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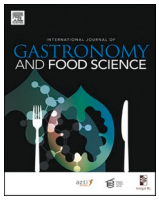

Determining the correlations between intention to reuse food waste, food waste behaviour and the culinary creativity level

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ABSTRACT

This study aimed to determine the effects of culinary creativity levels of chef candidates who study in undergraduate programs of gastronomy and culinary arts department on their intention to reuse food waste and food waste behaviours. While food waste has become a growing global problem, the creativity of chefs is considered critical to solving it. The study group consisted of undergraduate students in the Department of Gastronomy and Culinary Arts for the spring and fall semesters of the academic year 2023–2024. 524 volunteer chef candidates who were selected through convenience sampling, one of the improbable sampling types, were included in the study. In this study, the reliability of the "Culinary Creativity Level Scale" was .92, the reliability of the "Food Waste Behaviour Scale" was .66, and the reliability of the "Intention to Reuse Food Waste Scale" was .73. The significance values of the scales were found to be $p < 0.05$. The findings were analysed using SPSS and AMOS software. Culinary creativity levels of the chef candidates were found to increase the intention to reuse food waste by 55.0% and to lower the waste behaviour level in the kitchens by 13.0%. Moreover, the intention to reuse food waste reduced food waste behaviour by 13.0%. This study emphasised that the creativity levels of chef candidates can play an effective role in managing food waste, and future educational programs should be strengthened in this area. As a result, it demonstrates the importance of integrating the creative thinking skills of chef candidates into the educational processes in order to reduce food waste.

1. Introduction

Today, growing population can cause greenhouse gas emissions, inefficient use of water and land, food security, economic problems, and global food waste exist in developed and developing countries (Ariyani and Ririh, 2020; Canali et al., 2016; Conrad et al., 2018; Garnett, 2011; Graham-Rowe et al., 2014; Kummu et al., 2012; Lipinski et al., 2013; Nahman et al., 2012). Globally, food waste leads to excess carbon emissions, amounting to 124 g of CO2 equivalent per person daily (Chen et al., 2020). Kitchen waste, when mixed with other garbage, emits a large number of harmful gases after incineration, negatively affecting human habitats and damaging the economy and the environment (Buzby and Hyman, 2012; Cicatiello et al., 2017; Gustavsson et al., 2011; Vittuari et al., 2020). It was found that, in 2017, half of the annual emissions of the food system resulted from food loss and waste, making the practice of dumping waste in landfills a common method of waste disposal across the globe (Zamrisham et al., 2024). According to the United Nations Environment Programme (UNEP), approximately 931 million tonnes (mt) of solid waste were generated in 2019. This wasted food ends up in landfills and poses environmental problems (UNEP, 2021). According to the United States Department of Agriculture, food waste is the most common cause of solid waste in landfills (Upcycled Food Association, 2023). Another study indicates that 87% of the 91 million tonnes of uneaten or unsold surplus food in the United States of America is sent to landfills or drains, incinerated, or decomposed on production farms (URL-3). In this sense, recycling solid food waste reduces landfilling, increases soil fertility, improves environmental sanitation, reduces waste collection costs, and mitigates unpleasant garbage odours (Christian et al., 2009). Mandal et al. (2024) reported that reducing or recycling waste can bring about economic advantages at the national scale by providing better solutions to food security, lower production costs, environmental sustainability, and waste management (Mandal et al., 2024). Therefore, it is important to conduct studies to prevent the generation of food waste before the disposal of the waste

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generated.

Global food production has rapidly increased over the last 50 years, and 720 million to 811 million people were reported to face hunger by the end of 2020 (FAO, 2021). While investments in areas such as sustainable agriculture and food production need to accelerate (URL-1), one-third of edible food produced for human consumption goes to waste every year (FAO, 2019; Russell et al., 2017). Therefore, the United Nations (UN) has indicated that they have assessed the issues of food scarcity, hunger, and malnutrition among their 2058 targets (EU, 2023; URL-1, 2023).

Food waste behaviour has been reported to be affected by multiple factors such as cultural characteristics (Filimonau et al., 2020), socio-economic status (Gao et al., 2021; Liao et al., 2018), personality traits (Vizzoto et al., 2021; Yu et al., 2021), age and personal characteristics, food preparation methods, and psychological characteristics (Jia et al., 2022). It has also been reported that excessive purchasing of food by consumers (Parfitt et al., 2010), non-standardised food appearance, or the disposal of edible food by producers could lead to twice the global food waste per capita by 2050 (Lopez and Hertel, 2021).

Waste management, consumer attitudes, demographic factors (Dhir et al., 2020), service styles (Filimonau et al., 2020a), meal planning practices in hotel kitchens (Leverenz et al., 2021), guest food waste behaviours, food preferences, and guest attitudes related to food waste in the hospitality industry have also been reported to contribute to further food waste (Okumus et al., 2020). In this context, chefs have an important role in food waste generation as they are responsible for kitchen processes from design to management (Filimonau et al., 2023). Goh and Jie (2019) and Hennchen (2019) reported that there were a limited number of studies that examined the attitudes of kitchen staff who worked in food and beverage and hospitality establishments towards food waste. Närvänen et al. (2018) indicated that the sustainability of the creative behaviours of chefs in the kitchen can contribute to the reduction of food waste.

Another literature review indicated that food loss should be reduced, especially during the production and consumption phases, in order to prevent damage to global biodiversity with the growing population of the world (Jia et al., 2022). This has been considered among the important issues under the sustainable development goals of the United Nations, and solutions have been proposed to prevent food losses (Godfray et al., 2010). One of these proposals involves the EU project on Creative Food Cycles (CFC) (Navarro Gausa et al., 2020). Also, many nations have considered policies, laws, and donations as solutions to reduce food waste. For instance, it has been reported that the United Kingdom has launched nationwide regional calls and policies to reduce food waste (URL-1). Besides, the Clean Your Plate campaign in China was reported to adopt lean techniques and digitalisation to reduce food waste (Jia et al., 2022). Luca et al. also stated that companies in Italy made attempts to prevent food waste through innovation and digital investments in reducing excess food by creating digital solutions to reduce non-household food waste (Secondi et al., 2020). It has been stated that Turkey, as an action and strategy plan to prevent food waste, has launched campaigns to raise public awareness under the "zero waste" project, food waste has been processed in biogas plants, waste has been composted; businesses that implement zero waste practices have been rewarded; and practices such as "Food Banking" have been continued (URL-2,).

Although various practices such as *"Waste-Free Culinary, Clean Plate, and Waste-to-Taste"* have attracted attention to creativity, the literature lacks sufficient number of studies that empirically assess the effect of the culinary creativity level on food waste behaviour and intention to recycle food waste. It is important to raise awareness among gastronomy and culinary arts students who will work in restaurant and hotel kitchens in order to reduce food waste and maintain sustainability in the kitchen.

This study aims to understand the food waste behaviours of university students (chef candidates) attending gastronomy and culinary arts programmes in the context of a growing population, environmental problems, and food waste as a rising global threat and to demonstrate the change in waste use and waste behaviours with raising culinary creativity levels. Considering that culinary waste is a problem that negatively affects not only the environment but also economic and social structures, it is thought that the creative thinking skills of chefs can play an important role in solving this problem (Filimonau et al., 2023). The potential of chefs to reuse and recycle food waste as the architects of the cuisine are vital for a more sustainable food production and consumption process.

The aim of this study is to determine the effects of culinary creativity levels of chef candidates in undergraduate programmes of gastronomy and culinary arts department on their intention to reuse food waste and food waste behaviours. Therefore, the question "Is the culinary creativity level of these students effective in reducing food waste in the kitchen?" was sought to be answered.

From this standpoint, the study aimed to determine the correlation between the intention to reuse food waste, food waste behaviour, and the culinary creativity levels of university students ("prospective chefs") who attend the gastronomy and culinary arts programme.

1.1. Literature review and hypothesis development

The environmental and food safety problems caused by food waste cannot be ignored. Therefore, how to utilise food waste has become an important issue. There are still deficiencies in knowledge and awareness about recycling of food waste in developing countries (Lang et al., 2020). Eriksson (2015) emphasised the elimination of food waste as "resource reduction" to prevent overproduction. However, the solutions offered for food waste should be both environmentally protective and sustainable (Ribeiro et al., 2019).

