potential solutions. Focus on education and prevention**

Strategies by which this phenomenon is reduced are based on the fight against factors which generates it: overproduction, withdrawing products showing minor damage from the market, inefficient packaging, poor logistics and poor inventory management, obsolete

marketing strategies (like offer 2 products at the price of 1, in retail) lack of information, lack of planning purchases, depending on urgent need and personal budget, confusion regarding validity of the product, as shown on the label: Best before / use by, standardization servings in catering, improper storage conditions throughout the entire supply chain, inadequate food packaging.

For both developed and developing countries, fighting against waste can prove to be a challenging process, but there is no other option for either. However, the solutions exist and results are beginning to show in the countries that have started implementing them:

1. Awareness campaigns for citizens;
2. Promoting responsible consumption;
3. Proper regulation: changing the legislation in many of the EU countries in order to reduce waste by donating the products towards the ones in need. For this concern, Romania is the 3<sup>rd</sup> country in Europe with specific legislation against food waste. Implemented last week (after the parliament and also the president passed the law in November, 2016);
4. New types of labels and packages;
5. Food recovery campaigns organized by NGO's;
6. Creating a network between food producers and shops with people and organizations in need for food;
7. Changing the warnings "best before" and "use by".

### **2.5 Efficient solution: reducing wastage by changing the formulas on packages: "best before"& "use by"**

An overwhelming proportion of household waste (which is the major cause of food waste) is associated with the data printed on the packaging, which mislead the final consumer. The very well-known warnings: "best before" and "use by" must be changed with more clear formulas in order to avoid the wastage. Between 15-33% of food waste produced in households could be avoided, by organizing awareness campaigns in order to point out the meaning of these phrases printed on the packaging.

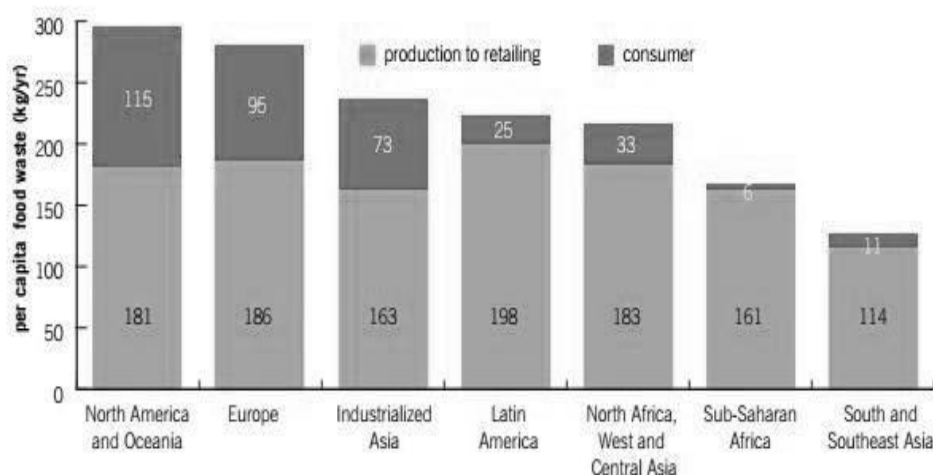
At European level, the specialized committees and working groups of the European Commission composed of specialists from all member states are analyzing better, more explicit formulas to describe the term of use. In this moment, studies and surveys are implemented in order to identify the perfect formulas. The priority is to explain to European citizens that "best before" is a phrase found on a category of products (frozen products), which also allows their use after the date mentioned on the package. Overcoming the date does not necessarily mean that the product is not edible! Products with high perishability have the packaging stated "use by". But the product can still be used after the date mentioned on the package. For example by chilling them right after purchase, the date may be extended significantly. Regarding the waste generated by retailers, an example of effective state intervention is allowing retailers to significantly reduce prices (below the production price) for food products whose shelf life is nearing maturity. Thus, the amount of unsold food would decrease significantly and at the same time, a low-income social class would have access to healthy foods at prices they can pay. In some states, legislative authorities have come up with ingenious solutions such as introducing mandatory donations for supermarkets: compulsion to donate the products which are close to expiration. In this way, food which eventually would have been thrown in a few days, reach the people who need it.

### **2.6 Sustainable development by reducing food waste**

Currently, European Member States generates a total of 90 million tons of waste. Losses associated with these quantities are estimated at 143 billion euros. The 90 million tons of waste generate about 170 million tons of CO<sub>2</sub> equivalent. Grim scenario says that in the absence of effective measures, food waste problem will continue to worsen over time, so



alarming figures are estimated for 2020: an increase of 40%, up to 126 million tons. (Caronna, 2011).



