Article

Culinary Knowledge and Sustainability: Chef-Led Food Waste Management in Serbia's Hospitality Sector

Nikola Vuksanović [1,*], Dunja Demirović Bajrami [2], Goran Perić [3], Nataša Perović [4] and Marija Bojić [5]

1   Department of Agricultural and Food Studies, Toplica Academy of Applied Studies, 18400 Prokuplje, Serbia
2   Geographical Institute "Jovan Cvijić" SASA—Serbian Academy of Sciences and Arts, 11000 Belgrade, Serbia; d.demirovic@gi.sanu.ac.rs
3   Department of Business Studies, Toplica Academy of Applied Studies, 18420 Blace, Serbia; goran.peric@vpskp.edu.rs
4   Faculty of Business Economics and Law, "Adriatic" University of Bar, 85000 Bar, Montenegro; natasari@t-com.me
5   Department of Geography, Tourism and Hotel Management, Faculty of Sciences, University of Novi Sad, 21000 Novi Sad, Serbia; marija.cimbaljevic@dgt.uns.ac.rs
*   Correspondence: nikola.vuksanovic@vhs.edu.rs

Abstract

The challenge of food waste poses significant economic, environmental, and ethical concerns worldwide, with the hospitality sector being particularly affected. This study explores food waste prevention and management practices in five-star hotels in Serbia, focusing on the knowledge, attitudes, and resourcefulness of head chefs as key actors in implementing sustainable solutions. A qualitative exploratory design was applied, combining semi-structured interviews with eight head chefs and hotel managers, in-kitchen field observations, and food waste audits conducted in eight luxury hotels in Belgrade. The food waste hierarchy framework was used to assess how head chefs understand and act upon food waste issues. Findings reveal that while food waste policies vary across hotels, head chefs demonstrate varying levels of awareness and resourcefulness, often shaped by corporate policies, training, and personal experience. Despite limitations in policy enforcement, many head chefs apply practical strategies such as FIFO stock rotation, local sourcing, and creative reuse of ingredients. This study advances the theoretical understanding of food waste management in hospitality by linking practice theory with culinary knowledge and corporate influence. It also provides practical implications for training, policy development, and sustainable hospitality operations in transitional economies.

1. Introduction

Food waste has become a critical issue globally, raising concerns across environmental, economic, and ethical dimensions. Within the hospitality industry, particularly in food service operations, food waste contributes significantly to global food loss, impacting sustainability efforts and the achievement of the United Nations Sustainable Development Goals (SDGs) [1–3]. While growing attention has been paid to food waste reduction in high-income countries [4,5], there remains a limited understanding of how such practices are implemented in transitional and developing economies [6–9], particularly within luxury hospitality settings [10,11]. In transitional economies such as Serbia, the challenges of

minimization of kitchen waste in the hospitality sector are exacerbated by limited institutional support, insufficient infrastructure for waste separation and recycling, and a lack of formalized sustainability standards within hotel operations [12]. While some large international hotel chains implement corporate sustainability protocols, many locally owned or self-managed hotels rely heavily on informal practices, individual staff decisions, and ad hoc managerial initiatives. In such contexts, food waste is frequently disposed of in landfills—the least desirable option on the food waste hierarchy—due to inadequate systems for composting, redistribution, or reuse [13,14]. Moreover, despite growing awareness of sustainability among consumers and hotel operators, concrete actions often lag behind due to budget constraints, lack of training, and fragmented policy implementation [15–17]. These gaps are particularly evident in kitchen environments, where head chefs (hereafter referred to as 'chefs') play a central but underexamined role in determining how food is stored, prepared, and repurposed [18–20].

Food waste in Serbia presents not only an environmental burden but also a growing economic challenge for the hospitality sector. It is estimated that the country generates around two million tons of organic waste annually, straining landfill capacity and contributing to over 300 landfill fires each year, with substantial costs to both the environment and the economy. According to the United Nations Environment Programme, Serbia discards approximately 83 kg of food per person annually, which is above the global average [21]. Hotels and restaurants are responsible for an estimated 40,000 tons of food waste per year, the vast majority of which ends up in landfills, releasing greenhouse gas emissions comparable to those of 7000 motor vehicles. Despite this, only about 13% of hospitality businesses engage with authorized operators for waste handling, reflecting both limited awareness and weak economic incentives [21,22]. Recent research emphasizes that such inefficiencies undermine the financial stability of hotels and restaurants, making food waste not only a sustainability issue but also a factor that directly affects profitability and resilience [23]. At the same time, pilot initiatives such as the UNDP-supported "Food Shifters" project in Belgrade have shown that better food waste collection and processing can yield dual benefits: reducing emissions and avoiding unnecessary operational costs for hotels [24]. The European Environment Agency has similarly stressed that Serbia must scale up prevention efforts, moving beyond isolated projects toward systemic integration of waste audits, redistribution, and circular economy practices [22]. Taken together, these findings confirm that food waste in Serbian hotels is both an ecological liability and a measurable economic loss, underscoring the need for future studies to link chef-led preventive strategies with concrete financial assessments.

Over the last five years, Serbia has seen a gradual move from ad hoc, kitchen-level practices toward more structured, prevention-oriented approaches in hotels, particularly in Belgrade's upscale segment. City- and national-level pilots (e.g., Food Shifters in Belgrade from 2019) and UNDP-supported circular economy projects have raised visibility, built basic infrastructure, and tested collection/processing models with hospitality partners. These initiatives documented measurable capture of food waste streams and CO_2 avoidance, while calling for clearer regulation and scale-up [24,25]. At the same time, sector snapshots indicate sizable commercial food waste in urban Serbia and estimate tens of thousands of tons annually from hotels and restaurants, underscoring cost and climate implications that are increasingly salient to hotel managers and chefs [21,26,27]. Hotel-focused studies that include Serbian samples report a widening baseline of preventive measures (inventory control, more frequent purchasing, portioning discipline) and selective reuse/donation but also note that chain-affiliated hotels tend to codify policies and monitoring, whereas self-managed hotels rely more on informal, chef-driven solutions motivated primarily by cost control [28]. Given recent pilots and policy attention, the near term is likely to bring

incremental formalization rather than a sudden shift: broader roll-out of staff training and SOPs, tighter procurement/portioning (especially for buffet service), simple digital tracking of waste "hotspots," and selective partnerships for redistribution or treatment (oil recycling, compost/AD) where infrastructure exists [25]. Economic analyses from Serbia suggest managers already perceive food waste as a profitability issue, which should reinforce uptake of low-cost prevention and measurement routines; however, comprehensive, comparable cost data at hotel level are still limited [23]. Overall, evidence points to chefs' growing agency as operational change-agents—most pronounced when backed by corporate standards in chain properties and supported by city/national initiatives that reduce liability and logistics barriers. In a wider international perspective, food waste management in hospitality shows both convergence and divergence within the Serbian context. Across Europe, hotels consistently report buffet service and plate waste as the leading sources of avoidable losses, particularly at breakfast, where overproduction and portion size strongly influence guest behavior [29,30]. Empirical studies in the Nordic countries quantified that buffets generate disproportionately higher waste volumes than à la carte service, a challenge also observed in Serbian luxury hotels [31,32]. In the United Kingdom, initiatives supported by the Waste and Resources Action Programme (WRAP) and the Hospitality and Food Service Agreement have institutionalized waste measurement and monitoring, demonstrating both financial and environmental savings from prevention [33]. Beyond Europe, hotel-sector research in Malaysia and Taiwan identifies similar hotspots—buffet overproduction and side-dish/plate waste—and calls for a stronger role for managers and chefs in adopting corporate procedures and guest-oriented interventions [2,34]. These comparative findings underline that while Serbian chefs operate under transitional economy constraints (limited infrastructure, less regulatory clarity), the challenges they face and the preventive strategies they employ are broadly consistent with global hospitality trends.

While the existing literature acknowledges a range of contributing factors to food waste in hospitality—such as overproduction, poor storage, excessive portion sizes, and misaligned consumer expectations—there remains a significant research gap regarding the human dimension of food waste management [35,36]. Much of the existing research focuses on managerial policies, consumer behavior, or technological interventions, while overlooking the practical and everyday actions of kitchen staff who directly influence food handling and disposal [19,37,38]. In particular, chefs—especially those in senior roles—serve as key decision-makers in menu design, inventory control, preparation methods, and food reuse strategies. Their tacit knowledge, culinary creativity, and operational judgment play a critical role in determining whether food is utilized efficiently or wasted [18,39]. Despite this central role, the extent to which chefs are aware of, trained for, or empowered to engage in food waste reduction remains poorly understood, particularly in luxury hotel contexts within transitional economies [19,39,40]. Furthermore, few studies have applied structured frameworks like the food waste hierarchy to evaluate how chefs' behaviors align with best sustainability practices [10,41,42]. This lack of focus on chef-led practices represents a major oversight in current research and limits our understanding of how professional kitchens function as both sites of waste generation and potential hubs for sustainable transformation.

Although food waste has been addressed through broader studies on tourism sustainability [23,43], waste infrastructure [44], or consumer behavior, research focusing specifically on the practices, experiences, and decision-making of culinary professionals remains scarce [45,46]. The hospitality sector in Serbia, characterized by a mix of self-managed and chain-affiliated hotels, presents a valuable context to explore how food waste is addressed at both policy and operational levels. To address these research gaps, this study investigates food waste prevention and management practices in five-star hotels in Serbia by focusing on the knowledge, awareness, and resourcefulness of head chefs—key but underexplored

actors in the hospitality value chain. Drawing on the food waste hierarchy [47] as a guiding theoretical framework, the research employs a qualitative approach, combining structured interviews with top management and head chefs, as well as in-kitchen observations and food waste audits. This design enables an in-depth understanding of how food waste is conceptualized, prevented, and handled at multiple operational levels. The study specifically examines the extent to which chef-led practices align with sustainability principles, how corporate policies enable or constrain waste-reduction behaviors, and how knowledge and training influence resourcefulness in food preparation. By situating the investigation within a transitional economy and a luxury hospitality context, the study offers novel insights into how sustainable food waste practices can be implemented beyond the often-studied Western, high-income settings. To guide the investigation, the research is structured around the following questions: (1) what knowledge do chefs in five-star hotels possess regarding food waste reduction and management? (2) how do chefs apply resourceful practices in their daily operations to minimize food waste? (3) what role do corporate policies, training, and organizational culture play in shaping food waste-related behaviors in hotel kitchens? Through these questions, the study aims to contribute both theoretically and practically to the evolving discourse on sustainable hospitality management. Although exploratory in nature, these research questions were informed by prior literature and therefore imply several working assumptions. First, it was expected that preventive practices (e.g., portioning, inventory control, FIFO rotation) would dominate over redistribution or recovery approaches, reflecting the limited infrastructure and regulatory frameworks in Serbia. Second, we anticipated that chain-affiliated hotels would exhibit more formalized policies and monitoring practices compared to self-managed establishments, which were expected to rely more heavily on informal, chef-driven solutions. Third, it was assumed that while chefs possess strong operational knowledge, the influence of corporate policies, training opportunities, and organizational culture would condition the extent to which this knowledge is consistently applied in daily practice. These working hypotheses justified the use of semi-structured interviews as the primary method, since they allowed for an in-depth exploration of chefs' perspectives and experiences, while also providing a flexible framework for identifying practices and challenges that may not yet be captured in the existing literature.

2. Literature Review

2.1. Food Waste Management and Waste Hierarchy Model

The primary drivers of food waste include overproduction, consumer behavior, food safety regulations, staff (dis)engagement, and economic factors. Overproduction poses a particular challenge, as chefs frequently prepare more meals than are actually required. Moreover, supply chain inefficiencies—including inadequate logistics, transportation issues, and insufficient storage facilities—can result in food spoilage before reaching end consumers. Consumer behavior likewise plays a crucial role in food waste generation. Inadequate meal planning, impulsive buying, and misjudgments about portion requirements can result in surplus food being discarded. Oversized portions served at home and in restaurants further increase the likelihood of uneaten food and non-consumed leftovers. Consumers' limited knowledge about correct food storage, reuse of leftovers, and understanding of food labels often increases food waste. In addition, strict food safety regulations can cause the rejection of edible food that does not conform to requirements concerning appearance, size, labeling, or packaging integrity [12,39,41,45,48].