Today, 95% of the human population wants to contribute to reducing food waste (Upcycled Food Association (UFA), 2023). Recently, the 'upcycling' approach has been at the forefront to utilise food waste more efficiently. This concept can also be referred to as "Reprocessed, Reclaimed, Scaled, Salvaged, Processed, Reused" (Aschemann-Witzel et al., 2023; Bhatt et al., 2018). Upcycling food is an innovative approach to food waste as it is a solution based on consumers and is economically sustainable (Spratt et al., 2021). This approach contributes to sustainability by utilising food waste and food loss in food sectors (Rakesh and Mahendran, 2024). Food upcycling is also defined as food that would otherwise be disposed of but is instead converted into alternative local foods, with tangible benefits to the environment and society (Spratt et al., 2021). It includes activities such as using food that is close to its expire date (Hebrok and Boks, 2017), appropriately utilising leftover food (Selzer et al., 2009), and reducing food waste by trying to use all parts of food (Bhatt et al., 2020).

Furthermore, efforts have been initiated to recycle and reuse food waste in the circular economy. It has been stated that food waste should be brought back to consumption as "taste," especially by using the ability of creativity in the kitchen (Filimonau et al., 2023; Rashid and Shahzad, 2021). Here, it has been indicated that chefs have a lot of work to do in preventing food waste (Batat, 2020; Filimonau et al., 2021) and solutions should be sought "in the kitchen". On the other hand, the majority of food waste has been reported to be generated in the kitchens of restaurants during the preparation and cooking of food (McAdams et al., 2019); therefore, it has become imperative and urgent that the prevention of food waste generation definitely begin in the kitchen (Thompson and Haigh, 2017).

The main sources of food waste (FW) are restaurant food waste (RW) and household food waste (HW) (Wang et al., 2023). The global food waste report (2019) indicates that the service sector accounts for 18.15% of food waste (Loth, 2021). In particular, the literature review emphasises the prevention of food waste in the kitchens of food and beverage businesses among existing solutions to reduce waste (Monde jar-Jim enez et al., 2016; Young et al., 2018; Kaman et al., 2024;

Heikkila et al., 2016; Martin-Rios et al., 2020; Filimonau et al., 2023). US consumers are reported to spend more money on eating out due to their lack of ability to cook and longer working hours (Jamrisko, 2015). Therefore, reducing food waste in restaurants has become more important as food becomes ever more prepared and served outside the home (Hamerman et al., 2018). The restaurant and food service industry accounts for approximately 40% of total food waste in the United States, costing the restaurant industry $162 billion annually (Recycle Track Systems, 2021).

In particular, Batat (2020) and Thompson and Haigh (2017) indicated that chefs should actively work on their activities toward food waste behaviour. The culinary skills and creativity of chefs are crucial in preventing food waste in professional kitchens (Elnasr et al., 2021; Filimonau et al., 2021). Another study (Närvänen et al., 2018) found that the common point between the socio-cultural aspect of food and the socio-cultural aspect of waste is the concepts of creativity, aesthetics, and ethics. In this context, creativity has been defined as a new value or novel product that has never been introduced before or has been modified from the original (Hsia et al., 2021).

Wallas (1926) was the first to address creativity as a process, and his model described it in four stages: preparation, design (incubation), development (illumination), and control (verification). Creativity in the kitchen, on the other hand, has been stated to depend on the habits that chefs build through improvisations and experiences in the kitchen, and building creativity may be due to the curiosity, interest, and enthusiasm of the chefs (McCabe and de Waal Malefyt, 2013). Horng and Hu (2009) adapted Wallas' creativity process model to the culinary creativity process model, and the model includes the 'preparation stage for new ideas': data collection and blending of new information and previous experiences. These include the ''ideation stage'': selecting ideas, synthesising, transferring comparable ideas, and separating or dropping previous experiences or irrelevant parts or giving up; the ''development of idea stage'': finding common qualities, clearing the mind or seeking inspiration, figuring out how to solve basic problems; and the ''idea evaluation stage'': evaluating concepts and techniques and building the final product idea (Kesici and Önçel, 2015; Moore, 2019).

Ferguson and Berger (1985) emphasised that raising future chefs in the industry and elevating the culinary creativity level is an important goal for culinary schools and found that creativity plays an important role in preventing and reducing hunger, the second goal of sustainable development (Hsia et al., 2021; Peng et al., 2012). Närvänen et al. (2018) also emphasised that creativity in the kitchen represents the first of the preventive goals for reducing food waste. It has been reported that creativity in the kitchen involves chefs developing new recipes based on ingredients, adapting recipes and using ingredients creatively, as well as reusing, creatively processing, and preserving existing food (Horng and Hu, 2009).

Another study has suggested that chefs can contribute to the creation of a brand-new product through an artistic spirit while producing a beautiful, tasty, and useful product from consumer waste (Fernandez et al., 2011). While food waste can be a source of creative thinking (Handoyo et al., 2021), it has also been reported that there is a mutual interaction in reducing waste by using creativity (Närvänen et al., 2018).

In their study, Närvänen et al. (2018) indicated that food bloggers, who encourage creating a new product from food waste, being creative and adapting recipes, turned food waste into valuable products and created a new product from an existing product (Närvänen et al., 2018). It has been indicated that there are blog pages such as "From Waste to Taste" where new dishes are prepared from leftover foods or meals to prevent food waste through creativity in the kitchen and which raise awareness about this (Fernandez et al., 2011; McCabe and de Waal Malefyt, 2013; Pizzetti et al., 2024; Yaşa, 2022). In another study Unilever Food Solution (2023), on the other hand, reported that utilising food waste as part of the waste-free kitchen practice can reduce waste by achieving creativity, which would be beneficial for both the environment and businesses.

For example, food waste such as onion skins, carrot stalks, and celery leaves can be utilised to cook a delicious broth, waste vegetables can be added to a smoothie, or cooked grains can be utilised to make salads. Also, stale bread can be utilised to make soup, meatballs, or canapés to prevent food waste (UFS, 2023). As for Türkiye, there is an independent "Clean Plate" movement in digital media, the twelfth article of which states that chefs use creativity by utilising production output to prevent food waste. For instance, it was found that the anti-waste campaign organised by the coffeehouse included practices that invited innovative ways of utilising coffee grounds (FIL, 2017; Yüzüncüyıl and Güldemir, 2021). As understood from the studies, the fight against waste has been stated to rely on the creative food cycle (Navarro Gausa et al., 2020).

This study suggests that the creativity of future chefs in the kitchen would be an important factor in minimising food waste. In this regard, the study aimed to determine the correlation between the intention to reuse food waste, food waste behaviour, and culinary creativity levels among university students ("prospective chefs") who attended the gastronomy and culinary arts programme. According to this purpose, the following hypotheses are proposed.

H1. As the level of culinary creativity of the prospective chefs rises, their intention to reuse food waste increases.

H2. As the culinary creativity levels of the prospective chefs rises, their food waste behaviours decrease.

H3. As the intention of prospective chefs to reuse food waste increases, their food waste behaviours decrease.

2. Methodology

2.1. Design

The correlations between dependent and independent variables were determined using quantitative research approach. Given the quantitative studies, the assessment instrument was developed and adapted from several pre-existing scales to fit the objectives of the study. After establishing the validity and reliability of the scale, Structural Equation Modelling (SEM) was also used to verify the model fit (Fig. 1).

2.2. Population and sample

The sample group of this study consisted of undergraduate programme students of gastronomy and culinary arts in the spring and fall semesters of the 2023–2024 academic year. The population consisted of prospective chefs who are undergraduate students of gastronomy and culinary arts programmes in Turkey. However, the large size of the population made it impossible to reach the whole population; therefore, a sample that can represent the population for both cost and time was preferred. The data collection tool was applied to 524 prospective chefs.

