

Food Wasting on Consumption Level: Analysis of the Situation in Latvia Compared to Global Tendencies

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Abstract – Reducing food waste at all stages of the food value chain holds out considerable social, environmental and economic potential. With the global population estimated to reach 9.5 billion by 2075, mankind needs to ensure it has the food resources available to feed all these people. With current practices wasting up to 50 % of all food produced, it is important to promote sustainable ways to reduce waste. But to do so, it is important to understand the current situation regarding the food waste amounts. The aim of this article is to compare the situation regarding food waste in Latvia and food waste in foreign countries, as well as to identify factors that influence food wasting behaviour. The results are based on the research of theoretical guidelines, foreign research results and on the pilot research conducted in Latvia by the authors of the article in 2013, in which 610 respondents participated. The results of the pilot research show that the situation in Latvia is very similar to the situation globally.

Keywords – Behaviour, eating habits, environment, impact.

I. INTRODUCTION

While around 1.4 billion people are sick from the consequences of food excess, like obesity and chronic diseases, there are also 850 million people that suffer the hunger of insufficiency. At the same time, the production, distribution and delivery of that food are destroying the environment upon which future food production depends [9]. But having produced this food at considerable environmental cost, much of it ends up uneaten. An estimated 30 % – 50% of all food produced is spoiled or wasted – representing a waste of land, water and other inputs, the generation of “unnecessary” emissions, and contributing to food insecurity [14]. According to EUROSTAT data, 42 % of the produced food is wasted at the household level [17], meaning that the produced food gets most wasted directly at the consumption level, but at this level it is harder to identify factors that influence such behaviour, it is also harder to change it, because there are not a lot of instruments that can motivate people to waste less.

Wasted food is defined as food that is discarded not fully consumed [8]; it is closely related to attitudes and behaviour. Food gets “lost” if it is affected by structural causes such as weak infrastructure, technological obsolescence, lack of refrigeration, etc. [11]. If the food loss problem in poor countries could be solved by investing money in infrastructure, processing and storage technologies and facilities, that is, mostly by investments, then in rich countries to solve the food wasting problem, it is necessary to change people’s attitude towards food and their habits.

The food waste concept, however, is not so strictly defined and it varies from research to research. The classification itself can be specific to a particular region or culture, and can be affected by the eating habits of the researchers. Thus, the classification not only includes the stage of food that gets discarded, but also it can include the interpretation of what is considered “avoidable” and “unavoidable food waste”. While, for example, Langley *et al.* [15] consider all preparation by-products and residues of food preparation inedible and therefore unavoidable, researchers that cooperate with Waste and Resources Action Programme use an additional subcategory of possibly avoidable food. Possibly avoidable food is considered edible and defined as the food and drink that some people eat and others do not (e. g. bread crusts), or that can be eaten when food is prepared in one way but not in another (e. g. potato skins) [13].

II. METHODOLOGY OF RESEARCH

Primary sources for the theoretical discussion and the base for shaping the pilot research survey are scientific papers, monographs, fundamental documents, studies that are closely related to the subject and could be found in the scientific databases and as free sources on the Internet. The sources were selected by the search terms and by the provided references that were found in the studies. The analysis of the food waste situation on a global scale was based on the results of foreign research of the problem, but the situation in Latvia was researched by conducting the pilot research, because there is not much information available regarding food waste amounts and factors that cause such behaviour in Latvia.

The pilot research was conducted by the author from May till September 2013. A survey was posted on the Internet, and had 48 questions in Latvian regarding food wasting and possible factors that can influence such behaviour. 610 respondents took part in the survey: 345 women and 265 men. The main candidate selection factor was age. All participants had to be at least 18 years old.

Age distribution:

- 18 – 29: 135 respondents or 22 %;
- 30 – 49: 243 respondents or 40 %;
- 50 – 69: 196 respondents or 32 %;
- 70 and more: 36 respondents or 6 %.

The global tendencies were researched by using the research materials of EUROSTAT and international non-governmental and governmental organizations, as well as the results of individual researchers.

