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Reducing Food Loss and Waste in Restaurants: Exploring Determinants and Impacts - A Systematic Review

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ABSTRACT

Research on Food Loss and Waste (FLW) has mainly focused on quantifying causes, often neglecting strategies for mitigation. This article organizes literature on FLW determinants and effects in restaurants, reviewing 80 selected articles from Scopus and Web of Science. Findings reveal FLW in restaurants, determined by consumer behavior, restaurant management, and public policies, has economic and environmental effects. The study emphasizes the importance of investing in employee training and policies promoting FLW reduction. It also underscores the need for educating consumers on responsible consumption. Implementing these measures will foster sustainable and efficient food systems, minimizing adverse effects of food waste.

Keywords: food loss and waste; FLW; restaurants; systematic literature review

1 Introduction

It is estimated that one third of the world's food produced for human consumption is lost or wasted (FAO et al., 2019). One of the United Nation's goals is, by 2030, to "halve global per capita retail and consumer food waste, as well as food losses along production and supply chains, including post-harvest losses and consumer waste" (Johnston, 2016).

In an era of growing environmental consciousness, both professionals and academics show considerable interest in the subject of food waste (Meixner et al., 2020). The topic of reducing Food Loss and Waste (FLW) has been extensively researched, often with a focus on specific aspects such as the quantification and causes of waste. However, there has been relatively little discussion on the determinants and practices implemented to reduce FLW (de Moraes et al., 2020).

Annually, European countries produce around 88 million tons of food waste, of which 12%, or 11 million tons, is attributed to the food service sector (Stenmarck et al., 2016). A significant contributor to food waste in this sector is the leftover food from consumers in restaurants and cafés (Parfitt et al., 2013). A study conducted in the UK reported that 30% of the food waste generated in restaurants is attributed to plate waste (SRA, 2010). According to Thyberg and Tonjes (2016), making restaurants and food systems more sustainable is essential and urgent; actions across food systems are needed to moderate demand, produce more food, improve governance, and reduce food waste. Therefore, it is imperative to identify the determinants that contribute to FLW in the restaurant sector.

This underscores the significance of systematically organizing and analyzing global scientific research, specifically addressing FLW in restaurants, and identifying both the determining factors and the effects of such waste. In doing so, this research not only contributes to the existing literature on the subject but also offers valuable insights for public policymakers and individuals responsible for restaurant management.

To attain the objective of mapping research on FLW in restaurants, along with its determinants and

effects, this study addressed the following guiding questions: (1) What are the characteristics of the existing body of scientific research globally on FLW in restaurants? (2) What are the determinants and effects of food waste in restaurants? To achieve this, a systematic review of the literature was conducted using the Scopus and Web of Science databases, yielding 80 papers published between 2014 and 2023.

The main contributions of this article consist of organizing and summarizing the previous literature within the scope of FLW determinants and effects, considering the idiosyncrasies embedded in the foodservice context.

Furthermore, the authors propose a conceptual model that explicates the main determinants and effects of FLW in the restaurant's environment. Finally, we propose a call to action to empower restaurant owners and managers to devise proper solutions to mitigate FLW that might be applied in different serving formats.

The structure of the remaining sections in this article is as follows: Section 2 outlines the methodology employed for data collection and analysis. Section 3 presents the results obtained, while Section 4 provides a discussion. Finally, in Section 5, the article concludes with a summary, outlines the limitations of the study, and offers suggestions for future research.

2 Method

A systematic review of the literature was conducted following the PRISMA 2020 guideline, which "provides guidelines [...] for systematic reviews, which reflect advances in methods for identifying, selecting, evaluating and synthesizing studies" (Page et al., 2021). It is necessary to transparently describe the review design process and the literature collection method (Snyder, 2019). Therefore, defining a clear protocol for the article selection process is essential. Tranfield et al. (2003) highlight that the protocol defined before the start of the review process establishes the search strategy, the inclusion and exclusion criteria for studies, and the description of the methods to be used. The step-by-step process used in this research is presented in Table 1.

Table 1.
Systematic Review Protocol

1.Mapping the field through a scoping review
Objective
Map research on FLW in restaurants, along with its determinants and effects
Research Questions a) What are the characteristics of the existing body of scientific research globally on FLW in restaurants? b) What are the determinants and effects of food waste in restaurants?
2. Methodology
Search Terms: ("food wast*" OR "food los*" OR "FLW") AND ("restaurant*") AND ("practice*" OR "polic*" OR "mitig*" OR "initiav*")
Included Databases: Scopus, Web of Science (WoS)
Study Criteria:
Inclusion Criteria IC1: Articles published in Academic Journals IC2: Peer-reviewed journals IC3: Publication on the topic of FLW in restaurants IC4: Publication years between 2014 and 2023 IC5: Any language as publication language
Exclusion criteria EC1: Conference papers or book chapters EC2: Non-peer-reviewed Journals and grey literature EC3: Publication years before 2014
3. Quality Assessment
Assess the relevance of the studies concerned to answering the research question
4. Results
Report data obtained in the previous stage
5. Discussion
Summarize the main findings including the strength of evidence for each main outcome

6. Limitations
Highlight the limitations and any possible gaps to overcome
7. Conclusions
Provide a general interpretation of the results in the context of other evidence, and implications for future research

2.1 Definition of Databases

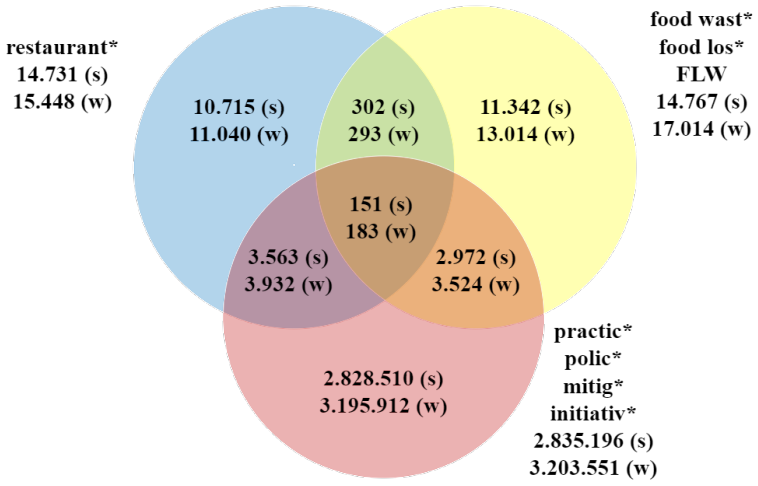
The Scopus and Web of Science databases were used to identify relevant academic research. The selection of these databases as sources of scientific literature was based on their comprehensive coverage and rigorous criteria in indexing articles. Webster and Watson (2002) emphasize that a thorough review must encompass relevant literature on the topic and cannot be limited to specific scientific journals.

2.2 Research and Data Collection Strategy

For Paul and Criado (2020), the definition of keywords used in the research strategy must be carried out according to the researcher's knowledge, judgment and experience. The terms were defined after reading articles that addressed the topic.

