

Study on consumer behavior towards food waste in Azerbaijan

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Abstract

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Introduction. The aim of this study was to investigate consumer behavior towards food waste in Azerbaijan.

Materials and methods. 455 people were determined in accordance with the criteria suggested by Cohen, Manion and Morrison (2018) and can represent the universe with a 95% confidence interval and a 5% margin of error. The relationships between food waste and its determinants were analyzed by Partial Least Squares Structural Equation Modeling (PLS–SEM) method.

Results and discussion. According to the structural equation modeling (PLS–SEM) analysis, only the variable “food characteristics” was found to have a significant effect on the amount of food waste ($\beta = 0.137$, $p = 0.005$). All other variables – food quantity ($\beta = -0.061$, $p = 0.498$), durability ($\beta = -0.014$, $p = 0.791$), frequency of purchase ($\beta = -0.066$, $p = 0.158$), peeling habits ($\beta = -0.090$, $p = 0.101$), purchase method ($\beta = 0.035$, $p = 0.642$) and price ($\beta = 0.016$, $p = 0.749$) – were not statistically significant.

Furthermore, no significant relationship was observed between food waste attitudes and the amount of waste ($\beta = -0.142$, $p = 0.213$). Of the 455 participants in the study, 77% were female and 91% were between the ages of 18–24. 58% of the participants are high school graduates and 32% are undergraduate graduates. 43% of the households consisted of five or more people.

When analyzing the responses to the question about the amount of food waste, 46% of respondents said that they throw away less than 5%, and 27% of respondents said that they throw away 6–15%. These results show that consumers in Azerbaijan have a low level of awareness about food waste and that waste is mostly due to the physical characteristics of food (freshness, appearance, and flavor). Other economic or behavioral factors were not found to be statistically effective. Thus, Azerbaijani consumers often throw away food products depending on their properties, as they do not care about reducing food waste in their country. Changing consumer behavior is one of the key areas to reduce overall food waste.

Conclusion. The results of the study allow raising consumer awareness about food waste and give grounds to believe that it is necessary to improve consumption planning by both consumers and the food sector in Azerbaijan.

Introduction

According to the Waste Management Regulation (2015), “waste” is any substance, product or material that is disposed of or thrown away by its producer or the real or legal person who holds it. Waste product is examined in three definitional frameworks as “food loss”, “food waste” and “food waste”. Food loss is the decrease in the quantity or quality of food suitable for human consumption (Lipinski et al., 2013), food waste is an inefficiency that occurs mostly at the final stage and is associated with changes in consumer behavior or habits (Parfitt et al., 2010), and food waste is a general term that covers both food loss and food waste (FAO, 2024). 54% of food waste occurs in the post-harvest processing and storage stages of production, while 46% occurs in the processing, distribution and consumption stages. According to the 2024 Food Waste Index Report published by the United Nations Environment Programme (UNEP), the largest share occurred at the household level (631 million tons of food waste) (UNEP, 2024).

According to the 2024 Food Waste Index Report prepared by the United Nations Environment Programme (UNEP) and Waste and Resources Action Programme (WRAP), 1.05 billion tons of food is wasted every year worldwide. This means that one in every five plates consumed is thrown away. Homes play a significant role in increasing food waste (Katsarova, 2011; Stenmarck et al., 2016; Zhang et al., 2018; Veselá et al., 2023). 60% of the waste, or 631 million tons, is caused by households. The remaining waste originates from the production, sales and food and beverage sectors. The report also states that even just half of the wasted food would be enough to solve the hunger problem of 783 million hungry people worldwide (UNEP, 2024).

According to FAO (2023) data, the most wasted products in the world are; bread and cereals (30%), milk and dairy products (20%), fruits and vegetables (40%) and meat products. Household food waste is increasing due to reasons such as faulty planning, excessive shopping, misinterpretation of date labels, inappropriate storage conditions, aesthetic preferences and incorrect portioning, as well as individuals' lack of knowledge about food evaluation (Aschemann et al., 2015; Graham et al., 2014; Hebrok and Boks, 2017; Mnerie et al., 2016; Qi and Roe, 2016; Quested and Johnson, 2009; Szymkowiak et al., 2022). Existing literature reveals that the majority of food waste is generated by consumers (Griffin et al., 2009; Kantor et al., 1997). Food waste is also a result of individuals' consumption behaviors shaped by psychological, economic and social factors (Solomon et al., 2006; Tas and Boyacıoğlu, 2024). While Marshall's Economic Model suggests that excessive purchases of products due to discounts may lead to waste (Marshall, 1890), Freud's Psychoanalytic Model states that excessive food intake due to unconscious motivations is aimed at increasing the sense of security (Freud, 1923). Pavlov's Conditioning Model states that factors such as advertising and social norms can shape individuals' automatic consumption habits and trigger waste (Pavlov, 1927).

