

CONSUMER BEHAVIOUR WITH RESPECT TO FOOD LOSSES AND WASTE

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At the G20 meeting held in Turkey in May 2015, the Agricultural Ministers decided to incorporate the reduction of food losses and waste as a common objective for collective action. They thus confirmed the importance of this issue for the most powerful countries in the world while being aware that this group of countries is expected to provide global leadership in this regard.

There is an increasing trend to analyse the cycle of agrofood products from farm to fork along the supply chain. The results of these studies provide insights enabling to better measure the significance of the different supply stages but also to understand the interaction between them (Fischer *et al.*, 2009). Generally, food waste is related to consumers and food losses affect the entire food chain. This is why in this chapter, we have chosen to focus on the responsibility of consumers in this regard, while being aware that there is also a close link between food losses and waste and retail behaviour.

The first part of this chapter provides some elements on consumer behaviour with respect to food losses and waste. The second part gives grounds to analyse recent trends regarding developed and developing countries across the Mediterranean. The aim is to distinguish the problems they face which arise in accordance to the economic development of different countries but also as a result of diverse legal frameworks. Lastly, conclusions and recommendations are provided to encourage their consideration in policy-making.

Consumer behaviour with respect to food losses and waste

It is important to understand the differences between food losses and waste and their connection with consumer behaviour. Food losses take account of all the food lost along the supply chain, that is, the amount of edible food that is not consumed after being harvested. Food waste is the part of the food losses resulting from consumer

behaviour such as cooking loss, plate waste and other causes. Thus, consumer behaviour has an impact on the rest of the agrofood supply chain. The interaction between consumers and retailers is crucial and enables a better comprehension of food waste along the supply chain.

Consumption waste is estimated to amount to 35% of the total food losses all over the world (Cuesta, 2014). In industrialised countries, consumption waste accounts for more than half of the total losses whereas in poor countries it drastically diminishes to the extent that it amounts to around 5% of the total losses in Sub-Saharan African countries. There is a high correlation between high per capita income and high food waste. At the consumption stage, the difference is greater than at other stages of the agri-food supply chain in different countries all over the world.

The food consumption decision-making process is an important application of behaviour economics (Just, 2011). Many of the decisions made by consumers on a daily basis occur without much thought. Impulse is an importer driver and in many occasions, reasoning does not contribute to decision-making even through decisions are sometimes based on past experiences. Decisions sometimes happen due to previous established habits, lack of knowledge, poor appreciations or many other reasons.

Food consumption decisions undertaken by adults are the result of a learning process since their childhood. It is difficult to change habits because consumers receive information from many different sources. There are public concerns but also private interests, which are sometimes in conflict. For example, do children eat cereals sold in attractive boxes because of the gift included inside or because of the cereals' taste? Packages are extra large to make them appealing but they have a negative impact on the environment.

In many countries, children do not have the habit of eating fruits and vegetables. This habit is difficult to change later in life. Promotions aimed at influencing these habits have limited results. The elderly might take their intake of fruits and vegetables more seriously because they feel the immediate effects. In these cases, it might be a combination of better information and special health circumstances that forces them to change food habits.

Although the income elasticity might be very low, in some special occasions such as in times of economic crises, consumers change their food habits due to economic restrictions. Food waste can be diminished and consumer awareness is increased. Likewise, the sensitivity of some segments of the population to ethical issues such as poverty in the developing world impacts their food waste habits.

The shaping of habits is therefore crucial to understand food consumption. It is a continuous development with current preferences depending on past consumption patterns and important changes occurring only under special circumstances. These changes are either brought by drastic economic changes or many other reasons such as environmental and health concerns. In developed countries, policies dealing with

environmental impact contribute to raising awareness more effectively than policies related to health information. This explains why the citizens' concerns have increased in recent years.

Environmental impacts related to food consumption have been directly and indirectly influencing consumers' food choice (FAO, 2013). The excessive use of natural resources or the amount of discarded packaging material are two well-known examples. Producing only the required amount of food represents a great challenge but unfortunately this is constrained by the complexities along the agrofood chain that are difficult to resolve.

Consumer behaviour is also driven by ethical factors that contribute to their decision-making processes when buying or disposing of food. Consumers have greater awareness of the constraints that exist in the developing world in comparison to the excess supply in wealthy economic countries. They therefore take ethical issues in consideration when making decisions.

