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## Economical, Environmental and Ethical Impact of Food Wastage in Hospitality and Other Global Industries

### SUMMARY

There is something horrible about throwing food in the bin. Based on existing literature, 30-50 percent (i.e. 1.2-2 billion tons) of the produced food never reaches anyone's plate. Global food production can be split into production losses, consumers' waste and consumption. In a world where 850 million people are undernourished, global food supply per person approximates to 570 kg: roughly, 380 kg is consumed, 140 kg is lost in the production and 50 kg is wasted by consumers. Households generate 53% of the total food waste in Europe, the processing industry 19%, food services 12%, the primary production sector 11%, and the retail/wholesale sector 5%. The European hospitality industry is a small food waster that generates only 12% of the total food waste in Europe. Wasted food is accountable for 3.3 GtCO<sub>2</sub>e. The average carbon footprint of food wastage is about 500 kg of CO<sub>2</sub> equivalents per person per year. The blue water footprint of food wastage is about 250 km<sup>3</sup>. 1.4 billion Ha of land – 28% of the world's agricultural area – is used annually to produce food that is either lost or wasted. The food which is not eaten contributes to the loss of biodiversity through habitat change, overexploitation, pollution and climate changes. Prompted in part by global food production inefficiency, 9.7 million hectares are deforested annually to grow food – 74% of the total annual deforestation. The scale of global food wastage is shocking, and this wasted food results in a number of ethically questionable implications. Pope Francis rightfully points out that from the moral standpoint prodigal expenditure and wasting of food is no better than stealing from the hungry and poor. From the ecological standpoint, it is no better than stealing from our own children. But moralizing, identifying problems, knowledge and information distribution, and suggesting solutions surely will not convince people to implement offered solutions. The world needs progressive politics for a fairer world to achieve more equitable distribution of wealth. Tourism and the whole hospitality industry can and must play an important role in raising awareness of the value of food. The

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entire touristic sector can promote changes in food management and consumption with very positive environmental and economic results.

**Keywords:** food loss; food waste, sustainable management, ecological footprint, hospitality, global industries.

## 1. Introduction

Food waste is an important issue for the global food security and good environmental governance, directly linked with environmental (e.g. energy, climate change, availability of resources), economic (e.g. resource efficiency, price volatility, increasing costs, consumption, waste management, commodity markets), ethical and social (e.g. health, equality) impacts (FAO, 2016, p. 1). Food waste topic raises ethical challenges and is linked to issues like environmental degradation, social injustice, world wealth distribution, universal human rights and bioethics, and integrative bioethics. Based on the existing literature, the aim of this paper is to present and analyse existing data about the type, origin, reasons and amounts of global food waste, as well as to offer a synthesis of food waste's environmental, public health, ethical and economical footprints. The authors' aim is to comprehensively and clearly present the contemporary date and actual scientific discussion regarding food waste and influence of specific industries to the problem. In the first chapter authors will start from universal human right to food and equality, and discuss it in the terms of hunger and lack of food problem versus global food production. Furthermore, hunger will be connected with food wastage, food loss and food waste not only through definitions, but also through empirical data that illustrates the seriousness of the problem, trying to understand causes, proportion and consequences of a global phenomenon. In the following chapter ethics of food and food wastage will be discussed as well as potential areas of change that form at least a part of the explanation for food waste. Also the issue of food being wasted due to excessive consumption will bring facing overweight vs famine. The fourth chapter will proceed from food wastage as ethical issues to unavoidable consequences in the form of environmental degradation and various ecological footprints of food wastage. Having wide coverage of different aspects of food wastage problem, in the final, fifth chapter the possible solutions will be enlightened from various points of view - different strategies to reduce food waste will be analysed and a conclusion will be made by calling for the reduction of food waste, implicitly taking the individualist approach towards the solution. The authors will conclude with appeal for a radical revolution from the anthropocentric to the ecocentric paradigm which promotes the inherent worth of living beings regardless of their instrumental utility to human needs, plus a radical restructuring of modern human societies in accordance with such ideas.

## **2. Food wastage, food loss and food waste – problem definition, causes, proportion and consequences**

According to the United Nations Universal Declaration of Human Rights (UN, 1948, art. 1), “all human beings are born free and equal in dignity and rights”. They are endowed with reason and conscience and it is stated that they should act towards one another in a spirit of brotherhood. Furthermore, everyone has the right to a standard of living adequate for the health and well-being of themselves and of their family, including food. However, despite the right to food, almost 800 million people worldwide do not have enough to eat. This means that one in nine people are suffering from hunger (FAO UN, 2015). Hunger and lack of proper nutrition are the number one health risk worldwide. Contributing factors include, but are not limited to: economic crises, poverty, socioeconomic status, politics, war, poor agricultural infrastructure, lack of access to the marketplace, increasing food prices, and natural disasters. It should be stated that people are not hungry because of the shortage of food supply in the world. More than enough food is produced globally to feed every single person on this planet. It is estimated that recovering just half of the food that is lost or wasted could solve world hunger (Gustavsson et al, 2011). Roughly one-third of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tons per year and it is estimated that 30–50% (or 1.2–2 billion tonnes) of all food produced remains uneaten (Stuart, 2009).

