THE IMPORTANCE OF UNIVERSITIES FOR SOCIETY AND ECONOMY THE EXPERIENCE OF RESEARCHERS FROM THE VISEGRÁD GROUP

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Publishing House of Wroclaw University of Economics and Business
Wroclaw 2024

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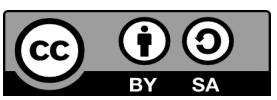

ISBN 978-83-67899-91-8 (for the paper version)
ISBN 978-83-67899-92-5 (for the electronic version)

DOI: 10.15611/2024.92.5

Quote as: Drelich-Skulska, B., Sobocińska, M., & Tomášková, A. (Eds.). (2024). *The Importance of Universities for Society and Economy. The Experience of Researchers from the Visegrád Group*. Publishing House of Wroclaw University of Economics and Business.

Printing: TOTEM

CHAPTER 4

A Step Towards Stopping the Food Waste Pandemic. The Case of Poland, Slovakia and Czechia

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Quote as: Piekara, A. (2024). A Step Towards Stopping the Food Waste Pandemic. The Case of Poland, Slovakia and Czechia. In B. Drelich-Skulska, M. Sobocińska, & A. Tomášková (Eds.), *The Importance of Universities for Society and Economy. The Experience of Researchers from the Visegrád Group* (pp. 59-67). Publishing House of Wroclaw University of Economics and Business.

DOI: 10.15611/2024.92.5.04

Abstract: In recent years, the awareness surrounding food waste all over Europe, including Poland, Czechia, and Slovakia, has grown, prompting increased efforts to address this issue. The chapter provides an overview of the food waste and loss landscape in these countries, shedding light on the scale of the problem, its underlying causes, and the initiatives undertaken to combat it. By understanding each country's challenges and opportunities, stakeholders can develop targeted strategies to minimise food waste and promote more sustainable food systems.

Keywords: food waste, food loss, food waste pandemic, food waste in CEE countries

4.1. Introduction

Food waste is one of the most important research topics in recent years, as proved by the number of scientific articles published over the last few years. In the period 2010-2023, the Scopus database included 9307 research articles, one of the keywords of which was food waste (research query keyword: 'food waste', Scopus database search: March 2024) (Fig. 4.1). Moreover, the number of these publications has increased rapidly.

When limiting the data to studies covering Poland, Slovakia or Czechia, the total number of studies since 2010 is only 763 (search within the results: Poland OR Polish or Slovakia OR Czech*). Food waste is a pressing global issue with significant

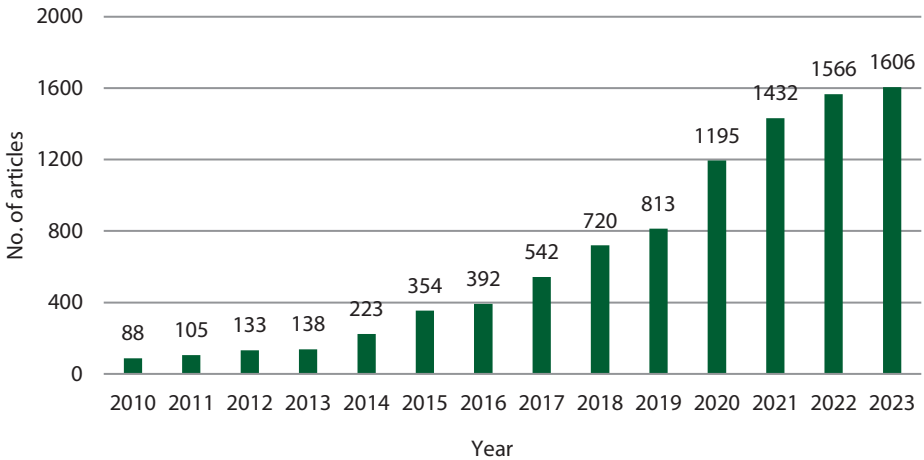

Fig. 4.1. Number of articles in the Scopus database from 2010 to 2023

Source: own study based on Scopus database search: March 2024; research query KEYWORD: 'food waste'; for 2010-2023.

environmental, economic, and social consequences (Papargyropoulou et al., 2014; Trivedi et al., 2023). In recent years there has been increasing recognition of the need to address food waste at national and international levels. As members of the European Union, Poland, Czechia, and Slovakia are no exception to this challenge. However, it should be pointed out that, in general, there are two components: food loss and food waste (Fig. 4.2).