Consumers' decisions are related to other decisions undertaken by other agrofood supply chain stakeholders. For example, when consumers make the decision to throw a food item into the bin, they are also influenced and affected by a multitude of factors and decisions made at an earlier stage of the food supply chain, such as aesthetic standards imposed by suppliers (Stuart, 2009). According to Jean C. Buzby *et al.* (2014) consumers' food waste could be the result of the treatment of food (spillages, excessive trimming, inadequate storage, biological aging in fruit), industry or government standards (that lead to the rejection of some food) and seasonal factors. It could also be the result of their confusion between the "use-by" and "best before" dates, lack of knowledge about food preparation, inappropriate portion sizes, psychological attitudes, habits and preferences leading to plate waste, uneaten or leftover food. All these issues can be explained thoroughly but we will focus on clarifying one of them that has caused a lot of confusion. The "best before" date indicates the date until when the food is expected to retain its optimal conditions. Whereas, the "use by" date indicates the date after which eating the food may be unsafe. Consumers confuse both terms and this could lead to the consuming of food after the "use by" date.

Recent trends in southern and eastern Mediterranean countries

In developing countries most food losses occur at the farmer-producer end of the food supply chain and less food is wasted at consumer level (EPRS, 2014). Yet, these countries have little information about consumers' food waste at home and outside. The main approaches used to deal with collective restoration were defined at the Eating City workshop held in Algeria (Lacourt *et al.*, 2014). The Workshop was aimed at achieving a common understanding of comparative problems taking place in different countries from the North and South of the Mediterranean. In 2015, a waste management plan involving different political parties and civil society organisations has been approved in Lebanon, the waste crisis in Beirut having led to the

increased awareness of Lebanese citizens on issues related to waste. With the support of the FAO, Morocco is also planning to implement a strategic plan with the aim of reducing losses and waste by half until 2024.

Developing countries share some common features with respect to food losses and waste but there are also some specific activities in each one of them. Some interesting experiences and approaches regarding staple diet products in Tunisia and Turkey are presented in the following boxes. The development of food banks in eastern and southern Mediterranean countries is described in another box.

Cereal products losses and waste related to consumption: the case of Tunisia

Changes and new trends in Tunisian food consumption

Tunisia has a high per capita consumption of cereals that represent, on average, 52% of the energy needs of the Tunisian population. This percentage is greater among medium and low-income population groups. Cereals are therefore at the centre of the price policy, not only because of the place they occupy in the daily food intake of the population but also because of their importance in the subsidy system.

Despite this high consumption of cereals, the average amounts consumed per capita have declined in recent years. On the contrary, there has been a significant increase in the consumption of animal products as well as fruit and vegetables. Although the daily ration required is met in terms of quantity, the quality levels could be unsatisfactory. According to the last Household Budget Survey carried out in 2010, the quantity of cereals has decreased by 8% since 2000, with a specific greater decrease for durum wheat (-31%). The consumption of soft wheat, primarily used for bread making has increased significantly (+15%). Some professionals explain this increase by its staple nature, while others think that it is due to the maintained low subsidised price levels. According to the National Statistics Institute, a Tunisian consumes averagely 119 large loaves and 84 baguettes per year. Flour used for making bread is for the most part derived from mainly imported soft wheat. This has led to increasing import expenditure with adverse impacts on the government budget.

Waste of subsidised bread: a growing phenomenon

Accurate estimates of waste in the overall Tunisian food system are unavailable. According to the National Consumer Institute (NCI) the cost of wasted bread in bakeries, hotel units, households and university restaurants is estimated at 100 million Tunisian Dinars per year. Globally, around 900,000 loaves of bread every day return to bakeries without being consumed. Subsidised bread is the most wasted product. Moreover, the Tunisian consumer purchases quantities of bread that exceed by far its real needs and does not adopt appropriate means to preserve it. Bakeries produce amounts that exceed their commercialisation potential.

To cope with this waste and the cost that is generated, the NCI has developed a strategy that aims to rationalise the subsidising cost of basic consumer products and to change consumer behaviour. This strategy to fight against bread waste is based on three pillars: the reduction of waste at production and consumption levels, the rationalisation of bread purchasing according to real needs and the adoption of adequate means for its preservation. The strategy also recommends the improvement of a single bread subsidy to replace the two current categories.