In this research, the terms "food waste" and "food loss" were used to identify articles addressing these themes. For this survey, any of the terms was considered valid and the search string used was (“food wast*” OR “food loss* OR “FLW”). The use of the asterisk is so that variations of the terms, such as “food waste” or “food wasting”, are considered, thus allowing for broader coverage. To delimit articles that specifically referred to the practices and initiatives adopted to mitigate FLW, the same strategy was followed, using the string (“practic*” OR “polic*” OR “mitig*” OR “initiav*”). Additionally, the selection was delimited with the string (“restaurant*”), selecting only articles containing the term "restaurant" and its variants, which aligns with the focus of this study. All terms were searched in the title, abstract, and keywords fields, as these sections contain the main terms of the articles.

The selected period for research encompassed publications from 2014 to 2023, covering a span of 10 years, which is considered appropriate for the analysis of publications on a specific topic (Vouga and Amatucci, 2015). The search was limited to articles published in scientific journals, excluding, for instance, conference papers, as the former generally adhere to higher quality standards for publication acceptance (Salazar-Moya and Garcia, 2021). Thus, the complete search string adopted was (TITLE-ABS-KEY (“food wast*” OR “food los*” OR “FLW”) AND TITLE-ABS-KEY (“restaurant*”) AND TITLE-ABS- KEY (“practice*” OR “polic*” OR “mitig*” OR “initiav*”)) AND PUBYEAR > 2013 AND PUBYEAR < 2024 AND (LIMIT-TO (SRCTYPE , “j”)), which brought, in survey carried out on January 04, 2024, a total of 151 publications in the Scopus database and 183 in the Web of Science that met all criteria, as shown in Figure 1.



(s): Scopus database
(w): Web of Science database

Figure 1. Number of Studies by Selection Criteria

2.3 Data Storage and Processing

All selected articles were downloaded and added to the Mendeley tool, considered good practice to facilitate the data processing (García-Peñalvo, 2022).

The first step involved removing duplicate searches between the two databases (n = 113) and excluding non-scientific articles (n = 31). Subsequently, the titles and abstracts of all articles were reviewed to screen for relevance to the study's topic, eliminating articles that did not align with the objective at this stage (n = 92). Following Snyder's (2019) recommendation, the titles and abstracts were initially reviewed for a preliminary selection, and then the full articles were read to make the final selection. The resulting articles were read in full, and those not adhering to the theme were excluded in a floating manner (n = 7).

After completing all the steps, as illustrated in Figure 2, a final selection of 80 valid articles were obtained for this systematic review.

2.4 Data Analysis and Interpretation

To achieve the objectives of this research, the selected articles were imported into the Atlas.ti tool for analysis. According to Lewis (2017), Atlas.ti provides significant assistance in systematic reviews for coding themes, determining how studies are related, and synthesizing results.

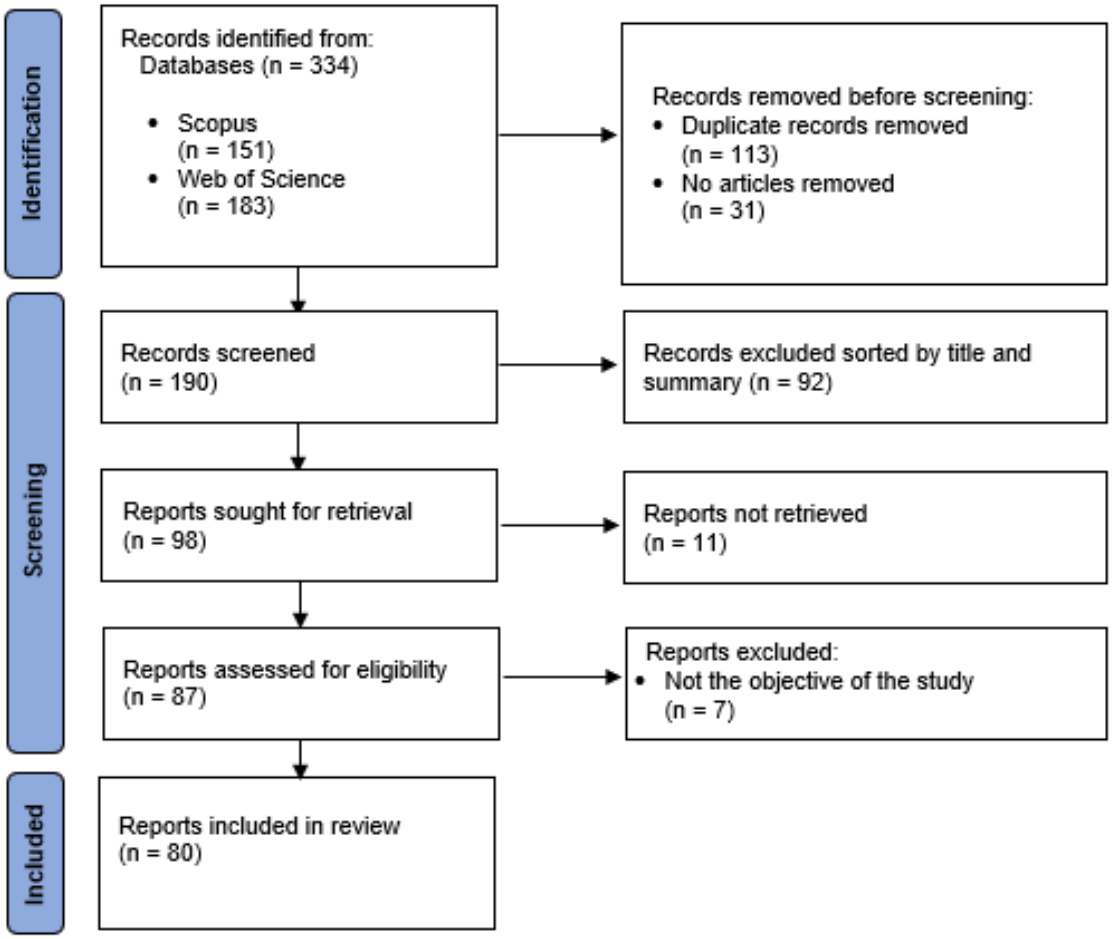


Figure 2. Flowchart of the Research Steps

3 Results

This section provides a synthesis of the main characteristics of the selected articles obtained in the systematic literature review.

3.1 Descriptive Analysis

When analyzing the years of publication of articles, there is an upward trend over the years, with a notable drop in the year 2022, the number of which remained consistent in the following year (Figure 3). In 2020 and 2021, restaurants faced in-person operating restrictions due to the COVID-19 pandemic, which may have impacted the publication of studies on FLW in these establishments. Conversely, there is an observable increase in articles published about the effects that these restrictions have had on restaurants (Bhoola, 2022; Karniouchina et al., 2022; Thoha et al., 2022).

