STUDY REGARDING SOLVING FOOD WASTE AND FOOD LOSS

SURDULESCU ALINA MARIA[1], SABOU ALIN [1], MARTIN ANAMARIA ROXANA*[1,2], FIRU NEGOESCU ADRIAN GHEORGHE [1], BĂLAN IOANA MIHAELA [1]
[1]University of Life Sciences "King Mihai I" from Timișoara, Faculty of Management and Rural Tourism, Timișoara, Romania
[2]Institution Organizing Doctoral Studies - University of Life Sciences "King Mihai I" from Timisoara, Doctoral school Plant and Animal Resources Engineering
*Corresponding author's e-mail: anamaria.martin@usvt.ro

Abstract: *The amount of food produced for human use that is lost or wasted is about one third. Food loss and waste have therefore gained significant attention in international policy circles. This is an alarming worldwide problem that creates negative environmental externalities in addition to threatening the viability of a sustainable food system.*
Food waste and food loss are terms that relate to poor food management, which leads to unnecessary food disposal. Food waste refers to the intentional or careless throwing of food, while food losses include all stages from production to consumption, where food is damaged or lost for various reasons, such as improper handling, improper transport or improper storage.

Key words: *food loss, food waste, kilocalories, supply chain, environment*

INTRODUCTION

Food losses and waste (FLW) is the term used to describe the waste of food as well as all the resources and abilities used throughout the food supply chain (FSC). With variations between high- and low-income countries, FLW have detrimental effects on the environment and socioeconomic conditions. [2] FLW have a negative impact on the environment and the ecosystem services they offer, on the one hand. FLW have a significant land and water impact and release greenhouse gases into the atmosphere. [6] However, in light of an increasing worldwide population, FLW raises concerns about distributive issues related to an unsustainable worldwide food and agriculture system, as well as food security and malnourishment. [4] Food support is therefore essential in many Member States as the number of obese individuals and FLW in the EU rises at the same time that 33 million people cannot afford a healthy meal every two days. [1] Numerous initiatives have been developed to reduce FLW; however, while establishing these initiatives, it is important to strike a balance between reducing food waste and meeting food safety regulations. This will create a situation where food and nutrition safety, as well as environmental sustainability, benefit from each other. [8]

There are five stages in the FSC: production, storage and handling, processing and packaging, distribution on the marker, and ultimate consumption. At every point in the supply chain, the right conditions must be offered to minimize FLW. The worldwide food system needs to be completely redesigned in order to combat food loss and waste. [3]

Every stage of the food value chain has the potential for FLW. FLW can happen at each stage in the following ways, as examples:

- In the course of production or harvest, in the form of grain left behind by inadequate harvesting equipment, abandoned fish, and fruit that is not harvested or is rejected because it is not economically feasible to do so.
- In the form of food that has been tainted by pathogens, fungi, or pests during handling and storage.
- In the form of milk that has spilled, fish that has been destroyed, and fruit that cannot be processed during processing and packaging. Because of ineffective order forecasting and inefficient manufacturing procedures, processed foods may be lost or squandered.

- When being distributed and marketed, edible food that doesn't meet aesthetic quality criteria or isn't sold by the "best before" and "use-by" dates is thrown.
- During consumption in the form of food that has been bought by customers, eateries, and caterers but has not yet been consumed. [11]

FLW has emerged as a top issue in global policy circles, especially in light of the UN's Sustainable Development Goals (SDGs), which were enacted in 2015 as a component of Agenda 2030. This covers both Goal 12 (responsible consumption and production) and Goal 2 (zero hunger). In line with the latter, objective 12.3 stipulates that "food losses along production and supply chains, including post-harvest losses, must be reduced and per capita global food waste at the retail and consumer levels by 2030." According to estimates, reducing food waste by half could actually be able to meet the expanding population's food needs. FAO has created two indices (the Food Loss Index and the Food Waste Index) to monitor the progress made towards objectives 12.3. In December 2019 were seen the announcement of the first findings. Nonetheless, there are still significant data problems in the process of creating these indices. [17]

MATERIALS AND METHODS

This study presents research based on external data on FLW, by region, provided by the Food and Agriculture Organization of the United Nations (FAO). These external third-party data were analyzed and expounded by the authors, using established methods of economic analysis and interpretation.

First, it is important to point out the source of the data - the Food and Agriculture Organization of the United Nations (FAO). This provides essential data to assess the scale of the FLW problem in various regions. These data provide a solid basis for research.

