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From Your Plate to Our Bin: Tackling Food Waste in Saudi Family Restaurants

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Abstract: This research tackled the food waste problem in Saudi Arabia, with a particular focus on family restaurants, where this issue is evident. The study adopted a semi-structured survey, including structured and open-ended questions with family restaurants' owner–manager/managers. The results of quantitative and qualitative data analysis showed that the most frequent types of food waste in family restaurants are starchy foods, especially bread and rice with a waste ratio above 50% of these items. Additionally, the average ratio of food waste was at least 20% of served food at sampled restaurants per customer. Three major reasons for this high rate of food waste were consumers' behavior, e.g., positive attitude towards food waste; external factors, e.g., absence of a legal framework; and factors related to restaurants, e.g., food portion served and food cycle management. The results identified no applied strategies for handling food left over and reducing food waste at most (70%) of Saudi restaurants. This study calls for a national policy and program on managing food waste at Saudi family restaurants by adopting the 5Rs model for proper food waste management. Restaurants are encouraged to adopt green initiatives, such as "clean your plate" or "eat or waste" to stimulate their customers' behavior for reducing their food waste and sustain the environment. This would support a green and circular economy.

Keywords: clean your plate; eat or waste; family restaurants; food waste index; green economy; Saudi Vision 2030; waste management strategies

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1. Introduction

The Kingdom of Saudi Arabia (KSA) is not an ideal place for agriculture due to several reasons, e.g., limited arable lands, low rainfall, lack of fertile soil, harsh temperatures, and narrow water resources [1,2]. Hence, the KSA depends mainly on imports from other countries to feed its citizens and residents by importing up to 80% of its food needs [3]. Despite this lack of domestic food production, food waste (FW) is massive and the main concern for the KSA's government. FW is considered the primary concern threatening sustainable development [4] and food security [5]. FW generates 10% of greenhouse gas emissions worldwide [6]. The Saudi government launched the Saudi Green Initiative (SGI) aiming to conserve the KSA by saving land and sea, decreasing carbon emissions, and attaining zero emissions by 2060 [7]. Certainly, the SGI supports the Saudi Vision 2030, which ensures quality of life for locals and residents and contributes to transforming into a green economy [8]. Additionally, the SGI contributes to achieving some UNSDGs including goals 11, 12, and 13. Definitely, FW remains a challenge to the development of SGI and eventually to the Saudi Vision 2030 [3].

Several reports [6,9,10] by national and international organizations confirmed that the KSA is branded amongst the top FW countries globally. FW is the prime waste in the KSA, which accounts for more than 50% of the overall waste in the KSA, exceeding any

other kinds of waste [11]. Furthermore, the Food and Agriculture Organization (FAO) [9] demonstrated that the average grain consumption per individual in the KSA is 158 kg, which is higher than the international mean. The same report indicated that the average FW per Saudi citizen (250 Kilograms "kg") is over double the global average (115 kg). Certainly, the quantity of FW increases meaningfully during special days, such as Ramadan [2,12]. Furthermore, Ouda et al. [13] emphasized that the proportion of FW increases dramatically during pilgrimage days; approximately 5000 tons of FW are generated in the Holy City of Makkah in a few days. Undoubtedly, these people rely mainly on restaurants to satisfy their needs leading to higher food waste [3,14].

According to Baig et al. [2], there are thousands of restaurants operating in the KSA to fulfill the food needs of Saudi citizens, residents, and visitors. Family restaurants are very popular with high demand in most KSA cities [15]. The increasing demand for family restaurants can be mainly attributed to the growing number of young people and women participating in dining out. With approximately 70% of the Saudi population being under 30 years old and more women entering the labor force, regimes have evolved, leading to limited time available for cooking. Furthermore, the impact of Western consumer culture has also played a role in the growth of these food outlets [2,3]. Parizeau et al. [16] emphasized that restaurant guests dispose of more items compared to those eating at home. Lipinski et al. [17] described FW as food that is appropriate for people's consumption and of good quality but is wasted by being discarded either before or after it spoils. Surprisingly, food services generate approximately 20 to 25% of food waste, while leftovers are the primary source of food waste [18]. The Food and Brand Lab at Cornell University indicated that restaurant guests leave approximately 17% of their food unconsumed, of which 55% of the still edible leftovers are abandoned in the restaurant [19]. Furthermore, the FW from food service outlets is ongoing, since food is increasingly eaten out of home [20]. The FW literature reported several reasons behind FW in family restaurants, for instance, consumer behavior and food consumption culture [2,12]. Food consumption culture is influenced by several factors, e.g., customer demographics and income, item pricing, and offers [21]. In Saudi Arabian culture, respect is associated with acts of generosity, especially during occasions, e.g., the holy month of Ramadan, weddings, and family gatherings whether these takes place at home or in a restaurant [12]. Furthermore, the rise in per capita income over recent decades can be attributed largely to the increase in oil revenue, which contributed to a notable level of FW. Additionally, Baig et al. [5] confirmed that one of the factors contributing to FW in restaurants is the portion size. Portion size and food promotions encourage patterns of buying unneeded food and consumers are less likely to consume it before it is spoiled [3].

This research sheds light on a research gap related to FW in restaurants that needs more attention. Although there is a growing body of research on FW, the majority of it has been undertaken in Western and developed countries [22,23]. Filimonau and De Coteau [24] argued that FW remains a topic that receives limited and inadequate attention from scholars, which translates into a scarcity of publications on this issue. This study answers the call of Pirani and Arafat [25], who claimed that few studies have investigated FW issues in Arab countries, including Saudi Arabia [3]. Additionally, Principato et al. [26] stated that most studies on FW are carried out at the household level, while limited studies are conducted in restaurant contexts. In addition, studies that have been undertaken in the KSA on FW (e.g., [1–3,5,12,13]) have been dedicated to understanding the FW drivers and their consequences. This means that there is a research gap in relation to FW in restaurants, particularly Saudi family restaurants, where FW is apparent.

The motivation for this research stems from the need to address the challenges of FW management in Saudi family restaurants as raised by Sobaih [3] and Sobaih and Abu Elnasr [14]. To the best of the research team's knowledge, there are no available English or Arabic studies that explore how FW could be properly managed in a Saudi family's restaurant. This research is the first that aims to identify the most frequent food waste types in family restaurants and addresses the finest strategies for handling food left over and

reducing FW at source. Furthermore, the specific research objectives include analyzing the types and ratio of food waste produced at family restaurants, understanding the factors contributing to waste generation, and discussing strategies that can mitigate this issue. The scope of this research encompasses a comprehensive examination of FW in family restaurants across various regions of the KSA, aiming to provide practical recommendations for stakeholders within the food service industry to reduce FW effectively and sustain the environment, which would lead to a circular economy. The current research addresses the following questions:

RQ1: What are the reasons for food waste in Saudi family restaurants?
RQ2: What are the most frequent food waste types in Saudi family restaurants?
RQ3: What strategies should be best adapted for handling food leftovers and reducing food waste?

2. Literature Review

2.1. An Overview of Restaurants in the KSA

Restaurants play a key role in the economic growth of many countries [27]. Based on several factors, including the level of service, menu, and price, restaurants are classified into four groups: contemporary premium restaurants, casual restaurants, family restaurants, and quick service restaurants [28,29]. Contemporary premium restaurants are those that provide premium food service with a full range of items from appetizers to elaborate desserts with often-high prices. Casual restaurants provide steak, seafood, and ethnic specialties with moderate to higher prices. Furthermore, family restaurants offer a wide range of food and drinks at moderate prices. In addition, quick-service restaurants provide limited food and drink choices with low prices. Family restaurants in the KSA are very popular [15] due to their cultural significance, culinary appeal, and convenient features. They align with the family unity and hospitality of the Saudi culture by offering welcoming atmospheres and ample space. They provide child-friendly environments, generous portions, and affordable pricing, which make them a popular choice for families seeking a comfortable and accessible dining experience. According to [15], family restaurants in the KSA are characterized by their spacious layouts, often featuring larger areas and wide-open spaces designed to accommodate families who prefer to remain at their meals. This also includes comfortable seating and sufficient room for a relaxed dining experience.

