Received Date: 05 November 2024 I Accepted Date: 02 December 2024

RESEARCH ARTICLE

OPUS Journal of Society Research

The Effect of Individuals' Attitudes Towards Food Waste on Their Intention Not to Waste: The Mediating Role of Moral Norm

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November 2024
Volume:21
Issue:6
DOI: 10.26466/opusjsr.1579462

Citation: Özkan, B., Koçoğlu, B. & Koç, F. (2024). The effect of ındividuals' attitudes towards food waste on their ıntention not to waste: The mediating role of moral norm. *OPUS– Journal of Society Research*, *21*(6), 490-504

Abstract

This study examined the effect of individuals' attitudes towards food waste on intention not to waste and the mediating role of moral norms in this relationship. The study, which was created within the framework of the Theory of Planned Behavior (TPB), addressed the main factors shaping individuals' intentions not to waste food. In the data collection process, an online survey form was used to reach participants and the survey was delivered to the participants via digital means. A total of 423 valid surveys were used in the analyses. According to the results obtained, attitudes towards food waste do not affect intention not to waste food, while subjective norms and perceived behavioral control affect intention not to waste food. In addition, attitude, subjective norms and perceived behavioral control affect moral norm, and moral norm affects intention not to waste food. However, according to the indirect effect analysis results, moral norm has a mediating effect on the effect of attitude, subjective norms and perceived behavioral control on intention not to waste food. In this context, awards can be given to individuals or businesses that demonstrate good practices in order to strengthen moral norms (for example, certificates for restaurants that reduce waste). Awareness programs can be created for different segments of society (students, housewives, restaurant workers, etc.) that emphasize the moral dimensions of food waste.

Keywords: *Food Waste, Attitude, Moral Norms, Theory of Planned Behavior (TPB)*

Öz

Bu çalışmada, bireylerin gıda israfına yönelik tutumlarının israf etmeme niyetine etkisi ve bu ilişkide ahlaki normların aracı rolü incelenmiştir. Planlı Davranış Teorisi (TPB) çerçevesinde oluşturulan çalışmada, bireylerin gıdaları israf etmeme niyetlerini şekillendiren ana faktörler ele alınmıştır. Veri toplama sürecinde, katılımcılara ulaşmak için online anket formu kullanılmış ve anket dijital yollarla katılımcılara iletilmiştir. Analizlerde toplam 423 geçerli anket kullanılmıştır. Elde edilen sonuçlara göre, gıda israfına yönelik tutumlar gıda israf etmeme niyetini etkilemezken, sübjektif normlar ve algılanan davranışsal kontrol gıda israf etmeme niyetini etkilemektedir. Ayrıca, tutum, sübjektif normlar ve algılanan davranışsal kontrol ahlaki normu etkilemekte ve ahlaki norm da gıda israf etmeme niyetini etkilemektedir. Bununla birlikte, dolaylı etki analizi sonuçlarına göre, ahlaki norm; tutum, sübjektif normlar ve algılanan davranışsal kontrolün gıda israf etmeme niyetine etkisinde aracı etkiye sahiptir. Bu doğrultuda, ahlaki normu kuvvetlendirme adına iyi uygulamalar sergileyen bireylere veya işletmelere ödüller verilebilir (örneğin, israfı azaltan restoranlara sertifika). Toplumun farklı kesimlerine (öğrenciler, ev hanımları, restoran çalışanları vb.) yönelik, yiyecek israfının ahlaki boyutlarını vurgulayan bilinçlendirme programları oluşturulabilir.

Anahtar Kelimeler: *Gıda İsrafı, Tutum, Ahlaki Normlar, Planlı Davranış Teorisi (PDT)*

Introduction

Unconscious and intensive consumption culture also brings about the concept of waste. Food waste, perhaps the most common waste element, has become a problem that threatens our future. It is not possible to prevent food waste completely, but it is possible to minimize it with external interventions (Kibler et al., 2018). Although consumers have the most important role in waste, there are many institutions that deal with such problems. One of these is the Food and Agriculture Organization of the United Nations (FAO). The aim of this institution is to put an end to food waste. According to FAO, every year, approximately 30% of the 4 billion tons of food produced for consumption is wasted, that is, thrown away (Sezgin and Ateş, 2020). According to the information in the 2023 waste report of the Turkish Waste Prevention Foundation, it is stated in the 2021 food waste index report that 61% of food waste occurs in homes, 26% in the service sector, and 13% in the retail sector. According to the results of research conducted in Turkey, it is stated that 42% of food waste occurs in homes, 39% occurs by producers, 4% occurs by retailers, and 14% occurs by the catering sector **(**Republic of Türkiye Ministry of Agriculture and Forestry, 2024; Türkiye Foundation for Waste Prevention, 2024). According to Dölekoğlu (2017), food waste occurs in different dimensions in developed and developing countries. The unequal sharing of food is one of the factors that causes food waste. Especially in developed countries, food waste is at the highest level and it needs to be prevented with appropriate methods.