Source: World Bank, 2014, Food Price Watch, year 4, Issue 16

**Fig. 3: Global repartition of food waste/per capita/region**

In this respect, European legislation is very clear regulated, encouraging the implementation of an efficient management of organic waste, by adopting directives dedicated to creating a uniform legal framework, which is more environmentally friendly. Currently, in force are many such Directives: Directive 2006/12 / EC on waste, Directive 91/689 / EEC on hazardous waste, Directive 75/439 / EEC on waste oils, Directive 86/278 / EEC on sewage sludge. By adopting the 2030 Agenda with the 17 main objectives the UN member states acknowledges the importance of efficient waste management. Many of those 17 objectives are perfectly related with food waste and by fighting against the wastage, the benefits will merge significantly contributing to sustainable development.

**Table 3 Sustainable development generated through efficient waste management**

**No poverty**

- By ending food waste we can significantly reduce poverty. However, in 2016 we still have multiple chalanges in managing an equitable distribution of resources. By reducing postharvest losses, many economic advantages can be obtained: increase the amount of food left for the own use of producers, increase their independence and reduce the chances for small farms to ever become buyers, lowering expenditures per unit of food (grown/harvested or consumed)

**Zero Hunger**

- The total quantity of produced food meets the needs of every single person on earth, yet more than 800 millions of people suffer from hunger. Only by reducing losses on the value chain this generation can become the zero hunger generation. It is mandatory for this generation to achieve a level of food security by improving the quality of nutrition. Also, this objectives should become reality only by respecting and promoting the principles of sustainable agriculture.

#### Good health

- Health starts with good nutrition. Since the world still has major disequilibrium in the resource distribution, one of the most important consequence is the emergence of diseases associated with poor nutrition.

#### Gender equality

- Women will benefit from a better use of food resources since statistics show that they produce 50% of the food products but unfortunately their access to land is way smaller. Also, by reducing food loss the total household expenditures will be smaller leaving more funds available for women.

#### Economic growth

- Promoting inclusive and sustainable economic growth, with a high importance for the agriculture sector in low-income economies can reduce poverty with 50%. Employment can be stimulated and new jobs can boost the economy in developing countries.

#### Protecting the ecosystem

- The efficient use of the actual agricultural resources will protect the remaining natural ecosystems from being added to the production sector.

Source: based on information from Lipinski, 2013.

### 3. Case study: Romania's progress in fighting waste

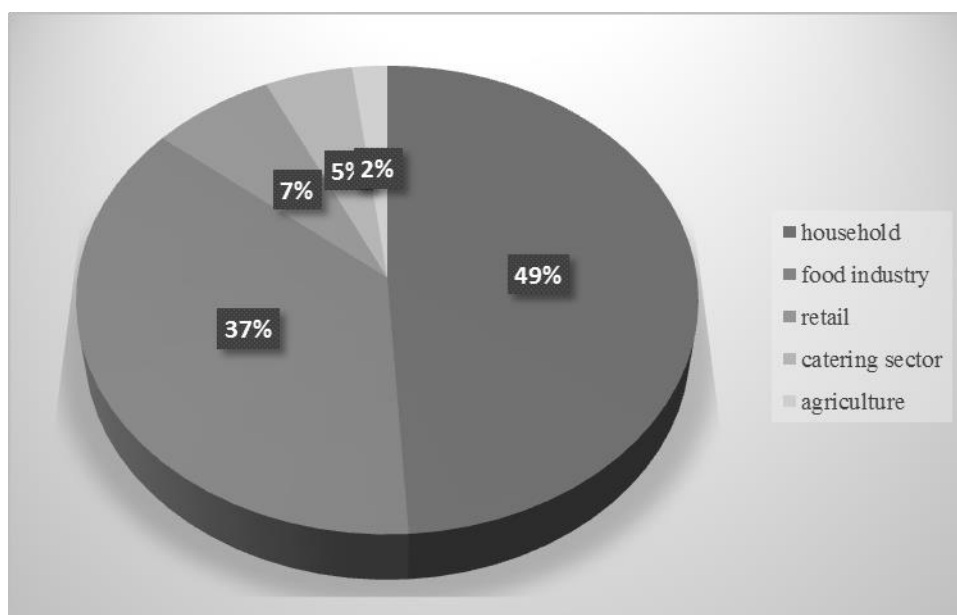
Customizing research on Romania, it should be noted that, in terms of stimulating sustainable development, important progresses were made. Romanian authorities have recognized the importance of respecting all the principles regarding environmental protection and efficient use of resources. After years of debating the importance of waste management, Romanian Parliament finally adopted a specific law, in order to help reducing waste, by introducing the obligativity for the food merchants to donate the products with a very close expiration date. Thus, in November last year, the Senate – as first Chamber of the Parliament- adopted the food waste law. According to it, retailers will be forced to donate all products which are close to expiration, prohibiting and sanctioning disposal. Article 2 of the Law clearly states: "Businesses that operate commercial premises with an area of over 400 square meters with destination "food sales" will have to sign a contract with a humanitarian organization or with an association of animal protection, as appropriate, in order to facilitate the donation of food, in a reasonable time, so that it can still be used."

