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Investigating Household Food Waste Behaviors: A Social Practice Theory-Based Survey Combined with an Educational Intervention

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Abstract

Household food waste constitutes a major sustainability challenge with worldwide implications. In the current study, an online survey (N = 252) was developed to explore how routine food management practices in Greek households influence food waste. The survey was combined with a Social Practice Theory (SPT) framework and an exploratory high-school educational intervention (N = 27) with app-based diary tracking. Under the context of SPT, indices for meanings (MNG), competencies (CPT) and materiality (MAT) were constructed, along with a Food Waste Frequency (FWF) index. Respondents were highly willing to follow educational advice (87.3%) but more moderately open to using a food-tracking app (48.1%). FWF index results (M = 2.01, SD = 0.64) suggested that household food waste was present but not established as a daily routine of the participants. Pearson's correlations and hierarchical regression of SPT indices and FWF showed that MNG were the main predictor of household FWF (R^2 = 0.38), with CPT providing a marginal contribution. Also, a positive correlation (r = 0.619, $p < 0.01$) was observed between FWF and MNG. The results from the food waste tracking app showed that legumes (14.6%), vegetable peel (14.6%), and meat (12.5%) were the most frequently discarded food categories and that 56.3% of the discarded food was used for animal feed. However, a decrease in the use of the application was observed after the second week. The results highlight the need for prevention policies that focus on practice configurations (i.e., MNG, CPT, and MAT). The current study operationalizes key SPT elements as measurable indices for quantitative analysis on these practice-based aspects.

Keywords: food waste; households; consumer behavior; social practice; digital tools; Greece; education

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1. Introduction

Food waste has become a major global problem in recent years affecting society, the environment and the economy that requires attention and action [1,2]. In 2022, it was estimated that 79 kg of food was wasted per inhabitant every year, producing 631 million tons of food waste, representing 60% of the total waste across households, food outlets and the retail sector [3]. The United Nations recognized the importance of this issue and set a goal to reduce per capita global food waste at the retail and consumer levels by 2030 as part of United Nations Sustainable Development Goal 12 [3]. Consumer behavior contributes

significantly in creating food waste as a result of the interaction of psychological, practical and social factors [4]. Food waste behavior is largely determined by emotional reactions like guilt, the influence of traditional family meal patterns, and a lack of knowledge about food labeling, such as the distinction between "best before" and "use by" dates [5–7]. Previous research studies have concluded that people rarely throw food away intentionally and that food waste arises from a combination several factors such as poor meal planning, buying too much, not knowing how food can be stored and failing to understand expiry labels [8–11]. The financial crisis of 2008 signaled important alterations in consumer behavior on food waste in Greece [5,6,12–14]. According to Ponis et al. [12], the economic situation plays a major role in reducing household food waste when the economy is going through a challenging period. Studies by Kritikou et al. [5] and Papamonioudis and Zabaniotou [15] stated that a number of factors were responsible for determining the amount of food waste, including weak food literacy, no interest in composting, and a lack of understanding of the terminology used in food labeling.

Despite these developments, food waste is often conceptualized as an individual behavior motivated by attitudes or sociodemographic factors. Also, research on socially embedded routines, shared meanings, material infrastructures, and everyday competencies is limited [16]. Social Practice Theory (SPT) provides a theoretical framework to apprehend this interaction. SPT views processes as a collection of three interconnected elements: meanings (MNG), competencies (CPT) and materiality (MAT) [17,18]. These components together determine not only how practices come into being but also how they continue and change over time. MNG are the interpretative, cultural and normative aspects of the understanding of a practice; CPT cover the skills, knowledge and practical know-how of the performance; and MAT refers to the physical infrastructures, technologies and objects which either facilitate or limit the practice. Recent studies that integrate SPT with food waste research show that food waste is typically linked to deeply embedded routines and cultural expectations [18,19]. Nevertheless, the majority of food waste studies using SPT is of a qualitative nature, primarily employing interviews, ethnographic observation and diaries [19–22]. A second gap is related to digital tools and their influence on food management practices. Mobile applications to support reflection on food waste and consumer willingness to use food waste or surplus food apps are increasingly explored in human–computer interaction and sustainability research [23–27]. Apps and digital platforms aimed at meal planning, inventory management, expiry tracking, and food waste monitoring are examples of new "digital materialities" [28–31]. However, it is still unclear how these technologies may be associated with the fundamental components of SPT.

The above gaps are addressed in this study through a survey of 252 respondents on household food waste behaviors, drivers, and preventive strategies for food waste in Greek households. Also, the current study employs SPT to develop quantitative indices for MNG, CPT, and MAT, which are then used to predict household food waste through hierarchical regression in order to conduct a theory-informed analysis of the relative contribution of each practice element. The survey findings were then linked to an experiential-learning-based educational intervention. A mobile app was used to track food waste to provide further insights into household practices.

Unlike previous SPT studies that were mainly qualitative, this study takes a novel approach to operationalize MNG, CPT, and MAT as composite quantitative indices. These indices are statistically examined together in a single model, and thus a theory-driven comparative assessment of the elements of practice is made possible. This is a novel method of quantitatively testing SPT in the food waste field. Furthermore, this study adds an exploratory, practice-oriented educational intervention with a food waste diary mobile app as a support tool. This innovation establishes a connection between survey-based

SPT indicators and experiential insights from real-life practice. The intervention does not measure causal behavioral change but rather depicts the dynamic interactions between meanings, skills, and material arrangements. Therefore, the current study provides novel, practice-oriented evidence that can be used to develop educational and policy-based waste prevention measures.

Building on SPT and previous research on household food waste, this study addresses the following research questions: (1) What are the dominant food management practices, perceived drivers, and preventive strategies related to household food waste? (2) Can the core elements of SPT be operationalized as quantitative indices using questionnaire items? (3) To what extent do MNG, CPT, and MAT predict household Food Waste Frequency (FWF), and what is the relative contribution of each practice element when modeled jointly? (4) Is willingness to use a mobile food-tracking application (digital materiality) associated with household FWF? (5) What practice-related insights emerge from an exploratory SPT-informed educational intervention using a mobile app?

The rest of the paper is organized in the following way: Section 2 explains the Materials and Methods in detail. It covers survey design, sample characteristics, how the SPT indices were constructed, statistical analysis, and the educational intervention development. Section 3 reports the Results and Discussion, which include descriptive findings, correlations among SPT elements, regression analyses, and the results of the app-based food waste diary used in the context of educational intervention. It also includes a section presenting limitations and implications. Section 4 recaps the key findings of the study.