The authors turned this raw data into relevant information. Rigorous methods of economic analysis were applied, identifying trends, patterns and factors influencing food loss and waste. This analysis process contributed to a deeper understanding of food-related issues.

To ensure the validity and reliability of the results, well-known and accepted methods of analysis in the academic and research community were used. This added depth to the study and made it possible to compare the results with other similar research. [18]

RESEARCH RESULTS

An estimated 1,3 billion tons of food, or 1,5 quadrillion kcal, are wasted annually worldwide; this amounts to one-third of the world's annual food production's weight and one-fourth of its caloric content. Put another way, one out of every three kilograms of food and one out of every four kilocalories of nutritional value are lost in our planet. [9]

A diagnosis of the root cause of food loss and waste must come before any attempt to reduce it. Certain conclusions can be gained from studying the FAO data. [5]

On a regional scale, North America, Oceania, Europe, and the industrialized Asian nations of China, Japan, and South Korea account for around 56 percent of global food loss and waste, while the developing world is responsible for 44 percent of the loss. South and Southeast Asia has the highest percent from the developing world, precisely 23 percent. Sub-Saharan Africa counts 9 percent, followed by North Africa, West and Central Asia with 7% and then the smallest account, 6 percent, by Latin America. (Figure 1).

With over 1500 kcal per capita daily lost or wasted from farm to fork, North America and Oceania stand out from other regions on a per capita basis. The second region in the ranking is Europe, but at a significant difference from North America and Oceania, precisely 748 kcal per capita, half of the amount of the first mentioned region. At a small difference of 2 kcal is Industrialized Asia with 746 kcal/capita/day.

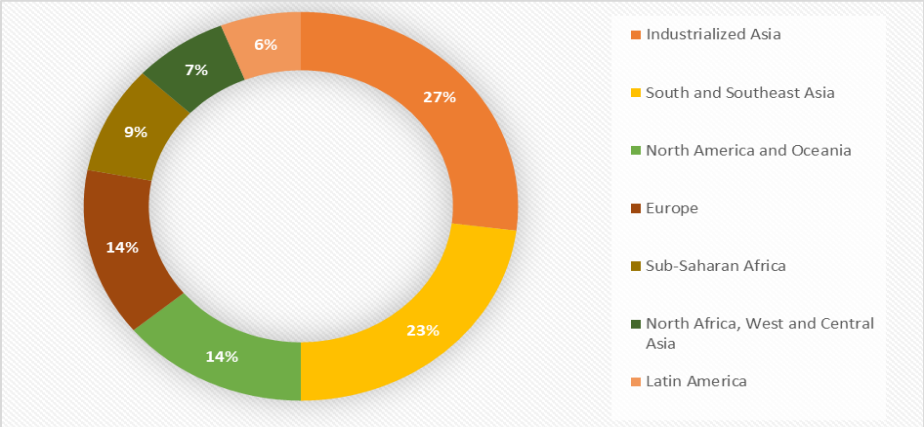

Figure 1. Share of Global Food Loss and Waste by Region, 2009 (100% = 1.5 quadrillion kcal)

Source: Authors own adaptation by [14]

The fourth region in the ranking is North Africa, Est and Central Asia, with an amount smaller with 152 kcal, precisely 594 kcal/capita/day. Sub-Saharan Africa is at a difference of 49 kcal, counting 545 kcal/capita/day. Continuing with the ranking, on the sixth place is Latin America with 453 kcal/capita/day and the last place is occupied by South and Southeast Asia with 414 kcal/capita/day.(Figure 2)