III. RESULTS

The research of food waste problem is not unified, it also is not the most researched one; the research is not done annually, and not in all countries. Different countries also have a different approach in dealing with it.

A. Food Waste in EU

In Europe latest big scale research was conducted in 2006, the research information was published in 2010, and one smaller research was conducted in 2010, and was published in 2013.

According to EUROSTAT data, in 2006 in Europe, totally 89 million tons of food got wasted. This translates into roughly 179 kg of food waste per capita in four sectors (manufacturing, wholesale/retail, food service/catering, and consumer). Of this amount, about 76 kg/capita, was produced by households (Preparatory study 2010). But in the research “Global Food Losses and Food Waste”, which was carried out from August 2010 to January 2011 by the Swedish Institute for Food and Biotechnology (SIK) on request from the Food and Agriculture Organization of the United Nations (FAO), data already show that in Europe the overall per capita loss/waste had increased and was 280 kg/year – 300 kg/year [11]. According to EUROSTAT data, 42 % of produced food was wasted at the household level, 14 % – catering facilities, 39 % – food producers, and traders – 5 % [17].

According to a recent study (2013), the highest food waste generators, expressed as kg per capita, were the Netherlands (541 kg), Belgium (345 kg), Cyprus (327 kg) and Estonia (265 kg); the lowest are Slovenia (72 kg), Malta and Romania (both 76 kg) followed by Greece (80 kg) and the Czech Republic (81 kg). Overall, the EU – 15 countries tended to waste more food per capita than the EU – 12 countries [21].

It can be seen in Table I that in comparison with EU average food waste at household level compared to waste at

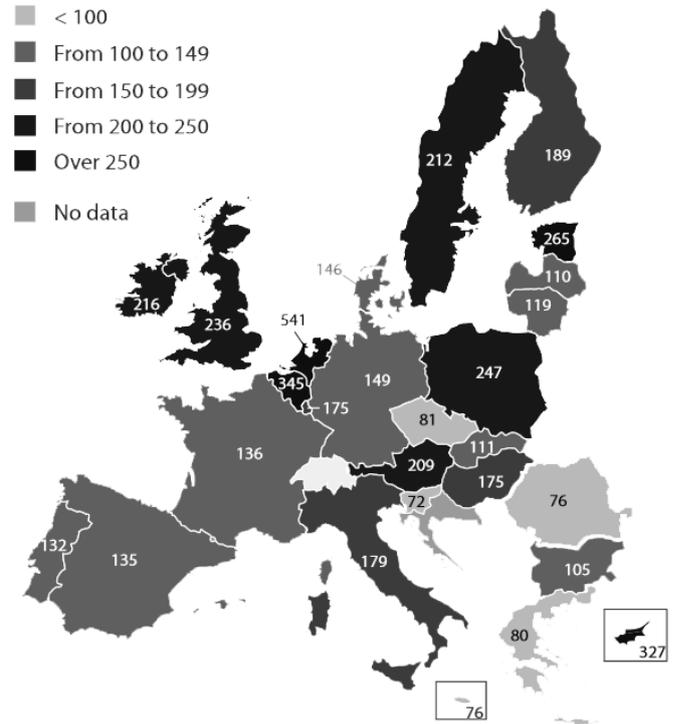


Fig.1. Estimated total food waste in the EU, 2010 (kg per capita) [21].

other stages and also compared to some other countries people in Latvia waste less amount of food products. However, compared to other Baltic countries at the household level consumers in Latvia waste more in the percentage ratio, 31 % of all wasted food, that is 79000 tonnes a year, or around 35 kg per capita.

Food waste reduction policy in Europe mainly focuses on waste recycling not prevention or at least food donation.