2. Materials and Methods

2.1. Survey Compilation

This survey was conducted from November 2024 to February 2025. A structured questionnaire was created using Google Forms (Google LLC, USA). The questionnaire was compiled without requiring a single previously validated psychometric scale. Instead, the items were carefully derived and adapted from peer-reviewed, internationally released research on household food waste [32–34]. All items were measured using a five-point Likert scale. The internal consistency of the constructs was tested employing Cronbach's alpha. Reliability coefficients are reported in Section 3. To enhance transparency, the questionnaire is provided in Appendix A.

Prior to giving the questionnaire to the participants, a trial run was conducted. The questionnaire was distributed through social media and the academic community's electronic networks. Due to the method of online distribution and the recruitment from academic and social circles, the sample cannot be deemed to be statistically representative of all Greek households. The survey offers an exploratory dataset for theory-informed analysis of household food waste practices using SPT. In order to reduce duplicate entries to a minimum, the Google Forms "Limit to 1 response" option was used. Question items were set as mandatory in order to reduce missing values. The final sample consisted of N = 252 respondents.

2.2. Questionnaire Structure

The first section of the questionnaire included six questions to collect information about the sociodemographic and household characteristics of participants. Questions included information about gender (Q1), age (Q2), level of education (Q3), how many people lived in the household (Q4), the monthly income (Q5), and the primary purchaser in the household (Q6).

The second section focused on analyzing food management practices, attitudes and solutions for reducing food waste and how respondents behave when it comes to

food waste. The respondents used a five-point Likert scale (1 = "Always", 2 = "Often", 3 = "Sometimes", 4 = "Rarely", 5 = "Never") to answer the questions Q7 to Q11. These focused on (a) the food types that were consumed (Q7), (b) the factors that affect how much food is prepared (Q8), (c) the use of methods for food preservation (Q9), (d) the frequency of discarding food (Q10), and (e) the reasons for discarding food (Q11). For questions Q12 to Q18, the following five-point Likert scale was used: 1 = "Strongly agree", 2 = "Agree", 3 = "Neither agree nor disagree", 4 = "Disagree", 5 = "Strongly disagree". The questions included (a) meanings associated with household food waste (Q12), (b) competence for reducing food waste in the household (Q13), (c) barriers to reducing food waste (Q14), (d) motivation to reduce food waste (Q15), (e) managing food items that are close to their expiration date (Q16), (f) willingness to follow advice to reduce food waste in the household (Q17), and (g) willingness to use a mobile app to track food consumption in order to reduce food waste in the household (Q18).

2.3. Construction of SPT Indices

To integrate SPT into the analytical framework, three composite indices were constructed, representing MNG, CPT and MAT, using a theory-driven content-mapping approach. Questionnaire items presenting clear conceptual alignment with the SPT elements, direct relevance to routine household food management practices, and no overlap with other SPT elements were selected for inclusion in SPT indices. To maintain conceptual clarity, motivational statements, perceived barriers, and behavioral intentions were not included in the SPT indices.

Subsequently, these indices were used as independent variables in the SPT model, while Food Waste Frequency (FWF) assessed the frequency of discarding specific food categories and was used as a dependent variable. The items included in the indices were selected through a theory-driven content-mapping process. Following the three-element model of Shove et al. [17], the questionnaire was screened for items that most directly represented (i) interpretive and normative framings of food waste (MNG), (ii) routine skills and know-how for food management (CPT), and (iii) preservation tools used in the household (MAT).

To ensure consistent interpretation across indices, variables were recoded where necessary so that higher values represent more sustainable practices. Reverse coding was performed using the standard transformation for 1–5 scales: reversed score = 6—original score (i.e., $1 \leftrightarrow 5$, $2 \leftrightarrow 4$, 3 unchanged). The MNG index was measured using questionnaire item Q12 "Meanings associated with household food waste". Q12 items represent "waste-driving meanings", as they reflect societal norms and common beliefs that justify food waste, such as notions of freshness, safety, having enough food, and distaste for leftovers. These shared understandings shape what people consider to be typical or appropriate food management behavior.

Since the original response coding for Q12 was: 1 = "Strongly agree" to 5 = "Strongly disagree", all items in Q12 were reverse-coded so that higher scores indicate stronger endorsement of food-waste-driving meanings. The MNG index was computed as the mean of the reverse-coded items. The CPT index was measured using the item Q13 "Competence for reducing food waste". The preventive action items Q13a–Q13d were reverse-coded so that higher values indicate stronger food management competencies, while Q13e ("I take no specific action") was not reverse-coded because agreement already indicates inaction (lower competence). The CPT index was computed as the mean of the Q13a–d reverse-coded preventive items and the un-reversed inaction item Q13e, such that higher CPT values represent stronger competencies.

MAT index was measured through the Q9 item "Use of food preservation methods". Q9 items were also reverse-coded so that higher values reflect greater availability/use of preservation methods. The MAT index was computed as the mean of the reverse-coded Q9 items, with higher scores indicating more frequent use of preservation methods.

Willingness to use a food-tracking mobile application (Q18) was examined separately as an indicator of openness towards digital materiality (D_MAT). It reflects the intention to use digital tools that may become part of food management practices.

FWF was assessed using the Q10 item of the questionnaire "Discarding of the following food types". All Q10 items were reverse-coded ($6 - x$). The FWF index was then computed as the mean of the reverse-coded items, resulting in a continuous measure where higher values indicate higher household Food Waste Frequency. The indices were defined using SPT and were theory-driven, so item selection was not done using exploratory factor analysis. The content validity of SPT indices was ensured by performing a thorough examination of the items for conceptual clarity and applicability to routine food management procedures, as well as theoretical alignment with the SPT framework. A detailed overview of item composition and coding direction is provided in Supplementary Table S1.

2.4. Statistical Analysis

The data analysis was carried out using SPSS version 29.0.0®. Cronbach's alpha coefficient [35] was calculated to check the internal consistency of the questionnaire. This coefficient was also calculated to assess internal consistency for reflective constructs (MNG and CPT). As MAT was specified as a formative index, internal consistency was not considered a reliability criterion. For conceptual clarity of SPT, the three indices were built in accordance with the theoretical features of each practice element. Therefore, MNG and CPT were modeled as reflective latent constructs. The MAT index was conceptualized as a formative construct because its indicators (e.g., freezing, use of airtight containers, dehydration) represent distinct material resources and preservation practices that collectively define household materiality. These indicators are not expected to be highly correlated, as each practice contributes a different aspect of material infrastructure rather than reflecting a single latent variable [36,37]. The use of a certain preservation technique does not require the application of an alternative technique. Therefore, Cronbach's alpha is not relevant for the reliability assessment of the MAT index, although it is reported in the current study. Pearson's correlation coefficients were used to determine the relationship between the FWF and the SPT indices. A hierarchical multiple regression analysis was conducted to examine the predictive contribution of the SPT indices to FWF.