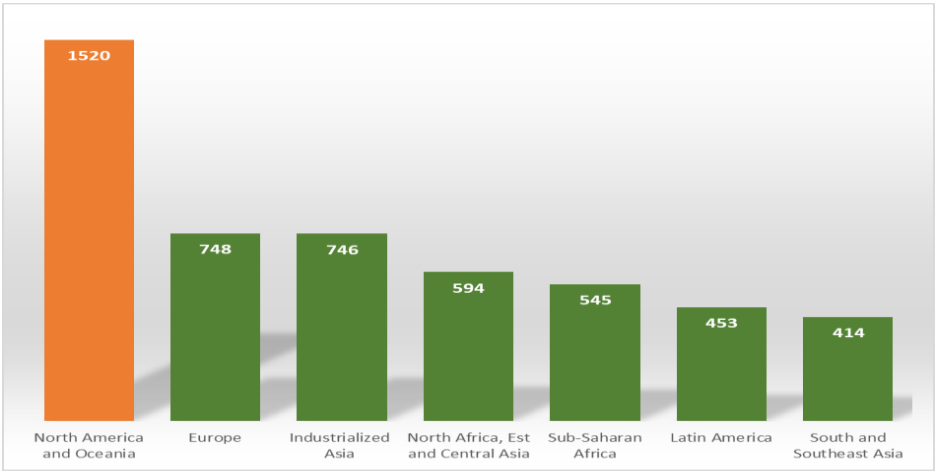

Figure 2. Food Lost or Wasted By Region, 2009 (Kcal/capita/day)

Source: Authors own adaptation by [14]

CONCLUSIONS

By using developments in technology and putting new policies and initiatives into place, it should be possible to accomplish the target of a 50% decrease in food waste nationally by 2030. [7] Solving the problem of food loss and waste is a complex challenge that requires coordinated efforts at various levels of society, from individuals and households to businesses, governments, and international organizations. [10] To truly effect change, farmers, distributors, retailers, and consumers must work together to strengthen the supply chain and foster an atmosphere that encourages society's ongoing shift toward a food-waste-free future. [12]

The following are some crucial tactics and ways to deal with food loss and waste:

- Consumer Education and Awareness: Educate individuals and families about the environmental, economic, and social impacts of food waste; promote meal planning, portion control, and smart shopping to reduce food waste at home; teach food storage and preservation techniques to extend the shelf life of perishable items.

- Food Recovery and Redistribution: Establish or support food rescue organizations that collect surplus food from restaurants, grocery stores, and food manufacturers and distribute it to those in need.
- Standardization and Innovation: Develop and implement standardized date labeling to reduce confusion about food expiration dates. Invest in research and technology for improved food packaging, transportation, and storage to minimize spoilage and extend product life. [15]
- Supply Chain Optimization: Improve supply chain efficiency to reduce losses during harvesting, processing, and transportation.
- Food Waste Reduction in Retail: Encourage supermarkets and grocery stores to adopt practices such as dynamic pricing to sell perishable items before they expire.
- Data Tracking and Accountability: Collect data on food waste at various stages of the supply chain to identify areas of improvement; set targets and monitor progress to hold businesses and governments accountable. [15]

It's important to recognize that reducing food loss and waste is a shared responsibility, and progress can be made through a combination of individual actions, industry initiatives, and government policies. Public awareness, education, and behavioral changes are key elements in the effort to mitigate this pressing global issue. [13]

Assessing the distribution of responsibility for food waste around the world, we note that this problem is far from evenly distributed. This unevenness presents us with the challenge of tackling food waste with region-specific approaches. Deepening this aspect, it is revealed that understanding these differences and identifying the specific causes in each area are essential steps for developing effective solutions to this global problem.

First, it is important to note that food waste is not an isolated phenomenon, but is shaped by a variety of factors specific to each region. These factors include the level of economic development, food infrastructure, prevailing cultures, consumption habits and even climatic conditions. For example, regions with a high level of economic development may tend to waste more food due to consumer demand for freshness and variety, while in developing regions, food waste may be more pronounced along the chain. of supply, due to inadequate infrastructure or post-harvest losses. [16]

Another crucial aspect is related to the behavior and consumption habits of the population in each region. Consumer education and awareness can play a significant role in reducing food waste. In some cultures, it may be necessary to promote more responsible buying and consumption practices and to teach food preservation techniques to extend their shelf life.

Also, each region may have specific resources and capabilities that it can use to address food waste. This may include developing partnerships with non-governmental organizations and the food industry, investing in research and development of food technologies, and creating government policies to support the reduction of food waste.