2.2. Drivers of Food Waste in Saudi Family Restaurants

Earlier studies have identified several factors that contribute to FW in restaurants. For instance, Papargyropoulou et al. [30] indicated that kitchen operations are the primary reason for FW. The same authors explained that FW frequently occurs in the kitchen due to equipment problems, poor sanitation, inadequate storage, and overproduction. Spoilage can also result from overproduction and insufficient cooking. In contrast, Martin-Rios et al. [31] highlighted that the consumption stage is the main contributor to FW. In this regard, Wang et al. [32] reported that customers contribute to food waste due to their tastes, over-large portion sizes, and excessive ordering [33]. Additionally, the social aspects of dining out play a significant role in plate waste, with events and functions often being the most wasteful occurrences in food service [34]. In the context of the KSA, the literature has identified several factors influencing consumer behavior toward FW. These reasons are economic prosperity [2], lack of awareness [35], special events and seasons [36], consumers' demographic [3], social media [37], personal attitude towards FW [12], impulsive purchases of food [36], and religiosity [12]. In addition, Saudis have a high income per capita due to the economic status of the KSA. Hence, they frequently engage in overbuying behavior and buy more food than they eat [27]. Furthermore, due to the high level of income for Saudis, they frequently dine out [5,12]. According to Parizeau et al. [16] customers tend to waste more food when dining out compared to when they eat at home. Consumer behavior plays a crucial role in the problem of FW [38]. The generous and hospitable nature of Saudi culture to their guests was found as a key predictor affecting the Saudis' intention to waste

food [12]. Earlier studies [5,12,36] have highlighted that the practices of restaurants in the KSA significantly contribute to FW. These practices include serving large portions of food along with additional side items such as bread, rice, and salad. In this vein, Geier et al. [39] indicated that portion size is connected to cultural norms. In KSA culture, food is provided in big sizes to guarantee that there is plenty for everyone. In contrast, Japanese restaurants serve food in small portions [40]. Moreover, offering food promotions, e.g., "buy one get one free" and other campaigns have contributed to waste by prompting patterns to buy more food than needed, leading to items being left uneaten and eventually going to waste [36]. Other practices such as the slogan of "All you can eat for 50 Saudi Riyal (SR)" and restaurants that serve buffets provide large items that contribute to FW. Furthermore, inadequate management of the food cycle in the restaurant has contributed to FW [14].

2.3. The Most Frequent Food Waste Types in Family Restaurants

According to Alshabanat et al. [41], the KSA experiences high food loss and waste rates. These rates of food loss and waste include 29.7% of wheat, 39.5% of vegetables, 39.6% of fruits, 33.6% of rice, 21.4% of dates, 29.1% of poultry, and 31.3% of meat. The Saudi Grain Organization (SAGO) [10] reported similar figures for overall FW, including 28% for potatoes, 23% for tomatoes, and 26% for cucumbers being wasted. In the restaurant context, Sobaih [3] observed that restaurants frequently serve large portions, particularly bread and rice, exceeding consumer needs. This practice, combined with consumer eating habits, contributes to the high levels of FW in restaurants. Baig et al. [5] supported this, reporting high waste among bakery items (53%), vegetables (25%), fruits (24%), and chicken/meat/fish (22%). The same authors argued that these are the most commonly discarded items in the food service industry. A survey conducted by Malibari et al. [35] among Saudi university students reveals that over 55% of respondents reported leaving leftovers, while only 25% typically took their leftovers home. This suggests a lack of awareness or motivation to reduce FW at source among this segment of consumers.

2.4. Strategies for Dealing with Food Leftovers and Reducing Food Waste

There is the fact that the KSA has no formal strategy for tackling FW, especially in restaurants [3]. However, some general initiatives were launched to handle this concern in the KSA [5]. For instance, in 2014, there were some suggestions to create a reduction in FW and loss alike [34]. In that regard, Mu'azu et al. [42] claimed that the KSA has adopted a reusing and recycling program. At the restaurant level, reusing and recycling practices are undertaken informally, utilizing only a small amount of the total FW produced [43]. Another initiative has been developed that aims to collect edible food from restaurants and redistribute it to needy people or use it for feeding animals, but this initiative applies to a limited size because a few charity organizations have participated in these initiatives [44]. In 2019, the SAGO launched an initiative titled "To Last" or "Let'doum". This initiative set some goals such as raising the level of awareness concerning the value of food conservation, improving the operation proficiency of the private sector, reusing and recycling FW, and creating general policy to share FW and reduce food loss [10]. Despite the different initiatives developed by the Saudi government to tackle FW, these initiatives and any other efforts did not achieve the desired results, since there is no available evidence indicating that FW was reduced after these efforts [3]. To that end, the study conducted by Sobaih and Abuelnasr [14] argued a strategy entitled the "5Rs holistic model" to achieve zero FW in restaurants. The proposed strategy is based on the 5Rs hierarchy for tackling FW starting with the reduction of FW at the source, redistributing the proper food surplus to people who are in need, reusing FW/leftovers, recycling FW, and recovering FW benefits, i.e., bioenergy production [14].

3. Methods

3.1. Research Design

The research implemented a mix of qualitative and quantitative data through a semi-structured survey. The survey has both structured and non-structured questions. Teherani et al. [45] indicated that qualitative research addresses questions regarding how individuals/organizations behave/function, the reasons behind such behavior, and the strategies adopted to overcome these challenges. The qualitative approach is instrumental in answering essential research questions. In this study, we delve into the perceptions and experiences of restaurant owner–managers/managers concerning the causes of FW within food service organizations in the KSA. It also explores their perspective on how FW could be properly controlled for food security. Following the introduction of the study on the first page, the survey was divided into five sections. Section 1 presents the profile of owner–managers/managers. This includes their gender, age, nationality, experiences, and qualifications. Section 2 presents the profile of family restaurants, including price range, average of guests per table, average dishes served, and possibility of food waste. Section 3 discusses the ratio of wasted food items in family restaurants. Section 4 presents the reason for food waste in family restaurants using a Likert measure of five points. Reasons were divided into three main types: external and cultural factors, factors related to restaurants, and consumer behavior factors. Section 5 includes strategies undertaken by restaurants for handling food waste. Section 6 presents open-ended questions about the food waste in family restaurants and adopted strategies. The survey was designed to collect both quantitative and qualitative data from owner–managers/managers of family restaurants. Figure 1 presents a summary of the research design.

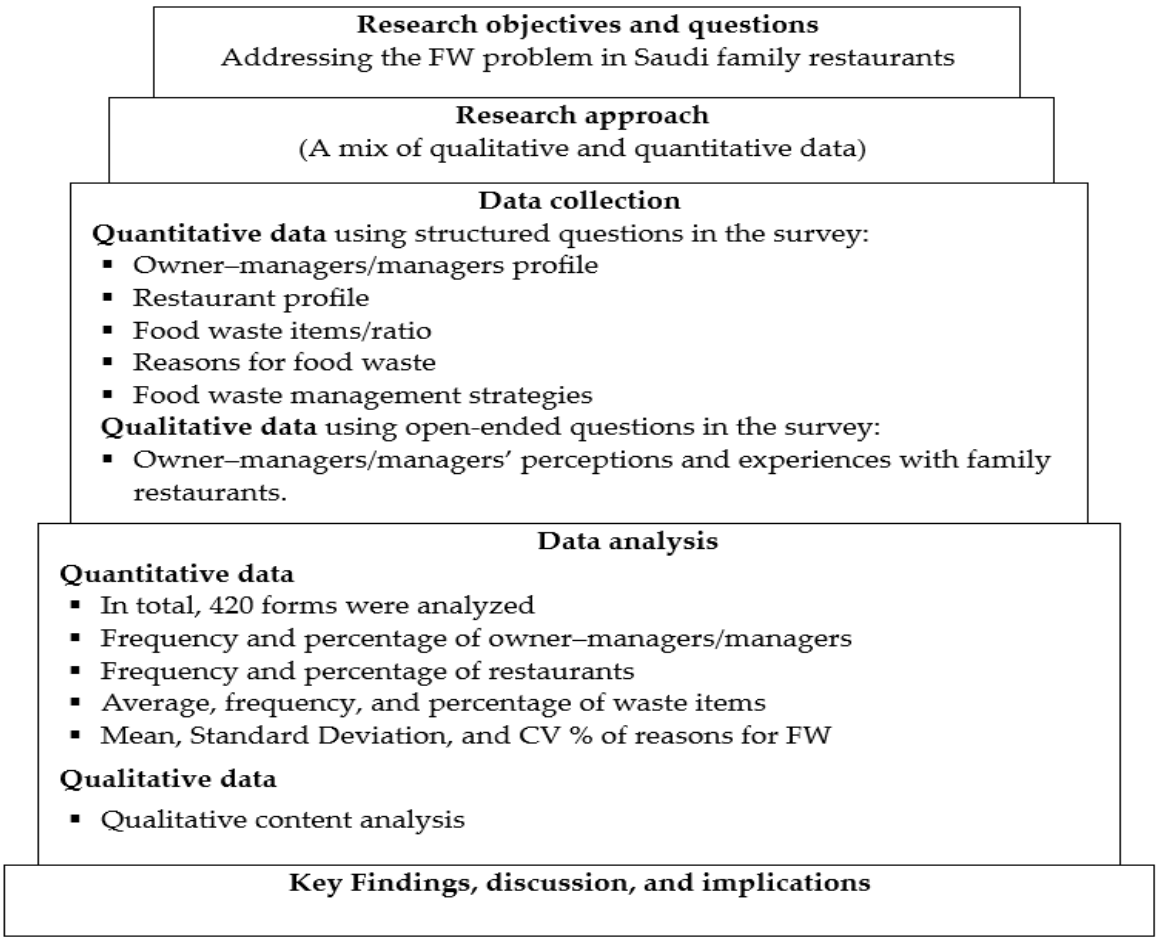


Figure 1. The research design.