2.3. Data collection tools

Intention to reuse food waste scale; The intention to reuse food waste was adapted based on the scale developed by Ariyani and Ririh (2020). The intention to reuse food waste (IRFW) used in that study was adapted to this study based on the scale developed by Ariyani and Ririh (2020). Ariyani and Ririh (2020) reported that the intention to reuse food waste consists of statements about reducing, reusing, and recycling it. Therefore, in the present study, we tried to determine the intentions of the chef candidates who studied in the undergraduate programme of the Department of Gastronomy and Culinary Arts towards reducing food waste, reusing, and recycling food waste by trying to use all parts of food. The intention of reusing food waste (4 items) was assessed with this scale. Items are rated on a 5-point Likert type scale (5 = strongly agree, 4 = agree, 3 = decided, 2 = disagree, 1 = strongly disagree). The scale for determining the level of culinary creativity; the "Culinary

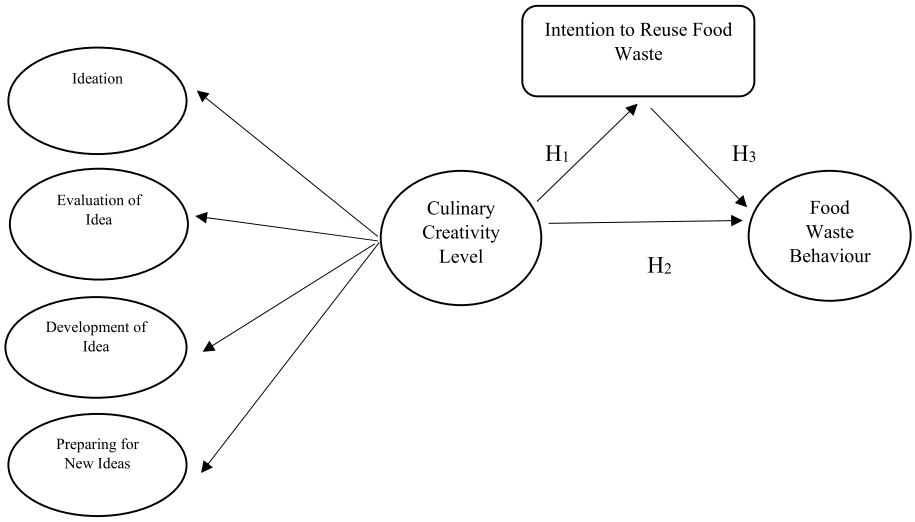

Fig. 1. Research model.
Source(s): Own elaboration

Creativity Level" scale developed by Horng and Hu (2009) and adapted into Turkish by Kesici and Önçel (2015), consists of 27 items and four subscales.

The first subscale is "ideation," the second subscale is "evaluation of idea," the third subscale is "development of idea," and the fourth subscale is "preparing for new ideas". It assesses ideation (7 items), evaluation of idea (8 items), development of idea (7 items), and preparing for new ideas (4 items). Items are rated on a 5-point Likert type scale (5 = strongly agree, 4 = agree, 3 = decided, 2 = disagree, 1 = strongly disagree). Food waste behaviour scale; The "Food Waste Behaviour" scale applied by Stefan et al. (2013) was translated into Turkish and used to assess food waste behaviour. The food waste behaviour (5 items) was assessed with this scale. Items are rated on a 5-point Likert type scale (5 = I dispose more than 50%, 4 = I dispose between 25% and 50%, 3 = I dispose between 10% and 25.0%, 2 = less than 10%, 1 = I almost never dispose).

2.4. Data collection methods

The survey technique, one of the quantitative research methods, was used to assess the intention to recycle food waste, food waste behaviour, and culinary creativity level. The researcher collected the questionnaire both online (Google Forms) and face-to-face. Distance education began upon the decision taken by the Council of Higher Education (YÖK) due to the damage to some university buildings caused by the earthquake occurring in Turkiye on February 6, 2023. Therefore, the data collection process that began to be carried out face-to-face in order to reach a sufficient number was later completed online through via Google Forms.

In the study, convenience sampling, one of the non-probability sampling methods, was used. Through convenience sampling, individuals who volunteered to participate in the study were included in the study. A total of 576 surveys were collected May 2024, of which 52 were eliminated for being incomplete in the essential questions for the study cluster analysis, thus 524 were valid. In the data collection process of the research, first of all, necessary permissions were obtained for the application; within the scope of the study, the Osmaniye Korkut Ata University Senate Ethics Committee was first consulted and the study was found ethically appropriate (E:178347).

2.5. Data analysis

The data of the study were collected by using the SPSS 22 (Statistical Package for the Social Sciences) and AMOS 26 (Analysis of Moment Structures) statistical software. The reliability, convergent, and discriminant validity of the study findings were analysed by testing the assessment model, while the hypotheses of the study were tested using the structural model. Structural equation modelling, a second-generation data analysis technique (Bagozzi and Claes, 1982), provides modelling of correlations between dependent and independent variables compared to first-generation statistical techniques such as regression (Anderson and Gerbing, 1988). Due to several reasons, including facilitating the mediation and moderation effects of this model and accounting for assessment errors, the structural equation modelling is used in the testing of many theories and the development of new models (Dursun and Kocagöz, 2010).

3. Results and discussion

This section presents the sample's demographics and the results of the data analysis.

3.1. Demographic information

The criteria used to present the sample characteristics of this study included gender, sectoral experience, training on creativity, mentioning about waste by the trainer, and food waste in the practice kitchen. Descriptive statistics from the 524 samples indicated that 154 participants were male (29.4%) and 370 participants (70.6%) were female. The sectoral experience revealed that 299 prospective chefs were experienced (57.1%) and 225 prospective chefs were inexperienced (42.9%). As another finding of the study, 437 (83.4%) students reported that the trainer informed them about waste, while 87 (16.6%) students reported that the trainer did not inform them about waste. When they were asked about the food waste in the training kitchen, it was found that 290 (55.3%) of the participants indicated that food was wasted, while 234 (44.7%) indicated that food was not wasted. Table 1 shows the demographic characteristics of the participants in the questionnaire (see Table 1).

3.2. Assessment of the measurement model

The data were collected using the survey method and transferred into computer environment for analysis. In determining the structural fit of the analyses, skewness and kurtosis values were analysed to understand whether or not the data are normally distributed (Gürbüz and Şahin, 2018). For data deemed normal, skewness and kurtosis values should lie

Table 1
Distribution of demographic characteristics.

Demographic criteria	Frequency	Percentage
Gender		
Male	154	29.4
Female	370	70.6
Sectoral Experience		
Available	299	57.1
None	225	42.9
Mentioning about waste by the trainer		
Yes	437	83.4
No	87	16.6
Food waste in the practice kitchen		
Yes	290	55.3
No	234	44.7

Source(s): Own elaboration

between −1.5 and + 1.5 (Tabachnick et al., 2007). When Table 2 was analysed, it was observed that the skewness and kurtosis values were within the specified range. After it was determined that the data were normally distributed, factor analyses were done. Factor analysis in the social sciences can be done with two analyses. These are Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). While EFA is frequently used to analyse the factor structure during the development of new scales, CFA is used to test the suitability of previously developed scales for the model. Results of Kaiser-Meyer-Olkin (KMO) mean values and Bartlett's Test of Sphericity should be calculated before proceeding with factor analyses (Gürbüz and Şahin, 2018). According to Büyüköztürk (2002), a value higher than.60 indicates eligibility for factor analysis. Also, the correlation between the factors in Bartlett's test should be $p < 0.05$ for the result to be considered significant. Reviewing the data analyses revealed a fit for factor analysis. If the loading values of the items on the scale are .30 and above, it is considered appropriate measure (Kline, 1994). Analysing the loading values of the items on the scale revealed appropriate factor loadings. Table 2 shows the validity and reliability analyses for the data (see Table 2).

When the total explained variance ratios of the scales were analysed, the culinary creativity scale explained 56.47 % of the total explained variance, with its factor structure consisting of four subscales. The food waste behaviour scale explained 50.90 % of the total variance, with its factor structure consisting of one subscale. The intention to reuse the food waste scale explained 59.70 % of the total variance with a factor structure consisting of a single subscale. Following these values, the Cronbach's Alpha values were analysed to establish the reliability of the study. The Cronbach's Alpha coefficient is a coefficient that assesses the reliability of the assessment tool (Christmann and Aelst Van, 2006). The reliability coefficient, known as Cronbach's coefficient, is used to assess the reliability level of a particular scale. This coefficient has a value ranging from .00 to 1.00. The coefficients in the range of $.00 \leq \alpha < 0.40$ indicate that the scale is not reliable. The coefficients in the range of $.40 \leq \alpha < 0.60$ indicate that the reliability level of the scale is low. The coefficient values in the range of $.60 \leq \alpha < 0.80$, an acceptable level for the reliability of the scales, indicate that the reliability is sufficient. Finally, the coefficient values in the range of $.80 \leq \alpha < 1.00$ indicate that the reliability of the scale is very high (Akgül and Çevik, 2003). The Cronbach's Alpha value for the culinary creativity scale was found to be CA = .92 and showed a high level of reliability. The Cronbach's Alpha value for the food waste behaviour scale was found to be CA = .66 a and showed a sufficient level of reliability. Moreover, the Cronbach's Alpha value of the intention to reuse food waste scale was CA = .73 and showed that it is sufficiently reliable.