It can be stated that there are many reasons why individuals waste food, such as personal, social, economic, etc. The reason for trying to determine the problem of food waste is to reveal the relationship of this behavior with other behaviors (Barr et al., 2001). In studies conducted on how waste can be prevented and reduced, it is seen that food waste is caused by reasons such as lack of awareness etc. (Thyberg and Tonjes, 2015). The most common food waste is that made by households. Developing countries in particular tend to waste more food than low-income countries because they can afford to buy more food (Porpino et al., 2015). Food waste occurs in developed countries as the waste of edible food at the end consumer level. It is stated that this waste is a big problem and especially the extra food purchased causes waste (Gönültaş et al., 2020). One of the reasons for the increase in food waste is that the approaches used to estimate the true extent of food waste are inconsistent and that is why solution methods cannot be developed (Tekiner et al., 2021). Likewise, Just and Swigert (2016) stated that food waste is seen not only in developing countries but also in developed countries and that food waste can be prevented at home using simple methods.

There are many reasons why individuals waste food, such as the society they live in, the family structure they grew up in, personality, habits, etc. This study aims to determine the effects of individuals' attitudes towards food waste on their intention not to waste food. In addition, determining the mediating role of individuals' moral norms in this effect is among the aims of the study. In the study, the behaviors of consumers that affect their intention not to waste were evaluated within the scope of Ajzen's (1991) Theory of Planned Behavior (TPB) model.

Moral norms are social and individual beliefs that determine what is right or wrong and what their moral responsibilities are. In an environment where individuals' attitudes, social pressures (subjective norms) and perceptions of behavioral control are shaped by moral norms regarding food waste, understanding how these norms serve as a mediator allows the correct targeting of the main factors that affect individuals' behaviors. In order for efforts to raise awareness about food waste and change social norms to be more successful, it is necessary to understand how moral norms affect people's decisions. The mediating role of moral norms may be important in promoting more sustainable and long-term behavioral changes against food waste in different segments of society, especially in groups such as youth and women.

Based on this, this study aims to find answers to the following research questions:

RQ1: Do attitude, subjective norm and perceived behavioral control have an effect on intention not to waste food?

RQ2: Does moral norm have a mediating role in the effects of attitude, subjective norm and perceived behavioral control on intention not to waste food?

Literature Review and Hypotheses Development

Effects of Attitude, Subjective Norm, and Perceived Behavioral Control on Non-Waste Intention

Many individuals are actually aware that they are wasting food and make purchases that they do not need (Daysal and Demirbaş, 2020). Consumers' planning and shopping routines are seen as important determinants of food waste (Stefan et al., 2013). There are many studies using the TPB model to reveal food waste behaviors. (Mondéjar-Jiménez et al., 2016; van der Werf et al., 2019; Heidari et al., 2020). Graham-Rowe et al. (2015) stated that the TPB model would be useful in determining food waste behaviors. According to the results of the study conducted by Aktaş et al. (2018), attitudes towards food waste have an effect on the intention not to waste food. According to Russell et al. (2017), attitudes towards food waste have no effect on the intention not to waste food, while subjective norm and perceived behavioral control have an effect on the intention not to waste food. According to the results of the study conducted by Chen (2023), negative attitudes towards food waste, subjective norm towards reducing food waste and perceived behavioral control positively affect the intention not to waste food.

In line with the literature review and the objectives of the research, the following hypothesis was formed.

H1: Attitude towards food waste has an impact on intention not to waste food.

There are various studies in the literature that address the effect of subjective norms regarding food waste on the intention to reduce waste. Graham-Rowe et al. (2015) examined the role of subjective norms on the intention to reduce food waste in the context of the Theory of Planned Behavior (TPB) and stated that the influence of the social environment significantly affects individuals' intentions to reduce food waste. Similarly, Russell et al. (2017) analyzed the effect of subjective norms on food waste behavior and emphasized that social pressure and expectations have a direct effect on the intention not to waste. Mondéjar-Jiménez et al. (2016) also addressed the importance of subjective norms on reducing waste among young individuals and concluded that pressure, especially from friends and family, increases individuals' intention not to waste. Stefan et al. (2013) stated that subjective norms play a role in food waste behavior and that pressure from the social environment has a significant effect on individuals' intention not to waste.