Unfortunately, as the survey conducted for this research clearly shows, the law is still unknown for the majority of the population, since the authorities have made very few efforts to popularize it. Centralizing the responses from 100 people, both female and men, the conclusion is simple: the efficiency of a law can't meet the target if citizens aren't educated about the changes. Half of them respondents haven't even heard about the new legislation, which means their behavior regarding wastage will be absolutely the same.

Both European legislation (directives and standards) and international commitments have proven to be an essential factor in the evolution process of Romania (today, the 3<sup>rd</sup> country in Europe with a specific legislation against food waste). Step by step, this objective was reached, starting with signing international treaties. A good example is the firm commitment Romania took by adopting the 2030 Agenda. Thus, alongside 193 UN member states, Romania adopted the 2030 Sustainable Development Agenda, a document drafted in 2015 during the Summit on Sustainable Development. The main objective of the Agenda is

to establish a balance between the 3 major components of sustainable development: economic, social and environmental.

Romania managed to be on a downtrend in terms of the total waste generated. The total amount of food wasted in Romania is estimated at 110 kg/capita, with a total of about 2.2 million tons annually. If we relate to the rest of European countries, according to Eurostat, Romania ranks 9<sup>th</sup> place in the EU-27 top (after Brexit). According to InfoCons, about 35% of the food purchased by the Romanians is discarded, and this proportion increases at the same time with consumption, mostly during the holidays when it reaches 38%. Analyzing the sources of waste, we can say that households concentrates the greatest share (49%), followed by the food industry (37%), retail (7%), the catering sector (5%) and agriculture (2%).



Source: Gustavsson, 2011.

**Fig. 4: Romania's waste generating factors**

Each day, Romanians throw away almost 6000 tons of food, which means each Romanian is responsible with 300 grams of food waste every day. Since Romania still has major problems with extreme poverty those numbers may seem shocking. But the good news is that authorities have acknowledged this problem and already have taken action. Thus, adopting the law against waste, after being promulgated last week, can make a significant difference for the years to come.

According to official data provided at the Green Report Conference, mainly by the Ministry of Environment, Water and Forests and also the Ministry of Agriculture, the reasons why Romanians decide to throw eatable food are the following: rapid degradation of the food product (26%), wrong estimation of the quantity of food to be consumed within a meal (21%), and last but not least, purchases in excess (14%). Regarding the quantities of food that most often are thrown to garbage, being considered the most perishable, distribution looks like this: cooked food (25%), bread and bakery products (21%), vegetables (19%) and fruits (16%).

The few awareness campaigns brought into public debate have generated positive effects. A good example is the campaign performed in 2011 when the restaurants placed in the old city area have encouraged customers to avoid food waste by encouraging clients to take home the leftovers. Within this campaign, restaurant received 5,000 "doggy-bags". After this campaign, some restaurants have introduced this option for customers who require the remaining food. Also, some of the restaurants decided to offer this possibility without any special request. But the number of restaurants who offer this possibility is still very small. Moreover, Romanians are ashamed to ask the staff to pack their leftovers, considering this behavior as inappropriate. In the survey, almost half of the respondents (42%) never asked to pick up their leftovers. However, if the restaurant staff would include this option, without the client necessity to ask for it, an overwhelming percentage (95%) show willingness to change their preconceptions. Thus, 48.6% of the respondents agree that in this case it will be less shameful, 47.2% said that it will probably get used with this practice and only 4% still refuses to take the leftovers, considering this method useless in fighting against wastage.

Starting from the need to reduce the quantity of wasted food generated by restaurants, earlier this year, France changed its legislation by adopting a special regulation requiring restaurants to provide these doggy-bags to customers who request it. To make it more attractive for the French customers, well-known for their *savoir-vivre*, the name of the bags was changed into a more fashionable one. Therefore, French legislation mentions gourmet-bags (Craciun, 2016).