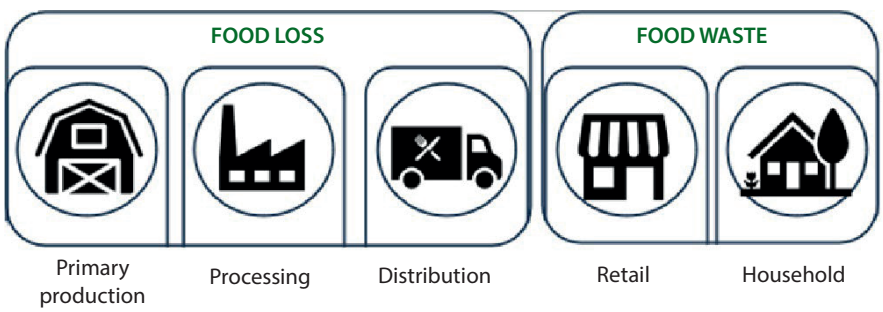

Fig. 4.2. Food loss and food waste across the food chain

Source: own work based on (Ishangulyyev et al., 2019).

The terms 'food loss' and 'food waste' were defined by The Food and Agriculture Organization of the United Nations (FAO, 2013) as well as by the European Commission (2024) as follows:

FAO:

Food loss: decrease in weight (dry matter) or quality (nutritional value) of food that was originally produced for human consumption.

Food waste: food appropriate for human consumption being discarded, whether after it is left to spoil or kept beyond its expiry date.

EC:

Food loss: a decrease in the quantity or quality of food resulting from decisions and actions by food suppliers (i.e. before or during food production and processing).

Food waste: a decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers (EC, 2024).

The chapter compared levels of food waste and the reasons for it in Poland, Czechia, and Slovakia. By understanding each country's challenges and opportunities, stakeholders can develop targeted strategies to minimise food waste and promote more sustainable food systems.

4.2. The Level of Food Waste

Despite being relatively prosperous nations, each of these countries faces unique circumstances influencing food consumption, production, and waste management practices. According to data gathered and published by Eurostat, around 131 kg of food waste per inhabitant was generated in the EU in 2021 (Eurostat, n.d.). A positive aspect is undoubtedly that the level of waste per person in each of the three countries was lower than the EU average (Table 4.1). A close look at the data indicates which areas most urgently require intervention.

Table 4.1. Food waste by sector of activities, 2021 (tonnes of fresh mass)

Region	Total food waste	Primary production	Processing and manufacturing	Retail and other distribution of food	Restaurants and food services	Households
EU ([1])	58 400 000	5 100 000	12 400 000	4 200 000	5 400 000	31 300 000
Czechia ([1])	972 445	27 022	100 339	64 394	37 941	742 749
Poland	4 281 212	639 352	809 287	345 514	186 433	2 300 626
Slovakia	537 486	23 764	125 013	17 630	8 988	362 091

([1]) 2021 data not reported, 2020 data presented; food waste and food waste prevention – estimates; excluding food losses (food not harvested or food not authorised to be marketed for safety reasons), for the year 2021.

Source: (Eurostat, n.d.).

The most significant differences occur in the categories 'primary production' and 'processing and manufacturing', where the highest value was recorded for Poland and the lowest for Czechia. It is obvious that, due to the arable area, Poland (Table 4.2) has the most prominent primary production among these countries. Hence, Poland recorded the highest overall amount of food losses in the primary production category. However, the data regarding the manufacturing sector are interesting, with Czechia recording a very low result per capita (Table 4.2). Note that the number of food preservation and production facilities in Czechia and Slovakia is smaller than in Poland. It would be worth examining whether the observation made by Eurostat is due to the number of facilities or whether their type has a more significant influence (e.g. the grain and milling sector is considered to generate the slightest losses, while the meat or dairy processing sector is much larger), as well as what level of implementation of modern technological solutions aimed at reducing losses exists.

Table 4.2. Food waste by sector of activities in 2021 (kilograms per inhabitant)

Region	Arable area sq km*	Total food waste	Primary production, processing and manufacturing	Processing and manufacturing	Households	Retail and other distribution of food, restaurants and food services
EU ([1])		131	39	–	70	22
Poland ([1])	144 995	113	38	21.5	61	14
Slovakia ([1])	18 560	99	27	23	66	5
Czechia ([1])	35 298	91	12	9.5	69	10

([1]) 2021 data not reported, 2020 data presented; * according to the World Bank (https://tradingeconomics.com/).

Source: (Eurostat, n.d.).