3.2. Sampling and Process

This study's population is all restaurants that have dining rooms to serve families in the KSA. There are no published figures about these restaurants, albeit they encompass a large segment of restaurants in the KSA. The sample of this research was decided based on the suggestion of Krejcie and Morgan [46] that a sample size of 384 units is sufficient for research with a population of a million units. This study self-distributed 500 survey forms to owner–managers (who own and manage at the same time)/managers in four main cities in the KSA: Riyadh, Dammam, AlAhsa, and Jeddah. Two cities were in the Eastern Province, Dammam and AlAhsa, one city in the Western Province, Jeddah, and one was the capital of the KSA, Riyadh. Respondents were contacted at their workplace with support from a company specialized in collecting data for research. They were asked to engage voluntarily in the study. Those who gave consent to participate completed the survey. We were able to collect 420 completed forms, which were suitable for analyses after ensuring they were fully completed. At least one member of the research team was available during the distribution and collection of forms to answer any questions and collect more data about the research issue from the respondents, especially the open-ended questions.

3.3. Data Analysis

Since the survey collected quantitative and qualitative data, two methods were adopted for data analysis. Quantitative data were tabulated and analyzed using IBM-SPSS (version 25). The profile of respondents and restaurants, items wasted at restaurants, and adopted strategies were analyzed using frequencies and percentages. Reasons for the food waste at family restaurants were analyzed with mean, standard deviation, and coefficient of variation (CV %). The qualitative information given by respondents was analyzed with qualitative content analysis.

4. Results

4.1. Profile of Respondents

Table 1 presents a summary of the participants' profiles. The vast majority of them were male managers (97%), while female managers represent a very small proportion (3%). Most participants (72%) were aged between 30 and 40 years old, whereas those aged between 41 and 50 years old represented 20%. Certainly, most managers (87%) were non-Saudi citizens, while the Saudi managers represented a small proportion (13%), who were mostly owner–managers. These results refer to the preference of Saudi citizens to avoid employment in the food service career; hence, the majority of food service managers in the KSA are male foreigners, which aligns with earlier studies by Sobaih [3] and Sobaih and Abuelnasr [14]. All of the participants in the survey have considerable professional experience; particularly, more than half of the respondents (53%) had between seven and ten years of restaurant experience and 24% of participants had above ten years of experience in the sector. Notably, not one of the respondents had less than three years of experience. In terms of educational level, the significant majority of managers (93%) had a university degree or equivalent, whereas a small proportion (7%) were postgraduates.

Table 1. Managers' demographics.

Demographics		Frequencies	Percentage
Gender	Male	406	97
	Female	14	3
Age	Less than 30 years old	12	3
	30 to 40 years old	305	72
	41 to 50 years old	83	20
	Over 50 years old	20	5
Nationality	Saudi	56	13
	Non-Saudi	364	87

Table 1. *Cont.*

Demographics		Frequencies	Percentage
Experience	One to three years	-	-
	Four to six years	96	23
	Seven to ten years	224	53
	Over ten years	100	24
Qualification	High school degree or equivalent	-	-
	University degree or equivalent	392	93
	Postgraduate degree	28	7

4.2. Restaurants' Profiles

The results of restaurants' profiles in Table 2 indicate that a significant portion of restaurant patrons (40%) are paying the price range of SAR 50–100 per meal, closely followed by 37% spending less than SAR 50 per meal, while only 23% of family restaurant customers are willing to pay above SAR 100 for a meal. Because family restaurants are serving groups rather than individuals, more than half (57%) of those dining come together in groups of more than seven persons, followed by 33% of restaurant customers coming together in groups consisting of between five and seven persons. In contrast, only 10% of guests dine with three to four individuals, while the family restaurant usually does not serve less than three guests. Concerning the number of dishes ordered by restaurant patrons, most guests (60%) order between three and four dishes, whereas 30% of restaurant customers prefer to consume more than five dishes per meal. Notably, only a small proportion (10%) prefer ordering one to two dishes. Surprisingly, a large percentage of restaurant patrons (77%) rarely eat what they ordered, indicating a potentially high level of FW. Meanwhile, 17% sometimes eat what they order, while only a small proportion (6%) always or often consume their ordered dishes.

Table 2. Restaurants' demographics.

		Frequencies	Percentage
Restaurant price range	Less than SAR 50	154	37
	SAR 50–100	168	40
	SAR 101–150	56	13
	Above SAR 150	42	10
Number of guests at the table	1–2 guests	-	-
	3–4 guests	42	10
	5–7 guests	140	33
	Above 7 guests	238	57
Number of dishes per guest	1–2 dishes	42	10
	3–4 dishes	252	60
	More than 5 dishes	126	30
How often do your customers eat what they have ordered	Rarely	322	77
	Sometimes	70	17
	Always	14	3
	Often	14	3

4.3. The Most Common Food Waste in Saudi Family Restaurants

According to the results in Table 3 and Figure 2, starchy food items are the most wasted items compared to any other food items. Notably, more than half of portion sizes of bread and rice is wasted as 93% and 90% of participants agreed to this. Certainly, these results indicate a significant ratio of FW in these items. Additionally, these results align with the study conducted by Almulhim [47], which found that food items such as flour products, rice, fish, poultry, and red meats are highly wasted during the consumption stage. The rest of the food items for the starchy group such as potatoes and pasta are less wasted, albeit still

at a high rate above 20%. Managers outline that 73% of customers are discarding between 20–30% of their servings, while only 17% waste less than 20%. For the pasta category, waste is similarly prevalent, with nearly half (47%) of restaurant customers wasting 31–40% of their servings and, similarly, 43% of guests are wasting between 20 and 30% of the portion size. In terms of the vegetable category, the results outline that cucumbers and tomatoes also revealed some waste, with 57% and 63% of customers, respectively, discarding between 20 and 30% of what was served. Lettuce showed a high level of waste, with 80% of restaurant managers reporting 31–40% of serviced portions going uneaten by customers.

Table 3. The most common food waste in Saudi family restaurants.

	Waste Items	Average per Customer	Frequencies	Percentage
Starchy	Bread	41–50% Above 50%	28 392	7 93
	Rice	41–50% Above 50%	42 378	10 90
	Potatoes	Less than 20% 20–30% 31–40%	70 308 42	17 73 10
	Pasta	Less than 20% 20–30% 31–40%	42 182 196	10 43 47
Vegetable	Cucumber	Less than 20% 20–30% 31–40%	42 238 140	10 57 33
	Tomato	Less than 20% 20–30% 31–40%	42 266 112	10 63 27
	Lettuce	Less than 20% 20–30% 31–40% 41–50%	28 42 336 14	7 10 80 3
	Onion	Less than 20% 20–30% 31–40% 41–50%	42 40 266 70	10 10 63 17
	Carrot	Less than 20% 20–30% 31–40% 41–50% Above 50%	42 238 140 280 140	10 57 33 67 33
Fruit	Banana	Less than 20% 20–30%	364 56	87 13
	Orange	Less than 20% 20–30% 31–40%	14 140 266	3 33 64
	Appel	Less than 20% 20–30%	364 56	87 13
	Mango	Less than 20% 20–30%	308 112	73 27
	Watermelon	Less than 20% 20–30% 31–40%	42 266 112	10 63 27
	Dates	Less than 20% 20–30%	280 140	67 33