The UK, the USA and Europe have nearly twice as much food as is required for the nutritional needs of their populations (Stuart, 2009). Up to half of the entire food supply is wasted between the farm and the fork. If crops wastefully fed to livestock are included, European countries have more than three times more food than they need, while the US has around four times more food than is needed, and up to three-quarters of the nutritional value is lost before it reaches people’s mouth (Stenmarck & Jensen, 2016). Although food waste differs in terms of quantities and causes from region to region and from nation to nation, being dependent on geography, infrastructures, cultural traditions, eating habits, etc., the effects of food waste on the environment, climate, and economy have worldwide and interconnected consequences (Stenmarck & Jensen, 2016).

But, in spite of its importance, there is no single accepted definition of food waste. In fact, there are many definitions of food loss and food waste, that vary in how they are produced, what they consist of, at which stage of the food supply chain they originate, and where or what are they generated by or discarded from.

A study by the Swedish Institute for Food and Biotechnology (SIK) on behalf of the FAO of the United Nations, *Global Food Losses and Food Waste*, distinguishes

between food losses and food waste (Stuart, 2009). Gustavsson states that food losses refer to the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption. Food losses take place at production, postharvest and processing stages in the food supply chain (Gustavsson et al, 2011). Food losses occurring at the end of the food chain (retail and final consumption) are rather called “food waste”, which relates to retailers’ and consumers’ behaviour (Lipinski et al., 2013).

According to Gjerris & Gaiani (2013, p. 9) *“food loss and waste together encompass the edible parts of plants and animals that are produced or harvested for human consumption but that are not ultimately consumed by people”*. FAO defines food wastage as any food lost by deterioration or waste. Food wastage occurs due to many different reasons and the term “food wastage” is thus often further divided into food losses and food waste, in order to specify food wastage on different stages of the FSC: *“Food wastage refers to any food lost by deterioration or waste (including composted, crops ploughed in/ not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea)”*. Thus the term ‘wastage’ encompasses both *food loss and food waste* (EU Fusion, 2016, p. 1).

In some reports about food waste, the terms ‘avoidable’, ‘partially avoidable’, and ‘unavoidable’ have been used. Avoidable food waste is food that was edible at some point prior to disposal. Partially avoidable food waste is waste generated because of different consumers. And finally, unavoidable food waste is food that is not edible and derives from preparation and consumption (Parfit et al, 2010). According to Gjerris & Gaiani food waste is caused by many factors. They pointed out socio-economic and demographic background of households (Gjerris & Gaiani, 2013, p. 9), but also Andrews (2010) adds behavioural patterns, consumption patterns, consumerism, food accessibility, cooking habits, food prices, availability of affordable food, and contemporary hectic lifestyles.

Causes of food loss and waste in low-income countries are mainly connected to financial, managerial and technical limitations in harvesting techniques, storage and cooling facilities in difficult climatic conditions, infrastructure, packaging and marketing systems. However, causes of food loss and waste in medium/high-income countries mainly relate to consumer behaviour as well as to the lack of coordination between different participants in the supply chain.

Although food losses occur throughout the supply chain, in developing countries most of this is prior to consumer purchase, mainly because of limited investments in efficient storage, transport and processing infrastructure. However, in industrialized countries the most is wasted by consumers, mainly due to food being relatively abundant and economically cheap (International Fund for Agricultural Development, 2015). Smil

(2004) also includes overnutrition in the definition of food waste. According to the author, “*overnutrition can be viewed as a gap between the energy value of consumed food per capita and the energy value of food needed per capita*” (Smil, 2004, p. 17). In the European Union, since 2008, food waste is defined by Directive 2008/98/EC where there is no specific definition of food waste, but just a broad description of “*categories of waste*” (European Parliament and of the Council, 2008).

According to Gustavsson (2011, p. 2), “*five system boundaries are distinguished throughout the food supply chains of vegetable and animal commodities*”. Food loss and waste were estimated for each of these segments of the FSC. Aspects that were considered are “*agricultural production, post-harvest handling and storage, processing, distribution and consumption*” (Gustavsson, 2011, p. 2).

Losses in agricultural production for vegetable commodities and products are due to mechanical damage or spillage during harvest operation and sorting of crops after harvest; for bovine, pork and poultry meat, losses at this stage refer to animal death during breeding; for fish, losses refer to discards during fishing; and for milk, losses refer to decreased milk production due to dairy cow sickness (mastitis). In post-harvest handling and storage for vegetable commodities and products losses happen due to spillage and degradation during handling, storage and transportation between farms and distribution; for bovine, pork and poultry meat, losses refer to death during transport to slaughter and condemnation at the slaughterhouse; fish losses refer to spillage and degradation during icing, packaging, storage and transportation after landing; and for milk, losses refer to spillage during industrial milk treatment (e.g. pasteurization) and milk processing to, for example, cheese and yoghurt. In the processing phase, losses for vegetable commodities and products include losses due to spillage and degradation during industrial or domestic processing, e.g. juice production, canning and bread baking, during washing, peeling, slicing and boiling or during process interruptions and accidental spillage; bovine, pork and poultry meat losses refer to trimming spillage during slaughtering and additional industrial processing; fish losses refer to industrial processing such as canning or smoking; and for milk, losses refer to spillage during industrial milk treatment (e.g. pasteurization) and milk processing. During the distribution phase, losses for vegetable and animal commodities and products happen in the market system, e.g. at wholesale markets, supermarkets, retailers and wet markets. The issue of deformed and misshapen grade fruits comes directly from the supermarkets that determine what the standards are going to be. Taste and nutritional quality of these products are very good, but because of their aesthetically deformed shape they end up as food waste. This stage is of big concern regarding fruits and vegetables: an estimated 20 to 40% of the UK fruit and vegetables are rejected even before they reach the shops - mostly because they do not match the supermarkets’ excessively strict cosmetic standards. The fish industry also

contributes to the annual amount of food waste because of cosmetic standards that the fish are held up to. Nearly 2.3 million tonnes of fish are discarded in the North Atlantic and the North Sea each year. Approximately 40 to 60% of all fish caught in Europe are discarded - either because they are the wrong size or species (Stuart, 2009).