TABLE I
ESTIMATED TOTAL FOOD WASTE GENERATION IN SELECTED EU MEMBER STATES [21]

Member state	Household food waste		Manufacturing + Household + Retail / wholesale + Food Service / catering food waste	
	kilo tons	%	kilo tons	kg per capita
Cyprus	48	19	251	327
Netherlands	1838	21	8841	541
Estonia	82	23	356	265
Belgium	935	26	3627	345
Lithuania	111	27	404	119
Latvia	79	31	253	110
EU-27	37702	42	89154	179
Romania	697	43	1635	76
Slovenia	72	50	144	72
Malta	22	71	31	76
France	6323	74	8591	136
Luxembourg	63	77	82	175

TABLE II

MATERIALS GENERATED IN THE US MUNICIPAL WASTE STREAM IN 2012 AND THE PERCENTAGE OF IT RECOVERED, PERCENTAGE OF TOTAL GENERATION (MADE BY THE AUTHOR BASED ON US ENVIRONMENTAL PROTECTION AGENCY [22])

Materials	Materials generated in the municipal waste stream in 2012, percentage of total generation	Recovery of municipal solid waste in 2012, percentage total generation
Paper and Paperboard	27.4	64.6
Glass	4.6	27.7
Food Waste	14.5	4.8
Wood	6.3	15.2
Metals	8.9	34.0
Plastics	12.7	8.8
Yard Trimmings	13.5	57.7
Other	12.1	16.1

Many researchers and members of non-governmental organizations argue that serious effort against fighting food waste in Europe is not made. In 2014 it was expected the European Parliament would publish a communication called "Building a Sustainable European Food System". But instead the European Commission Secretariat-General, once again blocked this piece of policy. People expected to see a clear proposal on how to change the (often unsustainable) ways food in the European Union was produced, identifying why people were wasting so much of everything produced (at least 30% or 1.6 billion tonnes every year), to set a target to change people's attitudes towards food. The food waste matter was also taken away from Directorate-General for the Environment and given to Directorate General for Health and Consumer Affairs in a way suggesting that food wasting problem is not a serious environmental problem [21]. In September 2014 the 11.11.11 – the coalition of non-governmental organizations, unions, movements and solidarity groups in Belgium – that all together combines the efforts of 70 organizations and 340 committees of volunteers, for the purpose of achieving a goal of a fairer world with no poverty, has launched the campaign on food waste called "Sorry is not enough". The aim of the campaign is to call on the general public to put pressure on policy makers to act strongly against food waste. The members of 11.11.11 believe that the act of the European Commission blocking its very own action plan to address food waste and to promote a sustainable food policy is shameful and needs wider publicity [6].

B. Food Waste in the USA

Another industrialized country that tries to deal with food wastage problem is the United States of America.

The situation in the USA is very similar to the one in the EU. As it is seen in Table II, Americans tossed out more than 36 million tonnes of food in 2012, but less than 5 % got recycled, according to the US environmental protection agency [22]. Though, the situation regarding food waste recycling improved in 2010 when only 3 % of the food waste got recycled and the amount that needed to be recycled only at household level also was less than 1 million tonnes. In the end much of the wasted food ended up rotting in landfills,

releasing methane that was a potent greenhouse gas that potentially was at fault of climate change.

C. Food Waste in Japan

One of the countries that is thinking seriously about the grave influence of food wastage is Japan. In 2010, Japan discarded approximately 18 million tonnes of food annually (23 million tonnes in 2009), five to eight million tonnes of that food was considered edible when it was discarded. This amount was virtually equivalent to the amount of the country's annual rice production (8.39 million tonnes). Three to four million tonnes came from the food industry and another two to four million from individual households; this is comparable to the total amount of food aid distributed worldwide (about four million tonnes) [16]. Other developed countries waste food, too, but in Japan the problem is particularly paradoxical, because Japan's self-sufficiency rate was only 39 % in 2013 (and 40 % in 2009), meaning that lots of food supply is imported, and yet a third of that food ends up in the garbage [7].

D. Factors that Influence Food Wastage

Eating habits, economical factors, the other factors (like: place of habitat, household structure) are the main factors that influence the formation of food wasting behaviour. Eating habits, economical factors were already truthfully researched in other publications, that is why in this publication there will be given only basic findings. And also research will focus on the so called "other" factors.

