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## **FOOD WASTE MANAGEMENT PRACTICES AMONG HOTELS IN SERBIA AND MALAYSIA**

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### **Abstract**

*The aim of this article is to explore practices of food waste management among hotels in Serbia and Malaysia. The research results reveal that the examined hotels exercise food waste management, both through prevention, reuse and recycling, with certain differences observed among the two countries. However, collaboration with participants in the supply chain is far less developed. Hotels should consider industrial symbiosis not only from economic perspective, but also as an expression of their corporate social responsibility through helping their suppliers to avoid food loss. The article has both theoretical and practical implications as it addresses the importance of food waste and loss, which is still in its infancy in terms of research and implementation. Hotel managers are provided with examples and guidance regarding food waste management, helping them to improve the triple bottom line.*

**Key Words:** *food waste management, hotel, sustainability, corporate social responsibility, supply chain, business performance*

**JEL classification:** *M11*

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## Introduction

Food and Agriculture Organization of the United Nations (FAO) defines food waste as food appropriate for human consumption which is discarded, usually after expiry date or due to spoilage, which mostly occurs as a result of oversupply or consumer habits (FAO, 2013). It includes both the edible and inedible food components that could be recycled or managed in another way (Öestergren et al., 2014). According to Eurostat (2023), more than 58 million tons of food waste was produced in the EU in 2021, with restaurants and food service providers generating more than 5 million tons, the same as primary food producers, representing 9% of the total waste generated by each group. In the literature, a distinction is made between food waste and food loss, depending on the stage of the supply chain at which a discharge of food materials occurs (Jeswani et al., 2021). Food loss occurs at the agricultural and manufacturing stages, while food waste occurs at the retail and consumption stages. Factors leading to food loss and waste can include inadequate planning, production technology, transportation and storage conditions, handling, excessive purchasing, excessive preparation, sales agreement, quality standards, consumer behavior, and the lack of coordination within the food supply chain (Giroto et al., 2015).

Globally, around 13% of food is wasted at the pre-retail stage and around 17% at the retail, food service and household stages (United Nations, 2023). As Jeswani et al. (2021) note, food waste has social, economic and environmental impacts. On the one hand, food loss and waste imply the waste of resources, such as land, fresh water, energy for production, transportation and storage, chemicals, human labor, etc., while, on the other, unnecessary negative impact is made, such as methane and carbon dioxide emissions from production, processing, transportation, storage and disposal in landfills, as well as damage to ecosystems. In addition, the world's population is growing, increasing the demand for food with limited resources, which can lead to insufficient quantity and quality of food as well as high food costs.

Companies are trying to minimize the cost of waste by better planning, using returnable packages, recycling etc., which reduces negative impact on the natural environment and enables access to cheaper resources from recycled waste. In the face of high customer demand, intense competition, polluted environment and economic crises, companies see waste management as an important source to improve business performance.

Apart from reducing costs, waste management also has a marketing effect and strengthens the image of companies through socially responsible behavior. This is especially true for hotels that produce large amounts of solid waste, gas emissions and polluted water. Food waste in the hospitality sector is becoming an increasingly important issue, as it has recently accounted for almost 12% of total food waste (Tostivint et al., 2016). The eating out trend, fueled by the growth of income and tourism, has made food waste a major issue in the hospitality industry, both in developed and developing countries (Wang et al., 2017). According to Amicarelli et al. (2022), more than a third of solid hotel waste comes from food. For this reason, hotel companies are paying great attention to food waste management to save costs, especially in the post-COVID-19 era, which is characterized by financial exhaustion, higher inflation, labor shortages and changing guest expectations. The policies and targets of international and national bodies, including hotel chains, have put pressure on many hotels and restaurants worldwide to manage waste. Yet the potential of working with supply chain partners in this regard is often neglected.

Asia produces over 50% of the world's food waste and therefore this region bears a great responsibility for achieving Goal 12.3 of the 2030 Agenda for Sustainable Development (Rabobank, 2021). This has increased attention and investment in food waste management and practices from this region can serve as a good basis for comparison and learning. This paper aims to explore and compare food waste management practices among hotels in Serbia and Malaysia, in order to identify good examples and potential areas for improvement.