The causes and levels of food waste vary across countries. Although West Asian countries are an important area of research on food waste, they have not been sufficiently examined in terms of consumer behavior across countries. Among these countries, Azerbaijan was included in the scope of the study. The main reason for the selection of Azerbaijan is the limited academic research on household food waste in the country and the lack of data in this area. According to the 2024 Food Waste Index Report, Azerbaijan ranks low confidence among West Asian countries in terms of per capita food waste.

Based on the total population of 210,500 out of a total population of 10,460,041 in Azerbaijan (The World Bank, 2024), the country is expected to annually waste 102 kg of food per person in 2024, totalling 1,055,462 tonnes. Compared to other West Asian countries,

Azerbaijan's food waste is higher than Kuwait (420,861 tonnes), Oman (451,415 tonnes), Palestine (534,863 tonnes), United Arab Emirates (930,427 tonnes), Cyprus (88,750 tonnes), Israel (874,433 tonnes). Lower than Yemen (3,490,097 tonnes), Turkey (8,694,318 tonnes), Jordan (1,136,788 tonnes), Saudi Arabia (3,818,681 tonnes), Iraq (6,378,198 tonnes) (UNEP, 2024; p. 171). Azerbaijan ranks in the middle levels among West Asian countries in terms of food waste and is in a remarkable position in terms of regional comparisons. However, empirical research on food waste in the country is limited. There are no comprehensive studies in the literature that examine the awareness levels, purchasing habits and waste management behaviors of consumers in Azerbaijan on food waste.

Azerbaijan is an economically developing country and changes in income levels directly affect consumption patterns. Understanding the impact of changes in food consumption with increasing welfare level on wastage is critical for developing sustainable food management strategies. In this direction, our study aims to determine the food waste behavior of households in Azerbaijan, measure their awareness levels and analyze the factors affecting waste. This research can be a welcome step in uncovering factors that are missing in this field. It is also hoped that this study may be useful in raising public awareness about food waste.

The aim of this study was to identify the behavioral, psychological and structural factors that cause household food waste in Azerbaijan, to assess consumers' awareness of food waste and to contribute to effective waste reduction strategies for policy makers, practitioners and future researchers in line with the findings.

Materials and methods

Research design and sample selection

This research was conducted using quantitative method. The data were collected through a survey method. The survey was conducted in Azerbaijan between December 2023 and February 2024 using Google Forms.

The sample size was determined as 455 people. As of December 2024, the total population of Azerbaijan was calculated as 10.18 million. In order to evaluate the representativeness of the sample from the population in question, the sample size criteria proposed by Cohen, Manion and Morrison (2018; p. 480) were taken into consideration. According to his calculation criteria, 300–500 samples are generally sufficient for large populations. In this context, the sample of 455 people used in the study is representative of household food waste behaviors in Azerbaijan with 95% confidence interval and 5% margin of error. Moreover, it meets the minimum sample size recommended for PLS-SEM analysis (Hair et al., 2022). The sample is considered methodologically reliable to represent the household food waste behavior in Azerbaijan.