3.3. Assessment of the structural model

Table 3 shows the results of the holistic model. Pearson correlation analysis was made to establish the correlation between the dimensions in the model. The analysis results showed that there was a positive

Table 2
Validity and reliability analyses for the data.

Factors/Items	*Factor Loadings EFA/CFA*	*Skewness*	*Kurtosis*	*Reliability CA*
Culinary Creativity Level (CCL)				.92
CCL Factor 1: Ideation (I)				
I think that I create new products by blending my ideas and experiences.	.636/.620	−.544	−.154	
I think that using many different pieces of information together reinforces my creative ideas.	.776/.753	−.991	1.151	
When I need to develop a new product, I think that I have researched the relevant concepts.	.781/.722	−.899	.835	
If the meal I cook is not good enough, I think I am trying to do better.	.700/.728	−1.263	.213	
I think I make use of my experience to find solutions to problems that come up in the kitchen.	.669/.778	−1.093	1.341	
I believe that assessing different aspects of food reinforces my creativity.	.537/.696	−1.110	1.398	
I believe that I put the experiences I have gained in life into my culinary work.	.615/.734	−1.057	1.257	
CCL Factor 2: Evaluation of Idea (EI)				
The meals I cook must be a fusion of the best ideas.	.560/.504	−1.114	1.348	
When dealing with a problem, I must find alternative solutions.	.692/.678	−.916	1.271	
After a thorough evaluation, I must decide whether to serve a meal.	.495/.540	−.890	1.270	
When I come up with a good meal idea, I must put it into practice after a detailed evaluation.	.403/.552	−.983	1.312	
I must constantly assess the meals I cook.	.766/.645	−.661	.506	
I must test each part of a meal separately.	.724/.609	−.531	−.364	
When I face difficulties, I must know what to do.	.517/.668	−.819	.978	
I must evaluate the opinions of all the kitchen staff about innovations.	.626/.646	−1.044	1.250	
CCL Factor 3: Development of Idea (DI)				
I think I look into different concepts to generate new ideas.	.417/.774	−.810	−.545	
I think that I benefit from the functions of a food for different purposes.	.453/.763	−1.029	1.392	
I think it is useful to develop new techniques to make my works more creative.	.722/.694	−.920	.647	
I think that the techniques I use for the work I do are unique to me.	.767/.373	−.215	−.443	
I think I incorporate fashion into my new meal ideas.	.744/.593	−.615	.058	
I think I can create an example of a meal by drawing it with a pencil on a piece of paper.	.476/.341	−.310	−.768	
I think that I try to find different solutions when I have difficulties.	.432/.708	−1.123	1.410	

(*continued on next page*)

Table 2 (*continued*)

Factors/Items	*Factor Loadings EFA/CFA*	*Skewness*	*Kurtosis*	*Reliability CA*
CCL Factor 4: Preparing for New Ideas (PNI)				
I believe that collecting information about my profession reinforces my studies.	.687/.484	−1.173	1.319	
I think it is important to record the works that I find successful.	.619/.761	−1.108	.946	
I think that keeping notes on new information about my profession improves my professional knowledge.	.743/.749	−1.271	1.497	
I think it is important to record my unsuccessful work.	.435/.779	−1.336	1.404	
Total Explained Variance: 56.47 % KMO Sampling Adequacy: .925 Bartlett's Test of Sphericity: 6762 Degree of Freedom: 325 P-Value: .000				
Food Waste Behaviour (FWB)				.66
Meat and dairy products	.594/.442	1.416	1.439	
Fresh fruit and vegetables	.793/.708	1.086	1.046	
Bread and other bakery products	.786/.687	.863	.168	
Processed foods (canned foods, frozen foods)	.661/.521	1.302	1.085	
Total Explained Variance: 50.90 % KMO Sampling Adequacy: .701 Bartlett's Test of Sphericity: 329.45 Degree of Freedom: 6 P-Value: .000				
Intention to Reuse Food Waste (IRUFW)				.73
I would like to use food efficiently without wasting it.	.816/.738	−1.350	1.370	
I would like to begin to reuse leftover food to reduce food waste.	.895/.952	−1.191	1.394	
I would like to turn leftovers into a different meal by adding some ingredients to reduce food waste.	.829/.692	−1.284	1.492	
I usually think about avoiding disposing of food in the bin.	.485/.380	−1.076	.105	
Total Explained Variance: 50.90 % KMO Sampling Adequacy: .679 Bartlett's Test of Sphericity: 723.44 Degree of Freedom: 6 P-Value: .000				

Source(s): Own elaboration

Table 3
Correlations between the dimensions.

Dimensions	CCL	IRUFW	FWB	MEAN
CCL	–	.510	−.167	3.99
IRUFW	.510	–	−.198	4.12
FWB		−.198	–	1.91

CCL, culinary creativity level; FWB, food waste behaviour; and IRUFW, intention to reuse food waste.
Source(s): Own elaboration

correlation between the culinary creativity level and the intention to reuse food waste (r = .51). Also, it was determined that there was a negative correlation between the culinary creativity levels of the prospective chefs and their food waste behaviour (r = .16). A negative correlation was also observed between their intention to reuse food waste and their food waste behaviour (r = .19). Table 3 shows the correlations between the dimensions (see Table 3).

The SPSS 22 (Statistical Package for the Social Sciences) and AMOS 26 (Analysis of Moment Structures) statistical software were used to analyse the data. The confirmatory factor analysis showed that the x^2/sd ratio was 3.12. This value indicates a good fit. The results of the data analysis were determined as GFI = .95, CFI = .95, NFI = .93, and RMSEA = .64. These results indicated that the data collected for the items on the overall scale overlapped with the relevant dimensions.

When Table 4 was analysed, it was observed that the culinary creativity levels of the prospective chefs positively affected their intentions to reuse food waste. In other words, an increase of one unit in the culinary creativity level of the prospective chefs improved their intention to reuse food waste by 55 % ($\beta = .55$; $p < 0.001$). Table 4 shows the testing hypotheses (see Table 4).

The results of the study showed that an increase of one unit in the intention to reuse food waste diminished the food waste behaviour by 13.0 % ($\beta = .13$; $p < 0.05$). Similarly, it was also found that the culinary creativity level of the prospective chefs diminished the food waste behaviour by 13 % ($\beta = .13$; $p < 0.05$). Kline (2011) claimed that beta coefficients of ≤.10 have a low effect, beta coefficients between .11 and .50 have a medium effect, and beta coefficients of ≥.51 have a high effect. Consequently, the hypotheses "H_1" and "H_2" that the culinary creativity levels of chefs are effective in their intention to reuse food waste and food waste behaviour were accepted. Also, hypothesis "H_3" that the intention to reuse food waste is effective in food waste behaviour was accepted.

This study examined the effects of culinary creativity levels of chef candidates who studied in the undergraduate programmes of the Department of Gastronomy and Culinary Arts on their intention to reuse food waste and food waste behaviours.

In the study, it was found that while 29.4% of the participants were male, 70.6% were female. While 57.1% of the chef candidates were experienced in the sector, 42.9% were inexperienced in the sector. While 83.4% of the students stated that the trainers informed them about food waste, 16.6% stated that the trainers did not inform them about food waste. The study conducted by Demir (2022) reported that lecturers placed pressure on students about food waste during the training and practice phase on food security and food waste for the food that goes to waste in the kitchen. On the other hand, Mattar et al. (2018) indicated that the guilt felt for food waste affected the intention to reduce food waste, Jagau and Vyrastekova (2017); Soorani and Ahmadvand (2019) reported that the trainings provided had an effect on the intention to prevent waste. It can be asserted that this is compatible with the result of this study. On the other hand, the other finding of the study was that 55.3% of the food was wasted in the training kitchen, while 44.7% of the food was not wasted. Okumus (2020) stated that errors in inventory management resulted in food waste. On the other hand, Demir (2022) indicated that the short-term planning of the management in training kitchens and the lack of establishing a food safety system in these areas, as well as the lack of information about food waste, led to a rise in food waste.

Another finding of the study was the positive correlation between the culinary creativity level and the intention to reuse food waste among the chef candidates. A negative correlation was found between the culinary creativity level of the chef candidates and their food waste behaviour. Also, a negative correlation was found between their intention to reuse food waste and their food waste behaviour. An elevated culinary creativity level showed that it positively affected the intention to reuse food waste and contributed to diminishing food waste behaviour. This was found to be similar to studies that demonstrated the critical role of

Table 4
Testing hypotheses.