In conclusion, food waste is a complex and variable challenge globally. By understanding regional differences and addressing specific causes in each area, we can develop solutions adapted to local realities. This tailored approach is essential to make significant progress in the fight against food waste and to ensure a more sustainable future for the entire planet. [17]

REFERENCES

[1]. BALAN IOANA MIHAELA, GHERMAN R., TRASCA T. I., TULCAN CAMELIA, SABRY A. E., BRAD I., DINCU ANA MARIANA, GHERMAN EMANUELA DIANA, MARTIN ANAMARIA ROXANA, 2022, Food Waste Worldwide – Top 10 countries, Scientific Papers: Animal Science & Biotechnologies / Lucrari Stiintifice: Zootehnie si Biotehnologii, 55(2)

[2]. BALAN IOANA MIHAELA, GHERMAN EMANUELA DIANA, BRAD I., GHERMAN R., HORABLAGA A., TRASCA T. I., 2022. "Metabolic Food Waste as Food Insecurity Factor—Causes and Preventions" Foods 11, no. 15: 2179. https://doi.org/10.3390/foods11152179

[3]. BALAN IOANA MIHAELA, GHERMAN EMANUELA DIANA, GHERMAN ., BRAD I., PASCALAU R., POPESCU GABRIELA, TRASCA T. I., 2022. "Sustainable Nutrition for Increased Food Security Related to Romanian Consumers' Behavior" Nutrients 14, no. 22: 4892. https://doi.org/10.3390/nu14224892

[4]. GAISE N'GANZI R., BALAN IOANA MIHAELA, TRASCA T.I., PASCALAU R., BRAD I., GHERMAN R., TULCAN CAMELIA, GHERMAN EMANUELA DIANA, MARTIN ANAMARIA ROXANA, 2022, Food Security in low developed countries – The case of the D.R. Congo, Scientific Papers: Animal Science and Biotechnologies, 55(2)

[5]. GHEORGHESCU C. I., VELCOTA IONELA IASMINA, MARTIN ANAMARIA ROXANA, BALAN IOANA MIHAELA, 2019, Food waste a major problem in the European Union. Journal Agricultural Management, 21(3)

[6]. MARTIN ANAMARIA ROXANA, BALAN IOANA MIHAELA, TRASCA T. I., 2022, Romania facing the problem of food waste, Scientific Papers: Animal Science and Biotechnologies, 55(1)

[7]. **SALASAN C., BALAN IOANA MIHAELA**, 2022, The environmentally acceptable damage and the future of the EU's rural development policy. In book: Economics and Engineering of Unpredictable Events. DOI: 10.4324/9781003123385-6

[8].*** - **FCRN FOODSOURCE**, "What Is Food Loss and Food Waste?" https://www.foodsource.org.uk/building-blocks/building-block-what-food-loss-and-food-waste#FLWBB2.

[9].*** - **FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**, 2022. Consumer Food Waste, www.fao.org/flw-in-fish-value-chains/value-chain/consumption/consumer-food-waste/en/. Accessed on March 10, 2023

[10].*** - **FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**, 2011, Global food losses and food waste—extent, causes and prevention, Rome: UN FAO.

[11].*** - **FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**. "Technical Platform on the Measurement and Reduction of Food Loss and Waste.". http://www.fao.org/platform-food-loss-waste/en/.

[12].*** - **REDUCING FOOD WASTE—METHOD FOR MEASURING WASTE QUANTITIES**. Available online: https://ec.europa.eu/info/ law/better-regulation/have-your-say/initiatives/2122-Establishment-of-a-methodology-of-measurementof-food-waste

[13].*** - **THE ENVIRONMENTAL IMPACT OF FOOD WASTE, MOVE FOR HUNGER**, 2020, moveforhunger.org/the-environmental-impact-of-food-waste

[14].*** - **THE STATE OF FOOD AND AGRICULTURE**, 2019, Moving Forward on Food Loss and Waste Reduction. CCBY-NC-SA3.0 IGO. Rome: Licence. 2019. Available online: http://www.fao.org/3/ca6030en/ca6030en.pdf. Accessed on March 23, 2023

[15]. *** - **UN ENVIRONMENT PROGRAMME**, FOOD WASTE INDEX REPORT 2021, https://www.unep.org/resources/report/unep-food-waste-index-report-2021.
[16].** - **WORLD FOOD PROGRAMME USA**, 2022, Food Waste vs. Food Loss: Know the Difference and Help #StopTheWasteToday. https://www.wfpusa.org/articles/food-loss-vs-food-waste-primer/
[17].** - **WORLD RESOURCES INSTITUTE UNEP**, Installment 2 of "Creating a Sustainable Food Future" Reducing Food Loss and Waste. https://files.wri.org/d8/s3fs-public/reducing_food_loss_and_waste.pdf
[18].** - **WORLD WILDLIFE FUND**, 2020, Driven to Waste Global Food Loss on Farms.www.panda.org/discover/our_focus/food_practice/food_loss_and_waste/driven_to_waste_global_food_loss_on_farms/