Questionnaire design and data collection

A survey form has been prepared to elucidate the reasons for food waste in consumers' homes and to determine their behaviors on the subject. The developed survey form was designed based on scales used in Ananda et al. (2021); Grainger et al. (2018); Ilakovac et al. (2020); Richter and Bokelmann (2017); Russell et al. (2017); Setti et al. (2018); Veselá et al. (2023); Wilson et al. (2017) studies, and 24 variables were identified (Table 1). These include: Amount of food waste (G1_1), amount of food (G2_1, G2_2, G2_3, G2_4), food

durability (G3_1), food characteristics (G4_1, G4_2, G4_3, G4_4, G4_5, G4_6), frequency of food purchasing (G5_1), food preparation (G6_1, G6_2), food shopping (G7_1, G7_2, G7_3), price (G8_1, G8_2, G8_3), and attitude towards food waste (G9_1, G9_2, G9_3). The amount of food waste is measured on a 7-point Likert scale (1 = I don't know the amount thrown away, 2 = 5% or less, 3 = 6–15%, 4 = 16–30%, 5 = 31–50%, 6 = more than 50%, 7 = None of these), while all other variables are measured on a 5-point Likert scale.

Table 1

Variables

G1_1	What percentage of the food you buy do you think goes to waste?
G2_1	I cook a lot of food (more than the number of people).
G2_2	I buy large packages of food.
G2_3	I throw away uneaten food scraps without composting.
G2_4	I ensure that the amount of food to be purchased is planned and prepared.
G3_1	How often did you check 'use by' or 'use by' dates before buying food?
G4_1	I don't use food that spoils during transportation, I throw it away.
G4_2	If the food is not of sufficient quality, I will not use it and will throw it away.
G4_3	I do not use food that spoils during storage, I throw it away.
G4_4	I don't use food that doesn't appeal to me, I throw it away.
G4_5	If the food is not tasty, I don't continue eating it and throw it away.
G4_6	If the food packaging is damaged, I will not use it and throw it away.
G5_1	Please indicate the frequency of your food purchases.
G6_1	I don't pay attention when peeling fruit.
G6_2	I don't pay attention when peeling vegetables.
G7_1	I use a shopping list when buying food.
G7_2	I check stock before purchasing food.
G7_3	I ensure the consumption of all purchased foods by cooking additional meals.
G8_1	I shop based on the price of the product.
G8_2	I prefer large food packages as I think they are more convenient.
G8_3	I prefer discount grocery shopping.
G9_1	I think the issue of food waste remains relevant.
G9_2	I think food waste poses a risk.
G9_3	I think food waste behavior is bad.

Research model and hypotheses

The research model was developed based on the variables used in previous studies identified through the literature review. The model and hypotheses developed in accordance with the research objectives determined as a result of the literature review are presented below.

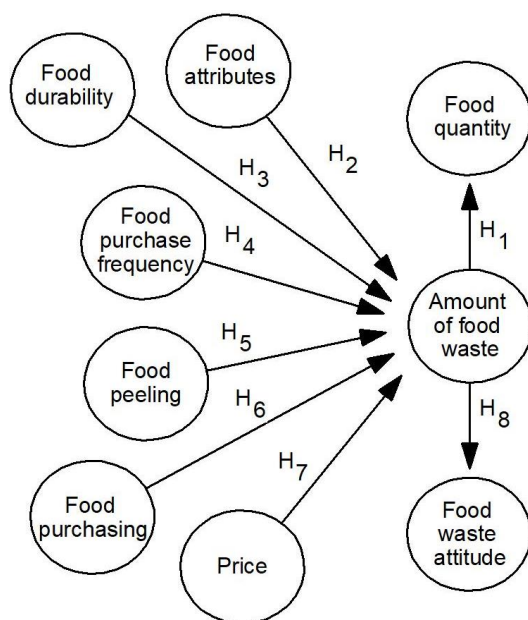


Figure 1. Research model

- H1: There is a positive effect of food quantity on food waste amount.
H2: There is a positive effect of food durability on food waste amount.
H3: There is a positive effect of food quality on food waste amount.
H4: There is a positive effect of food purchase frequency on food waste amount.
H5: There is a positive effect of food preparation on food waste amount.
H6: There is a positive effect of food purchasing on food waste amount.
H7: There is a positive effect of price on food waste amount.
H8: There is a positive effect of food waste amount on food waste attitude.

Data analysis method

The research model and the data obtained were tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis. PLS-SEM method is accepted as a suitable method for small sample sizes and multivariate analyses in structural equation modeling (SEM) (Hair et al., 2022). The statistical tests applied in the data analysis phase are as follows: Confirmatory Factor Analysis (CFA) was used to test the validity and reliability of the scales. Internal Consistency Reliability (ICR), the reliability of the scales was evaluated with values of 0.70 and above. Discriminant Validity (Discriminant Validity - HTMT Criterion), HTMT coefficients suggested by Henseler et al. (2015) were examined. Hypothesis Testing and Regression Analysis, t-test and p-values were calculated to evaluate significant relationships between factors affecting food waste.