Eating habits determine not only the food we eat, but refer to why and how people eat, what food they eat, and with whom they eat it, as well as the ways people obtain, store, use, and discard food [20]. Eating habits form at micro, meso and macro level, and at each level there are different influencing components. On micro level, according to Symbolic Interaction Theory, eating habits' forming affect ones mentality, family and friends [10], [18]. Like the pilot research data show that a person can consider a good/acceptable practice to cook more than that person can eat and then discard the leftovers, or a person might be too picky when it comes to food, and it can be encouraged by family or close friends, so the food that is not too good for one's taste is easily discarded.

The forming of eating habits at meso level are viewed from the developmentalism theory perspective. Simmel thought that all people needed excuses to justify their eating habits, and the role of the justification can play the culture [10]. For example, meat eating and the cruelty that comes to the animals that are slathered are justified by the natural order of thing and how humans are superior to animals, so eating meat is considered natural, healthy habit and acceptable practice, therefore a cultural element and an ethical practice, though there are some people that doesn't act the same way and in some cultures are considered outcasts, but they also try to find justification of their action in science research results and trying to find people who hold the same views.

Taste and behaviour change over time, and the base of those changes is the development of the previous societies [19]. At this level the main affecting forces are individual style of living, culture, traditions [12], [2]. Like people, who call themselves "Freegans" are the ones that choose to reclaim and eat food that has been already discarded.

The forming of eating habits at macro level is viewed from the social conflict theory perspective. From the social conflict theory point of view each individual in the society learns its values, norms, rules and laws, but all these culture formations do not have a united force, because each social group (ethical, religious, political etc.) tends to want to affect other group, therefore they defend their interests and try to make the features of their social group's culture elements to be the part of the dominant culture elements [1]. That can also work as a consolidating factor for the society. For example, Media have a great deal of influence on the masses; such thing as asking for leftovers after a meal at a restaurant is a wasteful eating habit that can both be manipulated by the media and big corporations, some of which are often the sponsors of certain "information".

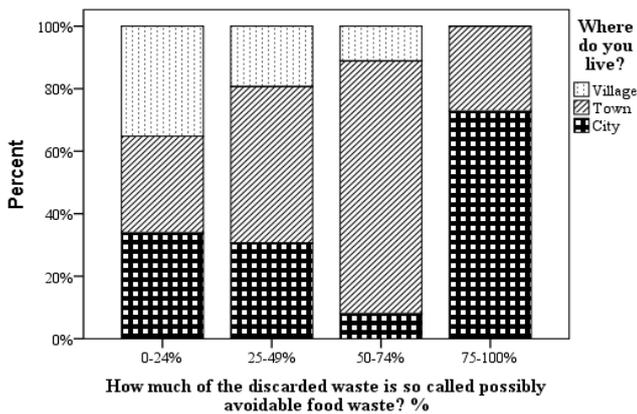


Fig. 2. Correlation between the place of residence and the amount of avoidable food waste (made by the author based on the results of the pilot research).

The economic factors are such as unawareness of amount of wasted food, the way of storing, packaging, people's environmental concerns, financial benefits that come with food wasting reducing, proper meal planning, understanding the labelling, shopping routine. The pilot research shows that in order for Latvian people to understand the seriousness of the food waste problem in the world, people must be more

often informed about food wasting problems and consequences; not only on a global scale, but also on a personal level – how people's actions affect them financially, because the financial factor is the most effective lever that can make people waste food less.

Other factors are: the place of habitat, household structure and largeness, lack of information regarding food waste impact on environment.

The place of residence affects the amount of food waste. People living in villages who live closer to the food production places, see how the food they buy is raised/grown and may have their own allotments, waste much less. And, in contrast to the villagers, people in the big cities waste the most. That could be explained by the easy accessibility of the food products and by the fact that people do not raise/grow their own food, so they do not appreciate the work and also do not really comprehend the greatness of the negative impact on the environment food production and also food wasting really has.