$\Delta\chi^2$/df	RMSEA	CFI:	GFI	NFI
3.12	.64	.95	.95	.93
Correlations	B	S.H	P	Hypotheses
CCL → IRUFW	.554	.077	***	Accepted
CCL → FWB	.137	.62	.047	Accepted
IRUFW → FWB	.134	.043	.044	Accepted

CCL, culinary creativity level; FWB, food waste behaviour; and IRUFW, intention to reuse food waste.
Source(s): Own elaboration

culinary creativity for sustainable food consumption and the prevention of food waste (Filimonau et al., 2023; Batat, 2020; Närvänen et al., 2018). In another study, Handoyo et al. (2021) also aimed to improve the creative thinking skills of high school students by using problem-based learning methods in the processing of basic food waste.

Another finding of the present study indicated that the culinary creativity levels of chef candidates had an effective role on the intention to reuse food waste and food waste behaviour concerning positive food waste. However, while it was stated that chefs did not pay attention to reducing food waste until recently (Chawla et al., 2020), the study conducted by Çetin and Çetin (2024) reported that chefs paid more attention to both diminishing food waste behaviour and their creativity behaviour in food waste reduction practices of the hospitality sector. In their study, Economou et al. (2024) reported that chefs' both culinary creativity and reducing the size of the portion sizes had a significant contribution to the country's economy in order to prevent food waste in the European Union sustainable development goals.

In their study, Martin-Rios et al. (2018) also reported that there were only a few zero-waste theme restaurants and a few chefs who cooked with food scraps. Some studies have reported that it is necessary to involve kitchen staff in food waste operations in the restaurant (Gallion, 2018; Reardon et al., 2024). Therefore, culinary creativity and innovation function as an important mechanism to diminish food waste behaviour. In this context, it is of great importance to implement training programmes to elevate the culinary creativity level. Ferguson and Berger (1985) emphasised the necessity of improving creativity in kitchen training and indicated that such training is critical for sustainable kitchen practices. Also, given the lack of academic literature on examining the attitudes of kitchen staff towards food waste (Goh and Jie, 2019; Hennchen, 2019), this study bridges an important gap. The result of this study supports the studies (Graham-Rowe et al., 2014; Secondi et al., 2020; Reardon et al., 2024; Pizzetti et al., 2024) which argue that altering the attitudes of chef candidates towards food waste can contribute to the reduction of overall food waste.

Upcycling Food Waste addresses global food waste issues, contributes to the economy, and mitigates greenhouse gas emissions and food insecurity. However, the success of these strategies relies on cooperation across the entire food supply chain, from producers to retailers and consumers. It has been stated that public awareness and educational and political support are necessary for the widespread adoption of upcycling practices and the conversion of the food system into a more sustainable and fair system (Bangar et al., 2024). This study is considered to be an important point that Upcycling practice should be considered under sustainable development goals in preventing food waste with the culinary creativity level of chef candidates.

Studies on reduction of food waste have indicated that chefs are often underestimated (Filimonau et al., 2023). This study is also considered to respond to the call by Batat (2020); Filimonau et al. (2021); Thompson and Haigh (2017) for more inclusion of chefs in academic research on food waste behaviour.

When looking at from a theoretical point of view, although practices such as *Waste-Free Kitchen, Clean Plate, and Waste to Taste* emphasise the importance of creativity in reduction of food waste, no empirical study that explained the effect of creativity was found in the literature. The study conducted by Goh and Jie (2019) and Hennchen (2019) also indicated that the number of examining the attitudes of kitchen staff towards food waste is limited. This study aimed to empirically reveal the effect of the culinary creativity level of future chefs on their food waste behaviour. This study may provide a useful conceptual framework for future research on FW (food waste). Previous studies (Ferguson and Berger, 1985; Fernandez et al., 2011; Närvänen et al., 2018) have reported that elevating the level of creativity in the kitchen and increasing the intention to recycle waste food will reduce food waste.

The results showed that the culinary creativity of the prospective chefs accounted for their intention to reuse food waste by 55.0 % and almost one-third (13.0 %) of their food waste behaviour. Therefore, this study revealed that the culinary creativity levels of the prospective chefs improved their intention to reuse food waste and decreased their food waste behaviour. As stated in the study by Närvänen et al. (2018), this study also found that turning waste into taste by using the creative thinking ability of chefs can reduce waste in the kitchen. The results obtained from this study are similar to those obtained from other studies in the literature (Ferguson and Berger, 1985; Fernandez et al., 2011; Navarro Gausa et al., 2020; Närvänen et al., 2018) that show that creativity levels will reduce food waste.

The study revealed that the creativity abilities of prospective chefs should not be overlooked in reducing food waste. In particular, it was concluded that reintroducing food waste to consume as "taste" is an important aspect of reducing food waste. One of the points where food is wasted the most is the kitchen (McAdams et al., 2019; Thompson and Haigh, 2017). As stated in the studies by McAdams et al. (2019) and Thompson and Haigh (2017), this study once again showed that the culinary creativity levels of the chefs were effective in recycling food waste at a rate of 55.0 %, indicating once again that the prevention of food waste should begin in the kitchen.

4. Conclusion

The course on creativity in the kitchen was found to be important in preventing food waste in the training kitchens of students who attend gastronomy or culinary arts departments. It is predicted that this course can be useful both for prospective chefs to improve their creativity skills and to reduce food waste in the practice kitchen. Likewise, Ferguson and Berger (1985) stated that improving the creativity level of future chefs is an important goal for cooking schools. Another study reported that creativity has become an ever more important issue for the culinary services industry (Hsia et al., 2021; Peng et al., 2012). A strategic action plan for reducing food waste in the kitchen includes an evaluation of the culinary creativity skills of prospective chefs who will work in food and beverage companies, hospitality establishments, and restaurants. Creativity in the kitchen is considered to be a solution to hunger—one of the goals of sustainable development.

5. Limitation

The study was limited to prospective chef students who studied only in the gastronomy department of state universities. Future studies can be implemented on the prospective chef students of foundation universities to investigate the differences in creativity ability and food waste behaviours of the students of state and foundation universities. This research is also limited to only prospective chefs since it aims to prevent food waste.

This study on food waste was limited to chef candidates only. However, the application of general strategies to prevent food waste to other professionals who work outside the kitchen and are involved in the food sector, food producers, retailers and consumers may have a wider impact. For a deeper understanding of food wastage behaviours, employees and individuals in different sectors where food waste is prevalent could be included in these studies.

Moreover, the methodological approach used in the study is limited to the quantitative method. A more detailed examination of food waste behaviours may be possible by using different research techniques and larger sample groups. For example, qualitative research can yield more in-depth data based on the personal experiences of the participants. Such an approach may provide a more effective understanding of the chef candidates' sensitivity towards food waste and their ability to develop creative solutions.

Another limitation of this study is that the creativity levels of the chef candidates were assessed by means of a questionnaire. It is recommended for future studies to form experimental groups to assess the effects of creativity levels of chef candidates, and experimental studies can be conducted between groups who are trained or not trained in

creativity and this issue can be analysed through different studies.

6. Implications for gastronomy

This study demonstrates the role of culinary creativity in the recycling of food waste. This study showed that chef candidates who were trained in gastronomy should become more active, especially in both culinary waste and culinary creativity practices. More courses and practices to reduce food waste in the undergraduate programme of gastronomy and culinary arts may allow future chefs to develop creative solutions that will contribute to sustainable culinary practices. This can make a significant change not only at the educational level but also in professional kitchens in reducing food waste.

For future research on kitchen staff and the problem of food waste, it may be suggested to identify an experimental group and check the waste food ratios of prospective chefs who attend the creativity course and those who do not attend. Future research could include qualitative studies in which the experiences of chefs in dealing with food waste in the kitchen are mentioned. Not only in restaurants and catering facilities but also in the training kitchens of gastronomy and culinary arts departments, sustainable six-week or two-week trainings can be used to raise awareness about food waste.

CRediT authorship contribution statement

Merve Onur: Writing – review & editing, Writing – original draft, Resources, Methodology, Investigation, Funding acquisition, Conceptualization. **Leyla Özgen:** Writing – review & editing, Writing – original draft, Resources, Conceptualization. **Emrah Keskin:** Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

References

Akgül, A., Çevik, O., 2003. İstatistiksel Analiz Teknikleri. Emek Ofset, Ankara.