In the same context, in 2015, the NCI planned to focus its activity on the rationalisation of bread consumption through awareness campaigns, field studies and training for restaurants and bakeries. Also, the reform of the distribution channels for cereal products as well as better targeting of food subsidies beneficiaries will contribute to the rationalisation of consumption, management of subsidy costs and cereal waste reduction. Agricultural and food policies reforms are therefore expected to focus more on this topic in the coming years.

Source: Abderraouf Laajimi, National Agronomic Institute of Tunisia (INAT) and National Observatory of Agriculture (ONAGRI) (Tunisia).

Food waste in Turkey

According to Turkish retailers, 10% of food waste occurs due to shopping habits, which are related to non-packaged and un-standardised/graded products, and consumer self-service increases the percentage of damaged products. For example, the total potato losses and waste from farm to household/food service roughly reach up to 30% (Ministry of Food, Agriculture and Livestock, General Directorate of Strategy, 2015).

Purchasing more than required is one of the main factors leading to food waste. Based on a survey conducted in 500 households in Ankara in July 2005, it was found that food waste at household level accounted, on average, for 9.8% of the daily energy intake per person and the average amount of discharged food per person was 318.8gm per day (FAO, 2006). Food waste is also an important issue for processed foods such as bread and meals consumed at food services. On 18 April 2013, Önder Arsan, CEO of Unilever Food Solutions in Turkey presented in the *Vatan* newspaper, the results of the research conducted by the company: every one of the 4,000 consumers eating food at their food service facilities at least once a week wasted 100gm of food.

Bread is a staple food in Turkey, with 11% share in household food expenditure and 104kg per capita annual consumption in 2013 (TurkStat, 2014). A research on bread consumer behaviour and factors affecting bread waste in Turkey conducted in 2008 and 2012, respectively found 5% and 6% of waste. In 2012, 5,950 bread loaves were wasted (250gm per bread). Purchasing more than required and lack of knowledge for bread preservation were the main reasons given by households, individual consumers, bread makers and grain mills operators to explain this large amount of waste. In 2012, about 81% of the total bread was purchased by households. The per capita daily disappearance quantity amounted to 0.319kg, i.e. 116kg per year while waste amounted to 2.9%. Bread waste amounts to 3.1%, 2.7% and 7.1% respectively in hotels and restaurants, employees' food restaurants and student food courts.

NGOs and private sector organisations are also very active and strongly contribute to the reduction of food losses and waste with the implementation of projects and programmes. In this respect, the FoodWard Project, Unilever Food Solutions food service actors training projects and food bank practices (Israf) are the main initiatives that should be mentioned. The first food bank opened in the Diyarbakır province in January 2004 and there were 50 in 2015. The amendment of the Turkish Income Tax Law (No. 5035, on 2 January 2004) enabled donors to deduct the cost of food delivered to the food bank from income and corporation tax statements.

Mahmet Mehdi Eker (2014) stated that the campaign had remarkable outcomes in Turkey although it was carried out without legal sanctions and only with voluntary support. It has encouraged the inclusion of two subjects in the Tenth National Development Plan of Turkey as a general call to the public for further saving: increasing domestic savings and waste prevention; the reduction of waste and prevention of repeated consumption.

Source: Ahmet Ali Koç, Akdeniz University, Department of Economics (Turkey).

FoodWard (<http://foodward.mkv-consulting.com/tr>); Israf (www.israf.org); Unilever Food Solutions (www.unileverfoodsolutions.com.tr)

The emergence of food banks in eastern and southern Mediterranean countries

Most eastern and southern Mediterranean countries are considered to be developing countries. Most of the food losses in these countries occur at the production and post-harvest stages of the food chain. However, the rapid socio-economic and demographic changes that these countries have experienced in the last few decades, in addition to the rapid urbanisation and the changes in the ways food is produced, procured and consumed, have led to a significant increase in food waste at the consumer end of the food chain problem. This increase has yet to be scientifically quantified.

Civil society initiatives have emerged in the region to reduce food waste and support vulnerable food needs. The food prices hikes in 2007 have significantly contributed to the growing food waste problem in these countries and the growing number of needy people. The Egyptian Food Bank (EFB) is an example of a not-profit organisation that was founded in 2006 by a group of businessmen driven by a sense of social responsibility to eliminate hunger and reduce food waste. The main mission of this Food Bank is to collect 'excess' food from hotels, restaurants, food factories and individuals and distribute it to the needy. At the same time, it conducts campaigns to raise awareness on food waste reduction at national level.