In the consumption phase for vegetable and animal commodities and products, losses and waste happen during consumption at the household level. Total *per capita* production of edible parts of food for human consumption in Europe and North America is around 900 kg/year, from which 280-300 kg/year is lost during the food supply chain, and 95-115 kg/year is wasted during the consumption process. In sub-Saharan Africa and South/Southeast Asia total *per capita* production is 460 kg/year, from which 120-170 kg/year is lost during the food supply chain and 6-11 kg/year is wasted during the consumption process (Stuart, 2009). Authors state that food losses in industrialized countries are as high as in developing countries, but in developing countries more than 40% of the food losses occur at post-harvest and processing levels, while in the industrialized countries more than 40% of the food losses occur at retail and consumer levels. Food waste at consumer level in the industrialized countries (222 million tons) is almost as high as the total net food production in sub-Saharan Africa (230 million tons) (Stuart, 2009).

The analysis of data from across Europe estimates food waste in the EU-28 to be 88 million tonnes. This equates to 173 kilograms of food waste per person in the EU-28, which is obviously different in different parts of Europe (Stuart, 2009). Households generate 53% of the total food waste in Europe, the processing industry 19%, food services 12%, the primary production sector 11%, and the retail/wholesale sector 5%. The European hospitality industry is a small food waster compared to the other components of the food chain, as food services (a category that covers not only restaurants but also party catering, contract catering in hospitals, schools, public institutions, etc.) only generate 12% of the total food waste in Europe. With billions of tourist meals estimated to be currently served per year globally, it is clear that the tourism sector has a big responsibility towards safeguarding food supply and stock. Tourism can and must play an important role in raising awareness of the value of food. Tourism can promote changes in food management and consumption with very positive environmental and economic results.

A report by the Danish Environmental Protection Agency suggests that a typical Danish family, living in a detached house, throws out around 304 kg of food every year (of this 168 kg is food that is still edible, i.e. every Dane throws away 42 kg of still edible food every year). The Danish Environmental Protection Agency surveyed domestic waste from around 800 households in Denmark (Danish Environmental

Protection Agency, 2011). According to the authors, an average Finnish person annually purchases around 500 kg of food, somewhere between 30% and 45% of it is unnecessarily discarded. In Norway, consumers account for more than 70% of food waste (they produce 51 kg of food waste *per capita* per year). According to data collected by Gjerris & Gaiani (2013), an average household in Norway buys 952 kg of food every year, of which 200 kg is thrown away. A typical Swedish household, which includes four people, throws away 30 kg of edible food *per capita* per year, i.e. 10 – 20% of all purchased food. Denmark, Finland, Norway and Sweden are mentioned because Nordic countries are viewed as some of the global leaders in environmental responsibility, and also to show that the complex problem of food waste differs even among countries that are geographically and culturally close. All of these facts and statistics should be viewed as an eye-opener for the necessity of rethinking the relationship of humans and nature. For example, it is estimated that 24 to 35% of school lunches end up in the bin and an estimated 15 million tons of food is wasted from the plough to the plate. Bread and other cereal products thrown away in the UK households alone would be enough to prevent malnourishment of 30 million of the world's hungry people (Gjerris & Gaiani, 2013, p. 10).

According to the Agency for Environmental Protection, food lost and wasted in the Republic of Croatia amounts to 309 000 tons per year, which is around 70 kg/year *per capita*. Much of the food used to be wasted because the tax for food donations was 25%; however, it has been 0% since 2015 (Regionalni centar čistog okoliša, 2014).

Gustavsson et al. (2011) state that in industrialized countries food mainly gets lost when production exceeds demand. Losses can be minimized by cooperation among farmers, which could reduce risk of overproduction by allowing surplus crops from one farm to solve a shortage of crops on another. In developing countries and, sometimes, developed countries, food may be lost due to premature harvesting. Small, resource-poor farmers can be organized in groups to produce a variety of significant quantities of cash crops or animals. In this way, they can receive credit from agricultural financial institutions or advance payments from buyers. Food that is lost during the food supply chain can be divided into food not recoverable for human consumption and food recoverable for human consumption. Food that is not recoverable includes livestock condemned for slaughter because of disease; diseased or otherwise unsafe produce; spoiled perishable food including meat, dairy, and prepared items; plate waste from foodservice establishments; losses of edible portions associated with processing, such as skin and fat from meat and poultry, and peels from produce. Recoverable food includes edible crops remaining in farmers' fields after harvest; produce rejected because of market "*cosmetics*" such as blemishes, misshapen, etc.; unsold fresh produce from wholesalers and farmers' markets; surplus perishable food from restaurants, cafeterias, caterers, grocery stores, and other food



service establishments; packaged foods from grocery stores, including overstocked items, dented cans, and seasonal items. Food losses and wastage have an impact on food security for poor people, on food quality and safety, on economic development and on the environment. Taking food for granted and throwing it away just because we can afford to do so, is wrong (Gustavsson et al., 2011).