2.5. Educational Intervention

The survey results were used to design and implement a small-scale educational intervention at the Evening Junior High School of Mesolongi (western Greece, Aetolia–Acarnania). Twenty-seven (27) adult students participated, attending upper secondary classes of A', B' and C' Lyceum, with an age range from 30 to 55 to years. The participation in the intervention was voluntary. The students were invited to participate in the research by an in-class invitation from a teacher at the Evening Junior High School who was the coordinator of the program "Lifestyle and Carbon Footprint". The pilot ran from 13 February–15 April 2025.

Food waste was monitored by means of a mobile application (FoodSavior3) developed for the educational intervention using the Google AppSheet (Google LLC, Mountain View, CA, USA) platform. Fourteen (14) of the twenty-seven (27) students downloaded the app, and eleven (11) of them used it at least once. Participants used the app from 13 March–15 April 2025. The discard events were recorded by students at home, choosing

the following from the dropdown menu of the app: (i) the food type, (ii) the estimated quantity (grams, litters, spoon, cup, and pieces), (iii) reason for disposal, and (iv) the destination pathway (bin/animal feed/composting). If "other" was selected, a short free-text description was provided and subsequently grouped into a residual category for reporting.

The records of the mobile application were exported in Excel format and analyzed descriptively. Discard events were combined across participants and presented as percentages by food category, discard reason, and destination. Days without an entry were considered missing and excluded. The experiment was approved by the school administration. The application did not collect any personal identifiers.

The educational intervention was designed as an exploratory pilot study based on the knowledge obtained through the survey results, grounded on SPT. The aim of the intervention was not to measure behavioral outcomes or causal relationships but to exemplify how everyday food management activities and material arrangements are enacted in concrete situations through participant reflective discussion of their routines.

3. Results and Discussion

In alignment with the study aims, the results of the study are presented according to the research questions and the three research phases. The descriptive analysis first summarizes household characteristics and reported food management practices, drivers, and preventive strategies in order to answer research question 1 (What are the dominant food management practices, perceived drivers, and preventive strategies related to household food waste?). Second, the questionnaire-based SPT analysis addresses research questions 2, 3, and 4 by reporting the construction and descriptive statistics of the SPT indices, their associations with FWF, and the hierarchical regression model. Third, the application testing phase addresses research question 5 (What practice-related insights emerge from an exploratory SPT-informed educational intervention using a mobile app?) by reporting descriptive findings from the app-based food waste diary implemented in the educational intervention.

By creating composite indices for MNG, CPT, and MAT, this study makes a significant original contribution in operationalizing SPT for household food waste. It offers a repeatable measurement framework appropriate for comparative and model-based analysis, expanding practice-based food waste research beyond qualitative applications.

3.1. Sociodemographic and Household Characteristics

Section 3.1 addresses research question 1 by describing the sample and household characteristics. In total, 252 individuals took part in the survey, 72% of whom were female (Table 1), a pattern which is common to food waste related surveys [38,39]. The majority of the participants were aged between 35 and 64, with 30.6% falling into the 45–54 age group and 23.4% being aged 55–64. This indicates that the respondent base was predominantly composed of mature individuals responsible for making household decisions. 34.5% held a Master's degree and 26.6% a Doctorate, while 6.7% has only completed upper secondary education.

The majority of the respondents lived in households comprising two-to-four persons, and just under a third stated that their incomes fell between 2000€ and 3000€, followed closely by those earning 1000–2000€ a month. Moreover, 64.3% of the participants were the primary food purchasers and thus the main decision-makers in both the acquisition and management of food. This is significant from the perspective of SPT since these individuals act as the primary carriers of household food waste practices.

Table 1. Sociodemographic profile and household characteristics of respondents.

Question	Characteristics	Frequency (N = 252)	Percentage (%)
Q1	Gender		
	Male	71	28
	Female	181	72
Q2	Age		
	18–24	10	4.0
	25–34	31	12.3
	35–44	52	20.6
	45–54	77	30.6
	55–64	59	23.4
	Over 65	23	9.1
Q3	Highest educational attainment		
	Elementary	1	0.4
	Lower secondary education (Gymnasium)	12	4.8
	Upper secondary education (Lyceum)	17	6.7
	Vocational upper secondary school	5	2.0
	Post-secondary non-tertiary education	6	2.4
	University degree	57	22.6
	Master's degree	87	34.5
	Doctorate	67	26.6
Q4	Number of people live in the household		
	1	39	15.5
	2	80	31.7
	3	60	23.8
	4	60	23.8
	5 or more	13	5.2
Q5	Household monthly income		
	Under 1000€	28	11.1
	1000–2000€	78	31.0
	2000–3000€	83	32.9
	Over 3000€	60	23.8
Q6	Primary food purchaser in the household		
	Myself	162	64.3
	My spouse/partner	36	14.3
	Both	32	12.7
	Another household member	22	8.7

3.2. Food Management Practices, Behaviors and Attitudes on Food Waste

Section 3.2 addresses research question 1 by reporting descriptive findings on food management practices, perceived drivers, and preventive strategies. Reliability analysis of the questionnaire gave a Cronbach's alpha coefficient of 0.815, which confirmed good internal consistency. The results show that the majority of the participants regularly consumed perishable foods (Supplementary Table S2). Fruits and vegetables were consumed "Always" by 36.9% and "Often" by 49.6%, while dairy products came second ("Always" 40.9%, "Often" 46.4%). Meat and fish were eaten "Often" by 62.3%, though only 16.3% consumed them "Always." Bread, cereals, and pasta were consumed moderately, with "Always" responses of 31.7% and 18.2%, respectively. Only 14.3% of respondents reported consuming

legumes "Always", while 32.1% stated they ate them "Sometimes". This type of diet, which is based on perishables, has a higher risk of spoilage unless it is managed correctly.

