Bibliometric analysis of studies on food waste in hotels

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Abstract.
The State of Food Security and Nutrition in the World 2023 report stated that over 3.1 billion people cannot afford a healthy diet. One-third of the food produced every year is wasted. It aims to halve global food waste by 2030. Hotels are one of the businesses where food production and consumption is most intense. Hotels may face severe food waste problems. This study aims to conduct a bibliometric analysis of studies on hotel food waste. One hundred eighty publications on food waste in hotels obtained from the WoS database were analyzed through VOSviewer software. Relationship networks have been created through co-authorship, co-occurrence, citation, and co-citation links.

Keywords:
Food waste
Hotels
WoS
VOSviewer

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1. Introduction

Food waste, accepted worldwide as a global problem, is defined in the United Nations Environment Program (UNEP, 2023a) report as simply the excessive use of produced food and throwing it away without consumption. According to World Hunger Education Service (2023), food waste is defined as food initially intended for human consumption but not consumed by humans. In the State of Food Security and Nutrition in the World 2023 report (FAO, IFAD, UNICEF, WFP, and WHO 2023), it is stated that nearly 783 million people around the world face hunger in 2022, and more than 3.1 billion people cannot afford a healthy diet in 2021. An estimated 13 percent of the world's food is lost in the post-harvest supply chain before the retail phase, while another 17 percent is wasted in homes, food services, and retail (UNEP, 2023a). This report states that one-third of the food produced in the world every year is wasted, which is a growing concern. In 2015, the "Agenda2030" report, which includes the Sustainable Development Goals, was prepared at the United Nations General Assembly as a road map containing what needs to be completed by 2030 to eliminate poverty, protect our planet, and combat inequality and injustice. The report calls for halving global food waste per capita at retail and consumer levels and reducing food losses along production and supply chains. The Kunming Montreal Global Biodiversity Framework (GBF) also calls for, among other things, “halving global food waste by 2030.” The common voice of these institutions working for the future of humanity and the world is accelerating actions to reduce food loss and waste and transforming agricultural food systems to provide tangible benefits for people and the planet (UNEP, 2023b).

2. Literature

Food wastage in hotels constitutes a significant issue on an industrial scale, carrying substantial implications from environmental, economic, and ethical standpoints (Bhajan et al., 2022). The hotel industry often procures large quantities of food and beverages. Still, it must improve to meet guest expectations, leading to increased wastage in fresh produce, prepared meals, or buffet presentations (Billore et al., 2023; Lagioia et al., 2023). Food wastage contributes to the
unnecessary use of resources and adversely impacts energy and water consumption while creating environmentally harmful waste. Moreover, squandering the efforts and resources invested in the production and transportation processes for wasted food adds to the predicament. The hotel industry can be pivotal in addressing this issue by establishing sustainable supply chains, adopting conscientious procurement and cooking practices to reduce waste, and implementing solutions such as food donation or recycling programs (Sezerel & Filimonau, 2023). Mitigating food wastage is paramount in environmental sustainability and societal responsibility (Yaşar et al., 2023). Taking steps in this direction allows hotels to utilize resources efficiently and set an example for the community.

Food waste has economic, economic, and social impacts (Bayındır & Demir, 2019). The economic dimension of food waste in the hotel industry has been extensively studied in the literature (e.g., Demir, 2014; Nair et al., 2017). The financial consequences of hotels from food waste have been demonstrated in some studies (e.g., Aditya & Kurniawati, 2023; Siddiqi & Bodolica, 2023). Some researchers (e.g., Billore, et al., 2023; Sezerel & Filimonau, 2023) conducted a comprehensive analysis outlining food waste's direct and indirect costs, highlighting its detrimental effects on operational budgets and profitability in the hospitality industry. Additionally, Bayındır and Demir (2019) highlight the economic burden created by inefficient management strategies in hotels, highlighting the significant savings potential of implementing waste reduction measures. The economic effects of food waste can have consequences not only at the micro but also at the macro level (Demir, 2014).

The environmental as well as economic effects of food waste in hotel businesses have received significant attention in academic research (e.g., Nair et al., 2017; Siddiqi & Bodolica, 2023). Many studies examining the ecological footprint caused by food waste (Demetriou, 2022) have highlighted its contribution to greenhouse gas emissions, resource depletion, and accumulation in landfills. Nair et al. (2019) and Lagioia et al. (2023) conducted a life cycle assessment that describes the environmental impacts of food
waste disposal methods commonly used by hotels and advocates for more sustainable waste management practices to reduce environmental damage. Negative effects caused by environmental effects can lead to consequences that can affect all people, animals, and plants.

The social impacts of food waste in the context of hotels have been studied with an increasing sociological dimension among scientists. Research by Mabaso (2017) and Nair et al. (2019) highlighted the social consequences of food waste in hotels, particularly its relationship to food insecurity and inequitable distribution issues. Demir (2014) examined the social responsibility of hoteliers in tackling food waste, highlighting the importance of community participation and initiatives aimed at redistributing excess food to alleviate social inequalities. Moreover, the importance of food waste in hotels was understood more clearly during the Covid-19 period. During the pandemic, limited restaurant services instead of open buffets showed how much food waste was in the past. Since many hotels need more rooms due to travel restrictions, booking cancellations, and falling customer demand (Demir et al., 2021), hotel food and beverage services have severely changed. Hotel restaurants and kitchens are usually planned for a specific capacity, entertainment-animation (Demir & Demir, 2015), and food orders are made based on this capacity. However, the scheduled amount of food can be wasted without being consumed due to sudden reservation cancellations or a decreasing number of customers during the pandemic. This situation may have significant consequences not only in economic terms but also in terms of social impacts.

