Abstract
In recent years the topic of food waste became one of the crucial subjects when it comes to environment. Food waste is one of the sustainability problems that needs to be talked about and society should pay more attention to. In general, consumers are one of the largest sources of this waste, which is the reason why reducing food waste should be seen mainly as societal issue. Even though food waste occurs in every stage of the food supply chain, food waste of households had been identified as one of the key and most important factors of food waste generation. That is also why food waste from households creates a considerable part of the total waste generated throughout the food supply chain. According to recent statistics, approximately one quarter of the food supplied for consumption for people is wasted all over the world. Understanding the factors affecting consumer perceptions and behaviour connected with food waste is one of the crucial efforts that should be made to reduce consumer-related food waste. The research paper presents the overview of the literature and views of wide variety of authors on factors causing food waste related to consumers in households as well as supply chains. To find out more about the consumers in Slovakia and their behaviour towards the food waste was used questionnaire survey aimed mainly on young people.

Keywords: consumer behaviour, food waste, household consumption of food

JEL Classification: D10, D19, Q56

1. Introduction
Food waste can be defined as fractions of food and inedible parts of food removed from the food supply chain to be recovered or disposed, including anaerobic digestion, composted, crops ploughed in/not harvested, bioenergy production, incineration, cogeneration, disposal to sewer, landfill or discarded to sea (Stenmarck et al., 2014). Food waste can be sometimes mistaken for food loss. However, it is necessary to differ between these two concepts. Food losses refer to losses in production, post-harvest and processing of food, while food waste represents losses at the distribution and consumption stages. (Gustavsson, J., et al., 2011, Kummu, M. et al., 2012). Every year large amounts of the food available for human consumption are lost or wasted in the different stages of the food supply chain (Kummu, M. et al., 2012). In numbers that means one third of food produced for human consumption, the equivalent of 1.32 billion tonnes of food is wasted globally (Gustavsson, J., et al., 2011). Food waste generated by consumers amounts 163 kg in a year per capita in Slovakia. Thus, a good understanding of factors that contribute to the amount of food waste generated by consumers is crucial. Yet, there is a surprising lack of studies investigating food waste disposal from the household food choice and consumer behaviour perspective. Most of the existing academic literature on food waste has focused on estimating the amount of food losses with only little attention to the factors driving these food losses. Scenarios for Europe indicate a considerable potential for reducing emissions through the reduction of food waste along the stages of the food production and consumption chain (Rutten, M., et al., 2013). Households are considered to be the biggest contributors to food waste (BIOIS, 2010). Therefore, it is crucial, if we want to reduce pollution of environment and decrease the
rate of climate change to solve the problem of food waste in the household level (Parfitt. J. et al., 2010). The energy and greenhouse emissions that was put into production of food is totally useless if the food is wasted by households. According to Stancu, V. et al. (2016) planning of food purchase did not make a direct contribution to the amount of the wasted food. On the other hand, Stefan, V. et al. (2013) argue there is direct connection of planning purchases of food with lower rates of food waste of households. Moreover, Romani, S. et al. (2018) considers insignificant factor the consumption of leftovers when dealing with food waste. Stancu, V. et al. (2016) however pointed out that the consumer behaviour related to leftovers describes 1/3 of the variance in food waste that was reported. Holt, A.R. et al., 2016 see production of food, consumption of food as well as waste of food as the great contributor to the bad state of the environment. Since food production is linked to using many various resources it is even more alerting that food waste is related to environmental problems and probably one of the reasons of pollution of air, water, or even issues like deforestation or soil erosion. Some efforts of companies to contribute to reduction of food waste can be welcoming innovations in form of technical development, such as new products development, or using technology of packaging that is more environmentally-friendly. These can have significant outcome only if they are also accepted and supported by consumers that get to actually choose the product. Both producers and consumers should pay much more attention to reducing food waste minding all the negative effects of food waste. Some of the possibilities that are offered regarding to reducing food waste are for instance working on changing perceptions of consumers about food and food waste, reducing sizes of portions in restaurants, overstock reduction (Niles, M., 2018), utilizing packaging and processing technologies that help keep food fresh for longer (Blanke, M., 2015), and clarifying the meaning of sell-by and use-by dates for consumers (Wilson, N.L.W. et al., 2017).