Regarding the management of waste resulting from overuse, Romania still records some deficiencies. Following the reasoned opinion received on 26 May 2016 by the European Commission, which warned about the urgency of developing and implementing a plan for prevention of waste generation, Romania should develop a plan to return to compliance with the regulations of Directive 2008 / 98 / EC and the principles of circular economy. This is a basic requirement for planning the use of EU funds in 2014-2020. Under these circumstances, Romania had only had two months to eliminate the violations. The involvement of European organizations in the management of sustainable development by strengthening the control of the Member States in an attempt to reduce the impact of waste on the environment and human health, as well as attempts to increase the efficiency with which resources are used, will have tangible effects in a few years from now. Preventive actions involve reducing waste at source and conduct awareness campaigns to determine the significant increase in demand for organic products certified with packaging that meets the criteria for environmental protection.

In case of exceeding the 60-day deadline, the Commission may report the case to the Court of Justice of the European Union (CJEU), which could lead to financial sanctions. This type of control mechanism may be generating positive results in reaching the sustainable development objectives. Moreover, Romania has a good track record of taking major international objectives and also the responsibilities incumbent upon those commitments. Since 2000, Romania has assumed the 8 Millennium Development Goals (MDGs) set out in the Millennium Declaration adopted by UN member states. Basically, this document was the only global commitment of this scale with sustainable development objectives. For 15 years (2000-2015), UN member states have pursued these objectives when developing public policies or adapting national legislation. And the results were as expected: reducing extreme poverty by half, halving the number of people without access to a source of water, significantly reducing the number of children without access to education in developing countries (10%). Globally, these efforts have not been evenly distributed so the new set of sustainable development goals (17 ODD) came to fix inefficiencies from Agenda 2000. In this respect, Romania is obliged to modify the National Strategy for Sustainable Development, in order to include all 17 ODD.

### **3.1 Survey results**

For making a more relevant analysis, an online survey was conducted. Thus, 130 people have responded to the 10 question of the survey, regarding the food waste phenomenon in Romania. The survey's objective was to identify and measure the Romanians perception and knowledge about wastage. The sample consists of men and women, aged between 18 and 65, with secondary and higher education. The results of the research, showing an eager public, wanting to learn more about the concept of "food waste". Only 33.8% of the respondents perfectly understand the concept and have read relevant articles about this subject before the survey. The overwhelming proportion of the respondents (60.2%) don't have the necessary data about this phenomenon although they are willing to find more about it.

Also, it is very important to note that people's perception on waste generators is very accurate, since most of them know the significant household contribution to this phenomenon. Households and retailers were correctly identified as the main generators of waste. Asked about how often they throw up eatable food for different reasons, most of the respondents admitted to do it rarely- meaning less often than once a month (35.9%) and weekly (31.3%). Regarding the composition of household food waste, respondent have identified home cooked food as the most likely to be wasted product (69%) followed by FVV's (fresh fruit and vegetables). Marketing strategies prove to be very efficient in Romania. Even though the level of poverty is still high in Romania, people are willing to buy double the amount of food needed, just because of a promotion price. Only 19.1% of the respondents know the importance of buying strictly the needed quantity of food, while 80.9% are willing to credit the campaigns. As far as the understanding the correct meaning of the advertisements from the packages: best before and use by, Romanians prove not to be very informed. 42% of the respondents have clearly stated that under no circumstances agree to use a product beyond the date mentioned on the package, considering the product dangerous for their health. Only 5.3% of the respondents know that, given the right refrigerating conditions, the product can still be used after the expiration date. The lack of information is confirmed by the high percentage of respondents who don't know nor the differences between "use by" and "best before", neither the significance of the formulas (23.7%).

Also the survey shows that people are still ashamed to ask for their leftovers from restaurants. Campaigns organized in other countries show how much this perception can change if a public debate clarifies the elements of taboo associated with this behavior.

### **Conclusions**

It is important to understand that we all have the responsibility to prevent the grim scenarios from becoming our future reality, to curb hunger and extreme poverty. Our planet produces enough food for the entire population, yet the food is insufficient and is unevenly distributed. In order to meet the common objective of significantly reducing waste, both developed and developing countries have to fight against their own specific generating factors. If developing countries are lacking technologies, generating mostly post-harvest waste, developed countries are fighting the waste generated by households. The contrast between the low prices of food products and the average income creates the context of waste. Studies have showed that, as the percentage of income spent on food products is lower, the probability to generate waste is bigger. Given this cleavage between different types of societies, the solutions against waste are also depending on the type of economy a country has. Thus, developed countries must focus on educating consumers within awareness campaigns, by changing and completing specific legislation. At the same time, in

developing countries there is an urgent need for investing in innovating technologies in order to reduce poor harvesting.