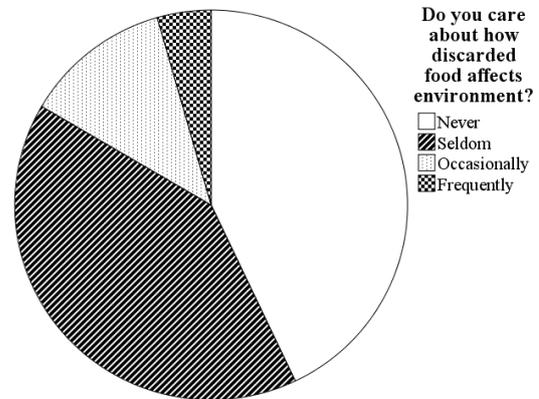


Fig. 3. Care about food waste possible negative affection on the environment (made by the author based on results of the pilot research).

In general people in Latvia seldom or never care about how their wasted food affect the environment they live in. That also explains the attitude to food wasting in general, namely why people easily waste unwanted food. This attitude can also be explained by the lack of active motivating campaign from the mass media, and also by the fact that the environmental situation in Latvia is more than satisfactory, so people cannot link negative impact on environment and food wasting at their households.

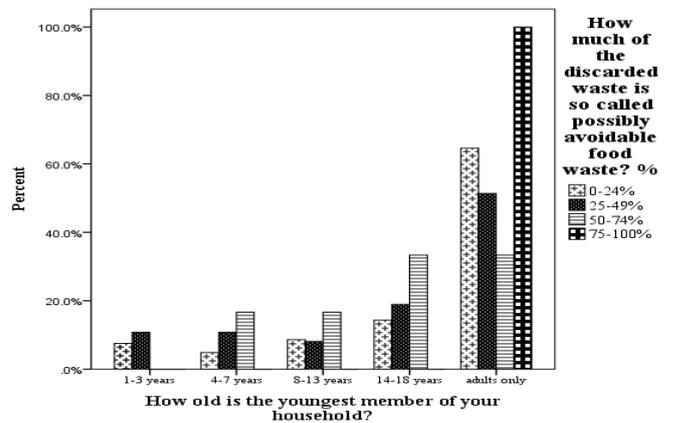


Fig. 4. Household structure and food wasting amount (made by the author based on results of the pilot research conducted by the author).

There are two studies on consumers' behaviour – in the UK and also in Australia that show that households with children waste more food than households without children [3], [4]. But in the case of Latvia, the pilot research data show that “adults only” household waste way more. That can possibly be explained by the fact that in Latvia people more truthfully plan meals when they have children, therefore less food gets wasted.

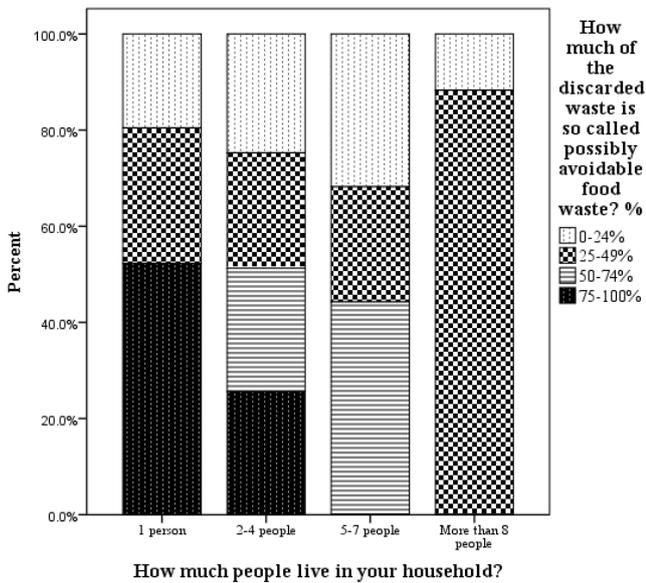


Fig. 5. The correlation of household largeness with the amount of food waste (made by the author based on the results of the pilot research conducted by the author).

The research conducted in the UK in 20102 showed that single-person households generate the most waste [5]. That can be explained by the producers/retailers policy to sell cheaper food products in larger quantities. Single people who are not able to eat everything before it spoils and often do not have proper facilities to store their food. Single people also tend to cook less for themselves and tend to make impulsive buys more often.

E. Fighting Food Wastage

Throwing food away means energy, water and land having been consumed to no avail. And in addition to the waste of resources, there are also the consequences of having to manage large quantity of waste, part of which could have been avoided.