While food banks in Europe and North America have a long history behind them, the phenomenon is very new in eastern and southern Mediterranean countries. The establishment of the EFB and its support has given way to the development of other food banks in the region, including Jordan, Lebanon, Syria and Tunisia but also in Mauritania, Iraq, Saudi Arabia and United Arab Emirates thus establishing a regional network of food banks operating with the same model (Food Banking Regional Network, FBNR).

Most of these food banks operate through protocols with multinational hotels and restaurants to save food waste, where food surplus is packed in foil trays, labelled and professionally transported at appropriate temperatures to the nearest orphanages and elderly homes for immediate use. Advocacy work with hotel managers and other food businesses to raise their awareness on the need of saving food is an essential component of these initiatives. However, it is also important to provide incentives for staff members who will stay after working hours to fill in the boxes and make them ready for distribution.

In addition, food banks accept donations in kind, in cash from businesses, individuals or donors and also establish links with the Zakat programme (a tax on wealth which is mandatory for Muslims), governmental income tax-exemption programmes and the organisation of lamb offerings on the occasion of Eid al-Adha, when a huge amount of animals are slaughtered and meat is normally wasted. Awareness campaigns targeting consumers are also an integral part of this initiative especially during

festive seasons like Ramadan for Muslims when a lot of food is wasted, or during social events like wedding celebrations. A year after the launch of the Egyptian Food Bank, 5.4 million meals were saved from hotels and distributed to the needy on a monthly basis. This number reached 17.2 million meals a month in 2010, with 400 hotels in Egypt participating in this initiative (*The Cyprus Weekly*, 2013). By partnering with 4,000 NGOs in Egypt and through a network of 47,000 volunteers, the EFB operates as a “front line” model distributing food directly to end users thus feeding 180,000 families across Egypt with an average of five to six persons per family.

Source: Fatima Hachem, *FAO Nutrition and Consumer Protection (Egypt)*.
FBNR (www.foodbankingregionalnetwork.com).

Recent trends in developed countries

European non-Mediterranean countries and the United States

Around 56% of total food losses and waste occurs in the developed world (Cuesta, 2014). A large share of food waste in developed countries occurs at the consumer stage (FAO, 2013). In those countries with a high income per capita, the concern about food losses has been small because the percentage of the income dedicated to food is very small (between 10% and 15%). So a high percentage of food waste corresponds to a small quantity of money for affluent consumers. However, food waste has received increasing attention in the past years. Consumers become more motivated and try to minimise their waste in periods of economic crisis. Besides these temporary reasons, there is an increasing awareness and concern on environmental issues. Social behaviour influences individual behaviour and ethical concerns are increasing among citizens in developed countries.

In 2012, it was estimated that around 100 million tonnes of food were wasted in the EU. This amount could rise by 20% till 2020. Societal values have influenced political decisions in Europe and there are plans to reduce food waste by 50% by 2025 (European Parliament, 2012). Food Use for Social Innovation by Optimising Waste Prevention Strategies (FUSIONS) is a programme implemented to drastically reduce food waste in the European Union¹.

According to Savy Vanham *et al.* (2015), Europeans waste an average of 16% of all the food-reaching consumers. Almost 80% of it is edible food, i.e. an amount of 47 million tonnes of avoidable food waste annually. This has significant impacts on water and nitrogen resources. Findings show great differences between countries because of the different life styles and purchasing power.

Vegetables, fruits and cereals have the highest wastage rates as they tend to have a shorter shelf life and are often over-purchased because they are generally cheaper than other product groups like meat. Strict norms about product appearance induce consumers to avoid buying damaged fruits and vegetables. These norms should be

1 - FUSIONS (www.eu-fusions.org).

reviewed. Although the amount of meat wasted is smaller, it accounts for the largest avoidable food waste footprint because its production is very resource intensive. In other words, a small reduction of wasted meat equates to a large reduction of wasted water and nitrogen resources.

As an example, in Germany, it is estimated that 81kg of food is wasted per person per year out of the 456kg consumed at home, which amounts to 18% of the total food waste. Buying only the necessary amount, cooking leftovers in creative ways and improving storage are ways by which consumers can minimise waste (Ritcher, 2015). Food services and catering services are other places where waste could be improved as these represent one third of food consumption. Food banks collecting products that retailers are unable to sell are becoming very popular in Germany where more than 900 food banks help around 1.5 million people.