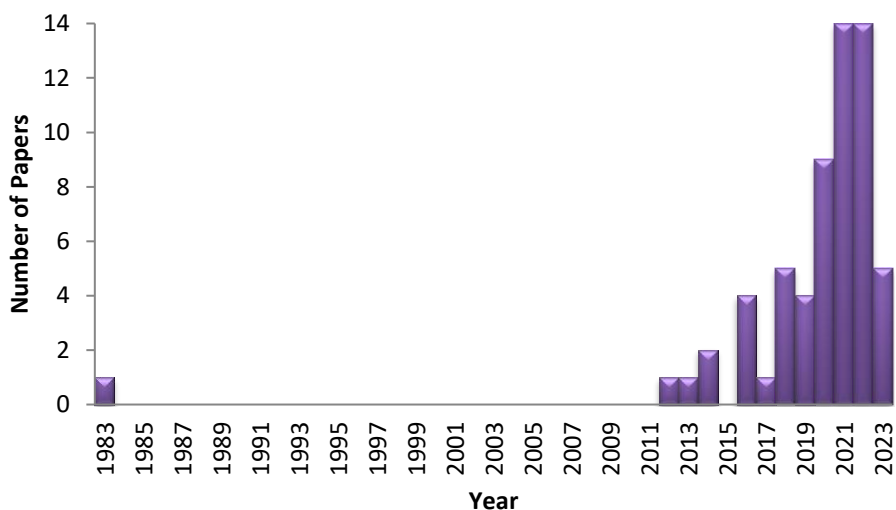
### **Literature review**

Research into the management of food waste in the hotel industry is not yet saturated, but is still in its infancy. There are a total of 62 research papers in the SCOPUS database from 1983 to 2023. As can be seen in Figure 1, the first paper was published in 1983 and there was a vacuum in research on this topic until 2012, when a steady and increasing interest from academics began. United Nations Conference on Sustainable Development (UNCSD) was held in June 2012 in Rio de Janeiro, Brazil, with the aim to reconcile the economic and environmental goals of the global community. Leaders of member states were supposed to jointly define a direction of sustainable development leading to the decent standard for living for all people, while protecting natural resources and ecosystems. As a result, clear and practical guidelines for sustainable

development were proposed (United Nations, 2012), while the importance of this topic started to arouse the attention of researchers worldwide.

Amicarelli et al. (2022) compared food waste management practices between an Italian and a Romanian hotel in order to identify trends, weaknesses and opportunities in this process. A good example can be observed in case of Italian hotel, which cooperate with local food suppliers who offer discounts to avoid food loss. The two parties work together to further limit food waste by transforming fresh fruit into jam. This is a win-win situation enabling shared economic gains and limited food waste. Srijuntrapun et al. (2022) mention creating new products from edible food waste as one of sustainable solutions in food waste management. Most of studies concern solving problems of hotel food waste, but the possibility of cooperation upstream the supply chain to help suppliers manage their waste within corporate social responsibility practices is rather neglected. Lagioia et al. (2024) find that despite the high level of awareness of food waste issues among hotel managers, implementation of circularity practices are at much lower level.

Figure 1: *Scientific research on the management of food waste in the hotel industry 1983-2023*



Source: *Authors using data from the SCOPUS database as of January 23, 2024*

Jeswani et al. (2021) note that waste reduction practices, such as initiatives and agreements, can be observed in the hospitality industry, but hardly in agriculture and food production, which are a notable source of food loss. The authors also point to the interlinkages between each link in the supply chain and argue that waste in one link may be caused by another link, e.g. quality standards for fruit and vegetables. This observation implies the need for cooperation between participants in the food supply chain to minimize food loss and waste.

Neves et al. (2019) state that industrial symbiosis is reflected in cooperation between companies, where one company uses waste from another company as a raw material, or they share resources. The logic of the term industrial symbiosis lies behind the mutually beneficial relationships of participants who end-up in a win-win economic position while reducing the negative impact on the environment. Kerdlap et al. (2019) describe circular economy as „a new paradigm for managing increasing volumes of waste that is coupled with economic growth” (p. 655). The authors argue that circular flows of resources across different entities in the supply chain are enabled through industrial symbiosis, and numerous tools are developed to support networking for exchanging waste as resources, such as platforms and applications, including their Industrial Symbiosis-Life Cycle Analysis for measuring environmental benefits of industrial symbiosis. Sorin and Sivarajah (2021) find that supply chain cooperation, as well as regulatory and fiscal environment are particularly important enablers of the circular economy. They point out that hotels are rather unaware of circular economy business model that enables value co-creation; there is a limited collaboration especially with partners upstream the supply chain; and the understanding of circular economy by employees, suppliers and customers should be strengthened.