Waste levels in retail and other food distribution, restaurants, and food services also vary and can be a subject of further analysis. Buzby et al. (2015) listed the primary factors contributing to food waste production in retail stores, which include packaging damage, over-stocking, and over-preparing, all associated with challenges in forecasting customer numbers. Additionally, customers' rejection of suboptimal food products was identified as a significant contributor. The food types that show the most significant impact on food waste production in supermarkets are fruit, vegetables, and bakery items. Moreover, products with higher added value, such as ready-to-eat foods prepared in-store, bread, pastry, and seafood, exhibit a higher rate of food waste in relation to sales turnover (Cicatiello & Franco, 2020).

Food waste within the catering industry in Poland continues to be a topic that lacks comprehensive study, primarily due to the reluctance of catering establishment owners to share relevant data. Many of them are hesitant to disclose such information,

fearing its potential misuse. According to the results of the conducted research of this nature in Poland, it was shown that leftover food on plates contributes significantly to the overall food wastage in food service establishments (Bilska et al., 2022; Tomaszewska et al., 2021). These studies indicated many possible methods of managing food surplus as practices employed in Poland by some restaurants or hotels owners e.g. selling meals at promotional prices, unsold dishes made available to employees, encouraging consumers to take away leftovers. However, more attention should be devoted to actions aimed at preventing food overproduction. It should not be forgotten that the majority of problems are caused by consumers' behaviour in relation to food served in catering establishments where too large portions constitute the main reason for the so-called plate waste (73.8% of answers), ordering too many dishes (54.8%), the inappropriate taste of food (23.8%), unpleasant atmosphere and finding undesirable elements in a dish, e.g. hair or nail (Bilska et al., 2020; Tomaszewska et al., 2021). A factor that can also concern consumers from the CEE countries was identified by Filimonau et al. (2020), who highlighted that the primary cause of food waste in the catering industry stems from consumers' elevated expectations concerning the catering selection and the sector's aim to satisfy these demands. Consequently, this results in the overproduction of food. Food waste in the catering sector in Poland, Slovakia and Czechia can be influenced by several factors at different levels, such as consumer expectations, consumer and staff engagement, and operational practices and more research is needed to identify the areas that require more immediate actions.

Post-communist countries within the EU demonstrate lower levels of household food waste when compared to other EU countries (Veselá et al., 2023). Several factors affect food waste in households and should be discussed in cultural and behavioural dimensions. Pelau and Sarbu confirmed that different nations' national cultures, values and habits impact the quantities of wasted food (Pelau et al., 2020). In general, in countries, including Poland, Czechia, and Slovakia, traditional customs need to undergo change in eating habits, encouraging them to purchase products based on their actual needs (Pelau et al., 2020). Based on the Hazuchová et al. (2022), it can be concluded that shopping decisions in Slovakia are primarily influenced by the state of the household's supplies and whether a list has been prepared in advance. Czech consumers show a preference for discounts and overall prices when shopping. Poles are regarded as the least responsible for food purchases.

As demonstrated by Veselá et al. (2023), in the case of Czech consumers, both socio-demographic indicators and the level of subjective food waste are affected by the overall management of food within the household. Product characteristics play a crucial role in decision-making, particularly for women and individuals with higher levels of education. In the study conducted in Poland, it was discovered that younger people tended to waste food more frequently. Conversely, older participants wasted

food less frequently and were more inclined to utilize leftovers to prepare other meals. Individuals with a university-level education were found to waste food more frequently, however they also demonstrated a higher propensity to adhere to storage conditions specified by the producer and to pay heed to expiration dates on labels (Bilska et al., 2020). The need for multidimensional actions was thoroughly described by Macková et al. (2019), and can serve as a universal list for all the three countries. Macková et al. (2019) expressed the necessity for heightened public communication regarding food waste, encompassing its adverse environmental effects, the economic repercussions of food loss, and the imperative to ensure access to nourishment for those unable to afford it. A pivotal outcome of the survey lies in discerning distinct consumer clusters characterised by differing opinions and attitudes toward food waste. Leveraging these clusters, developing and implementing targeted communication strategies tailored to resonate with specific consumer groups then becomes feasible.