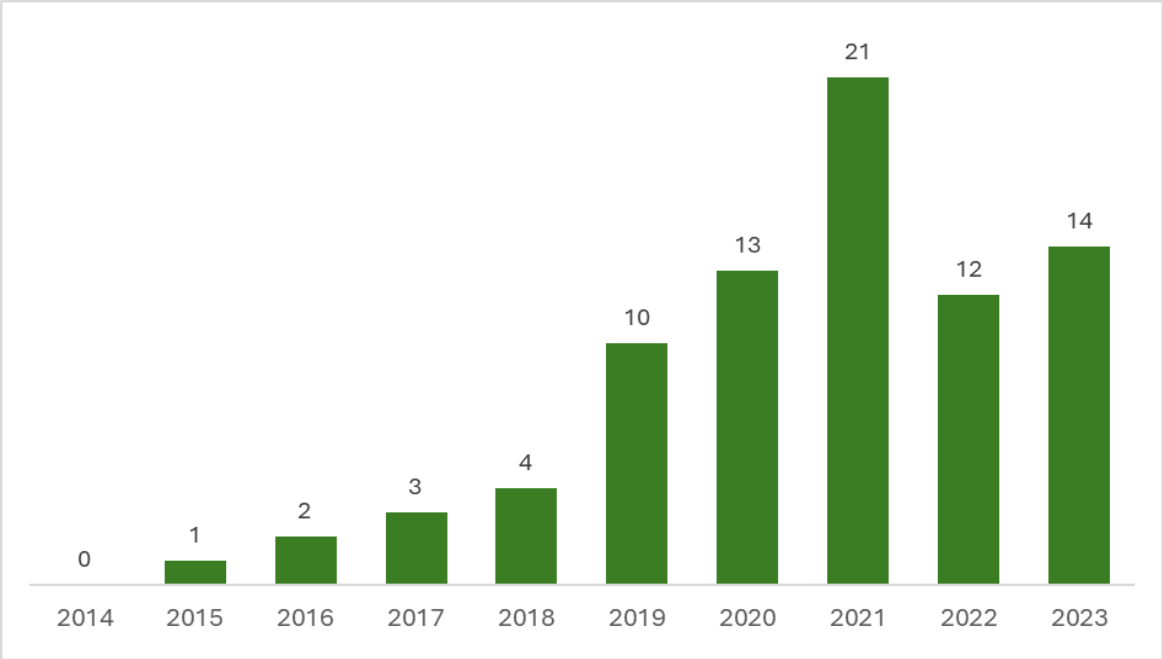


Figure 3. Publications per Year

The 80 selected studies found publication in 48 journals, as delineated in Table 1. While the subject matter has been disseminated across various journals, each, on average, addressed the topic infrequently, with an average of fewer than two publications in the last 10 years. This indicates that there is room for the topic to garner increased attention and research publications in the future.

Table 2.
Publications by Periodical

Periodical	Number
Journal of Cleaner Production	9
Sustainability (Switzerland)	8
British Food Journal	6
Waste Management	5
International Journal of Hospitality Management	4
Sustainability	3
International Journal on Food System Dynamics	2
Sustainable Production and Consumption	2
Tourism Management Perspectives	2
Others (one each)	39

The authors employed 351 keywords (Figure 4), with the most common being "food waste" (47), "restaurant(s)" (16), "sustainability" (7), "mitigation" (6), "consumer behavior" (4), and "environmental impact" (4). Notably, "sustainability," "environmental impact," and "consumer behavior" were not initially included in the database search terms, indicating their relevance as emerging themes.

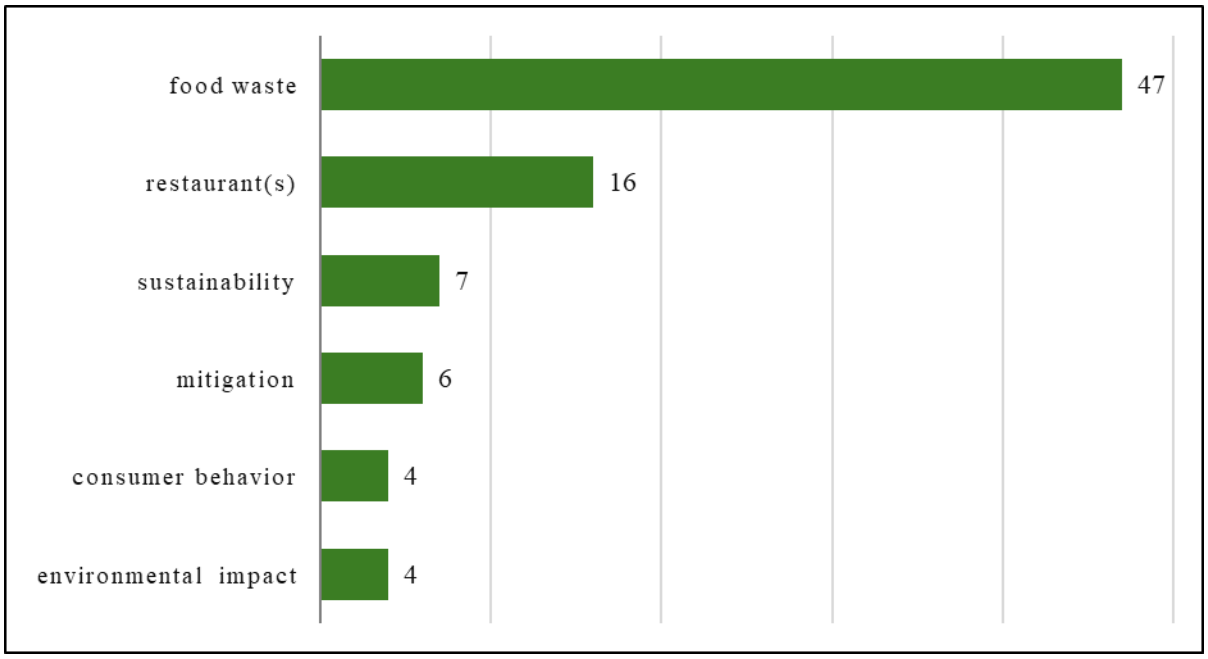


Figure 4. Most Used Keywords

3.2 Analytical Analysis

For a better comprehension of the articles and their interconnections, the VOSviewer software was employed to analyze the keywords, as illustrated in Figure 5.