The amount of food prepared (Q8) is mainly based on a need-based approach: 43.3% "Always" and 48.8% "Often" modified the quantity of food they prepared in line with the number of diners. A total of 37.0% ("Always"/"Often") of respondents regularly followed recipes, and 41.9% ("Always"/"Often") just estimated portion sizes without using measurements, a practice which risks over-preparation. It is significant that 29.0% "Always"/"Often" and 28.6% "Sometimes" cooked additional portions to have leftovers. Although this practice may reduce cooking frequency, the risk of creating waste may increase if the leftovers are not eaten. Yussof et al. [40] also came to this conclusion and found that overcooking and estimating quantities made a major contribution to household food waste. Freezing (Q9) was the most popular preservation method ("Always" 31.3%, "Often" 48.8%), followed by the use of airtight containers ("Always" 18.3%, "Often" 35.5%). Other techniques such as dehydration were not common. However, the fact that conventional and convenient methods of preservation were preferred indicates that there is an opportunity to promote various storage skills.

Fruits and vegetables were the most frequently discarded food categories (Q10), with over 50% stating they did it "Sometimes" or "Often". Bread, cereals and dairy had medium discard rates, while meat/fish, pasta and legumes were thrown away less often (>75% "Rarely/Never"). A comparison of consumption (Q7) and waste (Q10) reveals that fruits and vegetables, which were the most frequently consumed items, had the highest discard rates. This reflects their short shelf life and perishability. However, meat and fish, consumed by 78.6% ("Always"/"Often") of participants, were rarely discarded (82.5% "Rarely/Never"), a fact Love et al. [41] explain due to higher cost and perceived risk.

Product expiration (Q11) was the most commonly provided reason for food waste, with 27.8% of respondents stating that they discarded expired food "Always" or "Often". This finding is in agreement with the studies by Newsome et al. [42] and Wilson et al. [43] that concluded that date labels were primarily responsible for early discards. Waste due to over-preparation was 9.5% ("Always/Often"), which suggests that leftovers were often reused. Few respondents reported poor storage, suggesting effective use of refrigerators and container storage.

Aesthetics had little effect, since only 12.3% regularly ("Always"/"Often") discarded unappetizing food, while 61.1% stated that they "Rarely/Never" did this, which shows an acceptance of imperfections. The majority of the participants planned their meals for the week, (59.5% "Rarely/Never"), which supports Schanes et al.'s [44] report that basic planning is linked to reduced waste.

The most commonly endorsed item in Q12 (Supplementary Table S3) was forgetting food in storage (25.4%, "Strongly agree"/"Agree"), followed by overbuying (17.1%, "Strongly agree"/"Agree") and a dislike of leftovers (13.5%, "Strongly agree"/"Agree"). These findings have been previously reported by other studies [8,9] that concluded that impulse buying, household routines and poor portion estimates are major drivers of waste.

The majority of participants stated that they were committed to waste reduction (Q13), with 84.1% reporting that they only bought what they needed and 86.1% affirming that they stored food correctly, findings which are consistent with a previous study [44] with emphasis on the important role storage plays in reducing spoilage. Leftover use was more uneven: 21% strongly agreed that they repurposed leftovers, 35.7% agreed and 24.2% of respondents were neutral, which implies underuse, potentially due to concerns linked to taste, safety or time. Regular monitoring was practiced by 71.8% ("Strongly agree"/"Agree"), while only 12.7% agreed that they "take no specific action" for reducing food waste, suggesting inaction was the exception.

Barriers (Q14) were, for the most part, found to be practical or psychological. The majority of respondents did not think they were uninformed about storage (60.7% disagreed) or indifferent to waste (76.6% disagreed). However, 37.3% "strongly agreed"/"agreed" that there was a lack of time to keep track of food consumption and use. This aligns with Vittuari et al. [45], who determined that being aware of food waste as a societal issue does not necessarily involve recognizing one's personal contributions to the problem. Q15 was related to motivations, such as environmental concerns (95.6%, "Strongly agree"/"Agree"), economic inducements (91.7%, "Strongly agree"/"Agree") and social responsibility (90.5%, "Strongly agree"/"Agree"). A low 8.3% of the participants expressed disinterest in reducing waste, which proves that both moral and pro-environmental attitudes are important drivers [46,47].

Q16 examined the management of near-expiry food: 93.7% prioritized using items reaching their expiry date, while 90.9% ("Disagree"/"Strongly disagree") threw them away before expiry. Nevertheless, freezing (33.7%) and donation (2.8%) were not common, suggesting that alternative preservation and distribution strategies were underused. Expiration date was important for the participants, since only 10.8% "strongly agreed"/"agreed" that they do not pay attention. The acceptance rate of interventions varied. Educational advice had a positive response, since 87.3% "strongly agreed" or "agreed" to follow advice for reducing household food waste (Q17). A lower number of respondents reported being open to using technological tools (Q18) like food-tracking apps (48.1% favorable, 30.9% either hesitant or disinterested), which demonstrates that tech-based engagement may need improvements to clearly prove its benefits.

The results show that household food waste is associated with factors such as perishability, consumer habits and perceptions, and reliance on expiry dates. Over-preparation, inadequate storage and lack of planning are less common factors. Also, the participants are highly motivated and engaged when it comes to core waste-prevention practices but still have to tackle issues relating to the use of leftovers, time management and attitudes to food safety.

3.3. SPT

Section 3.3 addresses research questions 2 to 4 by presenting the SPT indices, their associations with FWF, and the regression model. The novelty of this study is presented by converting the key elements of SPT into composite quantitative indices and testing their explanatory power by multivariate modeling. While earlier SPT-guided food waste studies have mainly depended on ethnographic findings, the current study offers an index-based operationalization, allowing for hypothesis-driven statistical evaluation.

3.3.1. SPT Indices

Under the SPT context, food waste is conceived as a result of interconnected daily practices affected by the interactions between MNG, CPT and MAT [17,48]. Previous studies on SPT and food waste, have focused on how food waste is produced during routine activities in households [21], food service establishments [20], and shared student accommodation [19]. However, these studies have only used qualitative and ethnographic approaches, which limits the statistical testing of practice components and sample comparability. In response to recent calls to operationalize SPT and make it a testable explanatory model [21,49], in the current study, composite indices were developed for the three core components of SPT (MNG, CPT, and MAT). The development of these indices may allow for systematic measurements to be obtained and practice elements to be incorporated into quantitative food waste models.