According to the European Commission [49], the waste hierarchy ranks management strategies from most to least desirable: prevention, reuse, recycling, recovery, and disposal. Numerous organizations, scholars, and practitioners have drawn on this frame-

work to promote waste prevention and guide sustainable waste management practices. (e.g., [47,50–56]). The model incorporates several core principles that converge around five main tiers: prevention/reduction (avoiding surplus and loss at the source), reuse (redirecting surplus edible food to human consumption), recycling (such as converting food waste into animal feed or compost), recovery (energy production), and disposal (landfill or incineration). Prevention and reduction are viewed as the most preferable and impactful strategies as they minimize food loss at its origin while ensuring the optimal use of resources [42,47,50–56]. Research findings [41,42,53] highlight the effectiveness of the model, showing that its implementation can contribute to reducing food waste throughout the hotel food distribution and operational chain.

2.2. Food Waste Management in Food Service Operations

Past studies have documented various sustainable initiatives and good practices in food waste management within responsible food service operations. These are summarized in Table 1, which presents a foundational framework of prevention and management strategies tailored to the hospitality sector and mapped across the food supply and consumption chain [1,51,52]. It highlights the distinction between upstream preventive actions—such as menu planning, accurate demand forecasting, and smart procurement—and downstream reactive strategies like donation, reuse, and composting [39,41,53–58]. The classification underscores that while many hotels implement waste management practices, the emphasis often remains on managing waste after it has been generated rather than preventing its occurrence [59–64]. This reactive orientation is particularly problematic in luxury hotel settings, where high service standards can lead to overproduction and excessive waste. By using this classification as a conceptual lens, our study critically examines how chefs in Belgrade's five-star hotels operationalize these practices in their kitchens. It also allows us to assess the extent to which their actions align with sustainability priorities, such as those outlined in the food waste hierarchy. This structured framework is essential for understanding both the behavioral and institutional dynamics influencing food waste outcomes in hospitality. Previous studies highlighted that food waste management varies significantly across food categories. Perishable products such as fruits, vegetables, and dairy are especially vulnerable to spoilage during storage and preparation, requiring strict monitoring of temperature and expiry dates [47,65]. Meat and fish, while less frequently wasted, generate disproportionately high financial and environmental costs when discarded, which underscores the importance of careful portion control and procurement [66,67]. Baked goods and side dishes, particularly in buffet contexts, have been identified as common contributors to plate waste due to portion size and consumer behavior [67]. These findings suggest that effective food waste management must be tailored not only to organizational practices but also to the specific characteristics of different food types.

Table 1. Food waste management practices in hospitality operations.

Reference	Food Waste Management Practices
[54,55]	Redesign kitchen processes at the planning stage to reduce food waste.
[1,51,56–62]	Implement FIFO stock rotation; regularly monitor storage conditions.
[39,41]	Menu planning, accurate demand forecasting, procurement, storage, and production processes to minimize waste.
[51–53]	Redistribution of unused/unsold food (discount sales, donations, staff meals).

Table 1. *Cont.*

Reference	Food Waste Management Practices
[59–62]	Provide doggy bags for leftovers; recycle inedible waste as animal feed or compost.
[68,69]	Avoid overstocking through better demand forecasting; reduce pre- and post-consumption waste.
[70]	Measure and track food waste systematically to reduce it.

Source: Compiled by the authors based on data from [1,39,41,51,52,54–70].

2.3. Food Waste Management Practices

Table 1 demonstrates that while numerous strategies are available across the FWH spectrum, not all practices carry equal weight or frequency of adoption. Preventive strategies—including menu planning, procurement discipline, and inventory rotation—dominate the literature as both the most cost-effective and the most universally applied [39,41,51,52]. These practices reduce waste at its source, aligning with the top tier of the hierarchy. Redistribution practices, such as offering doggy bags, staff meals, or food donations, serve dual purposes: minimizing waste and fulfilling social responsibility [53,59–61]. They are particularly relevant in transitional economies, where social needs intersect with sustainability goals. However, adoption is inconsistent due to liability concerns, lack of formal redistribution channels, and stigma associated with offering leftovers. Recycling and recovery measures, including composting, oil recycling, and animal feed conversion, appear less frequently and often in ad hoc forms [68–70]. Their limited adoption is tied to infrastructure availability and the absence of standardized monitoring systems. The synthesis provided in Table 1 also illustrates the contrast between chain-affiliated and self-managed hotels. Chain hotels, influenced by corporate sustainability agendas, tend to adopt a wider spectrum of practices, including data collection and formalized policies [52,70]. In contrast, self-managed hotels often rely on informal, staff-driven measures, such as reusing food cuttings or repurposing nearly expired ingredients into staff meals, which can be effective but lack scalability and institutional support [39,51]. Ultimately, Table 1 highlights that the hospitality sector still relies heavily on basic, preventive practices, while advanced strategies such as systematic redistribution, recycling, and recovery remain underutilized. This imbalance underscores both the potential and the challenges for chef-led interventions, which must operate within broader managerial, regulatory, and infrastructural constraints [59–62,68–70]. Food waste generation in hospitality is shaped by multiple determinants, spanning business-related, consumer-related, chef-related, and operational dimensions. Table 2 provides a structured overview of these determinants as reported in previous studies, illustrating how organizational models, customer behaviors, professional competencies, and day-to-day operations intersect to influence waste outcomes. Business-related determinants are particularly influential. Research shows that buffet services generate significantly more waste than à la carte service models, largely due to overproduction and guest expectations for variety [41,63–70]. Similarly, chain-affiliated hotels often demonstrate more structured approaches to waste reduction, while self-managed hotels rely on informal and reactive practices [51,52]. Consumer-related factors also play a central role. Studies show that female guests and regular customers are more likely to leave plate waste compared to male or occasional visitors, while religiosity and cultural background influence how food is valued and consumed [71,72]. Such demographic differences highlight the need for tailored awareness campaigns and waste-conscious portioning strategies. Chef-related determinants concern the professional practices and competencies of culinary staff. In fine dining contexts, strict aesthetic and quality standards often drive waste, as ingredients are

discarded if they do not meet presentation norms [39,56,73–80]. Additionally, the absence of training in resourceful cooking or restrictions imposed by corporate policy can prevent chefs from reusing surplus ingredients creatively [51,52].

Table 2. Determinants of food waste in food service operations.

Determinant Type	Food Waste in Food Service Operations by Different Determinants Incorporate Business Model	References
Business-related determinants	Buffet services create higher waste compared to à la carte; independent restaurants generate more waste than chain-affiliated businesses; size, ownership, and management orientation significantly shape waste practices.	[41,63–65]
Consumer-related determinants	Females and regular guests waste more food compared to males and occasional guests; religiosity influences plate waste.	[71,72]
Chef-related determinants	Strict aesthetic/quality standards in fine dining drive waste; lack of competencies in resourceful cooking; corporate policies discourage reuse.	[39,56,73,74]
Operational practices	Poor storage adherence (temperature, FIFO); errors in demand forecasting; waste during trimming, portioning, and preparation.	[39,53,68–70]

Source: Compiled by the authors based on [39,41,53,56,63–65,68–74,80].

Finally, operational practices directly affect waste levels. Errors in demand forecasting, improper storage management, and failure to adhere to FIFO principles remain persistent issues [53,69,70]. Waste also occurs during trimming, portioning, and preparation, where chefs' handling skills determine whether ingredients are fully utilized or partially discarded. Table 2 synthesizes these determinants, showing that food waste in hospitality is the result of an interplay between organizational models, consumer behavior, chef competencies, and operational procedures. Importantly, these determinants often reinforce each other: for example, buffet formats create conditions for overproduction, while consumer habits and strict chef standards amplify the waste. This complexity highlights the need for a multidimensional approach to food waste reduction in hotels, combining policy reforms, training, consumer education, and operational improvements.

While much of the literature emphasizes structural and organizational factors, chefs themselves play a transformative role in food waste management. Their tacit knowledge, creativity, and decision-making directly shape whether ingredients are fully utilized or wasted. Beyond organizational and structural factors, research indicates that the psychological characteristics of chefs and kitchen managers may also play an important role in shaping food waste outcomes. Individual differences such as temperament, stress tolerance, openness to creativity, and leadership style can influence decision-making in high-pressure kitchen environments [75,76]. For instance, chefs with strong self-regulation and openness to innovation are more likely to experiment with repurposing ingredients, while those under stress or guided by rigid routines may default to discarding surplus food [40,77]. Although underexplored in hospitality research, this perspective highlights the importance of considering not only structural constraints but also the personal characteristics of decision-makers when analyzing food waste practices. Further, resourcefulness is increasingly recognized as a professional competence that links culinary skills to sustainability outcomes. Table 3 summarizes how previous studies conceptualize chef resourcefulness, highlighting its role in preventing waste and embedding sustainable practices in food

service operations. Research shows that creative reuse of surplus ingredients and the ability to adapt recipes or redesign menus are essential for minimizing food waste [70]. This creativity is often framed as a moral and sustainability imperative, where food is valued as a precious resource in the face of climate change and poverty [78]. Studies further suggest that resourceful cooking should be integrated into hospitality curricula and chef training, ensuring that future culinary professionals are equipped with the skills to manage waste [39,79]. At the same time, barriers persist. Chefs often face restrictive corporate policies that limit reuse of ingredients, or they may lack the training needed to apply preventive, skillful cooking practices [64,80]. Furthermore, research indicates that many chefs develop conservative habits, preferring traditional cooking routines over innovative methods that might reduce waste [81,82]. Taken together, the literature illustrates that chef resourcefulness is unevenly applied across contexts. Some chefs embrace innovation and embed sustainability into their practices, while others remain constrained by habits, organizational rules, or skill gaps. As shown in Table 3, resourcefulness represents both an opportunity and a challenge: it can transform kitchens into hubs of sustainability, but only when supported by appropriate training, autonomy, and managerial encouragement.

Table 3. Resourcefulness of chefs in food service operations.

Reference	Resourcefulness of Chefs in Preventing Food Waste
[70]	Creative reuse of surplus ingredients; preventing food waste as moral and sustainability imperative.
[78]	Food considered as precious and limited resource.
[39,79]	Resourceful cooking should be integrated into hospitality curricula and chef training.
[64,80]	Chefs' willingness and ability to prevent waste depends on skillful, preventive cooking practices.
[81,82]	Some chefs remain conservative or lack motivation to adopt innovative waste-reduction habits.
[3]	Many chefs develop habitual cooking practices that either prevent or exacerbate waste.

Compiled by the authors based on [3,39,64,70,78–82].

In addition to global perspectives, an emerging body of literature has examined sustainable hospitality practices in Eastern Europe and the Balkans, providing important insights for transitional economies such as Serbia. In Slovenia and Croatia, research highlights the role of environmental certification schemes and eco-labels in motivating hotels to adopt resource efficiency measures, including energy conservation, water reduction, and waste minimization, while simultaneously strengthening competitiveness and customer satisfaction [83–86]. In Serbia and Montenegro, scholars emphasize the significance of local culture and community engagement in embedding sustainability into hospitality, particularly among small and family-owned hotels that rely on local sourcing, staff-led initiatives, and informal food donation practices in the absence of formal policies or infrastructure [44,87]. Studies from the Western Balkans more broadly point to a growing awareness of the importance of sustainability, but also highlight persistent barriers, such as inadequate regulatory frameworks, limited financial incentives, and insufficient infrastructure for systematic waste collection and recycling [88]. Despite these constraints, hoteliers across the region are increasingly experimenting with initiatives such as food waste monitoring, recycling programs, and awareness-raising campaigns directed at both staff and guests [89]. Taken together, this regional evidence suggests that while Eastern European and Balkan hotels face similar structural challenges linked to post-socialist transitions, they

are gradually adopting sustainability-oriented practices that resonate with global trends. Importantly, these studies also reveal that progress often depends on individual managers and chefs acting as change agents within their organizations, a finding that strongly aligns with the chef-led focus of our study in Serbian five-star hotels. By situating our research within this regional context, we underline the relevance of examining how food waste management is evolving in Serbia's luxury hospitality sector and how chefs' knowledge and practices contribute to broader sustainability agendas in transitional economies.