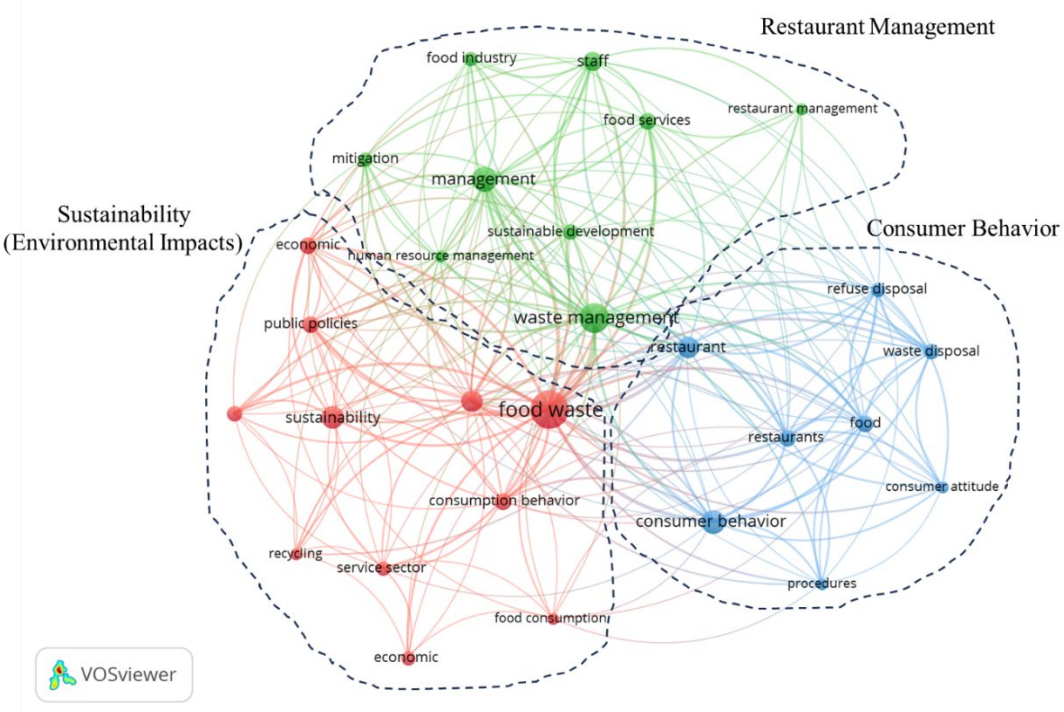


Figure 5. VOSviewer Clusters Map

As noted, three main clusters were identified, with some intersections between them, as classified by the author: Restaurant Management, Consumer Behavior, and Sustainability. These clusters served as the initial reference points in the coding process of the articles. However, during a detailed examination of each selected article, additional recurring themes were identified and subsequently coded: Public Policies and Economic Analysis.

Sustainability is a concept that encompasses economic, social, and environmental aspects (Ruggerio, 2021). An examination of the content of articles within the cluster initially categorized as Sustainability revealed that all articles focused on the environmental aspect. Finally, we have arrived at the key topics addressed in the literature, as outlined in Table 3.

Table 3.
Articles on Determinants and Effects of FLW in Restaurants

Topic	Nº.	Articles
Restaurant management	27	Akamatsu et al. (2022); Alcorn et al. (2021); Auwalin et al. (2022); Berkowitz et al. (2016); Bharucha (2018); Cozzio, Tokarchuk and Maurer (2021); Deliberador, César and Batalha (2021); Filimonau et al. (2022); Filimonau, V. et al. (2023); Filimonau, Krivcova and Pettit (2019); Filimonau, Zhang and Wang (2020); Hennchen (2019); Ko and Hong, (2023); Lemos and De Paula Castro (2021); Martin-Rios, Demen and Pasamar (2022); Maschio, et al. (2023); Mcadams et al. (2021); Montesdeoca-Calderon, Gil-Saura and Ruiz-Molina (2020); Nasser et al. (2021); Okumus et al. (2020) ; Rodriguez-Rodriguez et al. (2021); Sha'ari et al. (2023); Silvennoinen, Nisonen and Pietiläinen (2019); Stirnimann and Zizka (2022); Tagliabue and Sandaker (2019); Wu and Teng (2022); Zeineddine et al. (2021)
Consumer behavior	27	Antonschmidt and Lund-Durlacher (2021) ; Camilleri-Fenech et al. (2020); Çavuş, Bayhan and Ismail (2022); Chen et al. (2023); Coskun and Filimonau (2021); Coşkun and Özbük (2020); Filimonau et al. (2020b); Filimonau, Nghiem and Wang (2020); Hao et al. (2023); Huang and Tseng (2021); Kim, Che and Jeong (2023) ; Long et al. (2023); Marx-Pienaar et al. (2020); Massuga et al. (2022); Matzembacher et al. (2020); Mumtaz et al. (2022); Papargyropoulou et al. (2016); Sun, Shahrajabian and Cheng (2021); Tahir et al. (2022); Tahir et al. (2023); Talwar et al.. (2021); Talwar et al. (2023a); Tatano et al. (2017); Wang et al. (2022); Yi-Chi, Lin and Hsiao (2022); Wu et al. (2023); Yu et al. (2021)
Environmental impacts	16	Baltescu et al. (2022); Buczacki, Gladysz and Palmer (2021); Bux and Amicarelli (2023); Camilleri (2021); Charlebois, Creedy and Von Massow (2015); Delgado and Staszewska (2023); Erälinna and Szymoniuk (2021); Filimonau et al. (2019); Filimonau et al.. (2020a); Filimonau and Ermolaev (2021); Filimonau and Sulyok (2021); Gladysz, Buczacki and Haskins (2020); Gruia et al. (2021); Sakaguchi, Pak and Potts (2018); Tehrani, Fulton and Schmutz (2020); Zulkifli et al. (2019)
Public policies	6	Ai, Zheng (2019); Chalak, Abou-Daher and Abiad (2018); Dagiliute and Musteikyte (2019); Henz and Porpino (2017) ; Michalec et al. (2018); Reitemeier, Aheeyar and Drechsel (2021)
Economic analysis	4	Christ and Burritt (2017); Huiru et al. (2019); Lang et al. (2020); Papargyropoulou et al. (2019)

Based on the content of the articles, the main topics covered were (1) restaurant management, (2) consumer behavior, (3) environmental impacts, (4) public policies, and (5) economic analysis. Items (3) and (5) were treated as effects of FLW in restaurants, while (1) and (2) were considered as determining factors for FLW in restaurants, with public policies (4) acting as a moderator for restaurant management. Further discussion on this follows in the next section.

4 Discussion

According to the literature, it is possible to claim that FLW in restaurants has economic and environmental effects and depends on consumer behavior, as well as restaurant management, the latter being moderated by appropriate public policies. This relationship can be represented by the conceptual model proposed in Figure 6. A conceptual framework provides a visual representation of the essential components to be explored and the

interconnections among them. Constructed upon prior theoretical insights and empirical research findings (Miles et al., 2014), it serves as a comprehensive guide for understanding the subject matter.