Table 3. *Cont.*

	Waste Items	Average per Customer	Frequencies	Percentage
Red meat	Camel	Less than 20%	238	57
		20–30%	157	37
		31–40%	25	6
	Lamb	Less than 20%	168	40
		20–30%	182	43
		31–40%	70	17
	Beef	Less than 20%	266	63
		20–30%	154	37
Poultry	Poultry	Less than 20%	14	3
		20–30%	84	20
		31–40%	269	64
		41–50%	53	13
	Duck	Less than 20%	322	77
		20–30%	98	23
	Fish	Less than 20%	238	57
		20–30%	182	43
	Seafood	Less than 20%	252	60
		20–30%	140	33
		31–40%	28	7

Restaurant managers/owner–managers answered that onion has a significant level of waste; notably, 80% of customers are leaving between 31 and 50% of their onion items uneaten. Concerning the fruit category, the analysis of fruit waste outlines that a majority of patrons discard less than 20% of bananas (87%), apples (87%), dates (67%), and mangoes (73%). For oranges, 64% of restaurant customers waste between 31 and 40% of served portions. However, the results revealed that apple waste is comparatively lower since the majority of customers (87%) discard less than 20% of their portion. Because one watermelon can be served to more than one person, the results indicate a significant level of waste; specifically, 90% of customers waste more than 20% of offered items. The results of the red meat category highlight that both camel and beef showed that over half of restaurant customers (57% and 63%, respectively) wasted less than 20% of the served portion. Because of the widespread availability of sheep in the KSA, lamb is more popular in the KSA; as a result, there is more waste in lamb meat with 43% of patrons discarding between 20 and 30%, and 40% wasting less than 20%. Concerning the food waste of poultry, a large portion of restaurant customers (64%) wasted between 31 and 40% of portion sizes, while, for duck, 77% of customers wasted less than 20%. Fish and seafood showed lower waste levels as well, with 57% and 60% of patrons, respectively, discarding less than 20% of their portions.

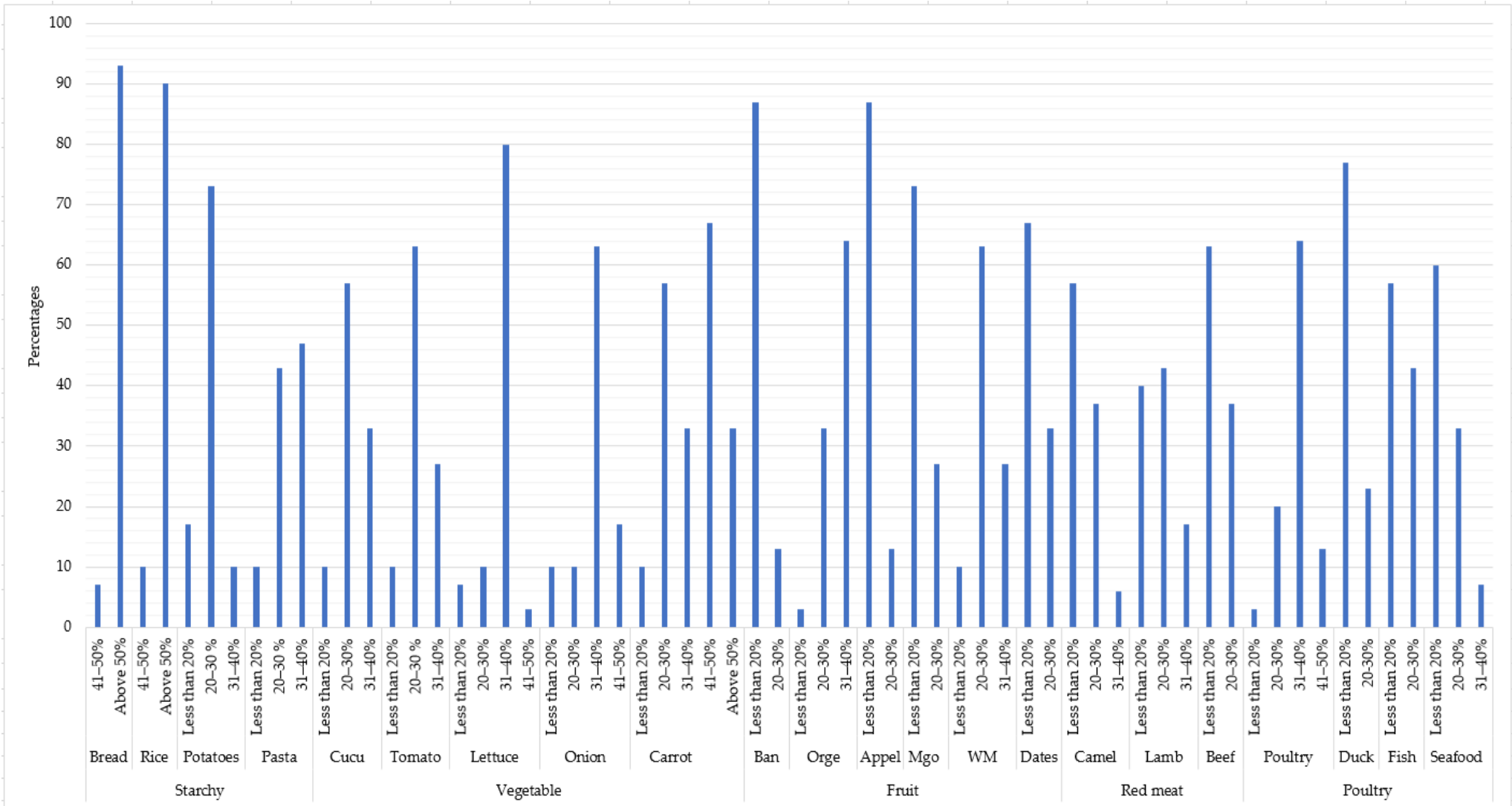


Figure 2. The most common food waste in Saudi family restaurants.

4.4. Factors Affecting Food Waste in Saudi Family Restaurants

Table 4 and Figure 3 show the causes of FW as perceived by restaurant managers. The findings in Table 2 outline that restaurant owner–managers/managers had a high mean score for factors of the traditional Saudi culture of hospitality and over-ordering (M = 4.8). This result aligns with the work of Elshaer et al. [12] indicating that the culture of Saudi people and the generosity in hospitality and over-ordering contribute mainly to FW. Participants also identified the food portion size (M = 4.8) as a primary cause of FW in restaurants. This supports the study of Baig et al. [5]. Restaurant owner–managers/managers imply a potential for increased waste during special seasons such as Ramadan and feast time, and on occasions such as weddings and any other kind of celebrations. Saudi citizens as illustrated by restaurant managers have a positive attitude toward food waste (M = 4.6). In this regard, a key result has been added by the participants that the young generation of Saudi citizens is generating a significant amount of waste because they are impacted by surroundings such as families and friends (M = 4.6). Definitely, positive attitude, behavior, and social norms positively affect food waste intention as confirmed by the study by Elshaer et al. [12]. Furthermore, survey managers believed that the high economic state of Saudi citizens plays a critical role in FW (M = 4.57). This result has been confirmed by Thyberg and Tonjes [48], who found that the greater the individual's income, the greater FW is generated.

Table 4. Factors affecting food waste in Saudi family restaurants.

Items	Min	Max	Mean	Std. D	CV%
External factors	3.83	4.50	4.283	0.1981	4.63
• Traditional Saudi culture of hospitality and over-ordering	3.00	5.00	4.800	0.4766	9.92
• Special seasons and events	3.00	5.00	4.633	0.6053	13.06
• Legal frameworks on food waste management	4.00	5.00	4.500	0.5006	11.13
• Social media	3.00	5.00	4.400	0.6117	13.88
• Support/follow-up from local authority	2.00	5.00	3.900	0.5391	13.83
• Mobile applications/food platforms	2.00	4.00	3.466	0.6189	17.88
Factors related to consumers	3.40	4.60	3.873	0.2946	7.62
• Social influence (families, friends, and network)	4.00	5.00	4.633	0.4824	10.41
• Consumers' positive attitude towards food waste	3.00	5,00	4.600	0.6117	13.30
• The economic state of consumers	3.00	5.00	4.566	0.5594	12.24
• Consumers' demographics	3.00	5.00	4.000	0.6332	15.83
• Consumers' religiosity	1.00	3.00	1.566	0.6683	42.67
Factors related to restaurants	2.89	3.89	3.422	0.2607	7.62
• Food portion and size	3.00	5.00	4.800	0.4766	9.92
• Food offers and promotions	2.00	5.00	4.366	0.7529	17.24
• Serving style and family-style dining	4.00	5.00	4.433	0.4961	11.19
• Inventory and storage management	2.00	4.00	3.266	0.6296	19.26
• Less sold items "Dog and puzzle items"	2.00	4.00	3.300	0.6912	20.98
• Skills and knowledge of kitchen staff	2.00	4.00	2.800	0.6007	21.43
• Plate and tray garnish	1.00	4.00	2.800	0.7492	26.74
• Food preparation practices	1.00	4.00	2.633	0.7529	28.57
• Owner–managers/managers' awareness and attitude towards leftovers	1.00	4.00	2.400	0.6117	25.49