Though the most preferable method to fight food wasting could include changing eating habits, changing policy of producers/retailers, as well as changing agricultural policy, and also promoting food sharing at all levels of consumption chain.

In most of industrial countries, including Latvia, the fight with food wasting concentrates on waste management.

In Latvia people mostly start thinking about reducing food waste at household level, when they realize how much food waste really costs them.

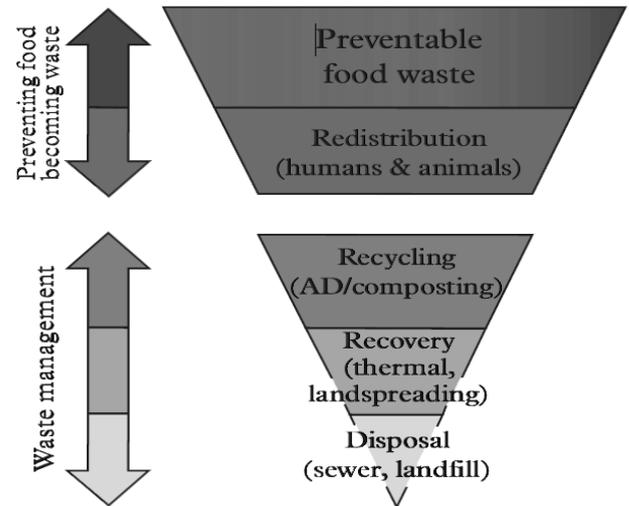


Fig. 6. The food use hierarchy [6].

And also when people see/have understanding of how much work it takes to raise/grow food products it motivates them to waste food less and to think about how to integrate leftovers into other meals.

IV. CONCLUSION

Consumers in Latvia have similar food wasting tendencies to the ones observed by foreign researchers.

Thoughtless food discarding is caused by different factors, including individual, social, cultural, economic, religious, ecological, and political.

In general, the amount of wasted food in Latvia is not as great as it is in other developed countries, but the tendencies are not positive. Food waste influencing factors are also very similar to the factors that affect food wastage on a global scale.

The results show that the most effective way to motivate people to waste less is not only to show them why they waste certain food and what can be done to reduce food waste, but also to show how much food waste really costs them.

Eating habits form at micro, meso and macro levels, and at each level there are main affecting forces, like family and friends at micro level.

Unawareness, storing, packaging of food, environmental concern, financial benefits, planning and labelling – all these non-price factors can have both – positive and negative effect on food wasting.

Other factors such as the place of habitat, household structure and largeness, lack of information regarding food waste impact on environment also have a strong impact on food wasting.

In order for Latvian people to understand the seriousness of the food waste problem in the world, they must be more informed about food waste problems and consequences not only on a global scale, but also on personal level – how people's actions affect them financially, because the financial factor is the most effective lever that can make people waste food less.