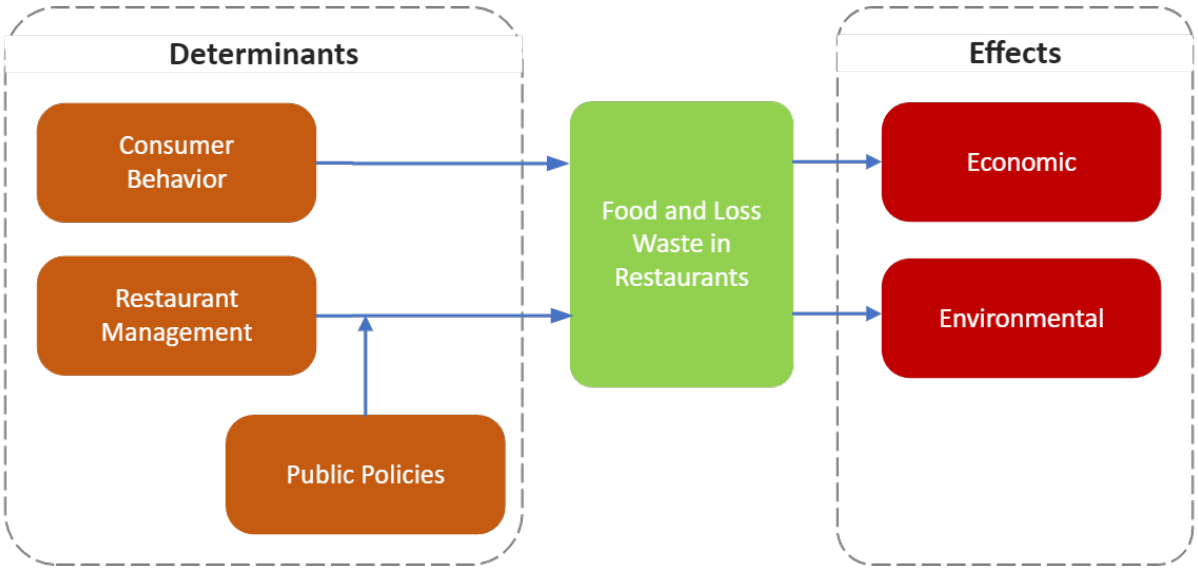


Figure 6. Determinants and Effects of FLW in Restaurants

4.1 Consumer Behavior

Part of food waste is due to consumer behavior. Irresponsible consumer behavior represents one of the key causes of food waste in restaurants (Filimonau et al., 2020b). Waste from consumers' dishes in restaurants is an important source of waste generated outside the home, with most of the food waste originating from the food service sector (Huang and Tseng, 2020). Çavuş, Bayhan, and Ismail (2022) concluded that while there is a level of consumer awareness regarding food waste, this awareness is not adequately translated into attitudes, behaviors, and practices. The authors suggest that educating individuals about factors such as environmental degradation resulting from food waste, the impact on health, poverty, and hunger in various regions would be advantageous.

This highlights the importance of changing consumer behavior to reduce food waste in restaurants. It is necessary to promote consumer awareness about the importance of avoiding food waste, encouraging responsible consumption practices, such as ordering only what is necessary, taking leftovers home, and making the most of food consumed outside the home.

4.2 Restaurant Management

Management also bears their share of responsibility. Lemos and De Paula Castro (2021) highlight that management influences food waste through operational violations resulting from unrecorded operations and administrative errors arising from discrepancies in controls and inventories caused by employee actions. Negligence and indifference of restaurant employees regarding waste were observed, and some incentives should be offered to minimize it (Bharucha, 2018).

Researchers Deliberador, da Silva César, and Batalha (2021) suggest regular training on correct preparation methods for restaurant employees, thus minimizing avoidable and potentially avoidable waste. It is important for leadership to raise awareness among employees about the importance of avoiding food waste, from the moment of preparation to the proper disposal of leftovers. Additionally, incentives offered by management, such as recognition and rewards programs, can be implemented to motivate employees to actively engage in reducing FLW in restaurants.

4.3 Public Policies

Public policies must be promoted to reduce food waste. Local governments play a key role in implementing effective strategies to minimize food waste in restaurants. As highlighted by Ai and Zheng (2019), public policies significantly influence the management of food waste by establishing regulations and guidelines for the handling of food waste in restaurants. This includes requiring the implementation of waste reduction strategies, proper food storage and handling, and the utilization of composting or recycling systems. Consequently, the approach adopted by a restaurant in managing FLW will vary according to the prevailing public policies. Moderation analysis is employed when interest is directed towards questions about the circumstances under which a certain variable influences another (Igartua and Hayes, 2021). Hence, we can assert that public policies play a moderating role in restaurant management concerning food waste.

One approach that could be implemented through public policies to address this issue is to offer free specialized training to restaurant managers and employees on how to mitigate food waste in kitchens (Filimonau, Zhang, and Wang, 2020). This may include proper techniques for storing, preparing, and managing leftovers. Furthermore, policies and regulations can be implemented to advocate the development of voluntary and even mandatory strategies aimed at reducing and preventing food waste (Chalak, Abou-Daher, and Abiad, 2018). Public policies can also encourage collaboration and networking among restaurants, waste management agencies, and other stakeholders to share best practices, resources, and solutions for food waste management (Ai and Zheng, 2019).

4.4 Economic Effects

Food waste represents a substantial economic loss of approximately 23% of the value of the food purchased, with the largest fraction of this loss occurring during the dish preparation process (Papargyropoulou et al., 2019). In addition to the direct economic effect, reducing FLW can result in savings for restaurants. The economic, environmental, and social effects of FLW are recognized at the highest levels of global governance (Papargyropoulou et al., 2019).

The acknowledgment of these effects emphasizes the economic significance of implementing comprehensive measures to address food waste. This not only underscores the environmental and social aspects but also highlights the potential economic gains achievable through the reduction of food waste, contributing to enhanced financial outcomes for businesses and economies on a global scale.

4.5 Environmental Impacts

FLW has salient effects on environmental dimensions. Concerns about health, social, environmental, and ethical issues have become increasingly relevant worldwide (Erälinna and Szymoniuk, 2021). Food waste is recognized as a problem causing significant negative socioeconomic and environmental effects (Filimonau et al., 2020a). Waste from discarded food results in negative effects on the environment, contributing to the increase in greenhouse gas production, the degradation of natural resources, and the loss of biodiversity, among other problems (Camilleri, 2021).

Therefore, addressing the reduction of food waste emerges as a fundamental requirement to alleviate the adverse environmental effects associated with both food production and disposal. The collective body of research underscores the pressing need for coordinated efforts in comprehensively managing FLW. This necessity extends beyond environmental considerations, as it plays a significant role in mitigating broader socioeconomic concerns on a global scale.

5 Conclusions

Food waste is a highly relevant topic, and waste in restaurants is significant in this regard. The findings of this systematic literature review show that restaurant management, consumer behavior, and appropriate public policies are the main determinants of food waste in restaurants, with the effects primarily being economic and environmental. Addressing this problem requires joint actions from everyone involved.

Food waste represents a substantial economic loss, so reducing FLW can result in savings for restaurants, highlighting the importance of implementing sustainable practices to minimize waste.

The environmental effects of FLW are increasingly recognized, as wasted food contributes to the production of greenhouse gases, degradation of natural resources, and loss of biodiversity.

Changing consumer behavior is key to reducing food waste in restaurants, as consumer dish waste is an essential source of waste generated outside the home. It is necessary to promote consumer awareness about the importance of avoiding food waste and encourage responsible consumption practices.

Restaurant management also plays a significant role in reducing food waste, as employee negligence and indifference can contribute to waste. Implementing regular training on correct preparation methods can minimize avoidable and potentially avoidable waste. Incentives, such as recognition and rewards programs, can also motivate employees to actively engage in reducing FLW in restaurants.

In addition to individual actions by consumers and restaurant managers, public policies play a fundamental role in reducing FLW. The government can implement strategies to minimize food waste in restaurants, including providing free specialized training for managers and employees on proper techniques for storing, preparing, and managing leftovers. Policies and regulations can also encourage sustainable practices, such as voluntary or mandatory programs to reduce and/or prevent food waste. Tax incentives for restaurants that implement sustainable practices may also be considered.