Regarding the legal framework of FW management, managers argued that there is a lack of legal framework (M = 4.5). Hence, there is no obligation on the restaurant managers/owners to implement a kind of FW management. In this vein, Sobaih [3] indicated that the absence of a legal framework and strategy is one of the main causes of FW due to the absence of penalties. Managers/owner–managers pointed out that the serving style in the family restaurant could lead to an increase in FW (M = 4.43). Serving items in lavish dishes or sometimes buffet style tends to generate a high level of FW [49]. Respondents indicated that social media has a positive impact on contributions to FW

(M = 4.40). This is consistent with the study results of Azzaz and Elshaer [37] who confirmed that social media promotes excessive buying and consequently FW alike. Furthermore, food offers and promotions are identified as top factors contributing to increasing the FW in family restaurants (M = 4.37). This result concurs with the study findings of Baig et al. [5] who confirmed that restaurant offers of food add to FW by inspiring patrons to buy food they do not need.

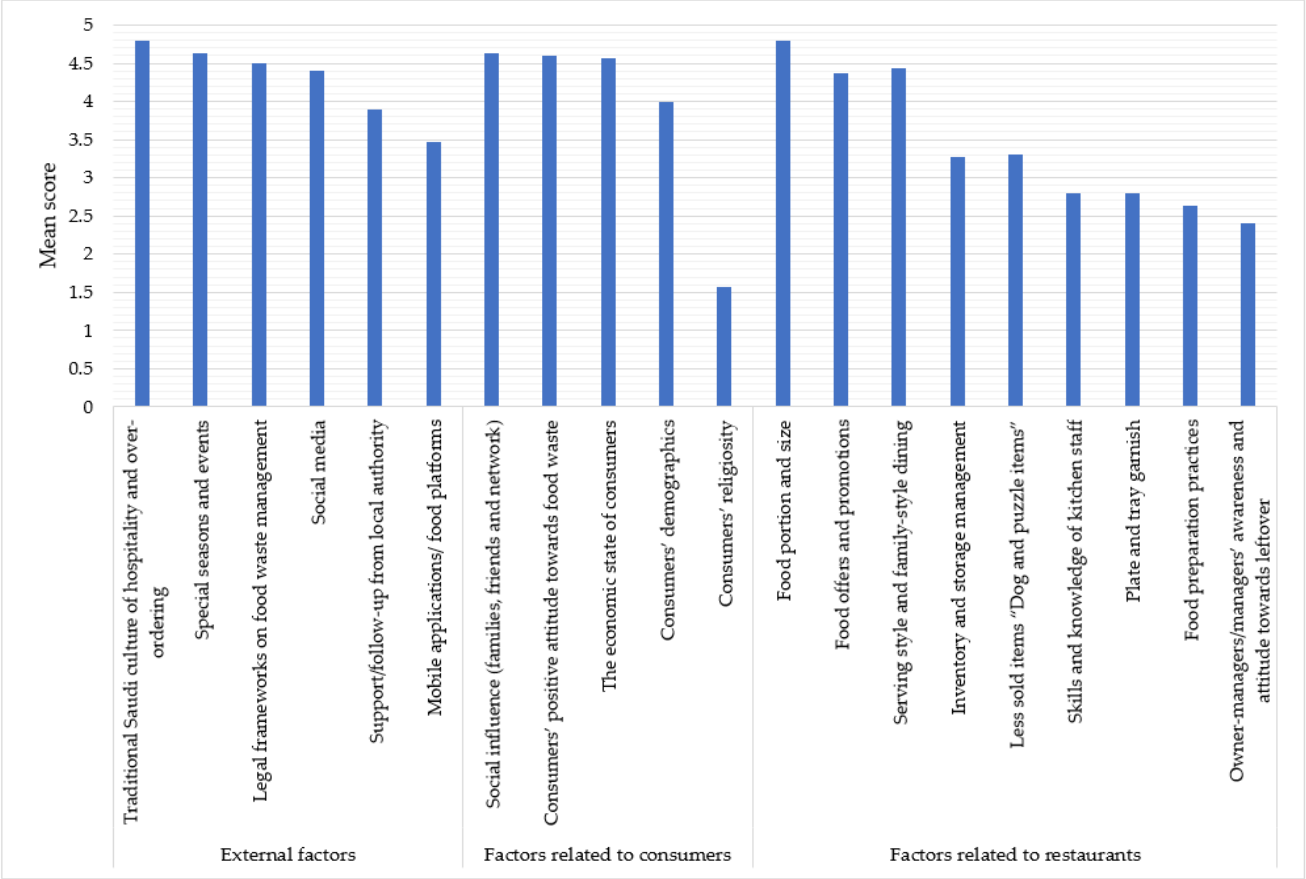


Figure 3. Factors affecting food waste in Saudi family restaurants.

The restaurant owner–managers/managers also outlined that consumer demographics play a key role in increasing food waste (M = 4.0). This result has been noted by earlier studies (e.g., [2,3]) who argued that females and young Saudi citizens are the main patrons of Saudi restaurants. Consequently, they are generating more waste than others are. An important result reported by participants is the lack of support or follow-up from the local authority (M = 3.9) to ensure the applicability of FW management in the restaurant. Concerning mobile applications, managers believe that mobile applications have a positive impact on FW (M = 3.5). This result concurs with the study findings of Sobaih [3] who argued that food mobile applications encourage restaurant patrons to buy items at ease, which translates to unnecessary purchasing of more food than needed, making more FW. Managers/owner–managers indicated a moderate concern for factors such as inventory and storage management (M = 3.3), and less sold items (M = 3.3). Nevertheless, restaurant owner–managers/managers indicate a low mean score for variables linked to restaurant operation and staff. For instance, they argued that factors such as skills and knowledge of kitchen staff, food preparation practices, plate and tray garnish, and owner–manager/manager awareness have a lower impact on FW (M = 2.8; M = 2.6; M = 2.8; and M = 2.4, respectively). Notably, these results are not supported by the earlier studies; for example, Tobler et al. [50] highlighted that inadequate kitchen staff leads to an increase in FW. Furthermore, Sobaih [3] confirmed that restaurant employee skills are essential to

control FW either during food preparation, e.g., skills of cutting, or during the level of service, like packaging. Albeit the vast majority of the population in Saudi Arabia is Muslim, Islamic teaching is against FW because of the Quran's directive "Eat and drink, but do not waste". However, surprisingly owner–managers/managers indicated that consumer religiosity does not impact consumer behavior toward FW (M = 1.6). This result aligns with the study findings of Elshaer et al. [12] who confirmed no significant correlation between religiosity and consumer intention toward FW. To conclude, family restaurant owner–managers/managers perceived that the external factors and factors related to consumer behavior are the main drivers of food waste (M = 4.3; M = 3.9, respectively), while the factors related to restaurant staff and operation contribute less significantly to FW (M = 3.4).

There is a low, i.e., less than 10%, coefficient of variation (CV%) for factors such as traditional Saudi culture of hospitality and over-ordering (9.92%) and food portion and size (9.92%), indicating low variability. In contrast, variables such as "consumers' religiosity" (42.67%), plate and tray garnish (26.74%), skills and knowledge of kitchen staff (21.43%), less sold items (20.98%), and food preparation practices (28.57%) exhibit high CV values, highlighting higher variability in these factors.

4.5. Tackling Strategy

Owner–managers/managers were asked about the applied strategy or the food waste management approach to tackling FW at their establishments. As Table 5 illustrates, the significant majority of respondents did not utilize any kind of strategy (71.4%). Among those that applied a strategy, only 75 properties applied the reduction at source strategy while 45 of them did not apply this strategy. The majority of owner–managers/managers who utilize a strategy depend primarily on reducing during steps of food preparation in the kitchen. Managers/owner–managers illustrated that consumer behaviors are out of their control; hence, they just applied a reducing strategy to reduce control food costs. Some managers/owner–managers (72.5%) illustrated that their properties applied a redistribution strategy through cooperation with some private donation organizations to share edible food with needy and hungry people. The reusing strategy is applied by a good number of establishments (95). They reuse food in the kitchen for preparing other food items and reuse leftovers by customers to feed animals, e.g., cats and dogs. Notably, a small number of establishments recycle food (16). This means there are no recycling programs at most restaurants. Additionally, there is no application of recovery strategies (see Table 5 and Figure 4).