REFERENCES

- [1] Ballantine, J. and Roberts, K., *Our social world: Introduction to Sociology*, Pine forge press. 2nd ed., 2009, p. 680.
- [2] Beardsworth, A. and Keil, T., *Sociology on the menu: an invitation to the study of food and society*, Routledge, London, UK, 1997, p. 277.
- [3] Bond, M., Meacham, T., Bhunnoo, R., and Benton, T. G., "Food waste within global food systems," A Global Food Security report. 2013. [Online]. [Accessed: Oct. 16, 2014], Available: <http://www.foodsecurity.ac.uk/assets/pdfs/food-waste-report.pdf>
- [4] David, B., Josh, F., and Richard, D., "What a waste. An analysis of household expenditure on food," Policy Brief No. 6. 2009. The Australia Institute. [Online]. [Accessed: Oct. 16, 2014], Available: <http://www.tai.org.au/node/1580>
- [5] DEFRA (Department for Environment, Food & Rural Affairs) "Food Statistics" Pocketbook 2012. [Online]. [Accessed: Oct. 16, 2014], Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/183302/foodpocketbook-2012edition-09apr2013.pdf
- [6] EU Committee, "Counting the Cost of Food Waste: EU Food Waste Prevention," *House of Lords*, UK. 2014, p. 78.
- [7] "Focus less on food self-sufficiency," *The Japan Times*, 2014. [Online]. [Accessed: Oct. 13, 2014], Available: http://www.japantimes.co.jp/opinion/2014/08/20/editorials/focus-less-food-self-sufficiency/#.VCMZmRY0_CZ
- [8] "Food waste," *Princeton University Dictionary*, 2006. [Online]. [Accessed: Sep. 18, 2014], Available: <http://dictionary.reference.com/browse/food+waste>.
- [9] Garnett, T., "The food sustainability challenge," 2013. [Online]. [Accessed: Sep. 14, 2014], Available: http://www.sbs.ox.ac.uk/sites/default/files/Skoll_Centre/Docs/essay-garnett.pdf
- [10] Gronow, J., *The Sociology of Taste*, Routledge, UK. 1997, p. 199.
- [11] Gustavsson, J., Cederberg, C., Otterdijk, R., and Meybeck, A., "Global food losses and food waste," *Study conducted for the International Congress*. FAO: Food and Agriculture Organization of the United Nations. Rome, Italy. 2011, p. 38.
- [12] Hall, K. D., Guo, J., Dore, M., and Chow, C. C., "The Progressive Increase of Food Waste in America and Its Environmental Impact," 2009. [Online]. [Accessed: Oct. 16, 2014], Available: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0007940>
- [13] "Household Food and Drink Waste in the UK Waste and Resources Action Programme," UK: WRAP, Banbury. 2009, p. 95.
- [14] IMECHE, "Global food: Waste not, want not. Institute of Mechanical Engineers," London, UK. 2013. [Online]. [Accessed: Sep. 14, 2014], Available: http://www.imeche.org/docs/default-source/reports/Global_Food_Report.pdf
- [15] Langley, J., Yoxall, A., Heppell, G., Rodriguez, E. M., Bradbury, S., Lewis, R., Luxmoore, J., Hodzic, A., Rowson, J., "Food for thought? A UK pilot study testing a methodology for compositional domestic food waste analysis," *Waste Management & Research*. 2010, vol. 28, no. 3, pp. 220–227. <http://dx.doi.org/10.1177/0734242X08095348>
- [16] Marra, F., "Food Waste in Japan: How Eco-towns and Recycling Loops are Encouraging Self-Sufficiency," 2013. [Online]. [Accessed: Oct. 23, 2014], Available: <http://foodtank.com/news/2013/11/food-waste-in-japan-how-eco-towns-and-recycling-loops-are-encouraging-self>
- [17] "Preparatory study on food waste across EU 27," Technical Report – 2010 – 054. *European Commission (DG ENV) Executive Summar*. Bio Intelligence Service. 2010. [Online]. [Accessed: Sep. 24, 2014], Available: http://ec.europa.eu/environment/eussd/pdf/bio_foodwaste_report.pdf.
- [18] Randall, S., "Television Representations of Food: a case study of Rick Stein's "Taste of the Sea"", *International Journal of Tourism and Hospitality Research: The Surrey Quarterly*, 1999, (1), pp. 41–55
- [19] Randall, S., "Food and Society," Department of Hospitality and Tourism at Queen Margaret University College, 11. 2002.
- [20] Rodriguez, J., "Eating Habits," 2011. [Online]. [Accessed: Oct. 16, 2014], Available: <http://www.faqs.org/nutrition/Diab-Em/Eating-Habits.html>
- [21] STOA (Science and Technology Options Assessment), "Technology options for feeding 10 billion people – Recycling agricultural, forestry and food wastes and residues for sustainable bioenergy and biomaterials," 2013. [Online]. [Accessed: Oct. 1, 2014], Available: http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/513513/IPOL-JOIN_ET%282013%29513513_EN.pdf.
- [22] US environmental protection agency, "Municipal Solid Waste," 2014. [Online]. [Accessed: Oct. 13, 2014], Available: <http://www.epa.gov/epawaste/nonhaz/municipal/index.htm>.



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