Anderson, J.C., Gerbing, D.W., 1988. Structural equation modeling in practice: a review and recommended two-step approach. Psychol. Bull. 103 (3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411.

Ariyani, L., Ririh, K.R., 2020. Understanding behavior of household food waste management: food waste hierarchy context. Jurnal Ilmiah Teknik Industri 19 (2), 142–154. https://doi.org/10.23917/jiti.v19i2.11994.

Aschemann-Witzel, J., Asioli, D., Banovic, M., Perito, M.A., Peschel, A.O., Stancu, V., 2023. Defining upcycled food: the dual role of upcycling in reducing food loss and waste. Trends Food Sci. Technol. 132, 132–137. https://doi.org/10.1016/j.tifs.2023.01.001.

Bagozzi, Richard P., Claes, F., 1982. Theoretical concepts, measurement, and meaning. In: Fornell, C. (Ed.), A Second Generation of Mulivariate Analysis, vol. 2. Praeger, pp. 5–23.

Bangar, S.P., Chaudhary, V., Kajla, P., Balakrishnan, G., Phimolsisipol, Y., 2024. Strategies for upcycling food waste in the food production and supply chain. Trends Food Sci. Technol. 143, 104314. https://doi.org/10.1016/j.tifs.2023.104314.

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

Bhatt, S., Lee, J., Deutsch, J., Ayaz, H., Fulton, B., Suri, R., 2018. From food waste to value-added surplus products (VASP): consumer acceptance of a novel food product category. J. Consum. Behav. 17 (1), 57–63. https://doi.org/10.1002/cb.1689.

Bhatt, S., Ye, H., Deutsch, J., Ayaz, H., Suri, R., 2020. Consumers' willingness to pay for upcycled foods. Food Qual. Prefer. 86, 104035. https://doi.org/10.1016/j.foodqual.2020.104035.

Büyüköztürk, Ş., 2002. Veri Analizi El Kitabı. Ankara: Pegem Yayıncılık.

Buzby, J.C., Hyman, J., 2012. Total and per capita value of food loss in the United States. Food Policy 37, 561–570. https://doi.org/10.1016/j.foodpol.2012.06.002.

Canali, M., Amani, P., Aramyan, L., Gheoldus, M., Moates, G., Östergren, K., et al., 2016. Food waste drivers in Europe, from identification to possible interventions. Sustainability 9 (1), 37. https://doi.org/10.3390/su9010037.

Çetin, M., Çetin, K., 2024. Investigating chefs' behaviours on food waste: an extended theory of planned behaviour. Int. Food Res. J. 31 (5), 1362–1377. https://doi.org/10.47836/ifrj.31.5.22.

Chawla, G., Lugosi, P., Hawkins, R., 2020. Evaluating materiality in food waste reduction interventions. Annals of Tourism Research Empirical Insights 1 (1), 100002. https://doi.org/10.1016/j.annale.2020.100002.

Chen, C., Chaudhary, A., Mathys, A., 2020. Nutritional and environmental losses embedded in global food waste. Resour. Conserv. Recycl. 160, 104912. https://doi.org/10.1016/j.resconrec.2020.104912.

Christian, A.H., Gregory, K.E., James, W.P., 2009. On-farm composting: a guide to principles, planning & operations. Virg. Coop. Ext. 452–232, 1–36. http://hdl.handle.net/10919/48077. (Accessed 11 February 2025).

Christmann, A., Aelst Van, S., 2006. Robust estimation of Cronbach's Alpha. J. Multivariate Anal. 97, 1660–1674. https://doi.org/10.1016/j.jmva.2005.05.012.

Cicatiello, C., Franco, S., Pancino, B., Blasi, E., Falasconi, L., 2017. The dark side of retail food waste: evidences from in-store data. Resour. Conserv. Recycl. 125, 273–281. https://doi.org/10.1016/j.resconrec.2017.06.010.

Conrad, Z., Niles, M.T., Neher, D.A., Roy, E.D., Tichenor, N.E., Jahns, L., 2018. Relationship between food waste, diet quality, and environmental sustainability. PLoS One 13 (4), e0195405. https://doi.org/10.1371/journal.pone.0195405.

Demir, Y., 2022. *Eğitim Mutfaklarında Gıda Israfını Belirlemeye Yönelik Bir Araştırma*, T.C. İstanbul Üniversitesi Sosyal Bilimleri Enstitüsü Turizm İşletmeciliği Anabilim Dalı. Doktora Tezi, İstanbul.

Dhir, A., Talwar, S., Kaur, P., Malibari, A., 2020. Food waste in hospitality and food services: a systematic literature review and framework development approach. J. Clean. Prod. 270, 122861. https://doi.org/10.1016/j.jclepro.2020.122861.

Dursun, Y., Kocagöz, E., 2010. Structural equation modeling and regression: a comparative analysis. Erciyes University Journal of Economics and Administrative Sciences 35, 1–17.

Economou, F., Chatziparaskeva, G., Papamicheal, I., Loiza, P., Voukkali, I., Navarro-Pedreno, J., Klontza, E., Lekkas, D.F., Naddeo, V., Zorpas, A.A., 2024. The concept of food waste and food loss prevention and measuring tools. Waste Manag. Res. 1–19. https://doi.org/10.1177/0734242X241237187.

Elnasr, A.E.A., Aliane, N., Agina, M.F., 2021. Tackling food waste in all-inclusive resort hotels in Egypt. Processes 9 (11), 2056. https://doi.org/10.3390/pr9112056.

Eriksson, M., 2015. Prevention and management of supermarket food waste: with focus on reducing greenhouse gas emissions. Acta Universitatis Agriculturae Sueciae. Swedish University of Agricultural Science, Uppsala.

EU, 2023. Reducing food waste: the EU's response to a global challenge. https://ec.europa.eu/commission/presscorner/detail/en/MEMO_16_3989. (Accessed 10 March 2024).

FAO, 2019. The State of Food Security and Nutrition in the World: Safeguarding against Economic Slowdowns and Downturns. FAO, Rome, Italy.

FAO, 2021. Food price index. http://www.fao.org. (Accessed 10 March 2024).

Ferguson, D.H., Berger, F., 1985. Encouraging creativity in hospitality education. Cornell Hotel Restaur. Adm. Q. 26 (2), 74–76. https://doi.org/10.1177/001088048502600219.

Fernandez, K.V., Brittain, A.J., Bennett, S.D., 2011. Doing the duck": negotiating the resistant-consumer identity. Eur. J. Market. 45 (11/12), 1779–1788. https://doi.org/10.1108/03090561111167414.

FIL. (Food in Life), 2017. Türk gastronomisinde "temiz tabak" hareketi. http://www.foodinlife.com.tr/haber/37859/Turk_gastronomisinde_.html. (Accessed 10 March 2024).

Filimonau, V., Chiang, C.C., Wang, L.E., Muhialdin, B.J., Ermolaev, V.A., 2023. Resourcefulness of chefs and food waste prevention in fine dining restaurants. Int. J. Hospit. Manag. 108, 103368. https://doi.org/10.1016/j.ijhm.2022.103368.

Filimonau, V., Nghiem, V.N., Wang, L.E., 2021. Food waste management in ethnic food restaurants. Int. J. Hospit. Manag. 92, 102731. https://doi.org/10.1016/j.ijhm.2020.102731.

Filimonau, V., Todorova, E., Mzembe, A., Sauer, L., Yankholmes, A., 2020. A comparative study of food waste management in full service restaurants of the United Kingdom and The Netherlands. J. Clean. Prod. 258, 120775. https://doi.org/10.1016/j.jclepro.2020.120775.

Filimonau, V., Zhang, H., Wang, L.E., 2020a. Food waste management in Shanghai full-service restaurants: a senior managers' perspective. J. Clean. Prod. 258, 120975. https://doi.org/10.1016/j.jclepro.2020.120975.

Gallion, B., 2018. Here's how some local restaurants. grocery stores cut food waste. https://www.daytondailynews.com/business/here-how-some-local)-restaurants-grocery-stores-cut-food-waste/7lkW2gUl7oaaBUYg0NToKL/. (Accessed 12 February 2025).

Gao, S., Bao, J., Li, R., Liu, X., Wu, C., 2021. Drivers and reduction solutions of food waste in the Chinese food service business. Sustain. Prod. Consum. 26, 78–88. https://doi.org/10.1016/j.spc.2020.09.013.

Garnett, T., 2011. Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? Food Policy 36, S23–S32. https://doi.org/10.1016/j.foodpol.2010.10.010.