In Table 2, descriptive statistics and Cronbach's α results for all indices are presented. The MNG, CPT, and MAT indices offer a quantitative template that can be replicated for measuring practice configurations, enabling cross-context comparisons and the incorporation of SPT components into food waste models in future research. The MNG index represents the acceptance of routine waste-producing habits (Q12) of participants. These habits may have been established by culturally shared meanings of freshness, safety, and care for the members of the household and guests [21,48]. The index exhibited a moderate level of endorsement of waste-driving meanings (M = 2.39, SD = 0.72), indicating that food waste is frequently justified by everyday meanings rather than being motivated by explicit food waste intentions [19,50].

Table 2. Descriptive statistics and Cronbach's α of indices.

Index	Number of Items	Min	Max	Mean	SD	Cronbach's α
MNG [1]	5	1.00	4.20	2.39	0.72	0.781
CPT [2]	5	2.00	5.00	3.95	0.61	0.697
MAT [3]	3	1.00	5.00	3.18	0.76	0.411
FWF [4]	7	1.00	4.00	2.01	0.64	0.880

[1] MNG: meanings; [2] CPT: competencies; [3] MAT: materiality; [4] FWF: Food Waste Frequency.

The CPT index revealed good routine food management skills (Q13), considering the mean score of the index (M = 3.95, SD = 0.61). Previous studies reported a stronger correlation between preventing food waste and the effective performance of standard tasks like preparation, portion control, storage, and disposal [19,21].

The MAT index was used to assess the employment of methods for food preservation (Q9). The MAT score showed a moderate engagement of participants in using food preservation methods (M = 3.18, SD = 0.76).

Cronbach's α for MAT is reported for transparency but is not interpreted, as internal consistency is not an appropriate evaluation criterion for formative constructs. In reflective measurement models, indicators are assumed to represent a common latent construct, and therefore, they are expected to correlate. Formative indicators, on the other hand, are discrete elements that collectively define the construct. In the current study, freezing, use of airtight containers and dehydration represent different material practices and not one common practice, and therefore, high correlations are not expected. The literature shows that internal consistency reliabilities (e.g., Cronbach's α) are inappropriate for formative constructs, as the validity of this type of construct depends on adequate coverage of relevant components rather than variable correlations [36,37,51]. The multicollinearity among predictors was tested using Variance Inflation Factors (VIFs) to evaluate the adequacy of the formative specification. All VIF values were below 2, which confirms that the indicators contribute distinct information, confirming the absence of collinearity.

According to earlier SPT-based research, when material arrangements are integrated into regular procedures and matched with meanings and competencies, they can assist in preventing food waste [19,21]. Due to the dispersed nature of food waste that is produced from daily habits, the FWF index was designed to quantify the total household food waste as the combined result of different food groups (Q10). The FWF had very good internal reliability (α = 0.880). The moderate level of reported waste (M = 2.01, SD = 0.64) suggests that household food waste was present but not established as a daily routine of the participants. Ozanne et al. [19] reported that household food waste comes from different food types and human activities. The creation of a multi-item frequency index therefore corresponds to existing research that visualizes household food waste as a general consequence of similar patterns of daily practice.

3.3.2. Associations Among SPT Components and FWF

The FWF index was correlated with the MNG, CPT, and MAT indexes, which depicts physical materiality. The correlation between FWF and digital materiality (D_MAT) was also tested by using the Q18 item ("I am willing to use a mobile app to monitor my food consumption and reduce food wastage in my household") as a reference point. Generally, physical tools tend to be more passive when they become part of daily practice, whereas digital tools usually need a lot of user engagement, especially when the user has not yet established a pattern of their usage [52]. Therefore, the relationship between MAT and D_MAT with FWF was evaluated separately.

The results showed a strong correlation between MNG and CPT and a weaker correlation for MAT (Table 3). A positive correlation ($r = 0.619$, $p < 0.01$) was observed between the FWF and the MNG index. According to SPT, the findings indicate that the cultural and moral aspects of the provision and disposal of food may have an impact on food wastage.

Table 3. Pearson's correlation among SPT components.

Index	MNG	CPT	MAT	D_MAT	FWF
MNG [1]	1.000	−0.457 **	−0.095	0.168 **	0.619 **
CPT [2]		1.000	0.346 **	−0.016	−0.421 **
MAT [3]			1.000	0.116	−0.149 *
D_MAT [4]				1.000	0.064
FWF [5]					1.000

[1] MNG: meanings; [2] CPT: competencies; [3] MAT: materiality; [4] D_MAT: digital materiality; [5] FWF: Food Waste Frequency. * $p < 0.05$, ** $p < 0.01$ (2-tailed).

A negative correlation between FWF and CPT ($r = -0.421$, $p < 0.01$) was observed, with the participants indicating that they have good stock monitoring, planning, storage, and leftover reuse skills, which resulted in less food waste. This is consistent with the survey data of Abeliotis et al. [53] that showed that preventive actions are related to better-organized daily food management. Furthermore, other studies reported that planning and storage skills greatly contributed to household food waste reduction [54,55].

A negative correlation was found between MNG and CPT ($r = -0.457$, $p < 0.01$), which could be interpreted as the fact that "waste-supportive" meaning structures are likely to be accompanied by diminished everyday skills. The observation agrees with the SPT explanation that practices are more like integrated configurations rather than independent driving factors. On the other hand, a positive correlation was also found between MAT and CPT ($r = 0.346$, $p < 0.01$), thus lending more support to the idea that the latter works as a kind of enabling resource. Despite that, the current study did not find any significant link between D_MAT ("willingness to use a food-tracking app") and FWF ($r = 0.064$, $p = 0.309$), thus implying that although consumer-facing apps have the potential to raise awareness, they have a difficulty in becoming part of consumers' routines [23,56].

In order to assess the combined explanatory contribution of the components of SPT, FWF was used as a dependent variable in a hierarchical regression model. Hierarchical regression provides a structured evaluation of which SPT elements account for the frequency of food waste in households. Hence, this modeling strategy provides an original contribution by moving from practice description to component-level explanatory testing within a single quantitative framework.

MNG were applied at the first step, accounting for 38% of the variance in FWF ($R^2 = 0.38$; $F = 155.68$, $p < 0.000$) (Table 4), confirming MNG as the main FWF predictor. The CPT step added more explained variance to the model ($R^2 = 0.41$). This confirms previous findings that skill gaps are a pathway to food surplus and eventually waste and supports

the idea that skills such as planning, portioning, stock rotation, and reuse of leftovers contribute additional explanatory power [19,54,55].

Table 4. Hierarchical regression to predict FWF.