Food consumer behaviour with respect to food losses and waste in the US

It is estimated that roughly 20% of the total supply of food at consumer level in the United States is uneaten. Food losses include cooking loss and spoilage due to inadequate storage after purchase in addition to plate waste from meals consumed in restaurants or at home (Buzby *et al.*, 2014). In 2013, municipalities collected more than 37 million tonnes of food waste accounting for over 20% of the total material incinerated or landfilled after the recovery of recyclable components.

The value of food waste at consumer level averaged around USD 370 per capita in 2010 or more than 9% of total food spending. But food is relatively inexpensive in the United States so, for many consumers, there are limited economic incentives to reduce waste. Less than 10% of average consumer income is spent on food, which is substantially less than the amount spent on transportation. Nevertheless, there is evidence of increased awareness on food waste. In a survey of more than 1,000 consumers conducted in 2014 (Neff *et al.*, 2015), 42% indicated that they had seen or heard information about food waste in the last year and 16% had sought information about reducing it. Respondents overwhelmingly reported discarding less food than was reported in national data. Over 70% indicated that they discarded "less food than average"; 13% indicated that they did not discard any food and 56% indicated that they discarded only 10% of the food they purchased.

Some organisations, including the US postal service, are involved in the collection of unused packaged food from consumers to supply organisations that distribute food to the poor. Roughly 50% of expenditure is on food prepared outside the home and it is a common practice for patrons of restaurants to request packaging for unconsumed items to take them home. Whether or not the food thus saved is ultimately consumed rather than being discarded can be questioned.

As in many other countries, there has been an increased emphasis on recycling in the United States to reduce the amount of material that has to be incinerated or landfilled and to reduce disposal costs (tipping fees). Many municipalities provide for the separate collection of recyclables, although only a limited number provide facilities for composting organic waste. Often prompted by pressure from students, many universities are implementing comprehensive recycling initiatives for food waste with the aim of reducing landfill to a minimum. The US Environmental Protection Agency (EPA, 2015) documented 3,560 community-composting programmes for food and other organic waste in 2013, although there was only a slight increase

from the 3,227 programmes in 2002. The EPA also reported that roughly 2.7 million households were served by food composting collection programmes in 2013, but this only merely represents 2% of US households.

Efforts are being made by government agencies to increase public awareness on food waste. In 2013, the US Department of Agriculture (USDA) and the EPA launched a joint effort to change perceptions about food waste and the way this is managed by the food industry. The EPA operates a programme to help businesses and organisations to measure and reduce food losses. The food industry, hunger alleviation groups, and non-governmental organisations with environmental interests are also active in attempting to change habits.

Source: David Blandford, Penn State University (Penn.), Agricultural and Environmental Economics Department.

COSUS: Behaviour research on consumers and food waste in Europe

The research project COSUS (COsumers in a SUstainable Food Supply Chain) conducts research on why consumers waste suboptimal food and how consumers' willingness to accept such foods could be increased. Suboptimal food is defined as food that deviates in sensory characteristics (odd shape, size, colour) or that has a best-before date that is approaching or has passed, but is still perfectly fine to eat. Expert interviews, focus groups and case studies were conducted and the results summarised to identify which consumer-related factors have the most impact on the generation of food waste at the consumer stage of the supply chain. Discussions were conducted on how typical retailer actions against food waste currently observed across Europe are contributing to resolving these problems. Thirty articles, published in English between 2000 and 2014 exploring consumer household behaviour and habits, were studied. Furthermore, eleven expert interviews were conducted in order to discuss causes of food waste at the consumer stage. On this scientific basis, a model highlighting the interacting factors was developed (Aschemann-Witzel *et al.*, 2015).

At consumer level, these factors can be grouped as follows: firstly, the degree to which consumers have the motivation to avoid food waste (ethical or economic reasons) is a crucial factor; secondly, because of other conflicting goals (taste, convenience, safety concerns etc.) and thirdly, a lack of food provisioning and handling capabilities, the weighing of priorities leads to wastage of food. Furthermore, all these factors (motivation, goals and handling capabilities) depend on 1) the context of their surrounding (assortments, marketing, infrastructure), 2) their social environment (family habits and social norms) and 3) the greater macro-environment (economic situation, technological, legislative and cultural background).