2. Data and Methods

The main aim of this research paper is to observe mainly the behaviour of young consumers in Slovakia related to food waste as well as purchasing food. The primary data were collected in January 2022 using the questionnaire survey in the electronic written form via Google Forms. Afterwards was acquired information in form of answers of 295 respondents coded into the program Microsoft Excel. Evaluation of results of this survey creates also the main part of presented research paper. For this research paper are used following procedures:

1. Related literature as well as scientific articles to the topic of the research determinants studying, along with data available related to the topic and subsequent processing of these data on the theoretical level,

2. Methods that were used for evaluation and interpretation of results:
   - Analysis: examined issues are resolved into elementary components to examine relations between these components based on particular indicators
   - Comparison: answers of respondents of the questionnaire survey are compared
   - Synthesis: answer of each respondent was evaluated to help us create a whole picture on the subject of matter

Answers were processed into the graphs to show the ratios as well as percentages of respondents' answers. Data collection method choice is important related to costs, question formulation and quality of data. Several years ago, the only choices that were available were between personal interviews, also called face-to-face interviews, telephone interviews and mail surveys, all using paper questionnaires. The biggest difference in these methods is the presence of the interviewer in the data collection process, since in personal interviews as well as telephone interviewing, the interviewer is present at a distance or physically, while in mail surveys, or any kind of online surveys, the interviewer is not present at all (Willem E. Saris, Irmtraud N. Gallhofe,
One of the benefits of using online, digital survey methods are connected to desired sample size, geographical sample distribution, and therefore cost-effectiveness, since larger number of participants in survey can be reached, also, distance is no problem in this case, as well as online survey is not too costly. Also, digital surveys have potential for fast turnaround, anonymity is as well great advantage for participants if does the questionnaire contain a sensitive or more personal information and respondents tend to feel safer providing honest answers in an online environment. And finally, according to our target – young people – digital survey is considered to be a good choice, since young generation has no problem with technology and working in online space and having access to the survey. (Valerie M. Sue, Lois A. Ritter, 2012). Respondents were chosen randomly, however, we wanted to aim the research mainly on young generation, therefore was the questionnaire sent on websites that are followed mostly by young people.

3. Results and Discussion

Around 931 million tonnes of wasted food were generated in 2019 according to UNEP Food Waste Index (2021). From these 931 million tonnes, as illustrated in Fig. 1, 61% food waste was generated in households, 26% from food service and 13% from retail. What is more, in the European Union, households generate more than half of the total food waste of the European Union, which makes 47 million tonnes, with 70% of food waste generated at households, food service and retail. That is also the main reason, why is this research paper aimed on households and their behaviour towards food and food waste.

According to our evaluation of the questionnaire survey aimed mostly on young people belonging to age group 18 – 30 (90.5 %). Out of the 295 respondents 74.6 % were represented by female respondents and 25.4 % by male respondents. The most of the respondents live in the city (53.2% of respondents) and 46.8 % live in a village. The most frequent answer to the question “What is your economic status?” was student, which makes 69.2 %, employed were 24.1 % of respondents, and others were either unemployed, entrepreneurs, retired or on maternity leave. The highest education level of respondents was for 48.1 % of respondents, 45.6 % of respondents graduated either first or the second level of university. The monthly family income of respondents was mostly more than 1800 EUR, represented by 28.5%. 19.7% of respondents stated their monthly family income vary from 901 to 1200 EUR, 25 % of respondents stated their income is either in the range from 646 to 900 EUR (12.5 % of respondents) or 1201 – 1500 EUR (also 12.5 % of respondents). The least frequent monthly income according to responses in our questionnaire is less than 646 EUR (9.2%). Utmost of respondents pay monthly for groceries 200 – 300 EUR (36.3%), almost 30 % of respondents spend 301 – 400 EUR, 16.3 % spend monthly less than 200 EUR. Nearly 14 % pay 401 – 500 EUR and less than 5 % of respondents pay more than 500 EUR. What was interesting was finding, that 64.4% of respondents do grocery shopping a few times in a week, 25.4 % shop groceries once per week, 8.5 % of respondents buy groceries daily, and only