Predictor	R	R^2	Adj R^2	SEE	R^2 Change	F Change	DF1	DF2	Sig F Change
MNG	0.62	0.38	0.38	0.50	0.38	155.68	1	250	0.000
CPT	0.64	0.41	0.40	0.49	0.02	10.10	1	249	0.002
MAT	0.64	0.41	0.40	0.49	0.00	0.67	1	248	0.415
D_MAT	0.64	0.41	0.40	0.49	0.00	0.26	1	247	0.609

Although the additional CPT variance explained ($\Delta R^2 = 0.02$) is modest, such incremental contributions are common in behavioral research where multiple interrelated factors influence the results. The finding remains theoretically relevant because it shows that CPT add explanatory value beyond shared meanings, even if their independent effect size is relatively small. Consequently, the practical value of CPT is found in the additive contribution in the context of the full design of practice elements rather than in large standalone predictive power.

MAT (step 3: $\Delta R^2 = 0.00$, $p = 0.415$) did not significantly increase predictive power. Openness toward D_MAT (Step 4: $\Delta R^2 = 0.00$, $p = 0.609$) did not significantly predict FWF. This suggests that willingness to adopt digital tools does not correspond to significant differences in FWF. Therefore, materiality within SPT may refer to enacted and embedded infrastructures rather than people's readiness to adopt new technologies in the future. Keegan and Breadsell [21] have shown that household technologies and storage infrastructures cannot reduce food waste sufficiently if preventive skills are not adopted. Likewise, Ozanne et al. [19] stated that the availability of material resources is insufficient to prevent food waste when planning, storage and management skills are lacking.

Multicollinearity diagnostics did not indicate any statistical concerns, as the VIF ranged from 1.00 to 1.43 and tolerance values ranged from 0.79 to 0.95 across models, which are within acceptable limits (Supplementary Table S4). Thus, although moderate-to-strong correlations were observed among certain SPT components, the results show that the regression coefficients are not biased by collinearity.

3.4. High-School Educational Intervention

Section 3.4 addresses research question 5 by reporting descriptive results from the app-based food waste diary used in the educational intervention. Based on the survey findings, an SPT-informed, school-based intervention was developed, since the survey responses indicated a high willingness to receive educational guidance (Q18). Educational intervention was performed in the first month of the study and consisted of three organized thematic sessions of approximately 60 min. The first session was intended to define household food waste and specify its association with carbon footprint and its environmental and socio-economic impact. Practical household-level waste reduction strategies were presented to increase awareness on food waste. The second session focused on food storage methods, stock organization and management and planning techniques to prevent waste and overbuying. The aim was to strengthen skills related to food conservation and house management. The third session presented techniques of portion estimation, calculation of the amount of cooked food and innovative reuse of leftovers. Plus, it offered guided training in the proper use of a food-tracking app. The general learning aim was to link competencies and material configurations to the daily practice of food management.

The intervention was based on a dialogue-based and participatory adult learning approach that successfully combined theoretical instruction with hands-on, workshop-

style, and reflective activities. Different multimodal educational tools were used, such as PowerPoint presentations and short educational videos. During the group sessions, interactive discussions were integrated to stimulate active participation and encourage engagement and sharing of food management experiences. An experiential sensory evaluation workshop was held, in which participants were asked—without the use of expiration dates—to rely on sensory cues such as smell, appearance and taste to identify which of two comparable products had expired. This activity aimed to counteract the currently dominant focus on date labels and to emphasize the importance of competence-based food assessment. In addition, a dessert prepared with espresso grounds was demonstrated as an example of sustainable cooking, thereby bridging the gap between theory and practice.

Each session was carefully designed and delivered by one facilitator with degrees in Chemistry and Culinary Arts who provided an interdisciplinary expertise related to food science and applied cooking practices. The facilitator was experienced in conducting food waste reduction seminars and in adult education teaching strategies. Such diverse expertise was instrumental in scientific validity, pedagogical consistency, and actual participation of learners. The intervention was intrinsically explorative and not designed to measure causal behavioral change. The purpose was to deliver practice-based understandings of the embodiment of MNG, CPT, and MAT within everyday settings. During implementation, a few minor practical and technical issues were observed. Some participants were absent during the session where the app was introduced, and others were unable to download it because of their mobile devices' limited storage space. As a result, 14 of the 27 participants downloaded and used the application.

Data from the app-based diary of the participants revealed that legumes and vegetable peels (14.6% each) followed by vegetables and meat (12.5% each) were the most commonly discarded items (Table 5).

Table 5. Food types discarded by participants.

Food Type	Percentage (%)
Vegetable peels	14.6
Legumes	14.6
Meat	12.5
Vegetables	12.5
Fruit peels	8.3
Pasta/Rice	8.3
Fish	6.3
Fruits	4.2
Dairy	2.1
Bread	2.1
Prepared food	4.2
Yogurt	4.2
Inedible parts	4.2
Other	2.1

The most common reason given for disposal was "other" (41.7%), followed by "no longer wanted" (22.9%) and "spoiled" (14.6%) (Table 6).

Table 6. Reason for disposal.

Reason for Disposal	Percentage (%)
No longer wanted	22.9
Spoiled	14.6
Excess quantity	8.3

Table 6. *Cont.*

Reason for Disposal	Percentage (%)
Mold	8.3
Not tasty	2.1
Expired	2.1
Other reason	41.7

Table 7 shows that over half of the food that was thrown away was converted to animal feed (56.3%), followed by bin disposal (29.1%) and composting (14.6%).

Table 7. Use of discarded food.

Use	Percentage (%)
Animal feed	56.3
Bin	29.1
Composting	14.6

After the first two weeks, the tracking app's engagement rate dropped from above 50%. From an SPT perspective, this implies that digital tools may considered as weak practice components unless they are incorporated into everyday routines. Also, the effectiveness of digital tools may depend on shared meanings and food management competencies. However, alternative explanations should also be considered. Reduced app use may indicate interface overload, logging fatigue, time requirements, or limited perceived immediate benefit. Therefore, the reduction is not solely due to theoretical misfit but possibly represents practical and contextual factors as well. The findings align with previous studies examining human–technology interactions, which have revealed that food waste apps reduce waste primarily when they are used as part of daily routines and accompanied by the appropriate skills and meanings [23,25].