The consumer-level and contextual factors described emphasise that actions conducted at retailer level such as the immediate supply chain actor interacting with consumers can have an impact on food waste within households. Across Europe, the retail sector has started to take action against food waste within the supply chain and at consumer level. These actions mostly involve pricing strategies such as abolishing multiple unit discounts, reducing prices for foods with close use-by and best-before date labels or with suboptimal features, increasing the assortment depth of suboptimal foods or proposing processed foods made from suboptimal foods, and directing suboptimal foods to alternative retail. While evaluations of the effectiveness are yet lacking, experts believe that actions have been successful in creating greater consumer awareness and attention to the issue as well as shifting perceived social norms.

Source: Aschemann-Witzel *et al.* (2015), Centre for Research on Customer Relations in the Food Sector (MAPP), Aarhus University (Denmark).

COSUS (<http://cosus.nmbu.no>).

EU Mediterranean countries

Issues related to consuming patterns in countries like France, Greece, Italy and Spain do not differ from those observed in other developed countries although specificities related to consumer habits and programmes can be noted.

In France, it is estimated that 67% of the food is wasted by consumers and another 15% by restaurants, while shops and distributors waste 11% of the total. According to the estimates of the French Environment and Energy Management Agency (*Agence de l'Environnement et de la Maîtrise de l'Énergie – ADEME*), every person in France throws away 20kg of food on average, of which around 13kg are leftovers and damaged and unconsumed fruit and vegetables and wastes a total of 21% of food purchased. In 2013, the Ministry of Agriculture elaborated a plan to reduce food losses and waste with the objective, among others, to raise public awareness and encourage responsible habits. The plan included educational initiatives in the agricultural and in the hotel industry training colleges; terms and conditions for reduced waste in contracts for the public procurement of institutional catering; a national day against food waste; a legal clause providing for the inclusion of the fight against food waste as part of corporate social responsibility (RSE); an advertising campaign against waste and a year-long experimental citizens' food donation programme based on a digital platform. France has also taken a leading approach towards the control of food waste in supermarkets. There are attempts to implement a new law stipulating that it will be compulsory for supermarkets above 400m² to donate unsold food to charity or food banks. This law is enforced in July 2016 and it is also aimed at influencing other European countries. So far, civil society organisations have established contracts with food distribution chains, which are willing to improve their good practices and to structure the entire process. However, there are also concerns that recipient institutions will not be able to handle the distribution of the expected large quantities of food.

The National Food Waste Prevention Plan (PINPAS)², established in Italy, is also another initiative aimed at food recovery through donation to charity organisations. This plan is at the centre of the political agenda from local to European level and it was developed to increase and spread knowledge about the environmental, social and economic impacts of food waste and raise awareness among consumers.

Andrea Segré *et al.* (2014) conducted a survey dealing with household food waste in Italy in the framework of Waste Watcher, the Italian Observatory of Food Waste. The data collected, which is composed of self-appreciations and estimations, shows, like in other countries, a close correlation between the amount of money spent on food and the quantity wasted. Food waste patterns differ between countries even though there are similarities between regions and households with equal income levels, but Andrea Segré *et al.* (2014) also found that household behaviour varies significantly between the North and the South of Italy. Economic factors but also factors related to demography, household size and composition, culture, habits and attitudes explain these differences. Cosimo Lacirignola *et al.* (2014) express their concerns for the situation in the Mediterranean area.

2 - PINPAS (www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Andrea_Segr%C3%A8_final_02042014.pdf).

In Spain, the economic crisis has resulted in the change of some habits with a clear impact on food waste (Albisu, 2014). Today, there is greater awareness and consumers are committed to save food. We can therefore state that economic factors have been determining in Spain. It is estimated that consumers waste around 18% of the food they buy even though they think that they only waste 4%. This shows that they are not aware of the extent of this phenomenon. Bread, grains and pastry products amount to 20% of the total consumers' waste, followed by fruits and vegetables with 17%. Greater efforts should be undertaken to increase awareness and strengthen education. In 2013, the Spanish Ministry of Agriculture, Food and Environment launched a campaign called "More food, less waste" that identified five areas of actions with several activities planned for each area. The strategy established was evaluated by a committee (MAGRAMA, 2015). The Spanish economic crisis together with the citizens' awareness on food waste has boosted the implementation of food banks. The Spanish Federation of Food Banks (FESBAL) coordinates the efforts and activities of various local food banks across Spain. FESBAL manages the relations with central government agencies, international organisations, private companies and other non-profit organisations that provide food assistance. It is nearly totally run (99%) by voluntary staff.