![Figure 1 Global food waste in 2019 (in %)](source: Own proceeding based on United Nations Environment Programme, 2021)
less than 2 % of respondents buy groceries less frequently. 5,1 % of respondents live alone, almost 25 % live in a household where live two people, 23,1 % of respondents live in a household with two more people. The most of respondents live with three more people (33,2%) and less than 15% live with more people. When we asked our respondents whether they consider food waste environmental issue the vast majority of them answered yes (95,9%). However, nearly 55 % do not think their household generates food waste. Our respondents ranked frequency of wasting food because of following reasons in their households:

a) It is after expiration date – 115 respondents stated their frequency of wasting food because of this reason as not very often, 87 respondents sometimes waste food because of expiration date, 43 respondents waste food because of this reason often and 27 respondents very often.

b) Food is spoiled – 86 respondents stated their frequency of wasting food because of this reason as not very often, 85 respondents stated frequency as sometimes. 16 respondents never waste food because it is spoiled, on the contrary, 59 waste it often and 49 very often because of this reason.

c) It does not taste good – 155 respondents stated they never waste food because of this reason, 87 respondents stated they do not waste food very often because of its taste, 39 respondents sometimes waste food because it does not taste as they wish, 9 respondents waste food often and 5 very often because of its taste.

d) It does not look good – 164 respondents never waste food because of its appearance, 76 respondents do not do it very often, 43 respondents do it sometimes. 8 respondents often do not consume and waste food because of this reason and 4 do it very often.

Respondents were also asked what do they do with food they do not consume. They chose on the scale from never to very often for each of these reasons, as it is also illustrated in Fig. 2:

a) I put it into municipal waste – 78 respondents never put food into municipal waste, 60 respondents put it into municipal waste not very often, 50 respondents sometimes, 48 often and 59 puts food into municipal waste very often.

b) I put it into bio waste – 120 respondents never put food into bio waste, 43 do not put it into biowaste very often, 57 respondents sometimes do, 35 do it often and 40 respondents do it very often.

![Figure 2 How often you waste food because of these reasons (in pcs)](source: Own proceeding based on questionnaire survey)
c) I put it into composter – 123 respondents never put food that they do not consume into composter, 44 respondents do it but not very often, 38 do it sometimes, 36 respondents often put food that was not consumed into composter and 54 do it very often.

d) I give it to animals – 65 respondents never give their food to animals, 39 do it not very often, 69 respondents sometimes give their food to animals, 49 do it often and 73 do it very often.

In the Fig. 3 we can see that less than 2% of respondents waste food every day and not even 4% of respondents never waste food. 13.2% of respondents waste food a few times per week, almost 27% every week, 24.1% do every month. 30.5% of respondents generate food waste less often.

Respondents were also asked to choose number on the scale from 1 to 5 for each type of food depending on the frequency of wasting it in their households. Results were, as it can be also seen from the Fig. 4 the most frequently wasted commodity is pastry, the least wasted commodity are durable goods.

In the following figure (Fig. 5) it can be seen how large the food wastage of each commodity was in 2011 globally along with the size of carbon footprint for each commodity.
According to the Fig. 5 we can see that meat is one of the lowest contributing commodities from selected commodities in terms of volume, however, it generates over 20% of carbon footprint, so we can say that even the smaller amount of wasted meat contributes significantly to the climate change and environmental problems. For instance, milk and eggs are wasted more but have lower carbon footprint percentage than meat. Most wasted commodity here is vegetables followed by cereals and starchy roots. When we compare Fig. 4 and Fig. 5 we can see some similarities. (FAO, 2015).

We wanted to find out what is the most common motivation for customers to buy food and then wasting it and according to our results it is mostly because they buy it for later (32.2%) and the second most frequent reason was low price of the food, discounts, etc. (20.7%). However, we see in the Fig. 6 that almost 30% of respondents stated they only buy as much food as they consume.