Results and discussion

Respondent characteristics

The demographic data obtained within the scope of the research are summarized in Table 1.

Table 1
Respondent characteristics

N = 455		Sample	Sample %			Sample	Sample %
Gender	Male	106	23	Age	18–24 years old	418	91
	Female	349	77		25–34 years old	27	5
Number of Households (Including you)	Yalnız Yaşıyorum	11	2		35–44 years old	8	2
	2	15	3		45–54 years old	1	1
	3	71	16		55–64 years old	1	1
	4	165	36		65–74 years old	-	-
	5+	193	43		75+ years old	-	-
Household Income (AZN)	1900-less	244	53	Education	Primary School		
	901–1500	121	27		Middle School	13	3
	1501–2000	47	10		High School	264	58
	2001–2600	17	4		Undergraduate	148	32
	2601+	26	6		Graduate	30	7

77% of the participants were female and 23% were male. When the age distribution is analyzed, it is seen that 91% of the participants are between the ages of 18-24. The majority of the participants (58%) are high school graduates, 32% are undergraduates and 7% have postgraduate education. When analyzed in terms of household size, 43% of the participants stated that they live with 5 or more people, while 36% stated that they live in households of 4 people.

Validity and reliability analysis of scales

Validity and reliability studies for the constructs in the research were made before the research model has been analyzed. The internal consistency reliability, convergent validity, discriminant validity in the context of the criterion-related validity of the scale were examined. Internal consistency reliability was tested by CR. Factor loadings and average variance extracted (AVE) values were used to assess convergent validity Factor loadings > 0.70, composite reliability coefficients ≥ 0.70 and AVE ≥ 0.50 are expected to occur (Hair et al., 2019, 2022). The measurement model results are presented in Table 2.

Table 2

Validity and reliability analyses of scales

Structure	Expression	Factor Loading	CR	AVE
Amount of food waste	1.1.AFW	1 .000	---	---
Food quantity	2.1.FQ	0 .782	0 .758	0 .611
	2.2.FQ	0 .782		
Food durability	3.1.FD	1 .000	---	---
Food attributes	4.1.FA	0 .726	0 .839	0 .635
	4.2.FA	0 .833		
	4.3.FA	0 .828		
Food purchase frequency	5.1.FPF	1 .000	---	---
Food peeling	6.1.FPE	0 .927	0 .924	0 .859
	6.2.FPE	0 .927		
Food purchasing	7.1.FPU	0 .662	0 .764	0 .520
	7.2.FPU	0 .778		
	7.3.FPU	0 .718		
Price	8.1.PRI	0 .800	0 .780	0 .639
	8.3.PRI	0 .800		
Food waste attitude	9.1.FWA	0 .724	0 .759	0 .512
	9.2.FWA	0.753		
	9.3.FWA	0.668		

*Amount of Food Waste =AFW; Food Quantity=FQ; Food Durability=FD; Food Attributes=FA; Food Purchase Frequency=FPF; Food Peeling=FPE; Food Purchasing=FPU; Price=PRI; Food Waste Attitude=FWA

According to Hair et al. (2022), was ≥ 0.70 for the factor loadings. According to the authors, items with factor loading less than 0.40 should be deleted from the measurement model, whereas items with factor loading range between 0.40 and 0.70 should be deleted when AVE or CR of the same variable is less than the required benchmark.

The indicator for Food Quantity (Item 4) was removed from the measurement model due to having a factor loading below 0.40. Factor loadings for Food Quality Items 4, 5, and 6; Food Purchasing Item 1; and Food Waste Attitude Item 3 were calculated between 0.40 and 0.70. Since the AVE coefficient for Food Quality Items 4, 5, and 6 was below the threshold, they were excluded from the measurement model. Similarly, Price Items 2 and Food Quantity Item 3 were removed from the measurement model because their AVE coefficients were below the threshold.