All the information analysed, all the data from international organisation and also the results from the survey show the consumers need for information about food waste. The marketing campaigns which have proven to be more harmful than useful, for both economy and environment, have to be stopped. Precisely, changing the outdated formulas from the packages: “use by” and “best before” – both unclear for the customers- is a necessary tool. Appropriate legislating and changing the law accordingly with the new principles of sustainable developing is mandatory but, at the same time, not popularising the changes makes them irrelevant for the population. Without awareness campaigns and without information, all legislative efforts are doomed to failure. Romania is the 3<sup>rd</sup> country in the E.U to have adopted law against food waste, but, without promoting this new measures, Romanians will still behave irresponsible.

On a global scale, only conjugated efforts of governments, food industry representants, economical agents and NGO’s can generate the desired reduction of food waste, making the “zero hunger generation” a reality no longer than 2025.

### References

1. Caronna, S. (2011). REPORT on how to avoid food wastage: strategies for increasing efficiency/ European Parliament plenary session document-PE467.138v03-00, 2011, available at <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A7-2011-0430+0+DOC+XML+V0//EN#title1> , last accessed at 15.10.2016
2. Craciun, A. (2016). EAT SMART: Mâncarea la pachet, în jurul lumii și în România, available at <http://www.green-report.ro/mancarea-la-pachet-jurul-lumii-si-romania/> , last accessed at 21.10.2016
3. Colinteanu, L. (2015). ONU vrea sa invinga saracia si foametea pana in 2030, Euroactiv.ro, available at: <http://www.euroactiv.ro/we-develop/video-onu-vrea-sa-invinga-saracia-si-foametea-pana-in-2030.-poate-1027>, last accessed at 15.10.2015
4. Eat smart Conference, 2016, Green Report Conferences, Bucharest, available at <http://www.greenreport-conferinte.ro/en/about-us/#more-240>
5. EuroStat official statistics, available at: [http://ec.europa.eu/eurostat/statistics-explained/index.php/People\\_at\\_risk\\_of\\_poverty\\_or\\_social\\_exclusion](http://ec.europa.eu/eurostat/statistics-explained/index.php/People_at_risk_of_poverty_or_social_exclusion) , last accessed at 20.10.2016
6. Food and Agriculture Organisation of the United Nations, 2016, “Food and Agriculture, key to achieving the 2030 Agenda for Sustainable developments, pp 4, available at [www.fao.org](http://www.fao.org), last accessed at 10.10.2016
7. Federation Europeenne des Banques Alimentaires official website, available at <http://www.eurofoodbank.org/poverty-waste/food-waste>, last accessed at 11.10.2016;
8. Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., ... & Balzer, C. (2011). Solutions for a cultivated planet. *Nature*, 478(7369), 337-342.
9. Food and Agriculture Organisation of the United Nations (FAO), 2016, Food and Agriculture, key to achieving the 2030 Agenda for Sustainable developments, pp 4, available at [www.fao.org](http://www.fao.org);
10. Food and Agriculture Organisation of the United Nations (FAO), World food situation, available at <http://www.fao.org/worldfoodsituation/csdb/en/>, last accessed at 20.10.2016
11. Gustavsson, J., Cederberg, C., Sonesson, U., Van Otterdijk, R., & Meybeck, A. (2011). Global food losses and food waste, Food and Agriculture Organization of the United Nations, Rom.

12. Lipinski, B., Hanson, C., Lomax, J., Kitinoja, L., Waite, R., & Searchinger, T. (2013). Reducing food loss and waste, World Resources Institute Working Paper.
13. Ministerul Agriculturii si Dezvoltarii Rurale, [www.madr.ro](http://www.madr.ro)
14. Parfitt, J., Barthel, M., & Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 365(1554), 3065-3081.
15. Savova, I. (2005). Europe 2020 Strategy—towards a smarter, greener and more inclusive EU economy, available at [http://temis.documentation.developpement-durable.gouv.fr/documents/Temis/0079/Temis-0079983/Eurostat\\_R\\_2012\\_39.pdf](http://temis.documentation.developpement-durable.gouv.fr/documents/Temis/0079/Temis-0079983/Eurostat_R_2012_39.pdf), last accessed at 9.10.2016
16. [www.senat.ro](http://www.senat.ro)
17. World Bank (2014), Food Price Watch, year 4, Issue 16 available at <http://www.worldbank.org/content/dam/Worldbank/document/Poverty%20documents/FPW%20Feb%202014%20final.pdf> , last accessed at 9.10.2016