3. Materials and Methods

3.1. Study Area

As the capital of the Republic of Serbia, Belgrade serves as the country's primary political, economic, and cultural hub, as well as a major tourism destination within the Western Balkans. Serbia's hospitality sector has expanded steadily in recent years, reflecting the country's growing tourism profile. According to the Statistical Office of the Republic of Serbia, in 2023 the country recorded over 4.2 million tourist arrivals and 12.4 million overnight stays, with foreign visitors accounting for more than half of this flow [90,91]. The hotel sector includes approximately 430 classified hotels, of which 18 operate at the five-star level, concentrated primarily in Belgrade, Novi Sad, and several spa and mountain destinations [92]. Belgrade alone accommodates more than half of the country's five-star properties (11) and receives nearly 45% of all foreign tourist arrivals, making it the core of Serbia's luxury hospitality segment. The restaurant and broader food service industry is also substantial, employing more than 95,000 workers (Belgrade 35,000) nationwide and serving millions of domestic and international consumers annually [93]. Within this context, the eight surveyed five-star hotels in Belgrade represent a significant share of the city's high-end market and illustrate practices in a segment that, while limited in absolute numbers, exerts disproportionate influence on culinary trends, managerial standards, and sustainability initiatives in Serbia's hospitality sector. Belgrade was chosen as the study location because it represents the country's main hub of luxury hospitality, combining international chains and self-managed establishments. Figure 1 illustrates the geographical position of Belgrade within Serbia and Europe, situating the research context. The rapid growth of Belgrade's hospitality sector has driven a marked increase in high-end hotels, international events, and gastronomic offerings catering to both domestic and international tourists [94]. This urban development has intensified food production and consumption within the city's hospitality industry, thereby contributing to rising levels of food waste [12,23,43]. Despite the strategic importance of Belgrade in shaping Serbia's tourism image, food waste management remains a critical and underregulated issue. Most hotels lack formal sustainability standards, waste separation infrastructure, or strategic plans for food recovery and redistribution [44–46]. Furthermore, while some international hotel chains have introduced corporate waste-reduction policies, many local and self-managed establishments rely on informal, reactive practices. This makes Belgrade an ideal case for examining how food waste is managed in luxury hospitality environments, especially within a transitional economy where policy implementation, infrastructure, and staff training vary significantly across hotel types.
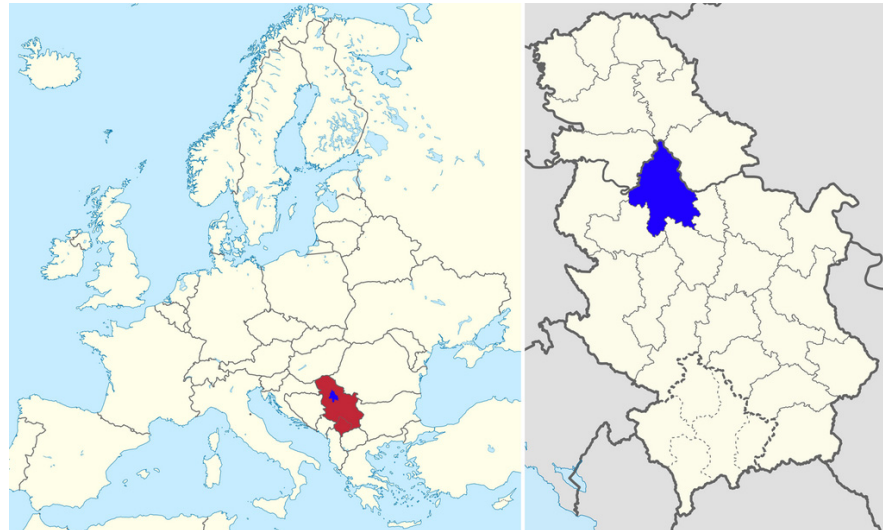
Figure 1. The position of study area: (**left**) position of Serbia in Europe, (**right**) position of Belgrade municipality in Serbia. *Source* [95].

3.2. Research Method

Based on available data from Booking.com and Tripadvisor.com, a total of 11 five-star hotels were identified in Belgrade, Serbia. Out of eleven contacted hotels, eight hotels agreed to be part of the research from February to June 2024. Munir's recent systematic review on sustainable food waste management strategies in the hospitality and food service sectors [96] indicates that most qualitative studies draw on samples ranging from 1 to 45 hotels or hotel restaurants. To achieve the study's aim, this qualitative research employs an exploratory design based on structured in-depth interviews with eight top-management executives and head chefs from five-star hotels. The use of structured interviews was deemed appropriate due to their flexible format, allowing for the collection of in-depth information on the nuanced practices within these hotels [39,41,97,98]. This exploratory qualitative research method is appropriate for this study as it seeks to understand food waste management practices through the top management's and head chefs' experiences and perspectives [39,41,99,100]. The interview guide was adopted directly from established instruments in previous studies on food waste management in hospitality (e.g., [1,39,41,42,49,50,52,54–57,59–61,63]). Using an unchanged, validated framework allowed for comparability across different studies and contexts. One questionnaire (as a checklist) for eight top managements was developed by Kattiyapornpong et al. [41]. Specifically, for the interview of head chefs, we used the interview model from the author Filimonau et al. [39]. Both questionnaires were translated into Serbian and used as such, and were later translated into English when entering the data into Nvivo. Word frequency visualizations (Figures 2–6) were generated in Nvivo to illustrate commonly used terms by chefs and managers. These figures served as supportive tools to identify initial patterns; however, the interpretation of chefs' cognition and behavior was based primarily on thematic analysis and contextual coding, rather than word counts alone.

The empirical research employed a two-stage qualitative design consisting of semi-structured interviews followed by kitchen observations. First, interviews with head chefs were conducted to capture their perspectives on food waste practices, barriers, and drivers. These conversations provided detailed accounts of how chefs perceive their own role in minimizing waste and what routines are most commonly applied in their hotels. Based on the insights from the interviews, kitchen observations were subsequently carried out in the same hotels. The purpose of these observations was to validate the reported practices and cross-check them against actual operational behavior. For instance, where chefs

described the use of FIFO inventory management, observations were used to examine whether this principle was consistently followed in practice. This sequential design ensured a higher level of data triangulation, allowing the study to combine self-reported insights with direct evidence from hotel kitchens. Two teams participated in the interview, one with top management and the other with the head chef. During the food waste audit, the research team weighed the discarded food and classified it according to its type (such as vegetables or meat) and the reason for its generation (such as over-preparation or cooking errors), in accordance with the procedures outlined by Filimonau et al. [39] and Papargyropoulou et al. [2]. It is important to note that while food waste audits and weighing were conducted to categorize waste by type and source, the data were not systematically recorded in volumetric or monetary terms. This was consistent with the qualitative and exploratory nature of the study, which prioritized capturing chefs' and managers' perspectives over quantification.

3.3. Sampling

The sample consisted of eight five-star hotels in Belgrade, selected to align with the study's objectives (Table 4). The hotels were selected according to four specific criteria: (1) they were officially categorized as five-star hotels under the national Rulebook on Standards for the Categorization of Catering Establishments; (2) they were located in the Belgrade metropolitan area, as the country's main hub of luxury hospitality; (3) they were listed on international booking platforms such as Booking.com and TripAdvisor to ensure comparability and external recognition; and (4) they agreed to participate in the study following formal invitation. These criteria provided a balanced sample of chain-affiliated and self-managed hotels, covering both medium-sized and smaller establishments. The decision to focus exclusively on five-star hotels in Belgrade was deliberate, as this segment represents the most resource-intensive operations, where food waste challenges are pronounced due to buffet services, high service standards, and strict aesthetic expectations. At the same time, these hotels often lead sustainability efforts within the hospitality sector. While the sample is not intended to statistically represent the Serbian hotel industry as a whole, its exploratory nature provides in-depth, context-specific insights into chef-led food waste practices in a transitional economy, forming a basis for future comparative studies across hotel categories and regions. Four of the hotels were self-managed, while the remaining four were part of a hotel chain. In terms of size, three hotels were classified as medium-sized, with room capacities ranging from 143 to 292, and five were small-sized, offering between 10 and 54 rooms. The number of on-site restaurants varied from one to three, and six hotels were listed in The Michelin Guide. All hotels held a five-star rating in accordance with the Rulebook on Standards for the Categorization of Catering Establishments for Accommodation [101].

Table 4. Respondent's profile.

Hotel	Type of Hotel Ownership	Size	No. of Rooms	Stars Rating	No. of Restaurants	World Guide
Hotel 1	self-managed	Medium	250	5	3	The Michelin
Hotel 2	self-managed	Medium	143	5	1	
Hotel 3	chain-owned	Small	20	5	2	The Michelin
Hotel 4	self-managed	Small	54	5	1	The Michelin
Hotel 5	chain-owned	Small	35	5	1	
Hotel 6	chain-owned	Small	45	5	2	The Michelin
Hotel 7	chain-owned	Medium	292	5	1	The Michelin
Hotel 8	self-managed	Small	10	5	1	

Source: Authors' own field research.

An interview with the eight top managements was first. Table 5 summarizes the checklist of food waste practices adopted from Kattiyapornpong et al. [41] and other relevant studies [1,47,49,52,59–63,100]. The checklist was applied to capture the current adoption status of food waste management practices in the surveyed hotels. Each item was coded as "yes" if the practice was actively implemented at the time of data collection, and "no" if it was not in use. Practices that had been used in the past but later discontinued, or that were performed only partially or indirectly, were not distinguished within this binary scheme. In cases of indirect or informal activity, hotels generally marked the practice as "no," unless they reported explicit, formal engagement. The eight surveyed five-star hotels in Belgrade demonstrated varied levels of engagement, yet several common patterns emerged. All hotels provided staff training, promoted waste awareness, and applied operational measures such as purchasing in suitable quantities, FIFO stock rotation, proper storage, expiry-date monitoring, and ingredient trimming. Some hotels also reused food cuttings, incorporated nearly expired items into staff meals, offered doggy bags, and donated surpluses. More advanced measures—such as formal waste policies, systematic data collection, or budget allocations—were limited, while practices like selling waste for animal feed, oil recycling, or composting were rare. Overall, hotels showed a baseline of structured food waste reduction, with chain-affiliated establishments generally adopting a broader range of measures than self-managed ones.

Table 5. Summarized checklist of the food waste practices.

Practices	Description	Hotel 1	Hotel 2	Hotel 3	Hotel 4	Hotel 5	Hotel 6	Hotel 7	Hotel 8
Food waste management Policies	Having general policies on food waste management			x			x	x	
	Having policies on encouraging customers to reduce food waste			x			x	x	
	Having policies on educating employees on food waste reduction	x	x	x	x	x	x	x	x
	Having policies on collecting food waste data			x			x	x	
	Promoting food waste management to employees	x	x	x	x	x	x	x	x
	Promoting food waste management to customers			x			x	x	
	Promoting food waste management to partners			x			x	x	x
	Promoting local communities' quality of life regarding food waste management			x	x	x	x	x	x
	Organising food waste management seminars/training for employees	x	x	x	x	x	x	x	x
	Organising food waste management seminars/training for customers								
	Organising food waste management seminars/training for partners							x	

Table 5. *Cont.*

Practices	Description	Hotel 1	Hotel 2	Hotel 3	Hotel 4	Hotel 5	Hotel 6	Hotel 7	Hotel 8
Food service planning, procurement, and storage	Planning on reducing food waste			x			x	x	
	Planning on stocking raw materials with suitable quantities	x	x	x	x	x	x	x	x
	Planning on purchasing raw materials with fewer leftovers			x			x	x	
	Arranging food with first in, first out (FIFO)	x	x	x	x	x	x	x	x
	Storing food at an adequate temperature and location to delay food spoilage	x	x	x	x	x	x	x	x
	Checking expiration date regularly	x	x	x	x	x	x	x	x
Food waste handling and operations	Trimming food materials with fewer leftovers	x	x	x	x	x	x	x	x
	Asking for cooperation in reducing food waste		x				x	x	
	Using nearly expired food for cooking			x	x	x			x
	Food cutting to make new food products							x	
	Giving excess food to employees								
	Offers doggy bags to customers							x	
	Selling food waste as animal feed							x	
Food waste management through reusing, recycling, donations, and disposal	Donating excess food to external organisations						x	x	
	Donating excess food to staff for free								
	Donating food waste for animal feed							x	
	Using food waste to make compost								
	Using food waste to make bio-fermented water								
	Using food waste to ferment into biogas								
	Recycling the hotel/restaurants' kitchen oil								
Food waste budget and resource allocation	Having a budget to manage food waste in the hotel/restaurant						x	x	
	Having equipment(s) to manage food waste in the hotel/restaurant							x	
	Having technology applications to manage food waste in the hotel/restaurant								

Source: Authors' own field research (interviews, 2024), using a scale adapted from [1,2,23,44,53–57].