Given that the CR coefficients of the constructs ranged from 0.758 to 0.924, internal consistency reliability can be considered adequate. The constructs achieved convergent validity with factor loadings ranging from 0.662 to 1.000 and AVE values ranging from 0.512 to 0.859.

The HTMT criterion, proposed by Henseler et al., (2015), has been used to assess discriminant validity. The HTMT coefficients are also presented in Table 3.

Table 3

Discriminant validity results (HTMT criterion)

Indicator	Price	Food Durability	Food Peeling	Food Attributes	Amount of Food Waste	Food Waste Attitude	Food Quantity	Food Purchasing
Price								
Food Durability	0.150							
Food Peeling	0.123	0.322						
Food Attributes	0.298	0.475	0.119					
Amount of Food Waste	0.087	0.081	0.106	0.170				
Food Waste Attitude	0.443	0.153	0.117	0.223	0.150			
Food Quantity	0.197	0.124	0.080	0.086	0.083	0.256		
Food Purchasing	0.653	0.389	0.310	0.354	0.077	0.470	0.144	
Food Purchase Frequency	0.052	0.000	0.083	0.027	0.062	0.100	0.188	0.142

The indicator developed by Henseler et al., (2015), specifies the HTMT as the ratio of the mean of the correlations between items of all variables related to the study to the geometric mean of the correlations between items regarding the same variable. The authors also argue that the HTMT value should be (less than 0.90) for related constructs, and (less than 0.85) for distinct constructs. From the result in Table 4, the HTMT coefficients between HTMT are below the threshold value. Based on the HTMT criterion (Henseler et al., 2015), we can confidently say that discriminant validity is established.

Testing the research model

The structural equation model created to test the hypotheses of the study is shown in Figure 2.

The research model was analyzed using Partial Least Squares (PLS) Structural Equation Modeling (PLS-SEM). The analysis has been done by using SmartPLS 4 Statistical software (Ringle, Wende and Becker, 2022; Yildiz, 2021). The PLS Algorithm was used to check linearity, path coefficients, and R2 value in the analysis of the research model. T-tests of the PLS path coefficients were calculated and the results were bootstrapped using 10,000 subsamples from the data set. Results including VIF and R-squared, and direct effect coefficients are shown in Table (4).