The limitation of the study lies in its sole use of the SCOPUS and Web of Science databases. To enhance the comprehensiveness of the research, it is recommended to address this limitation by extending the investigation to include other databases. For future research, qualitative studies are suggested to further deepen and understand each of the determinants of food waste. Theoretical models explaining these determinants can also be established and validated through quantitative research.

This systematic literature review advances the understanding of food waste in restaurants by organizing topics related to FLW, exploring their determinants and effects, and providing insights from the literature on actionable measures to mitigate food waste.

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References

Ai, N., & Zheng, J. (2019). Community-based food waste modeling and planning framework for urban regions. Journal of Agriculture, Food Systems, and Community Development, 9(1), 39-58.

Akamatsu, R., Tonsho, N., Saiki, M., Komatsu, M. (2022). Restaurant managers' readiness to maintain people's healthy weight and minimise food waste in Japan. *BMC Public Health*, *22*(1), 831.

Alcorn, M. R., Vega, D., Irvin, R., Paez, P. (2020). Reducing food waste: an exploration of a campus restaurant. *British Food Journal*, *123*(4), 1546-1559.

Antonschmidt, H., Lund-Durlacher, D. (2021). Stimulating food waste reduction behaviour among hotel guests through context manipulation. *Journal of Cleaner Production*, *329*, 129709.

Auwalin, I., Rumayya, Rahma Sari, F., Maulida, S. R. (2022). Applying the Pro-Circular change model to restaurant and retail businesses' preferences for circular economy: evidence from Indonesia. *Sustainability: Science, Practice and Policy*, *18*(1), 97-113.

Băltescu, C. A., Neacșu, N. A., Madar, A., Boșcor, D., Zamfirache, A. (2022). Sustainable development practices of restaurants in Romania and changes during the COVID-19 pandemic. *Sustainability*, *14*(7), 3798.

Berkowitz, S., Marquart, L., Mykerezi, E., Degeneffe, D., Reicks, M. (2016). Reduced-portion entrées in a worksite and restaurant setting: impact on food consumption and waste. *Public health nutrition*, *19*(16), 3048-3054.

Bharucha, J. (2018). Tackling the challenges of reducing and managing food waste in Mumbai restaurants. *British Food Journal*, *120*(3), 639-649.

Bhoola, S. (2022). The Impact of Covid-19 Pandemic Lockdown Measures on Restaurants in Durban, South Africa. *African Journal of Hospitality, Tourism and Leisure*, *11*(4), 1408-1424.

Buczacki, A., Gładysz, B., Palmer, E. (2021). HoReCa food waste and sustainable development goals—A systemic view. Sustainability, 13(10), 5510.

Bux, C., micarelli, V. (2023). Circular economy and sustainable strategies in the hospitality industry: Current trends and empirical implications. Tourism and Hospitality Research, 23(4), 624-636.

Camilleri, M. A. (2021). Sustainable production and consumption of food. Mise-en-place circular economy policies and waste management practices in tourism cities. *Sustainability*, *13*(17), 9986.

Camilleri-Fenech, M., i Sola, J. O., Farreny, R., Durany, X. G. (2020). A snapshot of solid waste generation in the hospitality industry. The case of a five-star hotel on the island of Malta. *Sustainable Production and Consumption*, *21*, 104-119.

Çavuş, O., Bayhan, I., Ismail, B. B. (2022). An overview of the effect of covid-19 on household food waste: How does the pandemic affect food waste at the household level?. International Journal on Food System Dynamics, 13(1), 1-16.

Chalak, A., Abou-Daher, C., Abiad, M. G. (2018). Generation of food waste in the hospitality and food retail and wholesale sectors: Lessons from developed economies. *Food Security*, *10*, 1279-1290.

Chang, Y. Y. C., Lin, J. H., Hsiao, C. H. (2022). Examining effective means to reduce food waste behaviour in buffet restaurants. *International Journal of Gastronomy and Food Science*, *29*, 100554.

Chen, F., Jiang, S., Gu, X., Zhiwei, W., Yang, L. (2023). External or internal beauty? A study on the mechanism influencing food waste behavior. Journal of Environmental Planning and Management, 1-19.

Charlebois, S., Creedy, A., von Massow, M. (2015). "Back of house"–focused study on food waste in fine dining: the case of Delish restaurants. *International Journal of Culture, Tourism and Hospitality Research*, *9*(3), 278-291.

Christ, K. L., Burritt, R. (2017). Material flow cost accounting for food waste in the restaurant industry. *British Food Journal*, *119*(3), 600-612.

Coşkun, A., Özbük, R. M. Y. (2020). What influences consumer food waste behavior in restaurants? An application of the extended theory of planned behavior. *Waste Management*, *117*, 170-178.

Cozzio, C., Tokarchuk, O., Maurer, O. (2021). Minimising plate waste at hotel breakfast buffets: an experimental approach through persuasive messages. *British Food Journal*, *123*(9), 3208-3227.

Dagiliūtė, R., Musteikytė, A. (2019). Food waste generation: Restaurant data and consumer attitudes. *Environmental Research, Engineering and Management*, *75*(2), 7-14.

De Moraes, C. C., de Oliveira Costa, F. H., Pereira, C. R., Da Silva, A. L., Delai, I. (2020). Retail food waste: mapping causes and reduction practices. *Journal of Cleaner Production*, *256*, 120124.

Delgado, A., Rodriguez, R., taszewska, A. (2023). Tackling Food Waste in the Tourism Sector: Towards a Responsible Consumption Trend. Sustainability, 15(17), 13226.

Deliberador, L. R., César, A. D. S., Batalha, M. O. (2021). How to fight food waste in university restaurants?. *Gestão & Produção*, *28*, e5415.

Erälinna, L., Szymoniuk, B. (2021). Managing a circular food system in sustainable urban farming. Experimental research at the Turku University Campus (Finland). *Sustainability*, *13*(11), 6231.

FAO, E. (2019). Moving forward on food loss and waste reduction. *The State of Food and Agriculture 2019*.

FAO, IFAD, UNICEF, WFP, WHO. (2023). The State of Food Security and Nutrition in the World 2023. Urbanization, agrifood systems transformation and healthy diets across the rural–urban continuum. Rome: FAO.

Filimonau, V., Chiang, C. C., Wang, L. E., Muhialdin, B. J., Ermolaev, V. A. (2023). Resourcefulness of chefs and food waste prevention in fine dining restaurants. International Journal of Hospitality Management, 108, 103368.

Filimonau, V., Fidan, H., Alexieva, I., Dragoev, S., Marinova, D. D. (2019). Restaurant food waste and the

determinants of its effective management in Bulgaria: An exploratory case study of restaurants in Plovdiv. *Tourism Management Perspectives*, *32*, 100577.

Filimonau, V., Todorova, E., Mzembe, A., Sauer, L., Yankholmes, A. (2020a). A comparative study of food waste management in full service restaurants of the United Kingdom and the Netherlands. *Journal of Cleaner Production*, *258*, 120775.