### 3. Ethics of food and food wastage

Pudel and Westenhofer (1988) have identified four areas of change that form at least part of the explanation for food waste. They stated that food is not seen as something valuable, but something obvious. They also sharply conclude that consumers no longer know what is the cultural background of the food they consume; lack of knowledge about the origin of food and loss of social and emotional linkage to food (Pudel and Westenhofer, 1988, as cited in Gjerris & Gaiani, p. 8).

Pearson et al. (2016) state that in a multicultural society it is natural to assume that there will be vastly differing ethical grounds and viewpoints regarding food-related behaviours of individuals. In addition to the differing ethical standpoints of individuals, there is the question of whether they, in spite of living in the Information Age, have access to information that enables them to make informed choices, on ethical issues among other things. Consideration of food supply leads to identification of some individuals as being more food secure than others, such as those who are more affluent. Food security is defined as *"when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life"* (UN, 1975, as cited in Faridi & Wadood, 2010, p. 99). Those of lower incomes are more likely to buy higher quantities of energy-dense foods that are high in fat and sugar, because they are more affordable and accessible. This is further demonstrated by Sustainable Organic Local Ethical (SOLE) products, in that the economically disadvantaged may not have practical access to the full array of choices afforded to more affluent consumers (Pearson et al., 2016). According to authors, this has led to the suggestion that ethical consumption of food may be an elite social practice.

The issue of food being wasted due to excessive consumption by individuals is growing, since for the first time in history, the abundance of food produced has brought society to a point where food has been devaluated and taken for granted in the majority of developed countries.

This overnutrition is evident in the prevalence of obesity around the world. In 2010, *"overweight and obesity already were estimated to cause 3.4 million deaths, 3.9% of years of life lost and 3.8% of disability adjusted life years (DALYs) globally"* (Ng et al., 2014, p.

2). It may be seen as a contrast between obesity and malnutrition – too much food as opposed to too little. Yet, obesity is both a problem of too much food and too much of the wrong food. The modern industrial food system has created some products that contribute to the enjoyment of life while making only limited contribution to human health. These are often processed convenience foods that have high levels of salt, sugar, and fat – also known by the colloquial term “junk food”. In rich countries, poverty often does not stop people from being hungry or thirsty, but it does prevent them from having a nutrient-rich diet. Obesity caused by overconsumption of food, and its associated prevalence of “junk food”, thus represents a waste of food.

Smil (2009) explicitly includes overnutrition – the gap between the energy value of consumed food *per capita* and the energy value of food needed *per capita* – in his definitions of food waste. In an era of increasing concern about environmental sustainability, this waste of productive agricultural land, clean water, agricultural chemicals, and non-renewable energy resources, particularly those that contribute to greenhouse gas emissions, are of particular concern.

Pearson et al. start from the point that “*reducing food waste does not automatically translate into fewer hungry people*” (Pearson, 2016, p. 403). For them, it might result in just the opposite if, for example, people are relying on this discarded waste for their survival (Pearson et al., 2016, p. 403). Authors state that putting food in the bin “*really is equivalent to taking it off the world market and out of the mouths of the starving since the food supply has become a global phenomenon*” (Pearson et al., 2016, p. 403). Are humans obligated, and if so, to what extent to change their consumption patterns in order to benefit others who are not as privileged as them? Remembering that the right to food is recognized as a fundamental human right, this would suggest that such obligation should exist. Instead of feeling guilty for wasting food, people should feel motivated by a sense of responsibility, knowing that by making minor changes in their everyday eating habits, they can help in improving lives of people who are hungry.

#### **4. Food waste, environmental degradation and footprints**

The effects of food waste on the environment, climate and economy have worldwide and interconnected consequences. Every time food is wasted, the water, energy, time, manpower, land, fertilizer, fuel, packaging and money put into growing, preparing, storing, transporting, or cooking the food are wasted.

The loss of biodiversity is a big concern because it removes a gene bank that could include currently unexploited opportunities. The emergence of coordinated maintenance of protected areas, such as National Parks and wildlife corridors, over

the last 100 years aims to maintain restricted areas of native habitat whilst allowing production of food to continue. Native ecosystems are lost on the land that is used to produce food that is wasted. The negative impact that the food system and food waste have on the natural environment is one area in which individuals are likely to make changes (Pearson et al., 2016). Desertification, eutrophication, pollution of air, land, and water, depletion of scarce resources, such as fresh water and phosphorous, and the negative impact on the climate are some of the consequences of modern agriculture. The link between food waste, environmental degradation and climate change is clearer than between food waste and hunger. However, reducing food waste itself will not solve the problems, if not observed as a part of a larger context, focusing on affluence and overconsumption of food and other natural resources. According to authors, producing food that will not be consumed leads to unnecessary CO<sub>2</sub> emissions in addition to the loss of economic value of the food produced. Wasted food is accountable for 3.3 GtCO<sub>2</sub>e; should it be a state, it would be the second runner-up on the global list of contaminators, right after China and the USA. If we include deforestation emissions, together with agriculture and production emissions, the food chain accounts for roughly 12.5 GtCO<sub>2</sub>e, or a quarter of total global man-made carbon emissions. Average carbon footprint of food wastage is about 500 kg of carbon dioxide (CO<sub>2</sub>) *per capita* per year. Europe, North America, Oceania and industrial Asia have the highest *per capita* carbon footprint of food wastage (approximately 700–900 kg of CO<sub>2</sub> equivalents *per capita* per year), while the Sub-Saharan Africa has the smallest footprint *per capita* (about 180 kg of CO<sub>2</sub> equivalents). If we planted trees on the land currently used to grow unnecessary surplus and wasted food, this would offset a theoretical maximum of 100% of greenhouse gas emissions from fossil fuel combustion.