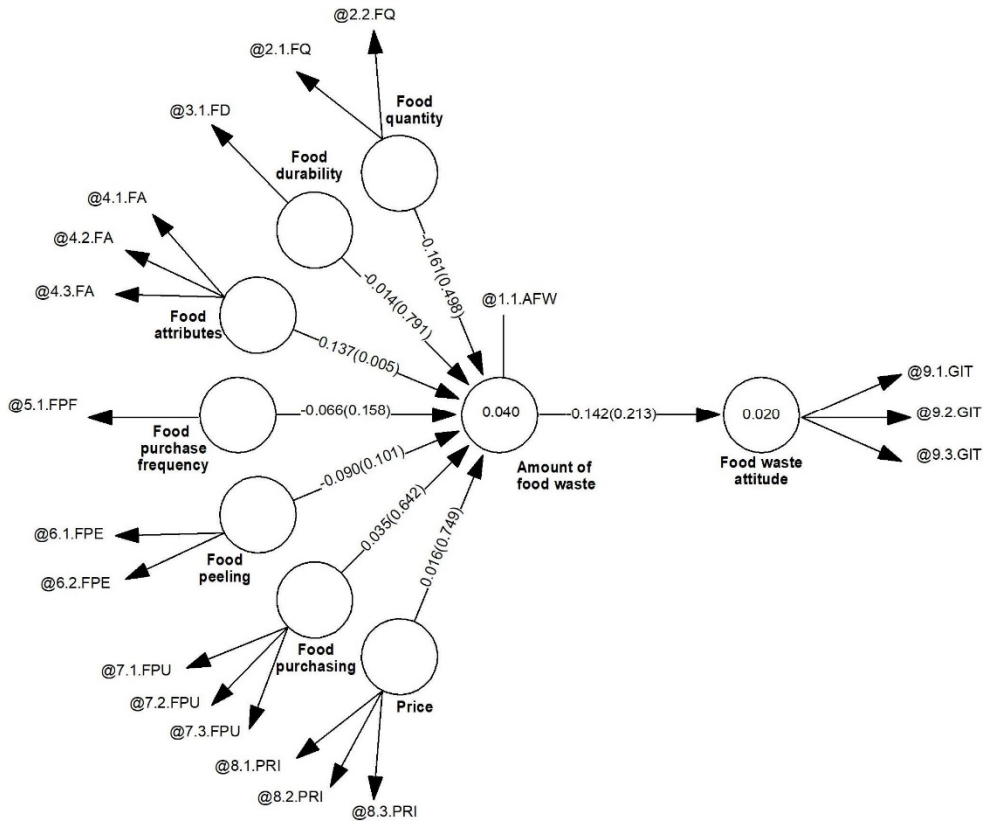


Figure 2. Measurement model with path coefficients

Table 4

Research model coefficients

Food Quantity	Amount of Food Waste	1.025	0.040
Food Durability		1.358	
Food Attributes		1.238	
Food Purchase Frequency		1.026	
Food Peeling		1.125	
Food Purchasing		1.236	
Price		1.126	
Amount of Food Waste	Food Waste Attitude	1.000	0.020

According to Hair et al. (2022), while VIF values lower than 5 imply there are no multicollinearity issues among the variables. In Table 3, It is seen that all the VIF values of the coefficients is less than the threshold of 5. In accordance with these results, it can be said no multicollinearity problems are present in the variables used in the study. After checking for the R^2 values of the model, I found that your model explains 4% of the food waste quantity, and 2% of the food waste attitude.

Table 5 shows a structural equation model (SEM) analysis in which the factors affecting food waste are statistically tested. The effect of each factor on food waste (β coefficient) is presented along with its standard deviation, t-value, p-value and hypothesis result.

Table 5

Research model direct effect coefficients

Path		β	Standard Deviation	t-value	p	Hypothesis Conclusion
Food quantity	Amount of Food Waste	-0.061	0.090	0.678	0.498	Rejection
Food durability		-0.014	0.054	0.265	0.791	Rejection
Food attributes		0.137	0.049	2.795	0.005	Acceptance
Food purchase frequency		-0.066	0.047	1.412	0.158	Rejection
Food peeling		-0.090	0.055	1.640	0.101	Rejection
Food purchasing		0.035	0.075	0.466	0.642	Rejection
Fiyat		0.016	0.051	0.320	0.749	Rejection
Amount of food waste	Food Waste Attitud	-0.142	0.114	1.245	0.213	Rejection

The table provides information about the effects of each variable on one another, the statistical significance of these effects, and whether the hypotheses are accepted or not. The analysis results show that food quantity, durability, purchasing frequency, peeling habit, price and food purchasing behaviors do not have a significant effect on food waste. According to the analysis results, the only variable that has a significant effect on food waste was determined as food attributes ($\beta=0,137$, $p=0,005<0,05$). The only significant relationship found is between food quality and food waste quantity. This suggests that consumers' emphasis on physical attributes of food, such as its appearance, freshness and packaging, increases food waste. Therefore, the findings suggest support for hypothesis H3, while hypotheses H1, H2, H4, H5, H6, H7, and H8 are not supported. Food waste quantity is not directly associated with food quantity, durability, purchasing frequency, preparation, or price.

The purpose of this case study research drawing from Azerbaijan was aimed at establishing consumer awareness of food waste and the ration of leading factors to food waste economically. The food waste issue is not significantly predictable from buying the right amount of food, Food Quantity (H1). Participants in the study felt that sale packages in large quantities (G2_2), the number of meals planned to be cooked (G2_4), using uneaten food scraps (G2_3), and the amount of meal ended up being a surplus compared to the number of

people (G2_1) do not affect the purchase of the right amount of food. Which indicates at this stage of the game, complete ignorance of food wastage. The other studies made similar observations, suggesting that consumers are not largely cognant of food waste (Giordano et al., 2023; Hamilton et al., 2005; Qi and Roe, 2016).

With regards to food durability, As shown in H2, there is no significant relationship between food durability and the amount of wasted food. Before purchasing food, consumers all want to know how long it will last or what does the expiration or use-by date is. These findings differ from those of Fan et al. (2022) and Thompson et al., (2020) concludes that problems with expiry date knowledge contribute to the consumer waste based on the interaction between food durability and food waste.