The final question that respondents answered was whether they usually plan their grocery shopping, which is one of the ways of possible reduction of food waste in households. Nearly 70% of respondents actually plan their grocery shopping, others do not.
4. Conclusion

To conclude, it was found, that even though households create considerable part of food waste, in general, young generation does consider itself a sizeable contributor to food waste in Slovakia. However, people in Slovakia see food waste as a major issue for environment of this country and countries all over the world. The research presented in this paper was aimed mostly on young generation of Slovak republic, belonging to age group from 18 to 30. The main goal was to understand the perceptions and behaviour of young people towards food and food waste. Research of this paper is backed by reliable literature, presenting ideas, perceptions and views of different authors related to topic of food waste. It was done using online written questionnaire survey via Google Forms. According to results of our survey we found out that most of young people generate food waste in their households less often than every month and only 2% waste food every day. The most frequently wasted food is pastry, the least wasted foods are durable goods. The majority of respondents waste food because they buy more to save for later, which ends up in not consuming what they bought (Blanke, M., 2015). Most of respondents that were asked, usually plan in advance what they want to buy. According to Davenport M. L. et al. (2019) the struggle of young consumers when it comes to managing leftovers and potential food waste is bigger than that of older people because of their experience of using leftovers. As Bravi, L. et al. (2020) observed, the habit of not eating leftovers and preparing portions that are too large is linked mainly to younger people, according to which we can confirm it is more difficult for young people to cook appropriate portions and manage leftovers somehow.

The solution that could be applied anytime is better measurement of food waste, which may rise the level of consciousness of people, along with encouragement of policy interventions with the objective of helping with the change of consumer behaviour. (Gaiani, S. et al., 2018).

Circular economy could be the solution for the future, how to deal with the problem of food waste, since it measures optimizing the use of resources, optimizing the use of products and increasing the number of material cycles and that can also lead to energy savings and thus reducing emissions (Svetlanská, T. et al., 2017).

Acknowledgements

This publication was supported by the Operational programme Integrated Infrastructure within the project: Scientific support of climate change adaptation in agriculture and mitigation of soil degradation, 313011W580, co-financed by European Regional Development Fund.

Supported by the Operational Programme Integrated Infrastructure (Project No. Drive4SIFood 313011V336, Demand-driven research for the sustainable and innovative food, co-financed by the European Regional Development Fund).

References

[1] BIOIS. (2010). Preparatory Study on Food Waste across EU 27. European Commission (DG ENV) Directorate C-Industry. Final Report. ISBN: 978-92-79-22138-5. Google Scholar

[2] Blanke, M. (2015). Challenges of reducing fresh produce waste in Europe—From farm to fork. Agriculture, 5, 389–399. doi: https://doi.org/10.3390/agriculture5030389.

[3] Bravi, L. Francioni, B., Murmura, F., Savelli, E. (2020). Factors affecting household food waste among young consumers and actions to prevent it. A comparison among UK, Spain and Italy. In Resources, Conservation and Recycling, vol. 153, no. 1, pp. 1-13.ISSN 0921-3449. doi: https://doi.org/10.1016/j.resconrec.2019.104586.

[4] Davenport, M.L., Qi, D., Roe, B. E. (2019). Food-related routines, product characteristics, and household food waste in the United States: A refrigerator-based pilot study. In Resources, Conservation and Recycling, [online], vol. 150, no. 1, pp. 1-16. ISSN 0921-3449. doi: https://doi.org/10.1016/j.resconrec.2019.104440.
[5] FAO. (2015). Food wastage footprint and climate change. Retrieved from: <https://www.fao.org/3/bb144e/bb144e.pdf.  

[6] Gaiani, S., Caldeira, S., Adorno, V., Segré A., Vittuari, M. (2018). Food wasters: Profiling consumers’ attitude to waste food in Italy. In Waste Management. vol. 72, no. 1, pp 17-24. ISSN 0956-053X. doi: https://doi.org/10.1016/j. 