Filimonau, V., Matute, J., Kubal-Czerwińska, M., Krzesiwo, K., Mika, M. (2020b). The determinants of consumer engagement in restaurant food waste mitigation in Poland: An exploratory study. *Journal of Cleaner Production*, *247*, 119105.

Filimonau, V., Matyakubov, U., Allonazarov, O., Ermolaev, V. A. (2022). Food waste and its management in restaurants of a transition economy: An exploratory study of Uzbekistan. *Sustainable Production and Consumption*, *29*, 25-35.

Filimonau, V., Krivcova, M., Pettit, F. (2019). An exploratory study of managerial approaches to food waste mitigation in coffee shops. *International Journal of Hospitality Management*, *76*, 48-57.

Filimonau, V., Ermolaev, V. A. (2021). A sleeping giant? Food waste in the foodservice sector of Russia. *Journal of Cleaner Production*, *297*, 126705.

Filimonau, V., Nghiem, V. N., Wang, L. E. (2021). Food waste management in ethnic food restaurants. *International Journal of Hospitality Management*, *92*, 102731.

Filimonau, V., Sulyok, J. (2021). 'Bin it and forget it!': The challenges of food waste management in restaurants of a mid-sized Hungarian city. *Tourism Management Perspectives*, *37*, 100759.

Filimonau, V., Uddin, R. (2021). Food waste management in chain-affiliated and independent consumers' places: A preliminary and exploratory study. *Journal of Cleaner Production*, *319*, 128721.

Filimonau, V., Zhang, H., Wang, L. E. (2020). Food waste management in Shanghai full-service restaurants: A senior managers' perspective. *Journal of Cleaner Production*, *258*, 120975.

García-Peñalvo, F. J. (2022). Developing robust state-of-the-art reports: Systematic Literature Reviews.

Gładysz, B., Buczacki, A., Haskins, C. (2020). Lean management approach to reduce waste in HoReCa food services. *Resources*, *9*(12), 144.

Gruia, R., Florescu, G. I., Gaceu, L., Oprea, O. B., Ţane, N. (2021). Reducing environmental risk by applying a polyvalent model of waste management in the restaurant industry. *Sustainability*, *13*(11), 5852.

Hao, N., Wang, H. H., Wang, X., Michael, W. (2023). Will the "nouveau-riche"(new-rich) waste more food? Evidence from China. China Agricultural Economic Review.

Hennchen, B. (2019). Knowing the kitchen: Applying practice theory to issues of food waste in the food service sector. *Journal of Cleaner Production*, *225*, 675-683.

Henz, G. P., Porpino, G. (2017). Food losses and waste: how Brazil is facing this global challenge?. *Horticultura Brasileira*, *35*, 472-482.

Huang, C. H., Tseng, H. Y. (2020). An exploratory study of consumer food waste attitudes, social norms, behavioral intentions, and restaurant plate waste behaviors in Taiwan. *Sustainability*, *12*(22), 9784.

Huiru, Z., Yunjun, Y., Liberti, F., Pietro, B., Fantozzi, F. (2019). Technical and economic feasibility analysis of an anaerobic digestion plant fed with canteen food waste. *Energy Conversion and Management*, *180*, 938-948.

Igartua, J. J., & Hayes, A. F. (2021). Mediation, moderation, and conditional process analysis: Concepts, computations, and some common confusions. The Spanish Journal of Psychology, 24, e49.

Karniouchina, K., Sarangee, K., Theokary, C., Kübler, R. (2022). The Impact of the COVID-19 pandemic on restaurant resilience: Lessons, generalizations, and ideas for future research. *Service Science*, *14*(2), 121-138.

Kim, W., Che, C., Jeong, C. (2023). Restaurant customers' food leftover reduction intention derived from nature connection and biospheric values: A comparison between men and women. Frontiers in Psychology, 13, 976102.

Ko, W. H., Hong, Y. L. (2023). Establishment and implementation of behavioral observation scale for avoiding food waste for hospitality students. International Journal of Sustainability in Higher Education.

Lang, L., Wang, Y., Chen, X., Zhang, Z., Yang, N., Xue, B., Han, W. (2020). Awareness of food waste recycling in restaurants: evidence from China. *Resources, Conservation and Recycling*, *161*, 104949.

Lemos, F. K., de Paula Castro, L. (2021). Food Retail as the Coordinator Agent of Food Supply Chain: Challenges and Opportunities for Reducing Loss and Waste. International Journal on Food System Dynamics, 12(3), 246-254.

Lewis, J. (2016). Using ATLAS. ti to facilitate data analysis for a systematic review of leadership competencies in the completion of a doctoral dissertation. *Available at SSRN 2850726*.

Long, F., Ooi, C. S., Gui, T., Ngah, A. H. (2023). Restaurant food waste among Chinese consumers in a group context: an extended value-attitude-behaviour (VAB) hierarchy with information publicity. British Food Journal.

Martin-Rios, C., Demen Meier, C., Pasamar, S. (2022). Sustainable waste management solutions for the foodservice industry: A Delphi study. *Waste Management & Research*, *40*(9), 1412-1423.

Marx-Pienaar, N. J. M. M., Du Rand, G. E., Fisher, H. J. H., Viljoen, A. T. (2020). The South African quick service restaurant industry and the wasteful company it keeps.

Maschio, G., Stoll, L., Hoppe, A., Sant'Anna, V. (2023). Heath, nutrition and sustainability are in the core heart of Brazilian consumers' perception of whole foods utilization. International Journal of Gastronomy and Food Science, 31, 100640.

Massuga, F, et al. (2022). Generation and disposal of solid waste in restaurants: consumer concerns. *Journal of Cleaner Production*, v. 19, p. 104-132.

Matzembacher, D. E., Brancoli, P., Maia, L. M., Eriksson, M. (2020). Consumer's food waste in different restaurants configuration: A comparison between different levels of incentive and interaction. *Waste Management*, *114*, 263-273.

Meixner, O., Kolmhofer, N. E., Katt, F. (2020). Consumers' food waste knowledge in Austria. International Journal on Food System Dynamics, 11(4), 402-412.

Montesdeoca-Calderón, M. G., Gil-Saura, I., Ruiz-Molina, M. E. (2020). How do food green practices and food waste management influence on the brand equity of restaurants?. *Estudios Gerenciales*, *36*(154), 100-113.

Michalec, A., Fodor, M., Hayes, E., Longhurst, J. (2018). Co-designing food waste services in the catering sector. *British Food Journal*, *120*(12), 2762-2777.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook. 3rd.

Mumtaz, S., Chu, A. M., Attiq, S., Shah, H. J., Wong, W. K. (2022). Habit—Does It Matter? Bringing Habit and Emotion into the Development of Consumer's Food Waste Reduction Behavior with the Lens of the Theory of Interpersonal Behavior. *International Journal of Environmental Research and Public Health*, *19*(10), 6312.

Okumus, B., Taheri, B., Giritlioglu, I., Gannon, M. J. (2020). Tackling food waste in all-inclusive resort hotels. *International Journal of Hospitality Management*, *88*, 102543.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *International journal of surgery*, *88*, 105906.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... Moher, D. (2023). A declaração PRISMA 2020: diretriz atualizada para relatar revisões sistemáticas. *Revista Panamericana de Salud Pública*, *46*, e112.