The results are consistent with a practice-based understanding of household food waste, highlighting the importance of routinized meanings, skills, and material arrangements. Nevertheless, the empirical evidence is based on individual-level self-reports, and therefore, the findings should be interpreted as supportive to a practice-based perspective. Tools and technologies need to become part of daily routines to be effective. Policies which increase awareness or promote new technologies will not reduce food waste in the long term unless they change attitudes towards food. Thus, the knowledge of everyday skills like planning, storing food, confirming what is available, and reusing leftovers is important. The results also show that food waste is shaped largely around shared expectations regarding freshness, safety, having "enough" food and safety concerns of leftovers. Therefore, education programs should combine practical skills, like meal planning, storage, portioning and leftover use. The findings of this study are consistent with current sustainability research, which emphasizes that waste reduction is a concern for economic efficiency, service organization, and administrative capacity. As stated by Barbosa et al. [57], effective sustainability strategies require integrated approaches that take into account institutional efficacy, infrastructure support, policy coherence, and behavioral change. Therefore, efforts to reduce household food waste should be incorporated into larger sustainability frameworks that address systemic limitations as well as practice patterns.

3.5. Limitations and Implications

It is important to consider certain limitations when interpreting the results. Over 60% of participants had a Master's or Doctorate. The sample is not representative of the

Greek population, as it is skewed toward highly educated women aged 35–64. The over-representation of highly educated people may skew reported food literacy, competencies, and attitudes toward reducing food waste because higher education is frequently linked to stronger normative orientations and a greater awareness of sustainability issues. As a result, the correlations between household food waste and SPT components may be stronger than in more sociodemographically diverse populations. Therefore, the findings cannot be generalized to all Greek households but should be considered exploratory and theory-testing in nature.

It is recommended that future research should employ the proposed quantitative SPT framework on samples with a wider range of sociodemographic and educational backgrounds. Given the self-reporting of the data, social desirability bias could have led to the underestimation of food waste and overestimation of preventive actions. This possible constraint should be considered in the interpretation of results. Also, it must be taken into account that the educational intervention was exploratory and not designed to test causal impacts on behavior.

Several implications for decision-makers can be proposed based on the results of this study. Given the importance of MNG as the main predictor of household FWF, campaigns should raise targeted intervention on the culturally specific norms and expectations (e.g., freshness, safety, and abundance in food distribution). Therefore, educational efforts should focus on redressing MNG associated with food waste, along with practical guidance. Furthermore, the important contribution of CPT highlights the need for practice-based learning focusing on particular food management skills such as meal planning, portioning, food storage, stock rotation, and the creative reuse of leftovers. These efforts can be embedded in schools, adult education schemes, and community initiatives. The constrained interpretative potential of the MAT index and digital tools indicates that stand-alone technological solutions are unlikely to contribute to the long-term reduction in household food waste. Finally, policy measures should coordinate household-level interventions with local waste-prevention policies, focusing on waste prevention at the source as opposed to downstream treatment options. Since waste-supportive MNG are substantially associated with FWF, communication campaigns should target prevailing norms about freshness, safety and abundance. Information campaigns about date labels, the use of leftovers along with retail actions such as discounts on near-expiry products might be important to shift consumer perception on food waste. Food management CPT are critically important, and therefore, strategies might include skill–competence improvement programs in meal planning, portion control, food storage and use of leftovers. These could be achieved through community workshops, adult education activities or interactive online education tools. Although MAT was not a good predictor of FWF, supportive infrastructure could help in stabilizing routines. Policymakers and designers may encourage household-level solutions such as improved storage, expiration date reminders and tools for portioning. Moreover, municipal activities such as the implementation of composting schemes and the build-up of redistribution networks might further improve practices for food waste reduction.

4. Conclusions

Household food waste was studied using an online survey informed by SPT and complemented by a small high-school pilot intervention. The theoretical and practical contribution of the current study is the SPT interpretation of household food waste as an outcome of interconnected practices. Methodologically, the operationalization of SPT elements as quantitative indices offers a replicable pathway for testing practice-based explanations of food waste at scale. Addressing a gap in food waste SPT research, composite

indices for MNG, CPT and MAT were developed, modelling their relationship with a multi-item FWF outcome, and providing a structured method for the quantification of key SPT elements. The findings of the current survey suggested that waste was related to dependence on date labels/expiry dates, over-purchasing or over-preparation, and uneven uptake of preservation practices. Participants expressed a strong interest in receiving educational advice, although their willingness to use a food-tracking app was found to be more moderate. From the hierarchical regression results, MNG were found to be the dominant explanatory component, with CPT providing extra explanatory power. On the other hand, MAT only had a weak contribution, and D_MAT was found to be insignificant. These results were supported by the high-school intervention, where the results showed that interest in using a food-tracking app declined after the second week. In turn, this implies that tools and infrastructures are only helpful if they are incorporated into stable everyday routines and supported by appropriate skills. The educational program described in this study was exploratory and pilot in nature and should therefore not be taken as definitive proof of causal efficacy but as a supplement to the survey results, providing practice-related understanding of CPT, MNG and MAT in everyday food waste management practices.

From a sustainability perspective, preventing household food waste can contribute to environmental and resource-efficiency goals. Although the findings provide insight into the influences of MAT, MNG, and CPT on household food waste, they are not generalizable to all Greek households. Another limitation of this study is the sample skewness toward respondents with a high level of education. Thus, future research directions in larger and more representative samples should be considered. Future research could also use mixed-method designs to better understand how SPT indices may change over time and how interventions affect them. In general, additionally to individual-level behavioral factors, household food waste can be interpreted as a result of interconnected daily practices.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/world7030042/s1, Table S1: Item composition and coding of SPT indices; Table S2: Scales and percentage (%) of responses (1 = "Always", 2 = "Often", 3 = "Sometimes", 4 = "Rarely", 5 = "Never"), mean, and standard deviation recorded for food management practices and behaviors on food waste; Table S3: Scales, percentage (%) of responses (1 = "strongly agree", 2 = "agree", 3 = "neither agree nor disagree", 4 = "disagree", 5 = "strongly disagree"), mean, and standard deviation recorded for attitudes and solutions for reducing food waste; Table S4: Hierarchical regression coefficients predicting Food Waste Frequency (FWF).

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Appendix A Questionnaire Items and Response Scales

This survey is part of a master's thesis in the field of "Food Loss and Waste in Greece: Survey in households, Conclusions and Suggestions for Improvement."

This study will collect data that will assist us in proposing improvements and solutions to minimize the phenomenon, which not only affects household budgets, but also the environment.

Participation is voluntary and anonymous, and no personal or identifying data are collected. It will only take about 10 min of your time, and participants can leave the study at any time without any repercussions.

It is understood that completion of the questionnaire will be considered consent to participate in the study.