[7] Gustavsson, J., Cederberg, C., Sonesson, U., VAN Otterdijk, R., Meybeck., A. (2011). Global food losses and food waste: Extent, causes and prevention Food and Agriculture Organisation of the United Nations (FAO), Rome, ISBN 978-92-5-107205-9  

[8] Holt, A.R., Alix, A.; Thompson, A.; Maltby, L. (2016). Food production, ecosystem services and biodiversity: We can’t have it all everywhere. Sci. Total Environ., 573, 1422–1429. doi: 10.1016/j.scitotenv.2016.07.139  

[9] Kummu, M., DE Moel, H., Porkka, M., Siebert, S., Varis, O. P.J. (2012). Ward Lost food, wasted resources: global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use Science of the Total Environment, 438 (0), pp. 477-489. doi: 10.1016/j.scitotenv.2012.08.092  

[10] Niles, M.; Ahuja, R.; Barker, T.; Esquivel, J.; Gutterman, S.; Heller, M.; Vermeulen, S. (2018). Climate change mitigation beyond agriculture: A review of food system opportunities and implications. Renew. Agric. Food Syst., 33, 297–308. doi: 10.1017/S1742170518000029  

[11] Parfitt, J., Barthel, M., Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. Philosophical Transactions of the Royal Society B: Biological Sciences, 365 (1554), pp. 3065-3081. doi: https://doi.org/10.1098/rstb.2010.0126  

[12] Quested, T.E., Marsh, E., Stunell, D., Parry.Spaghetti, A.D. (2013). soup: the complex world of food waste behaviours. Resour. Conserv. Recycl., 79, pp. 43-51, doi: 10.1016/j. 

[13] Romani, S.; Grappi, S.; Bagozzi, R.P.; Barone, A.M. (2018). Domestic food practices: A study of food management behaviors and the role of food preparation planning in reducing waste. Appetite , 121, 215–227. doi: 10.1016/j.appet.2017.11.093.  

[14] Rutten, M., Nowicki, P., Bogaardt, M.-J., Aramyan., L.(2013). Reducing Food Waste by Household and in Retail in the EU: a Prioritisation Using Economic, Land Use and Food Security Impacts LEI Wageningen UR. Doi: https://edepot.wur.nl/290135  

[15] Saris, W. E., Gallhofer, I.N. (2014). Design, Evaluation, and Analysis of Questionnaires for Survey Research. New Jersey: John Wiley & Sons. 384 p. ISBN 978-11-186-3461-5.  

[16] Schanes, K., Giljum, S., Hertwich., E. (2016). Low carbon lifestyles: a framework to structure consumption strategies and options to reduce carbon footprints. J. Clean. Prod., 139, pp. 1033-1043. Doi: https://doi.org/10.1007/s11625-012-1610-2  

[17] Stancu, V.; Haugaard, P.; Lähteenmäki, L. (2016). Determinants of consumer food waste behavior: Two routes to food waste., 96, 7–17. doi: 10.1016/j.appet.2015.08.025  

[18] Stefan, V.; VAN Herpen, E.; Tudoran, A.A.; Lähteenmäki, L. (2013). Avoiding food waste by Romanian consumers: The importance of planning and shopping routines. Food Qual. Prefer., 28, 375–381. doi: 10.1016/j.foodqual.2012.11.001  

[19] Stenmarck, B. Å., Jensen, C., Quested, T., Moates, G. (2014). Estimates of European food waste levels. ISSN 0962-8436  

[20] Svetlanská, T., Turčeková, N., Adamičková, I. Skalský, R. (2017). Food security facets: Case of Slovakia regions. In Journal of security and sustainability issues. vol. 7, no. 4, pp 1-10. ISSN 2029-7025.  

[21] United Nations Environment Programme. (2021). Food Waste Index Report 2021. Retrieved from: <https://www.unep.org/resources/report/unep-food-waste-index-report-2021>.  

[22] Valerie, M. S., Lois, A. R. (2012). Conducting Online Surveys. New York: SAGE. 242 p. ISBN 978-141-29-9225-1.  

[23] Wilson, N.L.W.; Rickard, B.J.; Saputo, R.; HO, S.T. (2017). Food waste: The role of date labels, package size, and product category. Food Qual. Prefer., 55, 35–44. doi: https://doi.org/10.1016/j.wasman.2018.05.021