Papargyropoulou, E., Wright, N., Lozano, R., Steinberger, J., Padfield, R., Ujang, Z. (2016). Conceptual framework for the study of food waste generation and prevention in the hospitality sector. *Waste management*, *49*, 326-336.

Papargyropoulou, E., Steinberger, J. K., Wright, N., Lozano, R., Padfield, R., Ujang, Z. (2019). Patterns and causes of food waste in the hospitality and food service sector: Food waste prevention insights from Malaysia. *Sustainability*, *11*(21), 6016.

Parfitt, J., Eatherley, D., Hawkins, R., & Prowse, G. (2013). Waste in the UK hospitality and food service sector. Technical Report No. HFS001-00 6.

Paul, J., Criado, A. R. (2020). The art of writing literature review: What do we know and what do we need to know?. *International business review*, *29*(4), 101717.

Reitemeier, M., Aheeyar, M., Drechsel, P. (2021). Perceptions of food waste reduction in Sri Lanka's commercial capital, Colombo. *Sustainability*, *13*(2), 838.

Rodríguez-Rodríguez, A., Mejías-Elizondo, R., Acuña-Piedra, A., Vindas-Chacón, C. (2021). Food loss and food waste assesment at the Instituto Tecnológico de Costa Rica. *Revista Tecnología en Marcha*, *34*(4), 16-27.

Ruggerio, C. A. (2021). Sustainability and sustainable development: A review of principles and definitions. Science of the Total Environment, 786, 147481.

Salazar-Moya, A., Garcia, M. V. (2021). Lot streaming in different types of production processes: A prisma systematic review. *Designs*, *5*(4), 67.

Sakaguchi, L., Pak, N., Potts, M. D. (2018). Tackling the issue of food waste in restaurants: Options for measurement method, reduction, and behavioral change. *Journal of Cleaner Production*, *180*, 430-436.

Sha'ari, N. S. M., Sazali, U. S., Zolkipli, A. T., Vargas, R. Q., Shafie, F. A. (2023). Environmental assessment of casual dining restaurants in urban and suburban areas of peninsular Malaysia during the COVID-19 pandemic. Environmental Monitoring and Assessment, 195(2), 346.

Silvennoinen, K., Nisonen, S., Pietiläinen, O. (2019). Food waste case study and monitoring developing in Finnish food services. *Waste Management*, *97*, 97-104.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of business research*, *104*, 333-339.

SRA. Sustainable Restaurant Association. (2010). Too good to waste: Restaurant food waste survey report. Sustainable Restaurant Association, UK.

Stenmarck, Â., Jensen, C., Quested, T., Moates, G., Buksti, M., Cseh, B., ... & Östergren, K. (2016). Estimates of European food waste levels. IVL Swedish Environmental Research Institute.

Stirnimann, A., Zizka, L. (2022). Waste not, want not: Managerial attitudes towards mitigating food waste in the Swiss-German restaurant industry. *Journal of Foodservice Business Research*, *25*(3), 302-328.

Tagliabue, M., Sandaker, I. (2019). Societal well-being: Embedding nudges in sustainable cultural practices. *Behavior and social issues*, *28*, 99-113.

Tahir, F. et al. (2022). Diner's sustainable behavior: differences between sustainable behaviors of casual and fine dining consumers. *Journal of Quality Assurance in Hospitality & Tourism,* p. 1-30.

Tahir, F., Ul Haq, J., Saleem, A., Akhtar, N., Bonn, M. A. (2023). Diner's sustainable behavior: differences between sustainable behaviors of casual and fine dining consumers. Journal of Quality Assurance in Hospitality & Tourism, 24(5), 599-628.

Talwar, S., Kaur, P., Yadav, R., Sharma, R., Dhir, A. (2023a). Food waste and out-of-home-dining: antecedents and consequents of the decision to take away leftovers after dining at restaurants. *Journal of Sustainable Tourism*, *31*(1), 47-72.

Talwar, S., Kaur, P., Yadav, R., Bilgihan, A., Dhir, A. (2021b). What drives diners' eco-friendly behaviour? The moderating role of planning routine. *Journal of Retailing and Consumer Services*, *63*, 102678.

Tatàno, F., Caramiello, C., Paolini, T., Tripolone, L. (2017). Generation and collection of restaurant waste: Characterization and evaluation at a case study in Italy. *Waste Management*, *61*, 423-442.

Tehrani, M., Fulton, L., Schmutz, B. (2020). Green cities and waste management: The restaurant industry. *Sustainability*, *12*(15), 5964.

Thyberg, K. L., Tonjes, D. J. (2016). Drivers of food waste and their implications for sustainable policy development. *Resources, Conservation and Recycling*, *106*, 110-123.

Thoha, N., Burhanudin, B., Hermawan, M. S., Aditya, L. F. (2022). Lockdown policy and its impact on employee termination and restaurant sustainability in Indonesia and European countries. In *Proceeding of the International Conference on Family Business and Entrepreneurship* (Vol. 2, No. 1).

Tranfield, D., Denyer, D., Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management*, *14*(3), 207-222.

Vouga, G.; Amatucci, M. (2015). Revista Eletrônica de Negócios Internacionais Artigo Convidado O que é bibliometria ? Uma introdução ao Fórum. *Revista Eletrônica de Negócios Internacionais,* v. 10, p. 1–5.

Wang, M., Rasoolimanesh, S. M., Kunasekaran, P., Zhao, Y. (2022). Understanding over-ordering behaviour in social dining: Integrating mass media exposure and sense of 'Mianzi'into the Norm Activation Model. *The Service Industries Journal*, 1-20.

Webster, J., Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS quarterly*, xiii-xxiii.

Wenli, S. U. N., Shahrajabian, M. H., Cheng, Q. (2021). Organic waste utilization and urban food waste composting strategies in China-A review. *Notulae Scientia Biologicae*, *13*(2), 10881-10881.

Wu, C. M. E., & Teng, C. C. (2022). Reducing food waste in buffet restaurants: a corporate management approach. Foods, 12(1), 162.

Wu, Y., Tian, X., Qin, J., Li, X., Liu, G. (2023). Decoding the influence mechanism of restaurant plate waste behaviors in urban China. Resources, Conservation and Recycling, 196, 107059.

Yu, Z., Ju, X., Bai, L., Gong, S. (2021). Consumer's over-ordering behavior at restaurant: Understanding the important roles of interventions from waiter and ordering habits. *Appetite*, *160*, 105092.

Zeineddine, M., Kharroubi, S., Chalak, A., Hassan, H., Abiad, M. G. (2021). Post-consumer food waste generation while dining out: A close-up view. *Plos one*, *16*(6), e0251947.

Zulkifli, A. A., Mohd Yusoff, M. Z., Abd Manaf, L., Zakaria, M. R., Roslan, A. M., Ariffin, H., Hassan, M. A. (2019). Assessment of municipal solid waste generation in Universiti Putra Malaysia and its potential for green energy production. *Sustainability*, *11*(14), 3909.