Godfray, H.C.J., Beddington, J.R., Crute, I.R., Haddad, L., Lawrence, D., Muir, J.F., et al., 2010. Food security: the challenge of feeding 9 billion people. Science 327 (5967), 812–818. https://doi.org/10.1126/science.1185383.

Goh, E., Jie, F., 2019. To waste or not to waste: exploring motivational factors of Generation Z hospitality employees towards food wastage in the hospitality industry. Int. J. Hospit. Manag. 80, 126–135. https://doi.org/10.1016/j.ijhm.2019.02.005.

Graham-Rowe, E., Jessop, D.C., Sparks, P., 2014. Identifying motivations and barriers to minimising household food waste. Resour. Conserv. Recycl. 84, 15–23. https://doi.org/10.1016/j.resconrec.2013.12.005.
Gürbüz, S., Şahin, F., 2018. Sosyal Bilimlerde Araştırma Yöntemleri (5. Baskı). Seçkin Yayıncılık, Ankara.
Gustavsson, J., Cederberg, C., Sonesson, U., Van Otterdijk, R., Meybeck, A., 2011. Global Food Losses and Food Waste. FAO, Rome, Italy.
Hamerman, E.J., Rudell, F., Martins, C.M., 2018. Factors that predict taking restaurant leftovers: strategies for reducing food waste. J. Consum. Behav. 17 (1), 94–104. https://doi.org/10.1002/cb.1700.
Handoyo, R.F., Rosbiono, M., Sopandi, W., 2021. Building students' creative thinking skills using problem-based learning in handling staple food waste. Journal of Educational Sciences 5 (1), 89–103. https://doi.org/10.31258/jes.5.1, 89-103.
Hebrok, M., Boks, C., 2017. Household food waste: drivers and potential intervention points for design–an extensive review. J. Clean. Prod. 151, 380–392. https://doi.org/10.1016/j.jclepro.2017.03.069.
Heikkila, L., Reinikainen, A., Katajajuuri, J., Silvennoinen, K., Hartikainen, H., 2016. Elements affecting food waste in the food service sector. Waste Manag. 56, 446–453. https://doi.org/10.1016/j.wasman.2016.06.019.
Hennchen, B., 2019. Knowing the kitchen: applying practice theory to issues of food waste in the food service sector. J. Clean. Prod. 225, 675–683. https://doi.org/10.1016/j.jclepro.2019.03.293.
Horng, J.S., Hu, M.L., 2009. The creative culinary process: constructing and extending a four-component model. Creat. Res. J. 21 (4), 376–383. https://doi.org/10.1080/10400410903297956.
Hsia, H., Chen, T.L., Tan, T.S., 2021. Examining the concept of creativity in a culinary school setting. J. Hospit. Tourism Educ. 33 (1), 66–73. https://doi.org/10.1080/10963758.2020.1726766.
Jagau, H.L., Vyrastekova, J., 2017. Behavioral approach to food waste: an experiment. Br. Food J. 119 (4), 882–894. https://doi.org/10.1108/BFJ-05-2016-0213.
Jamrisko, M., 2015. Americans' Spending on Dining Out Just Overtook Grocerysales for the First Time Ever. Bloomberg. https://www.bloomberg.com/news/articles/2015-04-14/americans-spending-on-dining-out-just-overtook-grocery-sales-for-the-first-time-ever. (Accessed 12 February 2025).
Jia, L., Zhang, Y., Qiao, G., 2022. Consumer-related antecedents of waste behavior in online food ordering: a study among young adults in China. Foods 11, 3098. https://doi.org/10.3390/foods11193098.
Kaman, G.S., Bozkurt, İ., Bölükbaş, R., Özhasar, Y., Demirci, B., İrfan, Y.Ğ.L., 2024. The strategy food waste in restaurants: a systematic literature review. Trends İn Food Science & Technology, 104625. https://doi.org/10.1016/j.tifs.2024.104625.
Kesici, M., Önçel, S., 2015. The relatıonshıp between job autonomy and creatıvıty process of chefs. Dokuz Eylul University Journal of Faculty of Business (JFB) 16 (1), 23–45. https://doi.org/10.24889/ifede.268168.
Kline, P., 1994. An Easy Guide to Factor Analysis. Routledge, New York.
Kline, R.B., 2011. Principles and Practice of Structural Equation Modeling, third ed. The Guilford, New York.
Kummu, M., De Moel, H., Porkka, M., Siebert, S., Varis, O., Ward, P.J., 2012. Lost food, wasted resources: global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. Sci. Total Environ. 438, 477–489. https://doi.org/10.1016/j.scitotenv.2012.08.092.
Lang, L., Wang, Y., Chen, X., Zhang, Z., Yang, N., Xue, B., Han, W., 2020. Awareness of food waste recycling in restaurants: evidence from China. Resour. Conserv. Recycl. 161, 104949. https://doi.org/10.1016/j.resconrec.2020.104949.
Leverenz, D., Hafner, G., Moussawel, S., Kranert, M., Goossens, Y., Schmidt, T., 2021. Reducing food waste in hotel kitchens based on self-reported data. Ind. Mark. Manag. 93, 617–627. https://doi.org/10.1016/j.indmarman.2020.08.008.
Liao, C., Hong, J., Zhao, D., Zhang, S., Chen, C., 2018. Confucian culture as determinants of consumers' food leftover generation: evidence from Chengdu, China. Environ. Sci. Pollut. Control Ser. 25, 14919–14933. https://doi.org/10.1007/s11356-018-1639-5.
Lipinski, B., Hanson, C., Waite, R., Searchinger, T., Lomax, J., 2013. Reducing food loss and waste. Creating a Sustainable Food Future. *Installment Two.* June 4. https://www.wri.org/research/reducing-food-loss-and-waste?page=1.
Lopez, B.E., Hertel, T., 2021. Global food waste across the income spectrum: implications for food prices, production and resource use. Food Policy 98, 101874. https://doi.org/10.1016/j.foodpol.2020.101874.
Loth, S., 2021. Three food waste facts everyone should needs to know. https://www.which.co.uk/news/2019/06/three-food-waste-facts-everyone-needs-to-know/. (Accessed 12 February 2025).
Mandal, M., Roy, A., Das, S., Rakwal, R., Agrawal, G.K., Singh, P., et al., 2024. Food waste-based bio-fertilizers production by bio-based fermenters and their potential impact on the environment. Chemosphere 353, 141539. https://doi.org/10.1016/j.chemosphere.2024.141539.
Martin-Rios, C., Demen-Meier, C., Gössling, S., Cornuz, C., 2018. Food waste management innovations in the foodservice industry. Waste Manag. 79, 196–206. https://doi.org/10.1016/j.wasman.2018.07.033.
Martin-Rios, C., Hofmann, A., Mackenzie, N., 2020. Sustainability-oriented innovations in food waste management technology. Sustainability 13 (1), 210. https://doi.org/10.3390/su13010210.
Mattar, L., Abiad, M.G., Chalak, A., Diab, M., Hassan, H., 2018. Attitudes and behaviors shaping household food waste generation: lessons from Lebanon. J. Clean. Prod. 198, 1219–1223. https://doi.org/10.1016/j.jclepro.2018.07.085.
McAdams, B., von Massow, M., Gallant, M., Hayhoe, M.A., 2019. A cross industry evaluation of food waste in restaurants. J. Foodserv. Bus. Res. 22 (5), 449–466. https://doi.org/10.1080/15378020.2019.1637220.
McCabe, M., de Waal Malefyt, T., 2013. Creativity and cooking: motherhood, agency and social change in everyday life. J. Consum. Cult. 15, 48–65. https://doi.org/10.1177/1469540513493202.
Monde jar-Jim enez, J.A., Ferrari, G., Secondi, L., Principato, L., 2016. From the table to waste: an exploratory study on behaviour towards food waste of Spanish and Italian youths. J. Clean. Prod. 138, 8–18. https://doi.org/10.1016/j.jclepro.2016.06.018.
Moore, N.S., 2019. The Development of the Culinary Creative Process in Food and Beverage Operations Management Curriculum. Doctoral dissertation, University of Johannesburg).
Nahman, A., De Lange, W., Oelofse, S., Godfrey, L., 2012. The costs of household food waste in South Africa. Waste Manag. 32 (11), 2147–2153. https://doi.org/10.1016/j.wasman.2012.04.012.
Närvänen, E., Mesiranta, N., Sutinen, U.M., Mattila, M., 2018. Creativity, aesthetics and ethics of food waste in social media campaigns. J. Clean. Prod. 195, 102–110. https://doi.org/10.1016/j.jclepro.2018.05.202.
Navarro Gausa, M., Pericu, S., Canessa, N., Tucci, G., 2020. Creative food cycles: a cultural approach to the food life-cycles in cities. Sustainability 12 (16), 6487. https://doi.org/10.3390/su12166487.
Okumus, B., 2020. How do hotels manage food waste? evidence from hotels in Orlando, Florida. J. Hospit. Market. Manag. 29 (3), 291–309. https://doi.org/10.1080/19368623.2019.1618775.
Okumus, B., Taheri, B., Giritlioglu, I., Gannon, M.J., 2020. Tackling food waste in allinclusive resort hotels. Int. J. Hospit. Manag. 88, 102543. https://doi.org/10.1016/j.ijhm.2020.102543.
Parfitt, J., Barthel, M., Macnaughton, S., 2010. Food waste within food supply chains: quantification and potential for change to 2050. Phil. Trans. Biol. Sci. 365 (1554), 3065–3081. https://doi.org/10.1098/rstb.2010.0126.
Peng, K.L., Lin, M.C., Baum, T., 2012. The constructing model of culinary creativity: a mixed methods approach. Qual. Quantity 47 (5), 2687–2707. https://doi.org/10.1007/s11135-012-9680-9.
Pizzetti, M., Longo, C., Türe, M., 2024. Embracing food well-being: lessons from chefs' caring actions in the fight against food waste. J. Publ. Pol. Market., 07439156231206791 https://doi.org/10.1177/07439156231206791.
Rakesh, B., Mahendran, R., 2024. Upcycling of food waste and food loss–A sustainable approach in the food sector. Trends Food Sci. Technol. 143, 104274. https://doi.org/10.1016/j.tifs.2023.104274.
Rashid, M.I., Shahzad, K., 2021. Food waste recycling for compost production and its economic and environmental assessment as circular economy indicators of solid waste management. J. Clean. Prod. 317, 128467. https://doi.org/10.1016/j.jclepro.2021.128467.
Reardon, J., Way, K.A., Garrison, M.B., 2024. Food waste in restaurants: a qualitative investigation of chefs' practices. Food and Humanity 3, 100405. https://doi.org/10.1016/j.foohum.2024.100405.
Recycle Track Systems, 2021. Food waste in America in 2021: statistics + facts. https://www.rts.com/wpcontent/uploads/2021/04/RTS_Food_Waste_Guide_2021.pdf. (Accessed 12 February 2025).
Ribeiro, A.P., Rok, J., Harmsen, R., Carreón, J.R., Worrell, E., 2019. Food waste in an alternative food network–A case-study. Resour. Conserv. Recycl. 149, 210–219. https://doi.org/10.1016/j.resconrec.2019.05.029.
Russell, S.V., Young, C.W., Unsworth, K.L., Robinson, C., 2017. Bringing habits and emotions into food waste behaviour. Resour. Conserv. Recycl. 125, 107–114. https://doi.org/10.1016/j.resconrec.2017.06.007.
Secondi, L., Principato, L., Mattia, G., 2020. Can digital solutions help in the minimization of out-of-home waste? An analysis from the client and business perspective. Br. Food J. 122 (5), 1341–1359. https://doi.org/10.1108/BFJ-03-2019-0205.
Selzer, M., Glanz, R., Schneider, F., 2009. Causes of food waste generation in households. https://www.researchgate.net/publication/285484556_Causes_of_food_waste_generation_in_households. (Accessed 12 February 2025).
Soorani, F., Ahmadvand, M., 2019. Determinants of consumers' food management behavior: applying and extending the theory of planned behavior. Waste Manag. 98, 151–159. https://doi.org/10.1016/j.wasman.2019.08.025.
Spratt, O., Suri, R., Deutsch, J., 2021. Defining upcycled food products. J. Culin. Sci. Technol. 19 (6), 485–496. https://doi.org/10.1080/15428052.2020.1790074.
Stefan, V., Van Herpen, E., Tudoran, A.A., Lähteenmäki, L., 2013. Avoiding food waste by Romanian consumers: the importance of planning and shopping routines. Food Qual. Prefer. 28 (1), 375–381. https://doi.org/10.1016/j.foodqual.2012.11.001.
Tabachnick, B.G., Fidell, L.S., Ullman, J.B., 2007. Using Multivariate Statistics. Pearson, Boston, MA.
Thompson, K., Haigh, L., 2017. Representations of food waste in reality food television: an exploratory analysis of ramsay's kitchen nightmares. Sustainability 9, 1139. https://doi.org/10.3390/su9071139.
UNEP, 2021. United Nations Environment Programme. Food Waste Index Report 2021, Nairobi. https://www.unep.org/resources/report/unep-food-waste-index-report-2021. (Accessed 11 February 2024).
Unilever Food Solution (UFS), 2023. https://www.unileverfoodsolutions.com.tr/konsept-uygulamalarimiz/plant-based/adan-zye-bitki-bazli/atiksiz-mutfak-uygulamalari.html. (Accessed 10 March 2024).
Upcycled Food Association (UFA), 2023. Growing the Upcycled Food Economy. UFA. Available at: https://www.upcycledfood.org/. (Accessed 11 February 2025).
URL-1:Türkiye Cumhuriyeti Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı On İkinci Kalkınma Planı 2024-2028, 2023). Available at: https://www.sbb.gov.tr/wp-content/uploads/2022/12/On-Ikinci-Kalkinma-Plani-Ozel-Ihtisas-Komisyonlari-El-Kitabi-08122022.pdf. (Acccessed 13 March 2024).