To protect confidentiality, quotations are attributed using pseudonyms (e.g., "Chef A," "Chef B"), which do not correspond to the demographic information in Table 6. This prevents any direct identification of individual participants while allowing a sense of multiple voices to be conveyed. Table 6 profiles the head chefs, who were predominantly experienced professionals with more than a decade in fine dining, and several worked in Michelin-listed establishments. Chefs with longer tenure and exposure to international culinary practices demonstrated higher awareness of sustainability and greater resourcefulness, whereas younger or less experienced chefs more often reported skill gaps contributing to waste. The sample included eight head chefs, aged between 37 and 50 years. Their work experience in fine dining ranged from 13 to 20 years, with 5 to 12 years specifically as head chefs. Most chefs specialized in fusion or Asian/fusion cuisine, and their restaurants varied in size from small (<20 seats) to large (>50 seats). Six of the chefs worked in Michelin-listed establishments, reflecting the high culinary standing of the sample. For the interview of head chefs, we used the interview model from Filimonau et al. [39]. While sample size holds

less significance in qualitative research, earlier studies on food waste in foodservice settings achieved saturation with 13 [42] and 17 interviews [39,74], supporting the adequacy of the current sample. Interviews averaged 37 min, were conducted face-to-face on-site using a structured questionnaire, and were complemented by in-kitchen observations performed in accordance with health and safety regulations.

Table 6. Study informants (n = 8).

Role	Age	Work Experience in Fine Dining Restaurant (Years) in Any Capacity	Work Experience in Fine Dining Restaurant Specifically in the Capacity of a Chef (Years)	Cuisine (Type)	Restaurant Size (Seats) Small (<20) Medium (21–50) Large (>50)	World Guide
Head Chef 1	50	20	10	Fusion	Large	The Michelin
Head Chef 2	45	13	5	Fusion	Medium	
Head Chef 3	48	19	12	Asian/Fusion	Large	The Michelin
Head Chef 4	38	17	7	Fusion	Medium	The Michelin
Head Chef 5	43	13	5	Fusion	Medium	
Head Chef 6	41	15	10	Asian/Fusion	Medium	The Michelin
Head Chef 7	44	15	10	Asian/Fusion	Large	The Michelin
Head Chef 8	37	13	5	Fusion	Small	

Source: Authors' own field research.

We initiated the interviews by assessing head chefs' knowledge of food waste in their kitchens and their attitudes toward its occurrence, employing open-ended questions related to preventive practices. The participants showed awareness of food waste and could specify the main food fractions wasted and the key factors contributing to wastage. In response to open-ended questions on food waste management practices, all chefs reported not measuring food waste quantities in their kitchens, offering only descriptive explanations. The interview data were subsequently processed in NVivo using word count and word cloud analyses to enable comparison. The frequency analysis (Figure 2) shows that the most common words in chefs' interviews were "food" (42 occurrences), "waste" (30), "leftovers" (21), "management" (15), "cooks" (13), and "buffet" (12). These terms point to the central focus of discussions around daily operational control of food flows, particularly waste prevention, leftover handling, and buffet-related challenges. The prominence of "expiration" and "system" underscores chefs' attention to stock rotation, expiry-date monitoring, and organizational routines, while words such as "policy," "animal," and "recreate" appeared less frequently, suggesting that broader regulatory frameworks and recovery strategies (e.g., using leftovers for staff meals or animal feed) were less consistently emphasized. Interestingly, the relatively low frequency of terms such as "FIFO," "precooked," or "recycling" indicates that while chefs are familiar with these concepts, they are not central in their narratives. This distribution reinforces the finding that preventive practices dominate the chefs' discourse, while redistribution and recovery measures remain secondary or occasional.

In the second step of interviews, we followed research methods using the interview schedule by Filimonau et al. [39] to find out how much head chefs knew about the food waste issues in their kitchens. The interview schedule has four themes: 1. Food waste: its magnitude and drivers; 2. Approaches to food waste prevention; 3. The role of different (f)actors; and 4. The outlook. Prior to thematic analysis, two researchers employed NVivo to compare and discuss the data and to ensure its quality and validity. The resulting analytical summary was subsequently confirmed by key informants to support data codification, verification, and validation, in line with previous research [39].
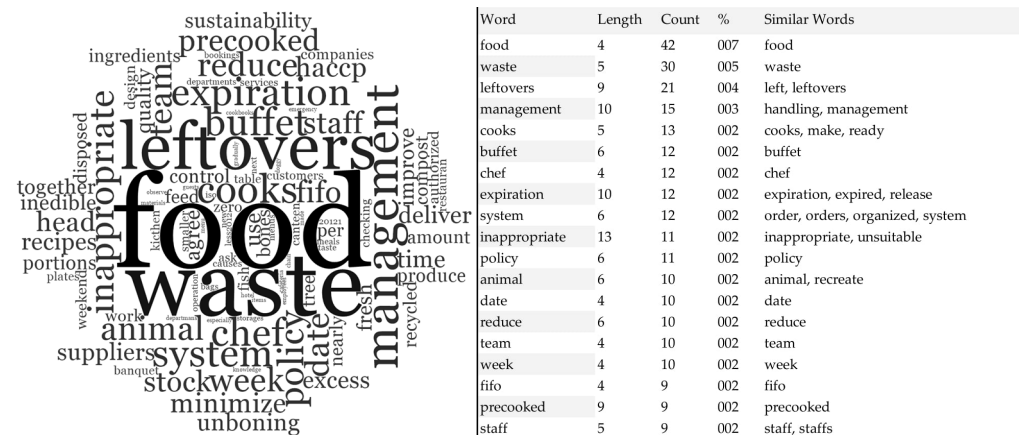
Word	Length	Count	%	Similar Words
food	4	42	007	food
waste	5	30	005	waste
leftovers	9	21	004	left, leftovers
management	10	15	003	handling, management
cooks	5	13	002	cooks, make, ready
buffet	6	12	002	buffet
chef	4	12	002	chef
expiration	10	12	002	expiration, expired, release
system	6	12	002	order, orders, organized, system
inappropriate	13	11	002	inappropriate, unsuitable
policy	6	11	002	policy
animal	6	10	002	animal, recreate
date	4	10	002	date
reduce	6	10	002	reduce
team	4	10	002	team
week	4	10	002	week
fifo	4	9	002	fifo
precooked	9	9	002	precooked
staff	5	9	002	staff, staffs

Figure 2. Most frequent terms in chef interviews on food waste. Source: authors' own analysis.

4. Results

The study informants were requested to elaborate on the importance of food waste, its magnitude and drivers of prevention (Figure 3). Most spoke about the temperature (as the main key to waste prevention), fruit as the largest waste item, and generally a medium amount of waste. Nonetheless, many participants highlighted the impact of both economic and personal factors on food waste prevention. These views may be rooted in prior negative experiences, such as witnessing substantial amounts of food wasted in kitchens. This study further supports the notion that chefs' interpretations of food waste play a crucial role in motivating their preventive efforts.
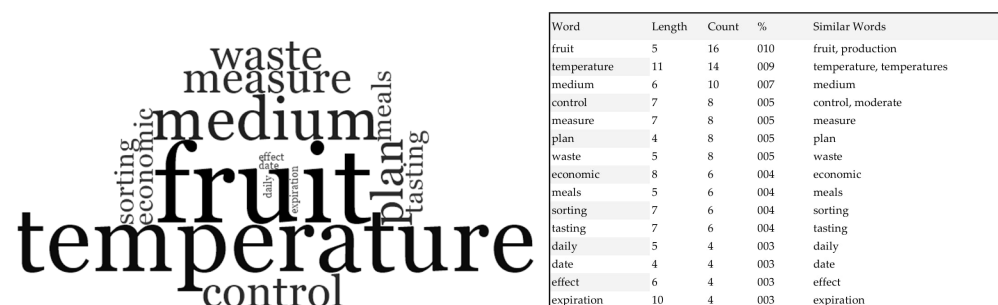

Word	Length	Count	%	Similar Words
fruit	5	16	010	fruit, production
temperature	11	14	009	temperature, temperatures
medium	6	10	007	medium
control	7	8	005	control, moderate
measure	7	8	005	measure
plan	4	8	005	plan
waste	5	8	005	waste
economic	8	6	004	economic
meals	5	6	004	meals
sorting	7	6	004	sorting
tasting	7	6	004	tasting
daily	5	4	003	daily
date	4	4	003	date
effect	6	4	003	effect
expiration	10	4	003	expiration

Figure 3. Key phrases linked to food waste prevention practices. Source: authors' own analysis.

Some studies [73] have highlighted storage as a critical source of food waste in kitchens. Key contributing factors include poor implementation of FIFO principles and frequent errors such as failure to maintain appropriate temperature conditions:

> *"We end up wasting a lot of food in storage. Some cooks, especially the new ones, don't always store ingredients properly—they sometimes forget to check if the fridge stays below 5 °C, and they don't consistently follow the first-in, first-out principle. Everyone knows about FIFO, but when it comes to putting things away, they don't always apply it." (Chef A)*

> *"The supply is going from local farmers for the salad bar in our restaurants. It shortens time and less food waste" (Chef H)*

> *"We follow the First-In, First-Out (FIFO) system and label everything, and we usually check the expiry dates every day". (Chef C)*

> *"We no longer add extra vegetables just to decorate the plates, and we focus more on à la carte menus now, so there's less food waste." (Chef F)*

"We order raw ingredients from our local suppliers daily, so we have no stock" (Chef E)

When spoken to about approaches to food waste reduction (Figure 4), the study informants referred to their knowledge with control-checking, meal in menu, and described their skills in preparing specific dishes. The informants, for instance, mentioned implementing control-checking and offering meals based on set menus as strategies to reduce food waste. They also noted that insufficient resourcefulness and poor management of kitchen processes often contribute to food waste generation.
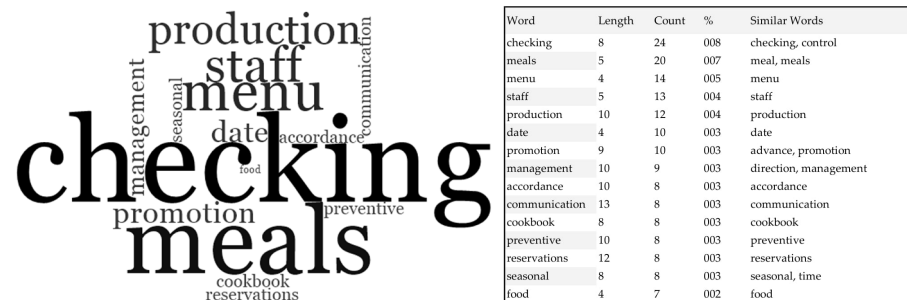

Word	Length	Count	%	Similar Words
checking	8	24	008	checking, control
meals	5	20	007	meal, meals
menu	4	14	005	menu
staff	5	13	004	staff
production	10	12	004	production
date	4	10	003	date
promotion	9	10	003	advance, promotion
management	10	9	003	direction, management
accordance	10	8	003	accordance
communication	13	8	003	communication
cookbook	8	8	003	cookbook
preventive	10	8	003	preventive
reservations	12	8	003	reservations
seasonal	8	8	003	seasonal, time
food	4	7	002	food

Figure 4. Common expressions describing resourceful cooking approaches. Source: authors' own analysis.