Table 5. Applied strategy for tackling food waste.

		No	%
Applied strategy	Yes	120	28.60
	No	300	71.40
Reducing	Not applied	45	37.50
	Applied	75	62.50
Redistribution	Not applied	87	72.50
	Applied	33	27.50
Reusing	Not applied	95	79.17
	Applied	25	20.83
Recycling	Not applied	16	13.30
	Applied	104	86.70
Recovery	Not applied	120	100
	Applied	0	0.00

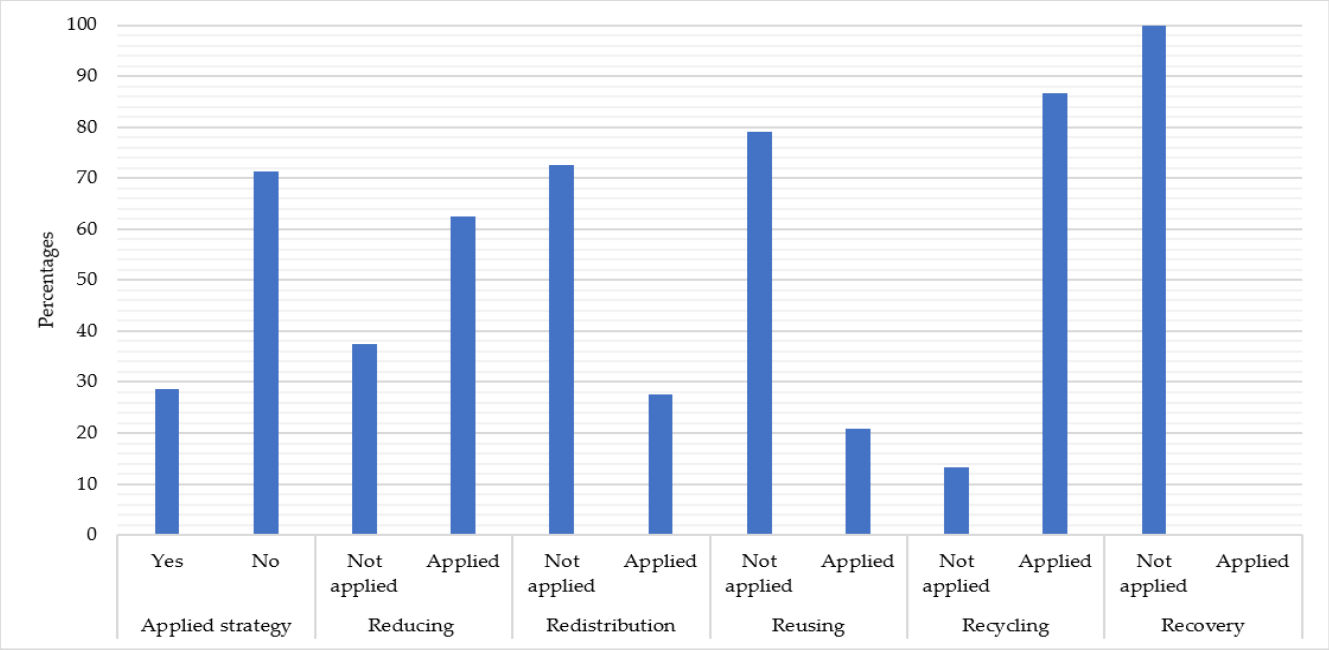


Figure 4. Applied strategy for tackling food waste.

4.6. Managers' Comments

Managers shared their thoughts and experiences about FW items in their outlets, why the food waste occurs, and how they can tackle this waste. Notably, there is an agreement among all managers that there is a level of waste across all types of food items. However, the majority of managers commented that there is a significant amount of FW related to certain food items. They outlined that starchy item including flour products "bread, bakery, pasta" and rice have a significant amount of FW with nearly 50% of guest portions uneaten. Notably, these findings are supported by a survey conducted by SAGO [10]. Restaurant owner–managers/managers attributed the significant waste of starchy items to several reasons such as the affordable prices of food items and over-large portion size. These findings align with study results by Sobaih [3] that demonstrated that, in Saudi culture and family restaurants alike, it is common to serve large portions per person for a group of guests, often exceeding their actual needs. This practice reflects the values of generosity and hospitality that are core to the culture. Consequently, these cultural norms expressively affect food consumption patterns among Saudis and contribute to FW behavior.

There was a consensus among managers that vegetables and fruits have a lower level of FW compared to starchy items. However, the majority of them indicated that certain vegetables, e.g., onions, lettuce, and green leaves, are frequently wasted by customers. Owner–managers/managers attribute the waste in these vegetable items to eating habits in the KSA. In terms of fruit, some managers confirmed that fruits are wasted in a significant amount, particularly during celebrations and special events, while other managers explained that the high rate of fruit waste is due to its perishable nature. One of the managers attributed the high waste in fruit to being because it cannot be redistributed or reused such as watermelon once it has been cut. Concerning meat waste, there was an agreement among all interviewees that meat waste is present across all meat types. Managers agreed that the significant level of meat waste is for lamb meat. Managers attribute the high level of waste in lamb meat to it being frequently cooked for occasions and celebrations. The majority of managers outlined that poultry is highly requested by youngsters and adults; hence, they noted a high level of waste for chicken compared to meat, duck, and fish.

Concerning the drivers of FW, managers identified multiple reasons whether related to restaurant operations, external factors, or consumer behavior. Notably, all interviewees concurred that the primary causes of FW are related to factors out of their control particu-

larly the consumers' behaviors and external factors. They confirmed that Saudi citizens have a positive attitude toward FW. Some of them explained that FW is associated with Saudi consumer behavior, which is connected with many factors such as high economic state, rooted food consumption culture, and social influence. The majority of participants indicated that their restaurant operations do not contribute significantly to FW because they need to reduce food costs; hence, they employ a highly skilled staff whether in the kitchen or at the dining hall with a sufficient level of awareness to reduce food loss and waste, while small numbers of them acknowledge that certain restaurant operations may contribute to FW, especially the regular promotions, package meals, and food offers. Two of the managers reported that the service style of the family restaurant can also increase FW. Concerning a tackling strategy, all managers/owner–managers indicated that waste management is costly. Surprisingly, there was a consensus among them that there is a lack of support from local authorities; consequently, they outlined the difficulties of adopting a food waste management strategy. They added that there is a lack of motivation for applying a strategy. Surprisingly, they highlighted that there is no legal framework to mandate managers of food service outlets to adopt a food waste strategy, except for some initiatives by some private charitable organizations. While some of the managers were aware of these initiatives, only small numbers of managers are actively collaborating with some charity associations such as "It'aam", and Kafa'a". This cooperation primarily focuses on sharing and distributing edible food to needy and hungry people. Notably, most managers are against adopting strategies such as reusing and recycling for safety and restaurant regulation. A few participants argued that it is possible to apply a recycling strategy through collaboration with concerned organizations. However, all the interviewed managers outlined the challenges of adopting a recovery strategy due to the absence and the cost of required pieces of equipment.

5. Implications of the Study

The results have some important implications for researchers, decision makers, and practitioners. From a theoretical perspective, the results indicated that addressing the FW problem at the level of restaurants is different in the household settings and restaurants. This differentiation highlights the need for specific strategies and frameworks that specifically target the exclusive challenges and nature of FW within the family restaurant. Furthermore, the results provide a deeper understanding of factors contributing to FW in the family restaurant. Notably, despite there being many factors contributing to FW in family restaurants, consumer behavior was the main driver of FW in the family restaurant. As a result, understanding consumer behavior and attitudes toward food waste can provide valuable insights, as it can direct strategies to effectively reduce FW in family restaurants. The results also have some implications for policymakers, highlighting the urgent need to develop a clear policy to mandate restaurant managers to adopt a food waste management strategy, e.g., recycling program. Furthermore, the developed regulations should be obligatory through regular audits, with penalties forced for non-compliance [3,14]. Furthermore, policymakers should support the initiatives that foster partnerships between restaurants and charitable organizations through incentives or grant programs to facilitate these collaborations. Policymakers should equip family restaurants with supporting tools, technology, and equipment to monitor, track, and tackle their FW. This may involve using particular software or an app designed to quantify and analyze the amount of FW generated. Certainly, these tools enable managers to identify specific areas that require improvement. Certainly, policymakers play a key role in promoting awareness among Saudi citizens [14]. Policymakers can develop a public campaign aimed to educating consumers about FW and its implications. These campaigns can help in shifting consumers' attitudes and behaviors. These campaigns should focus on the cultural aspects of food consumption and the importance of waste reduction.