3. Methodology

The study includes a bibliometric analysis of studies on food waste in hotels from the past to the present. The bibliometric review methodology is vital as it provides a categorized view of published documents in each research field based on objective criteria for analyzing and classifying publications. This analysis, done manually in the past, now allows much more data to be examined through computer package programs. One of the analysis methods developed for this purpose is "Vosviewer." The use of the VOSviewer software, in
turn, allows the presentation of the data in a graphical way through category maps (Cavalcante et al., 2021).

The data were obtained from the Web of Science (WoS), one of the most essential bibliographic databases. The WoS database was preferred because it collects scientific publications with the most significant impact. (Jimenez-Garcia et al. 2020). The scanning of documents in the WoS database was carried out in November 2023 using the keyword "food waste in hotels." Articles containing these terms in "all fields" were selected. "Sustainability Science," "Social Psychology," "Management," "Hospitality, Leisure, Sports & Tourism," and "Food Science & Technology" were selected in the Citation topics meso category. One hundred eighty publications were found under these search parameters. The data was then processed using VOSviewer, a similarity visualization program, to present some potential results graphically. Through the VOSviewer software, relationship networks were created through co-authorship, co-occurrence, citation, bibliographic coupling, or co-citation links, using the elements in the networks consisting of scientific publications, journals, researchers, research institutions, countries, keywords, and terms.

4. Data Analysis

4.1. Subsection publications by year

It is seen that the 180 studies obtained as a result of the search on food waste in hotels on the WoS database were primarily published in sustainability-related journals (127). Ten of these publications are review articles, 4 are early access, 104 are open access, and 43 are enriched cited references. When we look at the document types, we see that 156 are articles, 14 are proceeding papers, 10 are review articles, 4 are early access, and 2 are book chapters. The first research on food waste in hotels was published in 1987. The most publications were made in 2022 (37) and 2021 (37). As seen in Table 1, 71% of the publications on food waste in hotels were made in the last five years. The development of environmental awareness, the insufficient resources for all the world's citizens, and the increase in food deprivation and hunger in underdeveloped regions have led researchers to study the subject of waste. Hotels are a sector where food is
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used the most and, therefore, has a lot of waste, which may have led researchers to work in this field.

<table>
<thead>
<tr>
<th>Year of publication</th>
<th>Number of publications</th>
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<tbody>
<tr>
<td>2023</td>
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<td>2022</td>
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4.2. Publications by journal

It is seen that 180 studies were published in 97 different journals. Twenty-seven were published in Sustainability magazine, and 13 were published in the Journal Of Sustainable Tourism. The studies carried out are primarily associated with sustainability.

<table>
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<tr>
<th>Journal</th>
<th>Number</th>
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<tbody>
<tr>
<td>Sustainability</td>
<td>27</td>
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<tr>
<td>International Journal Of Hospitality Management</td>
<td>13</td>
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<tr>
<td>Journal Of Cleaner Production</td>
<td>7</td>
</tr>
<tr>
<td>Journal Of Sustainable Tourism</td>
<td>5</td>
</tr>
<tr>
<td>Journal Of The American Dietetic Association</td>
<td>5</td>
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4.3. Keyword analysis
One hundred eighty studies were analyzed on a keyword basis, and 639 keywords were identified. While the most repeated word, food waste, is seen in 58 studies, the word sustainability is seen in 23 studies, and the word hotel is seen in 23 studies. The words waste management and waste appear in a total of 14 studies.

4.4. Geographical analysis of publications
As can be seen in the co-authorship map of the countries, 27 publications on food waste were made in the USA, 17 in Norway, and 16 each in India, South Africa, and England. The country that received the most citations from these publications was Norway, with 734 citations.

4.5. Analysis by author
As of 2023, Amandeep Dhir has published the most on food waste in hotels with 14 studies and her studies have received 427 citations. Puneet Kaur is in second place with 11 publications and 320 citations, and Shalini Talwar is in third place with 10 publications and 267 citations.
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Figure 2
Co-authorship map of the countries

Figure 3
The map of the authors by publications and citations
5. Conclusion
This study analyzes studies conducted in hotels on food waste. One hundred eighty publications on this subject were analyzed in terms of year of publication, journals in which they were published, keywords used, authors, and number of citations. As a result of these analyses, it can be seen that the issue of food waste, especially in hotels, has been researched much more in the last five years. Although studies have been conducted in hotels, it is seen that the majority of the publications are published in journals in the field of sustainability. It was observed that most publications were made in the USA, but there were also quite a few studies conducted in South Africa and India. Food waste, now accepted worldwide as a global problem, is included in the Agenda 2030 report prepared by the United Nations as a road map for member countries. This report recommends that countries halve global food waste per capita and reduce food losses. Many foods can be wasted in hotels, one of the businesses that provide food service. This situation has led to increased studies on food waste in hotels. This study aimed to draw attention to the issue and guide those who will work on this subject in the future.

References:
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