The perceived food quality (H3) was another food characteristic that influences the quantity of food waste (Food Quality; Foods to purchase are fresh (G4_2), well packaged (G4_6), tasty (G4_5) and visually attractive (G4_4). This result is consistent with Richter and Bokelmann (2017) and Veselá et al., (2023). Likewise, related studies have also recognized food taste effect to the waste (Coskun and Özbük 2020; Szymkowiak et al. 2022). However, Do Carmo Stangherlin et al. (2020) found that defective food items did not increase food waste rates, contradicting this study's findings, indicating variability depending on consumer attitudes. Some individuals adopting zero-waste practices may tend to prefer these food items.

Purchasing frequency (Purchasing Frequency, H4) does not affect the amount of food waste. This finding is consistent with Giordano et al. (2019), where the frequency or quantity of food purchases did not influence food waste. Similarly, Veselá et al. (2023) found that purchasing frequency did not affect food quantity. Lack of planning for the amount of food to be used may be one reason for the increase in food waste.

The act to peel fruit or hartista vegetables had no registered influence on the food waste activity, and as a consequence, it is not an important factor in order to gap more food waste (Peeling of Food, H5) The results of this study are opposite to what Derqui and Fernandez (2017) and Richter and Bokelmann (2017) state on fruit and vegetable activity.

The study found that the price variable was not statistically significant. Accordingly, the hypothesis that price affects the amount of food waste (Price, H7) was not accepted. Participants do not consider food price to be a significant factor in food waste, supported by Giordano et al. (2019). Conversely, Van Geffen et al. (2020) found that price is a determinant of food waste.

Lastly, food waste quantity (Food Waste Quantity, H8) is not influenced by consumers' attitudes towards food waste. It is crucial to recognize this, as participants may not perceive food waste, thereby neglecting to evaluate food waste at home. Participants are unaware of their food management at home and do not realize they are contributing to food waste. Studies detecting food waste contradict this research (Parizeau et al., 2015; Stancu et al., 2016; Veselá et al., 2023), indicating that awareness of this issue increases with awareness of its urgency, shaping attitudes towards and awareness of food waste. Consequently, deficiencies in food management awareness may increase based on attitudes and awareness, depending on individual recognition of food waste.

Conclusion

1. Azerbaijan ranks high in the West Asia region in terms of annual food waste per capita, but this issue does not receive sufficient attention and academic research remains limited.

2. This study aims to fill this gap and increase awareness of food waste. At the same time, it contributes to national and international comparisons of food waste causes and consumer behavior in Azerbaijan.
3. The hypotheses tested in the study were analyzed using the PLS-SEM (Structural Equation Modeling) method and only one hypothesis was found to be statistically supported.
4. The physical properties of food variable was found to have a significant and positive effect on food waste ($\beta = 0.372$, $p = 0.005$).
5. Food price ($\beta = -0.04$, $p = 0.312$), purchasing method ($\beta = 0.032$, $p = 0.541$), purchasing frequency ($\beta = -0.021$, $p = 0.429$), peeling habits ($\beta = -0.054$, $p = 0.278$), durability ($\beta = 0.015$, $p = 0.692$) and quantity ($\beta = -0.038$, $p = 0.358$) variables were not found to have a statistically significant effect on food waste.
6. These results show that Azerbaijani consumers have low awareness of food waste and that waste is caused by the physical properties of food rather than economic or behavioral reasons.
7. The findings support some literature studies (Ilakovac et al., 2020; Richter and Bokelmann, 2017; Setti et al., 2018; Veselá et al., 2023) while contradicting some studies (Russell et al., 2017; Wilson et al., 2017). In particular, the conclusion that the price factor is not a determinant is not consistent with some previous studies.
8. The research can serve as an example for initiatives targeting behavioural change by addressing attitudes towards food waste. It also includes factors required for food management at the household level.
9. These findings are of great importance to practitioners and future researchers. It would be beneficial, especially for practitioners, to organize training and awareness activities that will encourage positive habits.
10. A limitation of the study is that the sample size is moderate (455 participants). Therefore, it is recommended that comparative analyses be conducted with more participants in future studies.
11. Reducing food waste continues to be an important issue on a global scale today and will continue to be so in the future.

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