These results corroborate the findings of McAdams et al. [73] and Filimonau et al. [39], pinpointing a critical area for preventive action. Such problems were especially prevalent among junior and less experienced chefs:

"The main reason for food waste is the lack of technique among younger chefs. Unlike experienced chefs, they're more likely to waste food—without solid cooking skills, they often discard ingredients that could actually be reused." (Chef B)

"Chefs are valuable because they're hard to recruit. But some can be so narrow-minded that I sometimes wonder how they even made it into the profession. You tell them one thing, and they just say, 'Oh no, I'll do it my way." (Chef F)

"Event sales staff need to work closely with the kitchen team during planning and then present the concept to customers to help keep costs down." (Chef D)

"Our procurement practice is to order the right amount of dried ingredients for a week and get fresh produce on call. If we need more over the weekend, our suppliers deliver just in time for us." (Chef G)

"We order some ingredients ready-to-use, which creates less waste and saves time." (Chef C)

"We don't sell nearly expired food to our customers but recreate the dish for our staff at their cafeteria" (Chef H)

"We serve buffet only at breakfast and use smaller plates to reduce food waste, as customers often take more food than they can eat." (Chef A)

"At our buffet, we regularly rotate the food to keep it fresh and at the right temperature for customers, while also reducing food waste." (Chef E)

Consistent with previous research [39,41], food handling emerged as a key factor in minimizing food waste, especially during preparation. The hotels indicated that they apply trimming techniques to reduce the amount of leftovers generated.

"Our chefs monitor food waste to ensure efficient use of ingredients—vegetable peels go into stock, and meat scraps and bones are used to make brown sauce or soup." (Chef E)

"We don't do fruit or vegetable carvings." (Chef C, Chef G)

The study informants perceived the factors presented in *The Role of Different (F)actors* (Figure 5) as having both positive and negative influences on food waste reduction. Many chefs highlighted professional development and experience—especially education—as crucial positive elements in preventing food waste. Several also emphasized the value of appropriate equipment, such as vacuum sealers and deep freezers, which they considered highly effective tools for reducing waste, thereby supporting the findings of Filimonau et al. [39]. In contrast, aspects such as exchange, standards, involvement, and requirements were viewed negatively, as they were associated with rigid corporate policies. Numerous informants also pointed out the lack of both general training on food waste and task-specific training aimed at enhancing chefs' culinary resourcefulness.

Word	Length	Count	%	Similar Words
education	9	18	006	development, education, preparation, prepare, training
involved	8	10	005	involved, need, needs, requires
experiences	11	8	004	experience, experienced, experiences
hotel	5	8	004	hotel
sustainability	14	8	004	sustainability, sustainable
waste	5	8	004	waste
management	10	7	003	deal, management, managers
chain	5	6	003	chain, chains
exchange	8	6	003	exchange, standards
food	4	6	003	food
important	9	6	003	important
preparation	11	10	003	cooks, organic, preparation, prepare, training
modern	6	6	003	development, modern
role	4	6	003	part, role, use
equipment	9	5	002	equipment

Figure 5. Word clusters highlighting barriers to waste reduction. Source: authors' own analysis.

Given the highly dynamic nature of kitchen operations, chefs were expected to learn cooking skills on the job, with little emphasis placed on developing resourcefulness during this learning process.

"Some corporate policies and procedures prohibit us from reusing ingredients because of concerns that it might lower food quality and cause customer complaints." (Chef E)

"Our policy includes food waste training, especially on cost management and waste sorting, and that's how we keep food waste to a minimum." (Chef D)

"Our policy is to send any buffet leftovers to the staff canteen" (Chef A, Chef C, Chef F, Chef G)

According to some authors [2,36], most chefs identified corporate policies and procedures that prohibit ingredient reuse as a key barrier.

"I think corporate food safety policies are one of the main causes of food waste. Sometimes ingredients are still perfectly usable, but they're thrown away because they don't meet the strict standards set by the rules." (Chef G)

As in the previous research [39,41,53], as well as in this one, hotels categorize food waste into two types: edible and inedible food waste for human consumption. These two types can be further divided into three main sources of food waste: leftovers from customers' plates, safely edible surplus from buffets or banquets, and excess food produced either before or after cooking. As illustrated in the word cloud (Figure 6), the chefs frequently highlighted education as a key driver for strengthening practical aspects of their work. They emphasized that education should convey the importance of sustainable food management and, in doing so, promote greater resourcefulness among chefs.
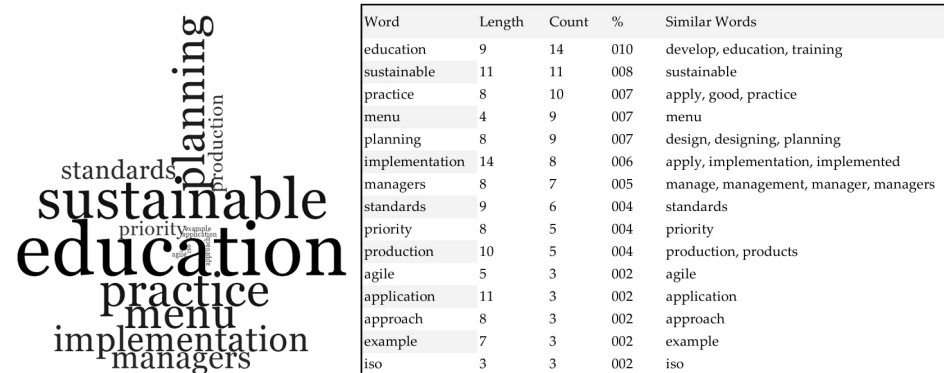
Word	Length	Count	%	Similar Words
education	9	14	010	develop, education, training
sustainable	11	11	008	sustainable
practice	8	10	007	apply, good, practice
menu	4	9	007	menu
planning	8	9	007	design, designing, planning
implementation	14	8	006	apply, implementation, implemented
managers	8	7	005	manage, management, manager, managers
standards	9	6	004	standards
priority	8	5	004	priority
production	10	5	004	production, products
agile	5	3	002	agile
application	11	3	002	application
approach	8	3	002	approach
example	7	3	002	example
iso	3	3	002	iso

Figure 6. Frequently used terms referring to external drivers of food waste. Source: authors' own analysis.

In addition, integrating it with dedicated training could generate a multiplying effect, addressing various categories of chefs at the same time.

"If cooks don't truly understand the issue, they won't change their behavior. I think it's essential to educate not just chefs and cooks, but also other hotel employees, so they understand what food waste is and why it's harmful." (Chef D)

"With a comprehensive training course, both junior and senior chefs can improve their culinary skills, gain a better understanding of each ingredient, and learn how to waste less." (Chef H)

Previous studies [10,53] highlight the value of the food waste hierarchy model as a comprehensive framework for reducing food waste, supporting both earlier findings [40] and those of this study.

"Sustainability is our core policy in every hotel department, and we weigh all food waste daily before disposal." (Chef G)

"Managing food waste is one of the key ISO criteria." (Chef C)

"Everyone benefits—customers get fresh, high-quality food, local farmers get to sell their produce, and it helps support the local economy." (Chef E)

"We handle food waste by recycling and reusing, which is especially important considering our size, location, technology, and space constraints." (Chef A)

Although customers hold differing views on food waste, some are aware of and understand its importance [37,68,102,103]. Their awareness and education on this issue can be shaped by various political, economic, and socio-cultural factors that influence their food-related behaviors.

"Guests do not see the negative impacts yet. They do not think about its impacts" (Chef G)

"Guests have certain expectations, so it's not easy to include them and reduce waste" (Chef B)

"As chefs, we plan to design our menus more carefully to help prevent and reduce food waste." (Chef F)

5. Discussion

5.1. Interpretation and Comparison of the Results

The research findings emphasize the significance of knowledge about waste reduction and management practices in five-star hotels in Belgrade, Republic of Serbia. First, it is

essential to highlight previous research showing that food waste management practices in the eight five-star hotels correspond to the four principles of the food waste hierarchy, which is consistent with earlier findings [41]. By applying the check list, it can be determined whether a corporation or a hotel in line with food waste hierarchy principles. These results indicate good food waste management practices as a policy. Small hotels indicate a short-term planning supply system for daily estimation and weekly booking, as well as cooperation with stakeholders. Conversely, medium-sized hotels emphasize long-term planning supply system, e.g., for emergencies, the suppliers agree to deliver on call. Waste separation and sorting are considered central to effective food waste management. Both chain-owned and independently managed hotels, regardless of their size, place strong priority on these practices, which are actively encouraged within their organizations. The findings also reveal that employees receive training in waste segregation [37], usually delivered internally. In addition, all hotels reported cooperating with local farmers and using locally sourced ingredients. This practice enables guests to experience local culture through regional cuisine—particularly during themed events focused on sustainable, zero-waste meals, local specialties, or national dishes [104]. Our findings on the reliance of self-managed hotels on informal, chef-driven waste practices and the stronger policy frameworks in chain-affiliated hotels resonate with studies from other Balkan contexts, where sustainability initiatives are often fragmented but gradually expanding [44,87]. Similar to evidence from Slovenia and Croatia, where eco-certification schemes motivate hotels to adopt structured resource-efficiency measures [83–93], the Serbian case illustrates both progress and barriers in aligning daily operations with sustainability principles.

The results of our study confirm that Serbian chefs are engaging in practices already documented in other European and global contexts, but with certain contextual differences. As in the UK and Nordic countries, preventive measures such as FIFO stock rotation, demand forecasting, and portion adjustments are widespread, and buffet service remains the critical arena where most waste occurs [29–32]. However, unlike in the UK, where WRAP-supported frameworks provide standardized reporting, Serbian hotels lack systematic monitoring systems, and most initiatives remain chef-driven and informal [33]. Luxury hotels in Southeast Asia likewise highlight the dual importance of managerial oversight and guest engagement (e.g., nudges, smaller plates, clearer signage) to reduce plate waste, which aligns with the emerging but still inconsistent practices observed in Belgrade [34,35]. Our findings also resonate with comparative evidence showing that high-cost categories such as meat, fish, and baked goods are disproportionately burdensome when wasted, with significant financial and environmental implications [1]. Taken together, the Serbian case suggests that while chefs are increasingly recognized as "change agents," the near future will depend on integrating their resourcefulness with system-level tools—such as digital waste tracking, redistribution partnerships, and corporate sustainability protocols—that have already been piloted successfully elsewhere in Europe and Asia.

This study complements previous research linking food waste in developing countries to ineffective operational, managerial, and logistical practices [5,42,46]. The examined hotels reported implementing preventive measures such as ordering appropriate quantities, ensuring proper storage conditions, and applying First-In-First-Out (FIFO) and labelling systems to prevent spoilage of raw ingredients. Food safety was also emphasized. All hotels have implemented the HACCP system and use flexible stock ordering with short procurement cycles (one to seven days) to reduce leftovers. Two of the eight hotels work exclusively with suppliers who comply with their procurement and storage policies. Overall, this study provides current managerial perspectives from five medium and three large five-star hotels in Belgrade, offering insights into sustainable food waste management. By applying the food waste hierarchy, it addresses theoretical gaps in hospitality and tourism

research and is among the few studies (e.g., [5,40]) to apply this framework in a five-star hotel context, offering guidance for improving food waste management in luxury settings.

Previous research shows that hospitality and food service operations generate large amounts of food waste [39,41,53], yet some hotels in this study lack formal food waste management policies. Despite this, they still implement daily waste reduction practices, viewing them as beneficial to all stakeholders. Findings reveal that only Hotel 3, Hotel 6, and Hotel 7 allocate specific resources to support food waste management, a practice highlighted in previous studies as effective [41]. One example is green menu planning with visual symbols or pictures in coffee shop and room service menus to help guests make informed choices—such as indicating whether dishes are spicy—thereby reducing waste from uncertainty about taste preferences. Hotel management also expressed interest in the "Green Hotels" initiative, which promotes a holistic approach to food waste, including green team committees and internal staff competitions to reduce food and other waste.