Food waste in restaurants can be reduced by improved menu planning and purchase procedures, useful storage options, and better training of food production and service personnel on food waste collection (Gössling et al., 2011; Gunders, 2012). Educating and training employees with guidelines and introducing standardized practices, as well as training employees in communicating with customers to improve portioning could be some solutions for the future (Marthinsen et al., 2012). Moreover, raising consumer awareness of the food waste implications can further help solving this problem.

One of solutions to the food waste problem could be a „smart waste management system” with intelligent sensors, visual cameras and hyperspectral cameras with an automatic waste sorting machine to examine non-recyclable waste. In this way, artificial intelligence (AI) technology could be used to automatically identify food waste. AI can also help to identify avoidable food waste and prevent edible food from being thrown away. For this reason, AI is one of the most important technological developments of the Industry 4.0 era and a unique opportunity to transform the food economy from a linear to a circular model.

### **Methodology and findings**

First part of empirical investigation was conducted in Serbia, among 4-star hotels of the largest city and tourism destination Belgrade, as well as the largest spa destination Vrnjačka Banja. For the purpose of obtaining data, a structured interview was conducted with the hotels’ chefs and general managers. Participants in the survey were asked how they prevent creating food waste, i.e. what are the practices and activities, and whether they cooperate with other participants in the food supply chain to help minimize both food loss and food waste. The results reveal that hotels take care of food waste, but their attention is mostly focused within the own boundaries. They prefer direct cooperation with fruit and vegetable producers. The hotel from Vrnjačka Banja helps producers to manage food loss by taking products which are not fresh any more at a lower price. However, there is no further cooperation, e.g. in processing fruit and vegetables into other products such as jam and using them in the hotel. Following the guest attendance is an important approach this hotel uses to plan food production and prevent waste. The hotel from Belgrade attempts to design a menu in such a way that all parts of the products are used, making no waste as a result. Food leftovers are used for employees in the canteen. However, the possibility of working with suppliers to manage food loss is rather unknown in that hotel.

The second part of empirical research was conducted in Malaysia, involving chefs and suppliers from two largest cities, Kuala Lumpur and Selangor. The results show that most hotel chefs care about food waste because of cost pressure, rather than for sustainability purpose, except in multinational hotel groups that insist on food waste prevention as an attempt towards sustainability, and introduce audit requirements for chefs concerning this issue. Attention is mostly concentrated on food waste

prevention through inventory control and higher frequency of purchase in smaller quantities. Consequently, food suppliers introduce individual quick freezing products (IQF) instead of fresh goods to match the demand of higher frequency and stricter inventory control. Regarding waste reuse and recycling, it can be mentioned that leftover cooked food from hotel buffets are channeled to staff cafeteria or food bank organizations for underprivileged, and food waste compost is used as fertilizer. Chefs who creatively repurpose leftover/surplus/trim ingredients were very few and mostly are chefs who came back from overseas experience (largely influenced by their former workplace that cares about reducing food trims).

The overall findings from Serbia and Malaysia highlight the need for hotels to adopt a holistic approach to food waste management, emphasizing collaboration, sustainability integration, and staff engagement. In Serbia, while hotels prioritize food waste reduction within their boundaries, opportunities for collaboration with suppliers remain underexplored, highlighting the importance of enhancing partnerships for surplus product utilization and processing. Meanwhile, findings from Malaysia reveal a predominant focus on cost-driven motivations for waste management among hotel chefs, with multinational hotel groups leading efforts in sustainability through audit requirements and promotion of waste prevention measures. Practical implications include enhanced collaboration with suppliers, sustainability integration in food waste practices, staff training and awareness, corporate social responsibility initiatives, community engagement, and knowledge sharing to drive meaningful change towards reducing food waste and promoting sustainability in the hospitality industry.

### **Conclusion**

Food losses and food waste management has become an issue of rising importance worldwide, due to its economic, environmental and social aspects. Participants of food supply chains (i.e. farmers, processors, distributors and sellers) are nowadays forced to reduce food losses and waste by international and national policies, but they are also motivated to reduce costs and improve image. However, the current study reveals that most activities are conducted within boundaries of individual food supply chain participants and cooperation between them is rather weak and unstructured.

Food loss and waste reduction should be seen as an ethical obligation and concern of all participants in the food supply chain, as well as that of national and international bodies since it is related to the sustainability of food supply and has implications for the increased use of natural resources. It is an important issue to be addressed and its significance is not dependent on the level of a country's economic development. Customers also have an important role to play in improving the management of food waste by increasing their awareness of it and changing their behaviour.

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