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# FORUM

## Invited article

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# FOOD WASTE: CHALLENGES AND OPPORTUNITIES IN SUSTAINABLE OPERATIONS

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## PURPOSE OF THE SPECIAL ISSUE

It is estimated that about 14% of the food produced in the world is lost before it reaches retail outlets (Food and Agriculture Organization of the United Nations [FAO], 2019), while an additional 17% of the food available for consumers is wasted (UNEP, 2021). Reducing and preventing food waste is important because negative externalities occur throughout the entire lifecycle of food and have an adverse impact on society. There are at least three major impacts: economic, environmental and social. Economically, resources used in production are wasted, such as land, water, labor, energy, etc. and profitability. Environmentally, it leads to unnecessary CO<sub>2</sub> emissions and air pollution, caused mainly by food being discarded on landfill sites, or being incinerated, and arable land and the machinery involved in producing and transporting food are occupied in vain. From a social and ethical standpoint, food loss and waste jeopardize opportunities for combatting food insecurity, with access to food reducing because of decreased availability, which drives up prices (Cicatiello, Franco, Pancino, & Blasi, 2016; FAO, 2013; Gustavsson, Cederberg, Sonesson, Otterdijk, & Meybeck, 2011; Kummu et al., 2012; Lundqvist, Fraiture, & Molden, 2008). Reducing food waste, therefore, can save economic resources, reduce costs, improve food security, minimize negative social and environmental impacts, and help answer the growing pressure that businesses are facing to become more sustainable (Thyberg & Tonjes, 2016), all of which help create a sustainable food system (Lipinski et al., 2013). Reducing and preventing food waste also meets the Agenda 2030 goals, since target 12.3 aims to halve food loss and waste in supply chains by 2030 (UN General Assembly, 2015). Due to the complex nature of food supply, however, it is a big challenge for researchers and practitioners alike (Raak, Symmank, Zahn, Aschemann-Witzel, & Rohm, 2017).

Food waste solutions, therefore, are the new frontier in the search for sustainability in operations management. Achieving target 12.3 of the UN's Sustainable Development Goals to halve food waste requires multidisciplinary efforts from all the stakeholders in food systems.

Covid-19 has increased the urgency to fight food waste, especially in terms of redistributing food to those vulnerable people who are affected by pandemics, and multiple efforts are being made by public, private and the third sectors to tackle food insecurity and hunger. The net effect of the pandemic on food waste will depend on how long it lasts, and on the impact it has on the global economy, on agri-food supply chains, and on households, as well as on the measures that are being taken by local authorities, and regional, national and global pandemic management (Burlea-Schiopoiu et al., 2021). We believe that this Special Forum, which was created before Covid-19 changed our lives, is an important reading and learning opportunity for all of us, as consumers, citizens and researchers.

## Contribution of the papers in this Special Forum

The call for papers for this Special Forum resulted in a very competitive selection of 37 being submitted. After several rounds of blind review, six papers were selected for this Special Forum. They clearly illustrate the challenges of carrying out research into sustainable operations and food waste reduction. They examine a variety of units of analysis and theories, which are embedded in different geographical contexts, and use a variety of analytical methods. What they all have in common is that they reveal just how applicable research aimed at finding solutions for reducing food waste is. In this Introductory article, we summarize the contributions of each of these six papers to the literature.

The first paper of this Special Forum (Costa, Campos, & Santana, 2021) reports the findings of an on-line survey of how consumer procrastination behavior relates to food waste, with 279 respondents answering questions that were analyzed using structural equation modelling. Findings are counterintuitive since procrastination has no direct relationship with food waste behavior. The paper uses the findings to illustrate the consumer side of food waste research and pose new questions. It contributes to our understanding of behavioral aspects of consumers related to food waste that can be helpful for promoting a sustainable food system.

Based on a systematic literature review, the second paper of this Special Forum (Santos & Martins, 2021) analyzes performance measurement systems and food waste. Findings reveal a conceptual map of the field and show how to move towards measuring supply chain performance systems. It contributes to food waste research by taking a supply chain perspective that can be applied to the flow of different food products.

The third paper of this special issue (Kazancoglu, Ekinei, Ozen, & Pala, 2021) describes the key elements of value stream mapping and illustrates it with a case study in Turkey. The study examines a single point, a meat processing plant, and is prescriptive for operations managers. It shows how a lean approach can minimize food waste in one focal company, and move it towards the circular economy.

The fourth paper is a systematic literature review of elements of resilience in food waste practices and the causes (Costa, Moraes, Silva, Pereira, Delai, & Jabbour, 2021). The study focuses on the application of elements of resilience at a single point on the supply chain, retail trade. The retail trade holds a powerful position in food distribution worldwide and by examining the theory this study points out important actions that can reduce food waste in retail operations.

The fifth paper is a single case study from a digital platform in Brazil (Moltene & Orsato, 2021). Digitalization in the food supply chain has been a major trend and this study focuses on the different kinds of digital platforms. It describes a case study of a digital platform that connects businesses that have surplus food with consumers. The study contributes to our understanding of the use and acceptance of this type of business model, which can help reduce food waste.

Using a single case study, the sixth paper of this Special Forum looked at the amount of food wasted by consumers in a Brazilian university dining hall during lunch time, and explored the factors that influence variations in the amount of food wasted (Deliberador, Batalha, Chung, & Cesar, 2021). With the findings of this study indicating that one of the causes of food waste is large portion sizes, which relate directly to the amount of food wasted, the paper suggests possible interventions for reducing it.

## FINAL REMARKS

Moving to production and consumption that are more sustainable is no easy matter. Research has been suggesting solutions, but they tend to focus on the consumer or the supply chain. This special issue contains relevant and rigorous research into the topic, mainly from an emerging country perspective. There is still the challenge, however, of how to integrate the consumer and supply chain sides using mixed methods in the same research, since the reasons food is wasted along the supply chain, from producer to household, are interconnected and require systemic analysis. We hope that this Special Forum contributes to advancing research into ways of reducing food waste.

We hope you enjoy your read.

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## AUTHOR'S CONTRIBUTION

Luciana Marques Vieira, Marcia Dutra de Barcellos, Gustavo Porpino de Araujo, Mattias Eriksson, Manoj Dora and Daniele Eckert Matzembacher worked on the conceptualization and theoretical-methodological approach. The theoretical review was conducted by Luciana Marques Vieira, Marcia Dutra de Barcellos, Gustavo Porpino de Araujo e Daniele Eckert Matzembacher Data collection was coordinated by Luciana Marques Vieira, Marcia Dutra de Barcellos, Gustavo Porpino de Araujo e Daniele Eckert Matzembacher Data analysis included Luciana Marques Vieira, Marcia Dutra de Barcellos, Gustavo Porpino de Araujo e Daniele Eckert Matzembacher. All authors worked together in the writing and final revision of the manuscript.