The blue water footprint (i.e. the consumption of surface and groundwater resources) of food wastage is about 250 km<sup>3</sup>, which is equivalent to the annual water discharge of the Volga River or three times the volume of Lake Geneva. A total of 1.4 billion ha of land—28% of the world’s agricultural area—is used annually to produce food that is either lost or wasted. This is equivalent to areas of Canada and India put together, and dwarfed globally only by the size of Russia. The irrigation water used globally to grow food that is wasted would be enough for domestic needs (at 200 litres *per capita* per day) of 9 billion people – the number expected on the planet by 2050 (Stenmarck & Jensen, 2016).

The food not eaten is one of the several factors that contribute to the loss of biodiversity through habitat change, overexploitation, pollution and climate changes. Prompted in part by global food production inefficiency, 9.7 million hectares are deforested annually to grow food; this represents 74 percent of the total annual deforestation (Stenmarck & Jensen, 2016).

Reducing food waste requires individuals and organizations to behave in a way that is pleasing and which fulfils aspirations they strive to achieve, while simultaneously minimizing the harm done to individuals, animals, and the natural environment in general.

All Member States of the European Union will establish frameworks to collect and report levels of food wasted across all sectors in a way that is comparable, with the intention of developing national food wastage prevention plans, aimed at reaching the objective to reduce food wastage by at least 30% between 1 January 2017 and 31 December 2025. To enable the process, the Commission adopted those acts by 31 December 2017, in order to establish uniform conditions for monitoring the implementation of food waste prevention measures taken by Member States of the EU.

The problem is expected to grow worse as the world's population increases and the neo-liberal capitalism spreads like metastases around the world. But for all these reasons, we should strive to reduce the waste we do create. Could we be the change that we wish to see in this world?

## **5. Possible solutions**

The scale of global food wastage is shocking, and this wasted food results in a number of ethically questionable implications. As food insecurity, obesity, and climate change start to endanger life quality of individuals, food waste is becoming one of the major social, health, and environmental issues of our time. In recent years, there has been an increasing amount of objections as well as awareness about wasting food, which is a sign that major changes could be on the way. Reduction, prevention, and management of food waste are thus on the agenda in many countries and often linked to issues such as social justice, environment, climate change, and resource management. While increasing food production is needed to meet increases in demand, tensions between the production and access to food could be reduced by reducing food losses. Efficient solutions exist along the food chain for reducing amounts of food lost and wasted. The reduction of inequalities between developed and undeveloped countries might decrease one part of food wastage, because in low-income countries reduction of inequalities should lead to improving harvesting techniques, farmer education, better storage facilities and cooling chains that would strongly reduce losses in the first part of the food chain. In industrialized countries, on the other hand, consumer households need to be educated and should change their behaviour, which is currently the cause of such high levels of food waste.

Technological advances in food processing and food by-product development are used to reduce food loss. Many food parts that would have been discarded by food processors 10 years ago are nowadays used as industrial raw materials and food products. These products include livestock feeds, biodiesel (fuel made from vegetable oils and animal fats), adhesives and solvents derived from citrus oils, pharmaceutical products made from cow and goat milk, juice products and vinegar made from apple peels. Food recovery programs could help conserve landfill space, lower the costs and environmental impact of solid waste disposal, reduce hunger, provide tax savings for farmers, food manufacturers, retailers, foodservice operators, and individuals/organizations that donate food. However, knowledge about food waste and moralizing about ethical responsibility will probably not be enough to stop people from wasting food, as food waste is an integral part of affluent consumer societies and as such for many people part of their cultural behaviour, background and lifestyle. However, it is also necessary to underline those food choices, including even overconsumption with a pandemic of overweight and obesity as consequences, are much more than free choice on individual level, because they affect the human population on the planet and sustainable development of Earth. Consumption which exceeds individual human necessities is also a kind of food waste with the same impact as food waste. Food behaviours are influenced by both socio-economical and socio-cultural factors as much as religious conceptions; so, food is not only a physiological need, but without doubt a cultural need as well. Cultural behaviour and religious demands connected with different usage of certain food products or parts also lead to wasting of certain amount of food. In almost all religions there are permitted and prohibited foods. Prohibited food, mostly parts or types of animals, is wasted in practice. Religious food laws are important for a significant part of the world population (Jews, Christians and Muslims), which share many common principles. For example, kosher dietary laws are observed all year around, not just during ceremonies, even if there are additional dietary limitations and restrictions during some religious ceremonies. The kosher dietary laws determine which foods are “fit or proper” for Jews and deal predominantly with the three issues: allowed animals, the prohibition of blood, and the prohibition of mixing milk and meat. Additional laws cover other areas, such as grape products, cheese, baking, cooking, tithing, and foods that may not be eaten during the Jewish festival of Passover (Regenstein et al., 2003). Islam, through the Qur’an, defines permissible (halal) and impermissible (haram) food and prohibits the consumption of certain kinds of meat, most notably pork. Food that is not kosher or halal is not consumed and might be treated as waste. Kosher, Christian and halal food laws share common principles, such as prohibition of certain animals (for example, pigs), prohibition of blood, the role of fasting and animal welfare. As a change in the diet is the solution,