URL-2: Available at: https://www.ua.gov.tr/media/ni4meght/2-tuba-bayram_proje-tan/C4/B1t/C4/B1m/C4/B1_go-zero-waste-management-pdf. (Acccessed 15 March 2024).

URL-3. In the U.S. 35% of all food goes unsold or uneaten e and most of that goes to waste. Refed. Available at: https://refed.org/food-waste/the-problem/#:w:text¼In/20the/20U.S./2C/2035/25/20of,of/20that/20goes/20to/20waste. (Acccessed 11 February 2025).

Vittuari, M., Pagani, M., Johnson, T.G., De Menna, F., 2020. Impacts and costs of embodied and nutritional energy of food waste in the US food system: distribution and consumption (Part B). J. Clean. Prod. 252, 119857. https://doi.org/10.1016/j.jclepro.2019.119857.

Vizzoto, F., Tessitore, S., Testa, F., Iraldo, F., 2021. Plate waste in foodservice outlets: revealing customer profiles and their support for potentially contentious measures to reduce it in Italy. Resour. Conserv. Recycl. 174, 105771. https://doi.org/10.1016/j.resconrec.2021.105771.

Wallas, G., 1926. The Art of Thought. Jonathan Cape, London, UK.

Wang, B., Zhang, L., Shi, J., Su, Y., Wu, D., Xie, B., 2023. Genome-centric metagenomics revealed functional traits in high-solids anaerobic co-digestion of restaurant food waste, household food waste and rice straw. Bioresour. Technol. 376, 128926. https://doi.org/10.1016/j.biortech.2023.128926.

Yaşa, H., 2022. The Zero Waste Movement in Social Media as the Environmental Movement, vol. 49. Selcuk University Journal of Social Sciences Institute, pp. 212–230. https://doi.org/10.52642/susbed.1156189.

Young, C.W., Russell, S.V., Robinson, C.A., Chintakayala, P.K., 2018. Sustainable retailing– influencing consumer behaviour on food waste. Bus. Strat. Environ. 27 (1), 1–15. https://doi.org/10.1002/bse.1966.

Yu, Z., Ju, X., Bai, L., Gong, S., 2021. Consumer's over-ordering behavior at restaurant: understanding the important roles of interventions from waiter and ordering habits. Appetite 160, 105092. https://doi.org/10.1016/j.appet.2020.105092.

Yüzüncüyıl, K.S., Güldemir, O., 2021. Exploring culinary creativity: clean plate example. Anadolu Akademi Social Sciences Journal 3 (2), 207–219.

Zamrisham, N.A.F., Idrus, S., Harun, M.R., Ab Razak, M.S., Jaman, K., 2024. Biogas production by integrating lava rock, red clay & ceramic bio ring as support carrier in treatment of landfill leachate with liquidised food waste. Biochem. Eng. J. 204, 109221. https://doi.org/10.1016/j.bej.2024.109221.