Restaurant owner–managers/managers have a primary role in tackling FW in different aspects. Practitioners should evaluate their own operations and consider adopting

integrated waste management strategies. Restaurant owner–managers/managers should adopt the 5Rs holistic model to handle FW [14], which encompasses five stages: reducing food surplus and waste at the source, redistributing food surplus to hungry and needy people, organic waste management companies converting the food they collect, which is unsuitable for consumption, into compost, and recovering food waste. Liquid fats and solid meat products can be used as raw materials in the rendering industry, which converts them into cosmetics. Certainly, recycling and recovery require support from policymakers and local authorities. Furthermore, restaurant managers should reconsider portion sizes [5], to offer the appropriate quantity of food that aligns with guests' actual needs. Certainly, reducing portion size should be applied gradually, and there is a need to gather feedback from patrons about new portion sizes. Additionally, restaurant managers can engage their customers to reduce the level of FW. This engagement can be promoted through awareness and motivation. The awareness can be applied through signage in restaurants that highlights the amount of food waste generated each day, and how the wasted quantity is enough to feed a certain number of needy and hungry persons. Such a message may be titled by verses from the Quran or Hadith "sayings" of Prophet Mohamed to inspire consumers as to the level of FW [12], while motivations can be applied through some initiatives such as "clean your plate and gain a prize" [51]. Managers should engage with charitable associations for food distribution and recovery that can not only reduce FW but also enhance a restaurant's social responsibility profile. Restaurant owner–managers/managers should evaluate their operational practices; for instance, if they apply buffet service, it can be replaced by an à la carte menu. Restaurant managers should promote the concept of "doggy bags" to pick up the rest of the edible food. Furthermore, training being required for restaurant staff in "kitchen and service" on best practices for food preparation and serving can significantly reduce FW. Additionally, restaurant managers should re-evaluate the menu items regularly, particularly the less sold items because they contribute to food loss and waste, and replace them with new items that are required by restaurant patrons. It is important that owners-managers/managers stimulate waste minimization behaviour among their employees to control food waste and ensure positive environmental consequences [52].

Like any other research, this research has some limits. It is limited to a particular type of restaurant, the "family restaurant". Hence, upcoming research might address this limitation. This research is limited to a specific country, the KSA, making it difficult to generalize findings to other countries. Cultural and economic factors can significantly influence consumer behavior and FW practices. Additionally, there is a need to enhance our understanding of FW management across various sectors and/or different restaurant types. Furthermore, the upcoming research might investigate the application of the role of emerging new technologies, such as artificial intelligence, which can help to develop innovative solutions for tracking and tackling FW. Additionally, future research can investigate consumer attitudes and behaviors toward FW across assorted demographics.

6. Conclusions

The KSA is categorized as a top country in FW (UNDP). While ample research has addressed FW at the household level, there is a scarcity of research that investigates it at the restaurant level. Hence, this research addressed the food waste issue in the Saudi context, with a primary focus on family restaurants, where this problem is obvious. The research identified the most common type of food waste in family restaurants and investigated the reasons behind this waste. Through both quantitative and qualitative data analysis, the results highlighted that there is a level of waste across all food categories and items. However, it was found that the most frequent food waste types in family restaurants are starchy items that include bread and rice. Furthermore, the study indicated that there is a high rate of waste items in the fruit category such as oranges, watermelons, and bananas, and, in the vegetable category, items such as onions, green leaves, tomatoes, and potatoes. Additionally, the research indicated a considerable level of waste associated with camel, lamb, and beef meat. Although many reasons contribute to FW in family restaurants, the

study confirmed that the factors out of the control of restaurant managers are a primary reason for FW in family restaurants, particularly the factors that are related to customers and customer behavior. Furthermore, the study highlighted that some variables related to restaurant operations can contribute to FW such as portion size, food promotions and offers, and food inventory management. The results indicated that restaurant managers did not adopt a proper strategy for tackling FW. The findings revealed that restaurant managers have not implemented effective strategies to tackle FW, highlighting a critical area for improvement in the management of food waste. At the end, the study has several implications for scholars, restaurant managers, and policymakers.

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

Data Availability Statement: Data are available upon request from researchers who meet the eligibility criteria. Kindly contact the first author privately through e-mail.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Baig, M.B.; Straquadine, G.S.; Aldosari, F.O. Revisiting extension systems in Saudi Arabia: Emerging reasons and realities. *J. Exp. Biol. Agric. Sci.* **2017**, *5*, S160–S164. [CrossRef]
2. Baig, M.B.; Alotaibi, B.A.; Alzahrani, K.; Pearson, D.; Alshammari, G.M.; Shah, A.A. Food waste in Saudi Arabia: Causes, consequences, and combating measures. *Sustainability* **2022**, *14*, 10362. [CrossRef]
3. Sobaih, A.E.E. Saudi Zero Food Waste Certification: A Novel Approach for Food Waste Management in Saudi Arabia. *Agronomy* **2023**, *13*, 1654. [CrossRef]
4. Chia, D.; Yap, C.C.; Wu, S.L.; Berezina, E.; Aroua, M.K.; Gew, L.T. A systematic review of country-specific drivers and barriers to household food waste reduction and prevention. *Waste Manag. Res.* **2024**, *42*, 459–475. [CrossRef]
5. Baig, M.B.; Al-Zahrani, K.H.; Schneider, F.; Straquadine, G.S.; Mourad, M. Food waste posing a serious threat to sustainability in the Kingdom of Saudi Arabia–A systematic review. *Saudi J. Biol. Sci.* **2019**, *26*, 1743–1752. [CrossRef]
6. UNEP. Tackling Food Loss and Waste: A Triple Win Opportunity—FAO, UNEP. 2022. Available online: https://www.unep.org/news-and-stories/press-release/tackling-food-loss-and-waste-triple-win-opportunity-fao-unep#:~:text=Definitions,and%20wasted%20in%20many%20ways (accessed on 1 June 2024).
7. The Saudi Green Initiative. Available online: https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/reduce-carbon-emissions/. (accessed on 1 July 2024).
8. The Saudi Vision 2030. An Overview. Available online: https://www.vision2030.gov.sa/v2030/overview/ (accessed on 1 August 2024). [CrossRef]
9. Food and Agriculture Organization of the United Nations FAO. Food Loss and Food Waste. 2019. Available online: http://www.fao.org/food-loss-and-food-waste/en (accessed on 1 July 2024).
10. Saudi Grains Organization "SAGO". *Results and Initiatives to Study Food Loss and Waste in the Kingdom of Saudi Arabia*; Saudi Grains Organization Riyadh: Riyadh, Saudi Arabia, 2019.
11. United Nations Development Program UNDP. Food Waste Index Report. 2021. Available online: https://www.unep.org/resources/report/unep-food-waste-index-report-2021 (accessed on 1 March 2024).
12. Elshaer, I.; Sobaih, A.E.E.; Alyahya, M.; Abu Elnasr, A. The impact of religiosity and food consumption culture on food waste intention in Saudi Arabia. *Sustainability* **2021**, *13*, 6473. [CrossRef]
13. Ouda, O.K.; Raza, S.A.; Al-Waked, R.; Al-Asad, J.F.; Nizami, A.S. Waste-to-energy potential in the Western Province of Saudi Arabia. *J. King Saud Univ. Eng. Sci.* **2017**, *29*, 212–220. [CrossRef]