there is a key role for the food industry to comply and for religious leaders to radically reduce meat consumption and food waste of its followers (Tieman and Hassan, 2015). Apart from Jews, Christians and Muslims concept, there is also a Buddhist concept known as “mottainai”, which encourage people to be grateful for the resources they have, to be respectful of them and use them with care. It also calls for humans not to waste.

It is important to mention that not only does the regular consumption of fast and cheap food diminish health, but also most cheap and fast food contains plenty of harmful chemical additives, such as preservatives, flavouring agents, and pesticides. They have a negative effect on air quality and water quality, as pathogens, hormones, drugs, and the fertilizers they use tend to seep into surrounding groundwater, potentially causing outbreaks of waterborne illness, fish kills, and other hazards. Wasting land and water for cheap fast food production also contributes to food waste in total. Overconsumption of cheap food is also an ethical dilemma, just like food wasting.

In a new study in Applied Economics, Palma et al. (2017) seek to reveal consumer motivation behind willingness to pay for expensive foods versus valuation of food attributes. Study found evidence of food consumption being driven by prestige to the point of becoming a symbol of social status. Palma et al. (2017) pointed out that *“the prestige-seeking behaviour seems to be motivated by invidious comparison or higher-class individuals seeking to differentiate themselves from lower-class individuals and pecuniary emulation, or lower-class individuals buying prestigious goods in order to be perceived as members of a higher class”* (Palma et al., 2017, p. 238). These findings could be used as a strong argument for improving social justice in the society, with redistribution of wealth and no division between the classes, and also for minimising present social differences.

Food is also wasted through animal farm production. The scientists reached the conclusion that if all food crops were fed directly to humans instead of animals, around 70% more food would be added to the world’s supply, which would be enough to feed additional 4 billion people. That sudden surplus alone would be enough food to feed over half the humans on Earth, let alone the 925 million who face hunger every day (Chatam, 2014).

Different strategies are employed in an attempt to reduce food waste. Knowledge and information distribution as a tool for raising individual and public awareness may be considered as one of many different strategies aimed at reducing food waste. It is necessary to understand both the magnitude and complexity of the issue to begin a transformation towards a more appreciative food culture. However, knowledge transfer does not necessary lead to awareness and attitudes and behaviour change.

Identifying problems and suggesting solutions surely will not convince people to implement offered solutions. As Gjerris pointed out *“when changes involve changing cultural habits, humans seem very resilient to change – even when the problems are obvious and solutions visible”* (Gjerris & Gaiani, 2013, p. 18). Even more, Gjerris & Gaiani (2013) are right when they very clearly say that humans cannot be persuaded to act only out of fear for the consequences, out of interest in the economic gain, or in sacrificial obedience towards moral imperatives. Their idea that to move from ideal to action more is needed, is simple truth (Gjerris & Gaiani, 2013). In order to ensure that every person on the planet has enough food to eat, and ultimately protect our own survival, humans must look deep within themselves and choose the path that is the most compassionate, healthy, and sustainable (Andrew, 2009). Alternative strategy might be moralizing. Food waste is morally wrong. One approach for the reduction of food waste could be through appeals to the morality of people. Strong rejection of food waste as morally wrong can be used to unfold the understanding of complexity of the problem and deep connection between food and sustainable development of humans and Earth itself. Believing in the power of moral pressure and moral imperative, Stuart is promoting a new approach toward food redistribution that is economically sensible, ecologically pressing, and socially responsible (Stuart, 2009).

There is a need for the political change that will lead to the redistribution of global wealth in the world where food waste will be reduced, but not eliminated. The world needs progressive politics for a fairer world. A more equitable distribution of income may help accelerate growth and promote economic development. Distribution of wealth and income is the way in which the wealth and income of a nation are divided among its population, or the way in which the wealth and income of the world are divided among nations. An equitable distribution of wealth gives all citizens a fair opportunity to become successful (Agarwal, 2018). It is questionable, whether this could be made through “effective altruism” or voluntary red distribution as it was proposed by Singer (2013). Some, like Paul Tudor Jones II, predict that the gap between the wealthiest and the poorest will narrow because history always does it. It typically happens in one of the three ways– either through revolution, higher taxes or wars. Unfortunately, radical political change through wars or revolutions did not bring a fair redistribution from the rich to the poor in the past, but in the long term, it occurs just from the rich to a different selected few. We need a radical revolution from the anthropocentric to the ecocentric paradigm which promotes the inherent worth of living beings regardless of their instrumental utility to human needs, plus a radical restructuring of modern human societies in accordance with such ideas (Naess, 1973).