4.3. Food Waste and SDG

Enterprises from the agri-food sector pursuing their strategy to implement selected sustainable development goals should analyse value chains to identify sources of waste and eliminate them. This is now also a necessity due to the transition from a linear to a circular economy in which – by definition – waste does not occur. Each material is viewed as a potential resource for reuse (von Braun et al., 2023). The concept of a circular economy is grounded in the waste management hierarchy and the '6R' principle (Ciccullo et al., 2021; Papargyropoulou et al., 2014). The central notion is to structure production processes, services, and energy usage to minimise or eliminate waste. The closed-loop concept suggests that rather than discarding raw materials for storage or incineration, they should be recycled for reuse, while products should be utilised many times. Food waste and loss are intricately linked to various Sustainable Development Goals (SDGs) due to their far-reaching impact on environmental, social, and economic sustainability. It is in the interest of entrepreneurs to skilfully indicate how individual activities may affect the achievement of the SDGs. The challenge of limiting Food Waste Loss (FWL) can be indirectly linked to six different goals, with goal 12 referring to this issue most precisely and broadly (Table 4.3).

SDG 12 specifically addresses the need for sustainable consumption and production patterns (Bartelings & Philippidis, 2024). Food waste and loss are a significant barrier to achieving this goal, as they represent inefficiencies in the global food system. By reducing food waste and loss, countries can promote more sustainable consumption and production practices, contributing to the overall achievement of the task SDG 12.3. Implementing sustainable consumption and production practices

Table 4.3. Food wastage addressed to the framework of the UN Sustainable Development Goals

SDG	Explanation
SDG 2: Zero Hunger	**FWL directly** contradict the goal of achieving zero hunger. When edible food is wasted or lost at various stages of the supply chain, resources used to produce that food, such as water, land, and labour, are also wasted. By reducing food waste and loss, more food can be made available to feed the world's growing population, contributing to eradicating hunger.
SDG 3: Good Health and Wellbeing	**Food waste** and loss have implications for public health. When food is wasted, it not only represents a loss of resources but also contributes to environmental pollution, such as greenhouse gas emissions from decomposing organic waste in landfills. Addressing food waste can improve environmental quality, which in turn can have positive impacts on human health and well-being.
SDG 6: Clean Water and Sanitation	**Food production** requires significant amounts of water. When food is wasted, the water used in its production is also wasted. By reducing food waste, less water is needed to produce food, which can help alleviate pressure on water resources and contribute to achieving clean water and sanitation for all (Ringler et al., 2022).
SDG 7: Affordable and Clean Energy	**Food production,** processing, and distribution require energy inputs. The energy used in these processes is wasted when food is wasted. By reducing food waste, less energy is required, leading to greater energy efficiency and contributing to the goal of ensuring access to affordable and clean energy
SDG 8: Decent Work and Economic Growth	**Food waste** and loss have economic implications, as they represent a loss of resources and potential income for farmers, producers, and businesses along the supply chain. By reducing food waste, more resources can be used efficiently, increasing economic productivity and job creation, contributing to decent work and economic growth.
SDG 12: Responsible Consumption and Production	**Food waste** contributes to an unsustainable consumption and production model as it leads to the excessive use of natural resources, including water, arable land, and energy, which are essential for food production. Additionally, food waste generates greenhouse gas emissions through decomposition and fermentation processes, which produce methane and carbon dioxide.

Source: own work based on (United Nations, n.d.).

can counteract food waste by promoting efficient resource use e.g. water use, reducing overconsumption, and advocating responsible attitudes towards food purchasing and consumption (Ringler et al., 2022). Such actions may include consumer education on proper food storage and utilisation, supporting technological innovations to minimise losses throughout the supply chain, and promoting a circular economy that minimises waste generation. Thus, achieving Goal 12 can contribute to reducing food waste by creating more sustainable consumption and production patterns, which positively impacts the environment, economy, and society as a whole (Bartelings & Philippidis, 2024). Food waste has significant environmental impacts, but valorisation methods such as composting and biofuel production offer potential sustainable solutions (Trivedi et al., 2023).

4.4. Conclusions

The issue of food loss and waste should be viewed from a broad perspective by stakeholders due to its impact on various aspects of each country's economy. Any amount of waste is linked to a certain amount of resources, including water, energy, and manpower. Both industrial and household waste necessitate appropriate waste management strategies. Given the current situation, the question arises: do we have overly high standards? Can businesses and consumers transition to a model where growth is not synonymous with increased production and consumption? This raises the question of whether we are at risk of a food waste pandemic, or already experiencing it? Collaboration between the public administration (on European and national levels) and non-governmental organizations is essential to act at every stage of the food chain to prevent resource wastage. Considering the significant amount of food waste generated by households in Poland, Slovakia, and Czechia, it seems that this area requires the most effort. However, this area also appears to be the most challenging to address, because age, education, economic activity, and perceived income influence individual attitudes towards food waste.

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