The findings reveal notable differences between chain-affiliated and self-managed hotels in their approaches to food waste management. Chain-affiliated hotels generally implemented a wider range of structured practices, supported by corporate sustainability agendas, formal training programs, and dedicated resources. In contrast, self-managed hotels relied more on informal, chef-driven initiatives such as repurposing surplus ingredients or portion adjustments, which were effective but often reactive and constrained by limited resources. This contrast underscores the role of organizational structure and ownership type in shaping the scope, consistency, and sophistication of food waste management practices in the hospitality sector. This study underscores the critical role of comprehensive knowledge in food waste reduction and management—an aspect often overlooked in the literature. Using the interview schedule by Filimonau et al. [25] proved useful in assessing head chefs' awareness of food waste issues in their kitchens. Education emerged as essential, with training recommended to promote resourcefulness and demonstrate creative ingredient reuse, especially for junior chefs who are more prone to cooking errors. Senior chefs should also be (re)trained to strengthen their understanding of the importance of minimizing waste, adapt their cooking habits, and integrate resourcefulness into daily practices, as supported by previous research [39]. Typical food waste management practices identified include providing staff seminars and training, planning for waste reduction, purchasing ingredients in appropriate quantities, applying First-In-First-Out (FIFO), ensuring correct storage conditions, checking expiry dates regularly, reducing leftovers through careful handling, involving staff in waste-reduction efforts, using nearly expired food for staff meals, repurposing food trimmings into new products or menu items, redistributing surplus food to employees, and offering doggy bags to customers on request. Although chefs have access to professional equipment that can help reduce food waste, their competencies in adaptive cooking practices are often limited, and corporate policies frequently discourage resourcefulness. This study suggests that developing chef resourcefulness should be embedded in hospitality education and training, while corporate policies should be revised to promote chefs' active involvement in food waste reduction. Corporate policies can have both positive and negative effects but play a crucial overarching role in connecting the components of practice theory. They can reinforce chefs' knowledge of food waste through training programs designed to build resourcefulness and strengthen competencies in sustainable food management. Moreover, investing in food waste prevention tools, such as smart technologies, can further support these efforts and contribute to sustainable practice development.

5.2. Implications of the Results

The findings of this study offer several practical implications that can guide more effective food waste management in the hospitality sector. The recommendations are presented according to the primary stakeholders to whom they are most directly relevant: hotel management and chefs, hospitality educators, and policymakers or industry associations.

Hotel management and chefs are in the best position to implement changes at the operational level. Strengthening preventive measures such as accurate demand forecasting, menu planning, and FIFO-based inventory control is essential to reducing waste at its source. In addition, regular training for kitchen staff can build awareness and foster accountability, while monitoring systems and simple measurement tools—such as waste logs, digital apps, or portion control records—can help track progress over time. Partnerships with NGOs and local charities can also facilitate the redistribution of surplus food, thereby minimizing waste while contributing to social responsibility objectives. Hotels may also benefit from experimenting with innovative practices, such as dynamic menu adjustments based on real-time demand, or encouraging customers to actively participate in waste prevention through communication and feedback systems. By integrating these practices systematically, hotels not only reduce costs but also reinforce their reputation for sustainable operations, meeting the growing expectations of environmentally conscious guests.

Hospitality educators also play a critical role by shaping the competencies of future professionals. Culinary and hospitality curricula should integrate sustainability principles, emphasizing waste prevention, creativity in resource use, and environmental responsibility. Embedding these topics into both theory and practice, such as through specialized training modules, case studies, or internships, ensures that future chefs and managers are better prepared to address food waste in professional settings. Stronger collaboration between academia and industry can further enhance this process by aligning training content with the real-world challenges observed in hotel kitchens. Educators may also consider using simulation tools, project-based learning, or chef-led workshops to develop both technical and behavioral competencies, including leadership and teamwork skills, which are essential for implementing sustainable practices in high-pressure kitchen environments. By doing so, hospitality schools and universities can ensure that sustainability becomes a professional norm rather than an optional add-on.

Finally, policymakers and industry associations can provide the enabling framework to support and scale up these efforts. Clear regulations and liability protection for food donations are essential to encourage redistribution without fear of legal repercussions. At the same time, investment in recycling and composting infrastructure—such as oil recovery systems, anaerobic digestion, and bio fermentation facilities—would make advanced waste recovery options more accessible to hotels of all sizes. Policymakers can also introduce incentives or certification schemes that reward hotels for reducing waste, while rating agencies and award programs could incorporate sustainability and waste management criteria into their evaluation systems. In transitional economies such as Serbia, policy support can further be directed toward awareness-raising campaigns, financial subsidies for adopting new technologies, and cross-sector collaborations between hotels, municipalities, and environmental organizations. Industry associations, in particular, can act as mediators by sharing best practices, benchmarking data, and providing training opportunities across different hotel categories. Such measures would send a clear signal to the industry that food waste management is not only an operational necessity but also a marker of excellence and competitiveness.

Effective food waste management in hospitality requires coordinated action across multiple levels. While chefs and hotel managers can implement immediate improvements within their operations, hospitality educators must ensure that future professionals are

trained in sustainable practices, and policymakers should provide the structural support needed to make such practices viable and rewarding. Together, these actions can create a comprehensive framework in which chef-led initiatives contribute significantly to broader sustainability goals in the hospitality industry.

5.3. Limitations and Future Research Directions

This study was designed as an exploratory case study, focusing specifically on eight five-star hotels in Belgrade. While this design provides rich, contextualized insights into chef-led food waste management practices in a luxury hospitality segment of a transitional economy, it does not aim to statistically represent the Serbian hotel industry as a whole. Consequently, the findings should not be generalized to mid-range or budget hotels or directly extrapolated to other transitional economies. Instead, the study offers a valuable starting point for further research that compares different hotel categories and geographical contexts. Also, it inevitably comes with certain limitations that shape avenues for future research.

First, the study's qualitative, small-sample approach limited generalizability. Although appropriate for uncovering in-depth perspectives, the findings may not reflect the diversity of practices across Serbia's broader hospitality sector or other transitional economies. Future research should therefore employ larger and more diverse samples, combining qualitative insights with quantitative methods—such as food waste audits, customer surveys, or financial analyses—to provide a more comprehensive and comparable understanding. Second, the focus on five-star hotel restaurants provides only a narrow lens. High-end hotels often operate under corporate standards and resource advantages that differ from mid-range, budget, or independent establishments. While this study highlighted contrasts between chain-affiliated and self-managed five-star hotels, it did not capture other hospitality formats. Future studies should expand to different hotel categories and ownership structures, as well as to catering, self-managed restaurants, and smaller operations, in order to identify sector-wide patterns. Third, the study relied primarily on the views of head chefs and senior managers, overlooking operational staff such as sous-chefs, line cooks, waiters, and procurement officers, who play crucial roles in daily waste-related practices. Miscommunication between front-of-house and back-of-house teams, for instance, may be a critical driver of waste. Future research should include these voices to provide a more holistic picture of organizational dynamics in waste generation and prevention. Fourth, while food waste audits and weighing were performed, the results were not systematically expressed in quantitative terms (e.g., kilograms, proportions of total food purchased, or financial cost). This limited the persuasiveness and comparability of conclusions. Future work should systematically quantify waste volumes and costs, allowing for a clearer link between chef-led practices, resource efficiency, and economic outcomes. Fifth, the study did not categorize practices by food type. Although chefs often noted that vegetables, garnishes, and side dishes were the most commonly wasted in buffet contexts, this was not systematically analyzed. Future research should adopt a combined qualitative–quantitative design to examine waste across food categories (e.g., meat, fish, bakery products, dairy), as these vary in perishability, cost, and environmental footprint. Sixth, this study did not systematically examine the psychological traits or temperaments of chefs, which may strongly influence waste-related decision-making in kitchens. Future research could incorporate perspectives from organizational psychology and human resource management to explore how characteristics such as leadership style, creativity, and stress tolerance shape food waste management outcomes. Seventh, our study did not explore whether food waste management performance is explicitly considered in chef hiring, restaurant rating systems, or kitchen awards. The interviews with chefs and managers focused on

operational practices within hotel kitchens, and participants did not report that waste minimization was a formal recruitment criterion or a factor in external evaluation systems. This suggests that, at least in the Belgrade five-star context, chefs' contributions to food waste reduction are valued internally as good practice but are not yet institutionalized in hiring policies, rating benchmarks, or award criteria. We recognize this as a limitation of our study and highlight it as a fruitful direction for future research, as integrating waste management into such processes could create stronger external incentives for chefs and kitchen teams to embed sustainability practices. Finally, the visual analysis was limited to word frequency representations, which do not capture semantic relationships or thematic networks. Although the study relied on thematic coding for deeper interpretation, future research should integrate more advanced approaches, such as semantic network analysis or topic modeling, to more robustly examine the connections between chefs' cognition and behavior.

6. Conclusions

This study examined food waste reduction and management practices in eight five-star hotels in Belgrade, Serbia, with a focus on the role of head chefs as key actors in shaping sustainable outcomes. As an exploratory case study, the research does not aim to statistically represent the Serbian hotel industry as a whole, nor to generalize across all transitional economies. Instead, it offers context-specific insights into how luxury hospitality environments in a transitional economy approach food waste management through the interplay of corporate policies, chef resourcefulness, and operational practices. By situating food waste management practices in Serbia within the broader context of Eastern Europe and the Balkans, the study adds regional relevance to a field still underrepresented in the international literature. Our findings contribute to understanding how sustainability challenges are approached in transitional economies, complementing existing research from Slovenia, Croatia, and other Balkan countries. From the theoretical point of view, contributors are addressing and filling the gaps in sustainable food waste management practices in hospitality. Drawing on the food waste hierarchy principles, this study outlines various aspects and levels of food waste management practices within hotel operations, particularly in five-star hotels. The practical component of the research applied the interview schedule developed by Filimonau et al. [39], which proved to be a useful tool for assessing head chefs' knowledge of food waste issues in their kitchens. Education emerged as a crucial factor in advancing this topic through comprehensive training of staff—whether junior chefs, sous chefs, or head chefs—and can enhance their culinary skills, gain a deeper understanding of ingredients, and learn how to reduce waste through more mindful practices. In addition, this study highlights the equally important role of other components of practice theory, particularly corporate influence. Corporate structures can play a key role in reinforcing chefs' knowledge of food waste, for example by supporting targeted training and fostering a workplace culture that prioritizes sustainable food management. Ultimately, while context-bound, this research provides a valuable step toward a more nuanced understanding of how sustainable food waste practices can be advanced in hospitality sectors that operate under transitional conditions, thus complementing the predominantly Western-focused literature in this field.

Institutional Review Board Statement: Ethical review and approval were waived for this study due to the national Law on Personal Data Protection (The Official Gazette of the Republic of Serbia, number 97/08; further, the law https://pravno-informacioni-sistem.rs/eli/rep/sgrs/skupstina/zakon/2008/97/1/reg (accessed on 1 November 2024).

Informed Consent Statement: Informed consent for participation was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