## 6. Conclusion

Food is the most vital and existential human connection to the planet. It has been sacred to all cultures up to now, and it has lost this sacred status due to overproduction and overconsumption promoted in various forms of capitalistic consumerism. As a result, most people no longer value food as they once did. The production and consumption of food constitute some of the largest environmental threats to our planet. Preventing food waste should be top-priority; not only will it save your property money, but it will also save valuable resources from being wasted, such as water needed to produce crops, energy for the growth and transport of food, and natural habitat that is converted for agriculture. A radical political change is necessary to save the planet. We need revolution in our mind, attitude and behaviour that will lead to the redistribution of global wealth in the world. In the meantime, it is necessary to prevent food waste from occurring in various forms of industries. We should donate and reuse the waste that cannot be prevented but is safe for people to eat, and divert the rest away from landfills. Shifting consumption patterns represent our biggest opportunities to establish sustainable and regenerative food systems.

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## 7. References

1. Agarwal Prateek. "Equitable Distribution of Income", Intelligent Economist, 2018. (Retrieved from: <https://www.intelligenteconomist.com/equitable-distribution-of-income/>)
2. Andrews Ryan. "All about Food Waste", Precision Nutrition, 2010. doi:10.1371/journal.pone.0007940. (Retrieved from: <https://www.precisionnutrition.com/all-about-gluttony-1>)
3. Chatham Michael. "Could Veganism End World Hunger?" Gentle World, 2014. (Retrieved from: <http://gentleworld.org/could-veganism-end-world-hunger/>)
4. European Parliament and of the Council, "Directive 2008/56/EC of the European Parliament and of the Council. Bruxelles", Official Journal of the European Union, 2008. (Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008L0056>)
5. General Assembly of the United Nations. "Universal Declaration of Human Rights. General Assembly Resolution 217A", Paris, 1948. (Retrieved from: <http://www.un.org/en/universal-declaration-human-rights/>)
6. Gjerris Mickey & Gaiani Silvia. "Household Food Waste in Nordic Countries: Estimations and Ethical Implications." *Etikk i Praksis - Nordic Journal of Applied Ethics* 2013, 7,1: 6–23. doi:10.5324/eip.v7i1.1786. (Retrieved from: <https://pdfs.semanticscholar.org/a609/4ba9184cc1257ab2ed8db755ec6775717302.pdf>)



7. Gustavsson Jenny, Cederberg Christel & Sonesson Ulf. "Global Food Losses and Food Waste: Extent, Causes and Prevention", International Congress FAO, 2011. doi:10.1098/rstb.2010.0126. (Retrieved from: <http://www.fao.org/docrep/014/mb060e/mb060e00.pdf>)
8. EU FUSION. "Food waste definition", EU FUSIONS, 2016, p.1. (Retrieved from: <https://www.eu-fusions.org/index.php/about-food-waste/280-food-waste-definition>)
9. FAO. "Estimates of European food waste levels" Family Farming Knowledge Platform, 2016, p. 1 (Retrieved from:<http://www.fao.org/family-farming/detail/en/c/412647/>)
10. FAO. "The state of food insecurity in the world: meeting the 2015 international hunger targets: taking stock of uneven progress". Food and Agriculture Organization of the United Nations, Rome, 2015. (Retrieved from: <http://www.fao.org/3/a-i4646e.pdf>)
11. Faridi Rushad & Wadood Syed Naimul. "An econometric assessment of household food security in Bangladesh." *The Bangladesh Development Studies*, 2010, 33,3;97-111, p. 99.
12. Lipinski Brian, Hanson Craig, Waite, Richard, Searchinger Tim, Lomax James & Kitinoja Lisa. "Reducing Food Loss and Waste." *Creating a Sustainable Food Future*, 2013. doi:10.2499/9780896295827\_03. (Retrieved from: <http://www.wri.org/publication/reducing-food-loss-and-waste>)
13. Naess Arne. "The Shallow and the Deep, Long-range Ecology Movement. A Summary." *Inquiry* 1973,16,1-4:95-100. doi:10.1080/00201747308601682. (Retrieved from: <http://dhaydock.org/2015-2016/Philo1516/Second%20Semester/Environmental%20ethics/naess-arne-the-shallow-and-the-deep-long-range-ecology-movement.pdf>)
14. Ng Marie, Fleming Tom, Robinson Margaret, Blake Thomson, Graetz Nicholas, Margono Christopher, Mullany Erin C, et al. "Global, Regional, and National Prevalence of Overweight and Obesity in Children and Adults during 1980-2013: A Systematic Analysis for the Global Burden of Disease Study 2013. , " *The Lancet*, 2014, 384,9945 : 766-81. p. 767. doi:10.1016/S0140-6736(14)60460-8. (Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4624264/>)
15. Palma, Marco A., Meghan L. Ness, David P. Anderson. "Fashionable Food: A Latent Class Analysis of Social Status in Food Purchases." *Applied Economics*, 2017,49,3:238-50. p.238. doi:10.1080/0036846.2016.1194965. (Retrieved from: <https://www.tandfonline.com/doi/full/10.1080/00036846.2016.1194965>)
16. Parfitt Julian, Barthel Mark, Macnaughton Sarah. "Food Waste within Food Supply Chains: Quantification and Potential for Change to 2050." *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 2017, 365, 1554: 3065-81. doi:10.1098/rstb.2010.0126. (Retrieved from: <http://rstb.royalsocietypublishing.org/content/365/1554/3065.short>)
17. Pearson David, et al. "Ethics of Food Waste." In *The Routledge Handbook of Food Ethics*, edited by Mary Rawlinson and Caleb Ward. New York: Routledge, 2016. p. 403.
18. Regenstein; Joe M., Chaudry, Muhammad M. & Regenstein, Carrie E. "The Kosher and Halal Food Laws." *Comprehensive Reviews in Food Science and Food Safety*, 2003,2,3:111-27. doi:10.1111/j.1541-4337.2003.tb00018.x. (Retrieved from: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1541-4337.2003.tb00018.x>)
19. Regionalni centar Čistog okoliša, "Predavanje Ravnatelj Agencije Za Zaštitu Okoliša u Povodu Svjetskog Dana Hrane - Regionalni Centar Čistog Okoliša." Regionalni Centar Čistog Okoliša, 2014. (Retrieved from: <http://rcco.hr/predavanje-ravnatelj-agencije-za-zastitu-okolisa-u-povodu-svjetskog-dana-hrane/>)
20. Singer Peter. *The Why and How of Effective Altruism* | TED Talk. TED, 2013. (Retrieved from: [https://www.ted.com/talks/peter\\_singer\\_the\\_why\\_and\\_how\\_of\\_effective\\_altruism](https://www.ted.com/talks/peter_singer_the_why_and_how_of_effective_altruism))