Section A. Sociodemographic Characteristics

Q1. Gender
(Response options: categorical selection)

- Male
- Female

Q2. Age
(Response options: categorical selection)

- 18–24
- 25–34
- 35–44
- 45–54
- 55–64
- Over 65

Q3. Highest educational attainment
(Response options: categorical selection)

- Elementary
- Lower Secondary Education (Gymnasium)
- Upper Secondary Education (Lyceum)
- Vocational Upper Secondary School
- Post-secondary non-tertiary education
- University degree
- Master's degree
- Doctorate

Q4. Number of people living in the household
(Response options: categorical selection)

- 1
- 2
- 3
- 4
- 5 or more

Q5. Monthly household income
(Response options: categorical selection)

- Under 1000€
- 1000–2000€
- 2000–3000€

- Over 3000€

Q6. Primary food purchaser in the household
(Response options: categorical selection)

- Myself
- My spouse/partner
- Both
- Another household member

Section B. Food Management Practices

(Response scale: 1 = Always, 2 = Often, 3 = Sometimes, 4 = Rarely, 5 = Never)

Q7. Food Types that Were Consumed	**Always (1)**	**Often (2)**	**Sometimes (3)**	**Rarely (4)**	**Never (5)**
a. Fruits and vegetables	☐	☐	☐	☐	☐
b. Meat and fish	☐	☐	☐	☐	☐
c. Dairy products	☐	☐	☐	☐	☐
d. Bread and cereals	☐	☐	☐	☐	☐
e. Pasta	☐	☐	☐	☐	☐
f. Legumes	☐	☐	☐	☐	☐

Q8. Frequency of Factors Affecting How Much Food Is Prepared	**Always (1)**	**Often (2)**	**Sometimes (3)**	**Rarely (4)**	**Never (5)**
a. How much food I make depends on how many people will consume it	☐	☐	☐	☐	☐
b. When I decide how much to cook, I follow recipes	☐	☐	☐	☐	☐
c. I guess how much food I need without exact measures	☐	☐	☐	☐	☐
d. I cook more on purpose so that I have leftovers.	☐	☐	☐	☐	☐

Q9. Frequency of Using Food Preservation Methods	**Always (1)**	**Often (2)**	**Sometimes (3)**	**Rarely (4)**	**Never (5)**
a. I freeze food	☐	☐	☐	☐	☐
b. I use airtight containers	☐	☐	☐	☐	☐
c. I employ methods like dehydration or similar	☐	☐	☐	☐	☐

Q10. Frequency of Discarding the Following Food Types	**Always (1)**	**Often (2)**	**Sometimes (3)**	**Rarely (4)**	**Never (5)**
a. Fruits and vegetables	☐	☐	☐	☐	☐
b. Meat and fish	☐	☐	☐	☐	☐
c. Dairy products	☐	☐	☐	☐	☐
d. Bread and cereals	☐	☐	☐	☐	☐
e. Pasta	☐	☐	☐	☐	☐
f. Legumes	☐	☐	☐	☐	☐
g. Prepared meals	☐	☐	☐	☐	☐

Q11. Frequency of Discarding for the Following Reasons	**Always (1)**	**Often (2)**	**Sometimes (3)**	**Rarely (4)**	**Never (5)**
a. Expired products	☐	☐	☐	☐	☐
b. Too much food cooked or served	☐	☐	☐	☐	☐
c. Spoilage as a result of improper storage	☐	☐	☐	☐	☐
d. Food with bad appearance or taste	☐	☐	☐	☐	☐
e. No weekly meal planning	☐	☐	☐	☐	☐

Section C. Attitudes, Competencies and Motivations

(Response scale: 1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly disagree)

Q12. Meanings Associated with Food Waste in the Household	**Strongly Agree (1)**	**Agree (2)**	**Neutral (3)**	**Disagree (4)**	**Strongly Disagree (5)**
a. I purchased more food than I needed	☐	☐	☐	☐	☐
b. I fail to remember food stored in the fridge or pantry	☐	☐	☐	☐	☐
c. I don't enjoy eating leftovers	☐	☐	☐	☐	☐
d. Food expires prior to consumption	☐	☐	☐	☐	☐
e. I cook excess quantity of food	☐	☐	☐	☐	☐

Q13. Competence for Reducing Food Waste	**Strongly Agree (1)**	**Agree (2)**	**Neutral (3)**	**Disagree (4)**	**Strongly Disagree (5)**
I purchase only what is necessary	☐	☐	☐	☐	☐
I store food properly	☐	☐	☐	☐	☐
I reuse leftovers to prepare other meals	☐	☐	☐	☐	☐
I check my fridge and cupboards regularly	☐	☐	☐	☐	☐
I take no specific action	☐	☐	☐	☐	☐

Q14. Barriers to Reducing Food Waste	**Strongly Agree (1)**	**Agree (2)**	**Neutral (3)**	**Disagree (4)**	**Strongly Disagree (5)**
a. Lack of knowledge about proper food storage	☐	☐	☐	☐	☐
b. Lack of time to keep track of food consumption and use	☐	☐	☐	☐	☐
c. Lack of awareness about the amount of food I waste	☐	☐	☐	☐	☐
d. I don't do anything specific	☐	☐	☐	☐	☐

Q15. Motivation to Reduce Household Food Waste	**Strongly Agree (1)**	**Agree (2)**	**Neutral (3)**	**Disagree (4)**	**Strongly Disagree (5)**
a. Saving money	☐	☐	☐	☐	☐
b. Protection of the environment	☐	☐	☐	☐	☐
c. Social responsibility (e.g., food donation)	☐	☐	☐	☐	☐
d. Reducing the need for additional purchasing	☐	☐	☐	☐	☐
e. I have no interest in reducing food waste	☐	☐	☐	☐	☐

Q16. Managing Food Items that Are Close to Expiration Date	Strongly Agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly Disagree (5)
a. I use them first	☐	☐	☐	☐	☐
b. I keep them in the freezer	☐	☐	☐	☐	☐
c. I discard them before expire	☐	☐	☐	☐	☐
d. I donate them (e.g., to food banks or community pantries)	☐	☐	☐	☐	☐
e. I do not pay attention to the expiration dates	☐	☐	☐	☐	☐

Item	Strongly Agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly Disagree (5)
Q17. I am open to following advice for reducing household food waste	☐	☐	☐	☐	☐
Q18. I am willing to use a mobile application to track my food consumption and reduce household food waste	☐	☐	☐	☐	☐

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