References

1. Filimonau, V.; De Coteau, D.A. Food waste management in hospitality operations: A critical review. *Tour. Manag.* **2019**, *7*, 234–245. [CrossRef]
2. Papargyropoulou, E.; Steinberger, J.K.; Wright, N.; Lozano, R.; Padfield, R.; Ujang, Z. Patterns and Causes of Food Waste in the Hospitality and Food Service Sector: Food Waste Prevention Insights from Malaysia. *Sustainability* **2019**, *11*, 6016. [CrossRef]
3. de Visser-Amundson, A. A multi-stakeholder partnership to fight food waste in the hospitality industry: A contribution to the United Nations Sustainable Development Goals 12 and 17. *J. Sustain. Tour.* **2022**, *30*, 2448–2475. [CrossRef]
4. Krah, C.Y.; Bahramian, M.; Hynds, P.; Priyadarshini, A. Household food waste generation in high-income countries: A scoping review and pooled analysis between 2010 and 2022. *J. Clen. Prod.* **2024**, *471*, 143375. [CrossRef]
5. Thaore, V.; Bahramian, M.; Boudou, M.; Hynds, P.; Priyadarshini, A. Geospatial analysis of food waste generation at the consumer-level in high-income regions, 2000–2023—A scoping review. *Environ. Res.* **2024**, *263*, 120247. [CrossRef] [PubMed]
6. Ali, Y.; Jokhio, D.H.; Dojki, A.A.; Rehman, O.; Khan, F.; Salman, A. Adoption of circular economy for food waste management in the context of a developing country. *Waste Manag. Res.* **2021**, *40*, 676–684. [CrossRef] [PubMed]
7. Sarker, A.; Ghosh, M.K.; Islam, T.; Bilal, M.; Nandi, R.; Raihan, M.L.; Hossain, M.N.; Rana, J.; Barman, S.K.; Kim, J.-E. Sustainable Food Waste Recycling for the Circular Economy in Developing Countries, with Special Reference to Bangladesh. *Sustainability* **2022**, *14*, 12035. [CrossRef]
8. Mmereki, D.; David, V.E.; Wreh Brownell, A.H. The management and prevention of food losses and waste in low- and middle-income countries: A mini-review in the Africa region. *Waste. Manag. Res.* **2023**, *42*, 287–307. [CrossRef]
9. Cimbaljević, M.; Panić, A.; Kovačić, S.; Knežević, M.; Pavluković, V. What Factors Do Tourists Consider Most Important When Evaluating the Competitiveness of Tourism? The Focus on Developing Economy. *J. Geogr. Inst "Jovan Cvijić" SASA* **2025**, *75*, 67–85. [CrossRef]
10. Chawla, G.; Lugosi, P.; Hawkins, R. Evaluating localized conceptions and embedded applications of the Food Waste Hierarchy in luxury hotels. *Curr. Issues Tour.* **2024**, *28*, 417–430. [CrossRef]
11. Chawla, G.; Lugosi, P.; Hawkins, R. Food Waste Drivers in Corporate Luxury Hotels: Competing Perceptions and Priorities across the Service Cycle. *Tour. Hosp.* **2021**, *2*, 302–318. [CrossRef]
12. Ivanović, N.; Vučinić, A.; Marinković, V.; Krajnović, D.; Ćurčić, M. Towards Sustainable Food Waste Management in Serbia: A Review of Challenges, Gaps, and Future Perspectives. *Sustainability* **2025**, *17*, 2961. [CrossRef]
13. Behera, A.; Jatav, S.S. Waste Management Practices of Small Hotels in Dehradun. *J. Tour. Insights* **2022**, *12*, 3. [CrossRef]
14. Appiah, P.A.; Adongo, R.; Safo, A.R. Sustainable Energy Systems and Green Hotel Practices in Hotels in Tamale Metropolis, Ghana. *J. Environ. Manag. Tour.* **2023**, *14*, 2915–2934. [CrossRef]
15. Tokro, L.S.; Dzitse, C.D. Barriers to the adoption of sustainability practices in small hotel businesses: A qualitative study in Ghana. *Res. J. Busin. Manag.* **2024**, *11*, 36–50. [CrossRef]
16. Luo, J.M.; Chau, K.Y.; Fan, Y.; Chen, H. Barriers to the Implementation of Green Practices in the Integrated Resort Sector. *SAGE Open* **2021**, *11*. [CrossRef]
17. Cigale, D.; Lampič, B. Aspects of Tourism Sustainability on Organic Farms in Slovenia. *J. Geogr. Inst Jovan Cvijić" SASA* **2023**, *73*, 251–267. [CrossRef]
18. Sezerel, H.; Kılıcaslan, H.; Filimonau, V.; Dülger, E. The role of chefs' creativity in food waste management in professional kitchens. *Int. J. Hosp. Manag.* **2025**, *128*, 104183. [CrossRef]

19. Way, K.A.; Johnston, N.E.; Reardon, J.; Garrison, M.E.B. Addressing Food Waste in Restaurant Training: Practices and Challenges. *Tour. Hosp.* **2025**, *6*, 121. [CrossRef]

20. Filimonau, V.; Sezerel, H.; Ashton, M.; Kubal-Czerwińska, M.; Bhaskara, G.I.; Ermolaev, V.A. How chefs develop the practice to manage food waste in professional kitchens. *Int. J. Hosp. Manag.* **2024**, *119*, 103712. [CrossRef]

21. National Alliance for Local Economic Development (NALED). *NALED, GIZ and Esotron Have Collected 1300 Tons of Food Waste*; NALED. 2022. Available online: https://naled.rs/en/news-naled-giz-and-esotron-have-collected-1300-tons-of-food-waste-6201 (accessed on 8 September 2025).

22. European Environment Agency (EEA). Waste Prevention Country Profile: Serbia. *EEA Report*. February 2025. Available online: https://www.eea.europa.eu/en/topics/in-depth/waste-and-recycling/country-profiles-on-waste-prevention-2025/rs-waste-prevention-factsheet-final.pdf (accessed on 9 September 2025).

23. Gajić, T.; Vukolić, D.; Penić, M. Revival of the Hotel Industry: The Impact of Food Waste Reduction on Serbia's Economic Prospects. *Agric. Econ.* **2024**, *71*, 75–98. [CrossRef]

24. United Nations Development Programme (UNDP) Serbia. *Food Waste Collection and Processing in the Hospitality Sector Benefit Both the Environment and the Companies*; UNDP Serbia: Belgrade, Serbia, 2024. Available online: https://www.undp.org/serbia/news/food-waste-collection-and-processing-hospitality-sector-benefit-both-environment-and-companies (accessed on 8 September 2025).

25. United Nations Development Programme (UNDP). *Independent Country Programme Evaluation—Serbia*; UNDP: Belgrade, Serbia, 2025. Available online: https://www.undp.org/sites/g/files/zskgke326/files/2025-07/icpe-serbia-report.pdf (accessed on 8 September 2025).

26. United Nations Serbia. *Analysis of Research on Direct Measurement of Food Waste in Belgrade Shows that Commercial Sector Throws Away Over 40 Thousand Tons of Food Annually*; UN Serbia. 2021. Available online: https://serbia.un.org/en/174893-analysis-research-direct-measurement-food-waste-belgrade-shows-commercial-sector-throws-away (accessed on 8 September 2025).

27. National Alliance for Local Economic Development (NALED). *The Action of Collecting 1000 Tons of Food Waste Continues*; NALED. 2021. Available online: https://naled.rs/en/news-the-action-of-collecting-1000-tons-of-food-waste-continues-5624 (accessed on 8 September 2025).

28. Milovanović, V.; Kostić, M.; Ka Leong, D. Food Waste Management Practices Among Hotels in Serbia and Malaysia. *Tour. Int. Sci. Conf. Vrnjačka Banja* **2024**, *8*, 500–509.

29. Dolnicar, S.; Juvan, E.; Grun, B. Reducing the plate waste of families at hotel buffets–A quasi-experimental field study. *Tour. Manag.* **2020**, *80*, 104103. [CrossRef]

30. Cozzio, C.; Tokarchuk, O.; Maurer, O. Minimising plate waste at hotel breakfast buffets: An experimental approach through persuasive messages. *Br. Food J.* **2021**, *123*, 3208–3227. [CrossRef]

31. Silvennoinen, K.; Heikkilä, L.; Katajajuuri, J.M.; Reinikainen, A. Food waste volume and origin: Case studies in the Finnish food service sector. *Waste Manag.* **2015**, *46*, 140–145. [CrossRef]

32. Silvennoinen, K.; Nisonen, S.; Pietiläinen, O. Food waste case study and monitoring developing in Finnish food services. *Waste Manag.* **2019**, *97*, 97–104. [CrossRef]

33. Waste and Resources Action Programme (WRAP). *Food Waste Measurement Principles and Resources Guide*; European Commission: Brussels, Belgium, 2018. Available online: https://food.ec.europa.eu/system/files/2018-04/fw_lib_fwp-guide_food-waste-measurement_wrap-2018.pdf (accessed on 9 September 2025).

34. Wu, C.E.; Teng, C.C. Reducing Food Waste in Buffet Restaurants: A Corporate Management Approach. *Foods* **2022**, *12*, 162. [CrossRef]

35. Vardopoulos, I.; Abeliotis, K.; Lasaridi, K. A Systematic Informetric Analysis and Literature Review of Food Waste Quantification Studies in the Food Service Industry. *Sustainability* **2025**, *17*, 103. [CrossRef]

36. Dhir, A.; Talwar, S.; Kaur, P.; Malibari, A. Food waste in hospitality and food services: A systematic literature review and framework development approach. *J. Clean. Prod.* **2020**, *270*, 122861. [CrossRef]

37. Juvan, E.; Grün, B.; Dolnicar, S. Waste production patterns in hotels and restaurants: An intra-sectoral segmentation approach. *Ann. Tour. Res. Empire Insig.* **2023**, *4*, 100090. [CrossRef]

38. Nand, A.A.; Bhattacharya, A.; Prajogo, D.; Sohal, A.; de Vass, T. Understanding food waste in the hospitality industry: A social practice theory approach. *Inter. J. Hosp. Manag.* **2025**, *130*, 104232. [CrossRef]

39. Filimonau, V.; Chiang, C.C.; Wang, L.; Muhialdin, B.J.; Ermolaev, V.A. Resourcefulness of chefs and food waste prevention in fine dining restaurants. *Inter. J. Hosp. Manag.* **2023**, *108*, 103368. [CrossRef]

40. Bhaskara, G.I.; Filimonau, V.; Kusumawardhana, I.; Darma Putra, I.N.; Sucita Yanthy, P.; Nur Hakim, I. Environmental habitus of chefs and food waste management in hospitality operations. *J. Sustain. Tour.* **2024**, 1–27. [CrossRef]

41. Kattiyapornpong, U.; Ditta-Apichai, M.; Chuntamara, C. Sustainable Food Waste Management Practices: Perspectives from Five-Star Hotels in Thailand. *Sustainability* **2023**, *15*, 10213. [CrossRef]

42. Srijuntrapun, P.; Sukwong, P.; Marshall, A. The role of food waste hierarchy as Thai hotels seek to fulfill their corporate social responsibility. *Heliyon* **2022**, *8*, e11201. [CrossRef] [PubMed]

43. Glišić, S.; Stamenković, P. Empirical analysis of tourists' intentions regarding food waste in Serbian hotel industry. *Hotel Tour. Manag.* **2025**, *13*, 1. [CrossRef]

44. Rajić, M.N.; Maksimović, R.M.; Milosavljević, P. Energy Management Model for Sustainable Development in Hotels within WB6. *Sustainability* **2022**, *14*, 16787. [CrossRef]

45. Blešić, I.; Petrović, M.D.; Gajić, T.; Tretiakova, T.N.; Syromiatnikova, J.A.; Radovanović, M.; Popov-Raljić, J.; Yakovenko, N.V. How the Extended Theory of Planned Behavior Can Be Applied in the Research of the Influencing Factors of Food Waste in Restaurants: Learning from Serbian Urban Centers. *Sustainability* **2021**, *13*, 9236. [CrossRef]

46. Lazić, B.; Batinić, B.; Tot, B.; Vujić, G. Assessment of restaurants food waste towards circular economy in transition country cities. *Environ. Engin. Manag. J.* **2022**, *21*, 1147.

47. Papargyropoulou, E.; Lozano, R.; Steinberger, J.K.; Wright, N.; bin Ujang, Z. The food waste hierarchy as a framework for the management of food surplus and food waste. *J. Clean. Prod.* **2014**, *76*, 106–115. [CrossRef]

48. Batat, W. Pillars of sustainable food experiences in the luxury gastronomy sector: A qualitative exploration of Michelin-starred chefs' motivations. *J. Retail. Consum. Serv.* **2020**, *57*, 102255. [CrossRef]

49. European Commission. Directive 2008/98/EC on Waste (Waste Framework Directive). 2008. Available online: https://eur-lex. europa.eu/legal-content/EN/ALL/?uri=CELEX:32008L0098 (accessed on 25 January 2025).

50. EPA, United States Environmental Protection Agency. Food Recovery Hierarchy. 2017. Available online: https://19january201 7snapshot.epa.gov/sustainable-management-food/food-recovery-hierarchy_.html (accessed on 25 January 2025).

51. Kilibarda, N.; Djokovic, F.; Suzic, R. Food waste management–reducing and managing food waste in hospitality. *Meat Technol.* **2019**, *60*, 134–142. [CrossRef]

52. Camilleri, M.A. Sustainable Production and Consumption of Food. Mise-en-Place Circular Economy Policies and Waste Management Practices in Tourism Cities. *Sustainability* **2021**, *13*, 9986. [CrossRef]

53. Camilleri-Fenech, M.; Sola, J.O.; Farreny, R.; Durany, X.G. A snapshot of solid waste generation in the hospitality industry. The case of a five-star hotel on the island of Malta. *Sustain. Prod. Consum.* **2020**, *21*, 104–119. [CrossRef]

54. Duursma, G.; Vrenegoor, F.; Kobus, S. Food waste reduction at restaurant De pleats: Small steps for mankind. *Res. Hosp. Manag.* **2016**, *6*, 95–100. [CrossRef]

55. SRA, Sustainable Restaurant Association. *Too Good to Waste: Restaurant Food Waste Survey Report*; Sustainable Restaurant Association: London, UK, 2010.