21. Smil Vaclav. "Improving Efficiency and Reducing Waste in Our Food System." *Environmental Sciences* 2004,1,1 17–26. p.17 doi:10.1076/evms.1.1.17.23766. (Retrieved from: <https://www.tandfonline.com/doi/pdf/10.1076/evms.1.1.17.23766>)
22. Stenmarck Asa & Jensen Carl. *Estimated of European Food Waste Levels*. IVL Swedish Environmental Research Institute, 2016. (Retrieved from: [www.eu-fusions.org](http://www.eu-fusions.org).)
23. Stuart Tristram. "Waste : Uncovering the Global Food Scandal" *Alternative Management* Observatory, Penguin Books, Londres, 2009. doi:10.1080/19397030903573317. (Retrieved from: [http://appli6.hec.fr/amo/Public/Files/Docs/298\\_fr.pdf](http://appli6.hec.fr/amo/Public/Files/Docs/298_fr.pdf))
24. Tieman Marco & Faridah Hassan. "Convergence of Food Systems: Kosher, Christian and Halal." *British Food Journal* 2015,117, 9:2313–27. p. 2313. doi:10.1108/BFJ-02-2015-0058.

# Ekonomski, okolišni i etički utjecaj rasipanja hrane u uslužnim djelatnostima i drugim globalnim industrijama

## SAŽETAK

Globalna proizvodnja hrane može se podijeliti na proizvodne gubitke, gubitke vezane uz potrošače i na konzumaciju hrane. U svijetu u kojemu je 850 milijuna ljudi pothranjeno, globalno se po osobi proizvede oko 580 kg hrane: 380 kg se konzumira, 140 kg se izgubi u proizvodnji, a 50 kg završi kao otpad potrošača. Kućanstva proizvode 53 % ukupnog otpada od hrane u Europi, prerađivačka industrija 19 %, prehrambene usluge 12 %, primarni proizvodni sektor 11 %, a sektor maloprodaje/veleprodaje 5 %. Europska ugostiteljska industrija mali je rasipnik hrane koji proizvodi samo 12 % ukupnog otpada od hrane u Europi. Otpad od hrane uzrokuje 3,3 GtCO<sub>2</sub>e. Prosječni ugljični otisak povezan s rasipanjem hrane iznosi oko 500 kg ekvivalenta CO<sub>2</sub> po osobi godišnje. Plavi vodeni otisak povezan s rasipanjem hrane iznosi oko 250 km<sup>3</sup>. Čak 1,4 milijardi hektara zemlje – 28 % obradive površine svijeta – godišnje se upotrebljava za proizvodnju hrane koja se izgubi ili baci. Hrana koja se ne konzumira pridonosi smanjenju biološke raznolikosti kao posljedica promjena staništa, prekomjerne eksploatacije, zagađenja i klimatskih promjena. Djelomično zahvaljujući neučinkovitosti globalne proizvodnje hrane godišnje se raskrči 9,7 milijuna hektara šume radi proizvodnje hrane – 74 % ukupne godišnje deforestacije. Rasipanje hrane na globalnoj je razini šokantno, a to rasipanje hrane rezultira nizom etički upitnih implikacija. Papa Franjo s pravom ističe da je s moralnog gledišta bacanje i rasipanje hrane kao da krademo od onih koji su siromašni i gladni. S ekološkog gledišta, to je isto kao da krademo od vlastite djece. Ali moraliziranje, identificiranje problema, raspodjela znanja i informacija te predlaganje rješenja zasigurno neće uvjeriti ljude da primjenjuju ponuđena rješenja. Svijetu je potrebna progresivna politika za pravedniji svijet kako bi se postigla pravednija raspodjela bogatstva. Turizam i čitava ugostiteljska industrija mogu i moraju imati važnu ulogu u podizanju svijesti o vrijednosti hrane. Cijeli turistički sektor može promicati promjene u upravljanju i potrošnji hrane s vrlo pozitivnim ekološkim i gospodarskim rezultatima.

**Cljučne riječi:** gubitak hrane, bacanje hrane, održivi razvoj, ekološki otisak, uslužna djelatnost, globalne industrije.