rethink food resources,
losses, and waste 2023 retaste

Food waste in EU level: a spatial and statistical approach

[1]K. Synani, [2]P. Andreopoulos, [3]K. Kalogeropoulos, [4]K. Abeliotis and [4]K. Lasaridi

[1]*PHd candidate Harokopio University*
[2]*Dr. Harokopio University*
[3]*University of West Attica*
[4]*Professor Harokopio University*

Abstract

The European Union's circular economy action plan places a high priority on addressing food waste and transitioning to a more sustainable model of production and consumption. To gain a comprehensive understanding of the challenges posed by food waste, further research is needed to examine various factors associated with this global issue, which impacts both developed and developing economies at all stages of production and consumption. Spatial analysis is a valuable tool for tackling intricate problems with geographical components. It allows for the exploration and comprehension of data through a geographic lens, facilitating identifying relationships, quantifying perspectives, trend analysis, and predictive modeling to support decision-making. Spatial analysis goes beyond mere mapping, enabling the study of spatial characteristics and the relationships that evolve within these spaces. It is particularly useful for addressing questions that cannot be adequately answered through traditional statistical analysis, as it takes into account spatial context, including factors like location, proximity, and distance. This study has three main objectives: i) Mapping various parameters related to food waste in the European Union, ii) Applying spatial analysis techniques to investigate potential spatial relationships and patterns in food waste generation, both by country and across different stages of the supply chain, and iii) Combining spatial analysis tools with traditional statistical methods to explore possible correlations and associations between food waste and other socioeconomic factors at the national level. These insights can inform strategies to mitigate the environmental, economic, and social consequences of food waste, which not only lead to substantial financial losses but also contribute to environmental issues like greenhouse gas emissions, water pollution, and land degradation (Evans et al., 2012).

This study encompasses a spatial and statistical analysis of food waste across 24 European countries. The initial data were sourced from the Eurostat database, and ArcGIS Pro software was utilized to create maps illustrating the geographical distribution of food waste. Subsequently, spatial analysis was conducted to identify hotspots and investigate potential contributing factors. The outcomes of this analysis can serve as a

foundation for crafting policies and interventions aimed at reducing food waste in Europe, aligning with the broader goal of fostering more sustainable and equitable food systems. Moran's I index was employed to assess the spatial autocorrelation of food waste data in conjunction with selected indicators in European countries. Specifically, the study revealed a significant positive autocorrelation between the level of food waste at the primary production stage and each country's vegetable consumption potential. However, it is essential to acknowledge the complex underlying factors influencing food waste, including food production, consumption patterns, and food handling practices. These findings align with prior research on food waste, which has identified systemic factors such as supply chain inefficiencies, consumer behavior, and waste disposal practices as key contributors (Neff et al., 2015). In conclusion, the positive autocorrelation observed in certain study variables suggests that efforts to reduce food waste should encompass a multifaceted approach, addressing interconnected factors and tackling the root causes of waste, rather than relying solely on short-term solutions (Gustavsson et al., 2011).

Keywords: Food Waste, Comparison, Spatial Analysis, Autocorrelation, GIS, T-test

References
Evans, D., Campbell, H., Murcott, A. A Brief Pre-History of Food Waste and the Social Sciences. Sociological Review 2012, 60: 5– 26. https://doi.org/10.1111/1467-954X.12035

Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., & Meybeck, A. Global food losses and food waste: Extent, causes and prevention. Rome: FAO. 2011. ISBN 978-92-5-107205-9

Neff, R. A., Spiker, M. L., & Truant, P. L. Wasted food: US consumers' reported awareness, attitudes, and behaviors. PloS one, 2015, 10(6), e0127881. https://doi.org/10.1371/journal.pone.0127881