56. Charlebois, S.; Creedy, A.; Massow, M.V. Back of house—Focused study on food waste in fine dining: The case of Delish restaurants. *Int. J. Cult. Tour. Hosp. Res.* **2015**, *9*, 278–291. [CrossRef]

57. FAO, Food and Agriculture Organization of the United Nations. Food Losses and Waste in Latin America and the Caribbean: FAO Regional Office for Latin America and the Caribbean. 2015. Available online: https://www.researchgate.net/publication/ 292976407_Food_Losses_and_Waste_in_Latin_America_and_the_Caribbean (accessed on 20 January 2025).

58. WRAP, The Waste and Resources Action Programme. Surplus Food Redistribution Case Studies. 2017. Available online: https://wrap.org.uk/content/surplus-food-redistribution-case-studies (accessed on 21 January 2025).

59. Gossling, S.; Garrod, B.; Aall, C.; Hille, J.; Peeters, P. Food management in tourism: Reducing tourism's carbon 'foodprint'. *Tour. Manag.* **2011**, *32*, 534–543. [CrossRef]

60. Cheng, Z.; Mo, W.Y.; Man, Y.B.; Nie, X.P.; Li, K.B.; Wong, M.H. Replacing fish meal by food waste in feed pellets to culture lower trophic level fish containing acceptable levels of organochlorine pesticides: Health risk assessments. *Environ. Int.* **2014**, *73*, 22–27. [CrossRef]

61. Hu, M.-L.; Horng, J.-S.; Teng, C.-C.; Chou, S.-F. A criteria model of restaurant energy conservation and carbon reduction in Taiwan. *J. Sustain. Tour.* **2013**, *21*, 765–779. [CrossRef]

62. Wong, M.H.; Mo, W.Y.; Choi, W.M.; Cheng, Z.; Man, Y.B. Recycle food wastes into high quality fish feeds for safe and quality fish production. *Environ. Pollut.* **2016**, *219*, 631–638. [CrossRef] [PubMed]

63. Papargyropoulou, E.; Wright, N.; Lozano, R.; Steinberger, J.; Padfield, R.; Ujang, Z. Conceptual framework for the study of food waste generation and prevention in the hospitality sector. *Waste Manag.* **2016**, *49*, 326–336. [CrossRef] [PubMed]

64. Filimonau, V.; Uddin, R. Food waste management in chain-affiliated and independent consumers' places: A preliminary and exploratory study. *J. Clean. Prod.* **2021**, *319*, 128721. [CrossRef]

65. Principato, L.; Pratesi, C.A.; Secondi, L. Towards zero waste: An exploratory study on restaurant managers. *Int. J. Hosp. Manag.* **2018**, *74*, 130–137. [CrossRef]

66. Goossens, Y.; Schmidt, T.G.; Kuntscher, M. Evaluation of Food Waste Prevention Measures—The Use of Fish Products in the Food Service Sector. *Sustainability* **2020**, *12*, 6613. [CrossRef]

67. Karakas, K.M. Food Waste Management in Luxury Hotels—Best Practices and Limitations. *J. Environ. Sci. Eng. B* **2021**, *10*, 103–111. [CrossRef]

68. Ball, S.; Jones, P.; Lockwood, A.; Kirk, D. *Hospitality Operations: A Systems Approach*; Thomson Learning Emea: London, UK, 2003.

69. Filimonau, V.; Zhang, H.; Wang, L. Food waste management in Shanghai full-service restaurants: A senior managers' perspective. *J. Clean. Prod.* **2020**, *258*, 120975. [CrossRef]

70. Thompson, K.; Haigh, L. Representations of food waste in reality food television: An exploratory analysis of ramsay's kitchen nightmares. *Sustainability* **2017**, *9*, 1139. [CrossRef]

71. Vizzoto, F.; Tessitore, S.; Testa, F.; Iraldo, F. Plate waste in foodservice outlets: Revealing customer profiles and their support for potentially contentious measures to reduce it in Italy. *Resour. Conserv. Recycl.* **2021**, *174*, 105771. [CrossRef]

72. Filimonau, V.; Kadum, H.; Mohammed, N.K.; Algboory, H.; Qasem, J.M.; Ermolaev, V.A.; Muhialdin, B.J. Religiosity and food waste behavior at home and away. *J. Hosp. Mark. Manag.* **2022**, *31*, 797–818. [CrossRef]

73. McAdams, B.; von Massow, M.; Gallant, M.; Hayhoe, M.A. A cross industry evaluation of food waste in restaurants. *J. Foodserv. Bus. Res.* **2019**, *22*, 449–466. [CrossRef]

74. Hennchen, B. Knowing the kitchen: Applying practice theory to issues of food waste in the food service sector. *J. Clean. Prod.* **2019**, *225*, 675–683. [CrossRef]

75. Cerasa, A.; Fabbricatore, C.; Ferraro, G.; Pozzulo, R.; Martino, I.; Luizza, M.T. Work-Related Stress Among Chefs: A Predictive Model of Health Complaints. *Front. Public Health* **2020**, *8*, 68. [CrossRef]

76. Ekincek, S.; Gunay, S. A recipe for culinary creativity: Defining characteristics of creative chefs and their process. *Int. J. Gastron. Food Sci.* **2023**, *31*, 100633. [CrossRef]

77. Tugay, O.; Pekersen, Y. Impact to culinary chefs' individual innovativeness levels on service innovation performance. *Int. J. Gastron. Food Sci.* **2022**, *27*, 100472. [CrossRef]

78. Porpino, G. Household food waste behavior: Avenues for future research. *J. Assoc. Consum. Res.* **2016**, *1*, 41–51. [CrossRef]

79. Michalec, A.; Fodor, M.; Hayes, E.; Longhurst, J. Co-designing food waste services in the catering sector. *Br. Food J.* **2018**, *120*, 2762–2777. [CrossRef]

80. Burke, E.; Napawan, N.C. Between kitchen sink and city sewer: A socio-ecological approach to food waste in environmental design. In *Food Waste Management*; Närvänen, E., Mesiranta, N., Mattila, M., Heikkinen, A., Eds.; Palgrave Macmillan: Cham, Switzerland, 2020; pp. 169–191.

81. Chawla, G.; Lugosi, P.; Hawkins, R. Evaluating materiality in food waste reduction interventions. *Ann. Tour. Res. Empir. Insights* **2020**, *1*, 100002. [CrossRef]

82. Filimonau, V.; Nghiem, V.N.; Wang, L. Food waste management in ethnic food restaurants. *Int. J. Hosp. Manag.* **2021**, *92*, 102731. [CrossRef]

83. Mihalič, T.; Žabkar, V.; Cvelbar, L.K. A hotel sustainability business model: Evidence from Slovenia. *J. Sustain. Tour.* **2011**, *20*, 701–719. [CrossRef]

84. Duric, Z.; Potočnik Topler, J. The Role of Performance and Environmental Sustainability Indicators in Hotel Competitiveness. *Sustainability* **2021**, *13*, 6574. [CrossRef]

85. Krizaj, D.; Sasidharan, V. Social sustainability and innovations in tourism—Cases from Slovenia. In *Sustainable Tourism Practices in the Mediterranean*; Tuzun, I., Ergul, M., Johnson, C., Eds.; Routledge: London, UK, 2019; Volume 17.

86. Krstinić Nižić, M.; Matoš, S. Energy efficiency as a business policy for eco-certified hotels. *Tour. Hosp. Manag.* **2018**, *24*, 307–324. [CrossRef]

87. Janjusevic, J.; Perovic, N. Eco-certification in the Montenegrin Tourism as a Response on Climate Change. In *Sustainable Development and Social Responsibility—Volume 2. Advances in Science, Technology & Innovation*; Al-Masri, A., Al-Assaf, Y., Eds.; Springer: Cham, Switzerland, 2020. [CrossRef]

88. Rakočević, L.; Vujko, A.; Cvijanović, D. Pro-environmental practices and green solutions adoption in Western Balkans hotels: Transformative path to enhance. *Sustain. BizInfo Blace* **2025**, *16*, 31–39. [CrossRef]

89. Dauti, M.B.; Licaj, B.; Tase, M.; Krasniqi, M. Attitudes of Hotel Managers on Sustainable Tourism Through Green Practices: Case Study Countries of the Western Balkans. *Int. J. Sustain. Dev. Plan.* **2024**, *19*, 3339. [CrossRef]

90. Statistical Office of the Republic of Serbia (SORS). *Trends, Quarter IV 2024*; Statistical Office of the Republic of Serbia: Belgrade, Serbia, 2025. Available online: https://publikacije.stat.gov.rs/G2025/PdfE/G20258001.pdf (accessed on 7 September 2025).

91. Statistical Office of the Republic of Serbia (SORS). *Tourism Overview—December 2023*; Statistical Office of the Republic of Serbia: Belgrade, Serbia, 2024. Available online: https://publikacije.stat.gov.rs/G2024/PdfE/G20241005.pdf (accessed on 7 September 2025).

92. Ministry of Tourism and Youth of the Republic of Serbia. *Categorized Accommodation Facilities—Republic of Serbia (July 2025)*; Ministry of Tourism and Youth: Belgrade, Serbia, 2025. Available online: https://mto.gov.rs/tekst/308/sektor-za-turizam.php (accessed on 16 September 2025).

93. Statistical Office of the Republic of Serbia (SORS). *Registered Employment in the Third Quarter of 2024*; Statistical Office of the Republic of Serbia: Belgrade, Serbia, 2024. Available online: https://www.stat.gov.rs/en-US/vesti/statisticalrelease/?p=15340 (accessed on 16 September 2025).

94. Vuksanović, N.D.; Tešanović, D.; Kalenjuk, B.; Portić, M. Gender, age and education differences in food consumption within a region: Case studies of Belgrade and Novi Sad (Serbia). *Acta Geogr. Sloven.* **2019**, *59*, 71–80. [CrossRef]

95. Pecelj, M.; Matzarakis, A.; Vujadinović, M.; Radovanović, M.; Vagić, N.; Đurić, D.; Cvetkovic, M. Temporal Analysis of Urban-Suburban PET, mPET and UTCI Indices in Belgrade (Serbia). *Atmosphere* **2021**, *12*, 916. [CrossRef]

96. Munir, K. Sustainable food waste management strategies by applying practice theory in hospitality and food services—A systematic literature review. *J. Clean. Prod.* **2022**, *331*, 129991. [CrossRef]

97. Bharucha, J. Tackling the challenges of reducing and managing food waste in Mumbai restaurants. *Br. Food J.* **2018**, *120*, 639–649. [CrossRef]

98. Vizzoto, F.; Tessitore, S.; Iraldo, F.; Testa, F. Passively concerned: Horeca managers' recognition of the importance of food waste hardly leads to the adoption of more strategies to reduce it. *Waste Manag.* **2020**, *107*, 266–275. [CrossRef] [PubMed]

99. Carrillo Ocampo, J.C.; Marshall, M.; Wellton, L.; Jonsson, I.M. When sustainable cuisine imaginaries become unsustainable: Storage and preservation practices in Swedish Restaurants. *Int. J. Gastron. Food Sci.* **2021**, *24*, 100353. [CrossRef]

100. Creswell, J. *Qualitative Inquiry and Research Design*; SAGE Publications: Los Angeles, CA, USA, 2013.

101. Pravilnik o standardima za kategorizaciju ugostiteljskih objekata za smeštaj ("Rulebook on Standards for the Categorization of Catering Establishments for Accommodation"), Official Gazette of Republic of Serbia, no. 83/2016 i 30/2017. Available online: https://www.paragraf.rs/propisi/pravilnik-standardima-kategorizaciju-ugostiteljskih-objekata-smestaj.html (accessed on 12 December 2023).

102. Quested, T.E.; Marsh, E.; Stunell, D.; Parry, A.D. Spaghetti soup: The complex world of food waste behaviours. *Resour. Conserv. Recycl.* **2013**, *79*, 43–51. [CrossRef]

103. Tatano, F.; Caramiello, C.; Paolini, T.; Tripolone, L. Generation and collection of restaurant waste: Characterization and evaluation at a case study in Italy. *Waste Manag.* **2017**, *61*, 423–442. [CrossRef] [PubMed]

104. Vukolic, D.; Gajic, T.; Petrovic, M.D.; Bugarcic, J.; Spasojevic, A.; Veljovic, S.; Vuksanovic, N.; Bugarcic, M.; Zrnic, M.; Knezevic, S.; et al. Development of the Concept of Sustainable Agro-Tourism Destinations—Exploring the Motivations of Serbian Gastro-Tourists. *Sustainability* **2023**, *15*, 2839. [CrossRef]