Like in Spain, the economic crisis and the severe recession in Greece has also significantly led to an increased solidarity among citizens, who, by force of circumstances, had to be more careful with their spending and became more aware about the extent of food waste (see behaviour analysis of Greek households during the economic crisis of Abeliotis *et al.*, 2014). Non-governmental organisations have created sophisticated logistics networks run by volunteers to manage food donations. The distribution chains and the restoration sector were also involved in this movement. Some municipalities have even made stores and fridges available to the public to store food. Consumers have appreciated this attitude and became more willing to make extra efforts so that food reaches people living in difficult conditions. This collective effort may serve to further promote food waste prevention at the household level and also strengthen environmental and social awareness that may outlast the economic crisis.

Conclusion

Since consumers' waste in developed countries is greater than in developing countries, policies should be different to address the local specificities. Today, national policies complement and expand the recommendations given by international institutions such as the EU and the FAO. The EU provides ten tips or good practices to reduce consumers' food waste: appropriate shopping planning; good understanding of consumption dates; concern about the budget; practice of a healthy fridge; good storage; appropriate rotation in the fridge; food servings in small portions; use of leftovers; freezing and compost production³.

3 - European Commission, "What Can I Do in my Daily Life to Limit Food Waste?" (http://ec.europa.eu/food/safety/food_waste/library/docs/tips_stop_food_waste_fr.pdf).

The FAO is promoting a global initiative entitled SAVE FOOD aimed at addressing food losses and waste reduction⁴. The third action of this initiative deals with “Supporting legislative and policy development” and part of it is dedicated to sustainable food consumption and dietary guidelines to save waste. Public organisations cannot directly reduce food loss and waste, but they play a crucial role in facilitating actions.

Several authors have reviewed food saving programmes and approaches to deal with it. Some have analysed several programmes implemented in the Mediterranean countries (Charalampopoulou *et al.*, 2014). Others have provided some solutions to minimise food losses and waste (Gustavsson *et al.*, 2011; HLPE, 2014). A report focusing on this issue presented at the Expo Milano 2015⁵ stresses the importance of effective inter-sector co-operation from farm to fork, where consumers play an important stakeholder role.

Food waste is mainly caused by consumer behaviour and therefore policy makers should set the appropriate rules to encourage consumers to change their behaviour or their perception of food. For instance, teaching them to evaluate the quality of fruit and vegetables and encouraging them to avoid disposing of fresh produce. Public policies also have an impact on the private sector. They should therefore apply to retailers and their understanding of how to handle food in order to satisfy consumers but also to comply with citizens’ overall needs. In this respect, French policies are a step forward towards complying with these objectives. The economic crisis and the increasing awareness of citizens on food waste have led to the development of initiatives, such as the creation of food banks. Public policies should protect, facilitate and encourage these initiatives.

Companies involved in building social responsibility should evaluate their social impact by analysing their relationship with citizens, governance and environmental matters (Albisu, 2012). Food waste at retailers’ outlets should be an integral part of the social responsibility programmes that food chains incorporate in their business plans. This will in turn enhance their role in society.

Most of the public policies implement educational programmes intended for consumers. Awareness campaigns have an immediate effect on adults but they have not reached their sustainable goals, that is, make children understand the implications of food savings and make their education shape their future consumer behaviour. Likewise, consumers in developing countries should learn from the excess waste occurring in developed countries and try to form appropriate habits. In many countries, the economic crisis has shown the important role solidarity can play via social networks. Public policies should reinforce initiatives of unconsumed food redistribution to poor people. Let us hope that the understanding of food disposal dates increases and that consumers differentiate more between optimum and adequate food and start eating sub-optimal food that can still be consumed. They should be encouraged to change their habits in order to largely contribute to reducing waste both at household and retail level.

4 - FAO, SAVE FOOD (www.fao.org/save-food/fr).

5 - Expo Milano 2015 (www.expo2015.org/en/news/all-news/2014-report-on-food-waste--its-findings).

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