14. Sobaih, A.E.E.; Abu Elnasr, A.E. Exploring the 5Rs Holistic Model for Zero Food Waste in Saudi Arabian Food Service Outlets. *Recycling* **2023**, *8*, 91. [CrossRef]
15. El-Sharkawy, M.F.; Javed, W. Study of indoor air quality level in various restaurants in Saudi Arabia. *Environ. Prog. Sustain. Energy* **2018**, *37*, 1713–1721. [CrossRef]
16. Parizeau, K.; Von Massow, M.; Martin, R. Household-level dynamics of food waste production and related beliefs, attitudes, and behaviours in Guelph, Ontario. *Waste Manag.* **2015**, *35*, 207–217. [CrossRef]
17. Lipinski, B.; Hanson, C.; Waite, R.; Searchinger, T.; Lomax, J. *Reducing food loss and waste*; World Resources Institute: Washington, DC, USA, 2013.
18. Ofei, K.; Mikkelsen, B.E. Food waste food service. *FoodServInSPIRe Project. Meal. Sci. Public Health Nutr*. 2011. Available online: https://vbn.aau.dk/ws/portalfiles/portal/60351514/FoodwasteNK4no.pdf. (accessed on 1 July 2024).
19. FoodPrint The Problem of Food Waste. 2020. Available online: https://foodprint.org/issues/the-problem-of-food-waste/?cid=2244#easy-footnote-bottom-37-1309 (accessed on 5 July 2024).
20. Giorgi, S. *Understanding out of Home Consumer Food Waste*; WRAP, Brook Lyndhurst: London, UK, 2013.
21. Musaiger, A.O. Socio-cultural and economic factors affecting food consumption patterns in the Arab countries. *R. Soc. Health* **1993**, *113*, 68–74. [CrossRef] [PubMed]
22. Ellison, B.; McFadden, B.; Rickard, B.J.; Wilson, N.L. Examining food purchase behavior and food values during the COVID-19 pandemic. *Appl. Econ. Perspect. Policy* **2021**, *43*, 58–72. [CrossRef]
23. Muriana, C. A focus on the state of the art of food waste/losses issue and suggestions for future researches. *Waste Manag.* **2017**, *68*, 557–570. [CrossRef]
24. Filimonau, V.; De Coteau, D.A. Food waste management in hospitality operations: A critical review. *Tour. Manag.* **2019**, *71*, 234–245. [CrossRef]
25. Pirani, S.I.; Arafat, H.A. Reduction of food waste generation in the hospitality industry. *J. Clean. Prod.* **2016**, *132*, 129–145. [CrossRef]
26. Principato, L.; Pratesi, C.A.; Secondi, L. Towards zero waste: An exploratory study on restaurant managers. *Int. J. Contemp. Hosp. Manag.* **2018**, *74*, 130–137. [CrossRef]
27. Mensah, I.; Mensah, R.D. Effects of service quality and customer satisfaction on repurchase intention in restaurants on University of Cape Coast campus. *J. Tour. Herit. Serv. Mark.* **2018**, *4*, 27–36. [CrossRef]
28. Sobaih, A.E.; Coleman, P.; Ritchie, C.; Jones, E. Part-time employees and service quality in the UK restaurant sector. *Hosp. Rev.* **2008**, *10*, 63–69.
29. Sobaih, A.E.; Coleman, P.; Ritchie, C.; Jones, E. Part-time restaurant employee perceptions of management practices: An empirical investigation. *Serv. Ind. J.* **2011**, *31*, 1749–1768. [CrossRef]
30. Papargyropoulou, E.; Steinberger, J.; 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]
31. Martin-Rios, C.; Demen-Meier, C.; Gossling, S.; Cornuz, C. Food waste management innovations in the foodservice industry. *Waste Manag.* **2018**, *79*, 196–206. [CrossRef] [PubMed]
32. Wang, L.; Xue, L.; Li, Y.; Liu, X.; Cheng, S.; Liu, G. Horeca food waste and its ecological footprint in Lhasa, Tibet, China. *Resour. Conserv. Recycl.* **2018**, *136*, 1–8. [CrossRef]
33. Kallbekken, S.; Sælen, H. 'Nudging' hotel guests to reduce food waste as a win–win environmental measure. *Econ. Lett.* **2013**, *119*, 325–327. [CrossRef]
34. Zhang, X.; Jeong, E.-H.; Olson, E.D.; Evans, G. Investigating the effect of message framing on event attendees' engagement with advertisement promoting food waste reduction practices. *Int. J. Hosp. Manag.* **2020**, *89*, 102589. [CrossRef]
35. Malibari, A.; Alsawah, G.; Saleh, W.; Lashin, M.M. Analysis of Attitudes towards Food Waste in the Kingdom of Saudi Arabia Using Fuzzy Logic. *Sustainability* **2023**, *15*, 3668. [CrossRef]
36. Sobaih, A.E.E. Excessive Food Buying in Saudi Arabia Amid COVID-19: Examining the Effects of Perceived Severity, Religiosity, Consumption Culture and Attitude toward Behavior. *Int. J. Environ. Res. Public Health* **2023**, *20*, 3126. [CrossRef]
37. Azazz, A.M.S.; Elshaer, I.A. Amid the COVID-19 Pandemic, Social Media Usage and Food Waste Intention: The Role of Excessive Buying Behavior and Religiosity. *Sustainability* **2022**, *14*, 6786. [CrossRef]
38. Sobaih, A.E.E.; Moustafa, F. Panic Food Purchasing amid COVID-19 Pandemic: Does the Impact of Perceived Severity, Anxiety and Self-Isolation Really Matter? *Int. J. Environ. Res. Public Health* **2022**, *19*, 15277. [CrossRef]
39. Geier, A.B.; Rozin, P.; Doros, G. Unit bias: A new heuristic that helps explain the effect of portion size on food intake. *Psychol. Sci.* **2006**, *17*, 521–525. [CrossRef]
40. Sirola, N.; Sutinen, U.M.; Närvänen, E.; Mesiranta, N.; Mattila, M. Mottainai!—A practice theoretical analysis of Japanese consumers' food waste reduction. *Sustainability* **2019**, *11*, 6645. [CrossRef]
41. Alshabanat, Z.; Alkhorayef, A.; Ben Haddad, H.; Mezghani, I.; Gouider, A.; Tlili, A.; Allouche, M.A.; Gannouni, K.A. Quantifying food loss and waste in Saudi Arabia. *Sustainability* **2021**, *13*, 9444. [CrossRef]
42. Abiad, M.G.; Meho, L.I. Food loss and food waste research in the Arab world: A systematic review. *Food Secur.* **2018**, *10*, 311–322. [CrossRef]
43. Mu'azu, N.D.; Blaisi, N.I.; Naji, A.A.; Abdel-Magid, I.M.; AlQahtany, A. Food waste management current practices and sustainable future approaches: A Saudi Arabian perspective. *J. Mater. Cycles Waste Manag.* **2019**, *21*, 678–690. [CrossRef]

44. Saudi-Food-Bank. Al Fozan Social Foundation Ita'am Initiative. 2017. Available online: http://www.alfozan.com/en/corporatesocial-responsibility/itaam-saudi-food-bank (accessed on 1 July 2024).
45. Teherani, A.; Martimianakis, T.; Stenfors-Hayes, T.; Wadhwa, A.; Varpio, L. Choosing a qualitative research approach. *J. Grad. Med. Educ.* **2015**, *7*, 669–670. [CrossRef] [PubMed]
46. Krejcie, R.V.; Morgan, D.W. Sample size determination table. *Educ. Psychol. Meas.* **1970**, *30*, 607–610. [CrossRef]
47. Almulhim, A.I. Toward a Greener Future: Applying Circular Economy Principles to Saudi Arabia's Food Sector for Environmental Sustainability. *Sustainability* **2024**, *16*, 786. [CrossRef]
48. Thyberg, K.L.; Tonjes, D.J. Drivers of food waste and their implications for sustainable policy development. Resour. Conserv. *Recycl.* **2016**, *106*, 110–123. [CrossRef]
49. Sillitoe, P.; Misnad, S. *Sustainable Development: An Appraisal Focusing on the Gulf Region*; Berghan Books: New York, NY, USA, 2014; pp. 65–67.
50. Tobler, C.; Visschers, V.H.; Siegrist, M. Eating green. Consumers' willingness to adopt ecological food consumption behaviors. *Appetite* **2011**, *57*, 674–682. [CrossRef]
51. Wang, L.; Yang, Y.; Wang, G. The clean your plate campaign: Resisting table food waste in an unstable world. *Sustainability* **2022**, *14*, 4699. [CrossRef]
52. Sobaih, A.E.E.; Gharbi, H.; Zaiem, I.; Aliane, N. ROSE (Recycling Organization through Sustainability Education): Examining the mediating effects of waste minimization behaviour in the relationship between environmental education and environmental performance at the Saudi Arabian Universities. *J. Infrastruct. Policy Dev.* **2024**, *8*, 6462. [CrossRef]

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