These findings have been supported by other studies. Stancu et al. (2016) revealed that the effect of subjective norms on individuals' intention not to waste is an important factor along with perceived behavioral control and attitude. Van der Werf et al. (2019) analyzed the food waste behaviors of households in Canada and found that subjective norms play an effective role in the intention to reduce food waste. Heidari et al. (2020) examined the intention to reduce the food waste of households in Iran and stated that social pressure and social approval contribute to individuals' decision not to waste. These studies reveal the decisive effect of subjective norms, that is, expectations from individuals' social environment, on the intention not to waste food.

H2: Subjective norm towards food waste has an impact on intention not to waste food.

When the literature is examined, a number of studies addressing the effect of perceived behavioral control regarding food waste on the intention not to waste emerge. In their study, Graham-Rowe et al. (2015) examined the role of perceived behavioral control within the framework of the Theory of Planned Behavior (TPB) regarding the intention to reduce food waste. Their findings showed that individuals' beliefs and abilities to control waste are associated with stronger intentions to avoid waste. Similarly, Russell et al. (2017) emphasized that as individuals develop a belief in their abilities to control waste, the likelihood of them engaging in waste avoidance behavior increases. Similarly, Stancu et al. (2016) found that perceived behavioral control significantly affects individuals' food waste

behavior. Their findings revealed that when people perceive themselves as more capable of preventing waste, they are more inclined to exhibit this behavior. In addition, Aktaş et al. (2018) indicated that consumers' perceived ability to control food waste is a critical factor in their intention not to waste food. They also found that positive perceptions further strengthen this intention.

Misiak et al. (2020) found that individuals' attitudes towards food waste are associated with their perception of behavioral control, and this perception of control increases their non-waste behaviors. Porpino et al. (2015) examined the effect of perceived behavioral control on food waste in low-income households, revealing that perceived control plays a critical role in reducing waste. Finally, Wang et al. (2021) examined the positive effect of perceived control on intention not to waste food during the COVID-19 process and showed that individuals with high perception of control are more determined in their intention not to waste even during crisis periods. These studies emphasize the positive effect of perceived behavioral control on individuals' intention not to waste food and support this hypothesis.

H_3: Perceived behavioral control towards food waste has an impact on intention not to waste food.

Effects of Attitude, Subjective Norm, and Perceived Behavioral Control on Moral Norm

Attitude refers to individuals' general tendencies or a positive and/or negative evaluation towards a particular behavior and moral norms involve a person's perception of whether a particular behavior is morally right or wrong (Ajzen, 1991). Research shows that individuals' positive attitudes towards food waste can affect their development of moral norms (Stefan et al., 2013). For example, Stancu et al. (2016) state that attitudes towards food waste shape individuals' intentions not to waste and that attitudes encourage behaviors based on moral norms. Individuals' negative attitudes towards food waste have been associated with environmental responsibility and ethical values. Additionally, they have increased the tendency to comply with moral norms (Russell et al., 2017). Therefore, positive attitudes towards food waste can contribute to the strengthening of moral norms.

H_4: Attitude towards food waste has a positive impact on moral norm.

Subjective norm refers to the tendency of individuals to behave in accordance with the expectations of those they consider important (Fishbein and Ajzen, 1975). In the context of food waste, subjective norms are one of the important elements that affect the process of individuals forming moral norms (Vermeir and Verbeke, 2008). Graham-Rowe et al. (2015) stated in their research that family and friends' expectations about food waste contribute to individuals' behaviors not to waste. In addition, studies such as Yazdanpanah and Forouzani (2015) show that subjective norms can create a moral norm in individuals to reduce food waste. In food waste, increasing environmental responsibility awareness strengthens the influence of society on individuals in this regard and contributes to the development of moral norms.

H_5: The subjective norm on food waste has a positive effect on the moral norm.

Perceived behavioral control refers to individuals' perceptions of their abilities and possibilities regarding whether performing a behavior is under their control and is shaped by factors that facilitate or suppress the performance of the behavior. In summary, perceived behavioral control refers to individuals' perceptions of competence and control over performing a certain behavior (Ajzen, 2002). In studies on food waste, it has been shown that perceived behavioral control has an effect on individuals' moral norms towards not wasting. For example, Koivupuro et al. (2012) stated that when individuals' control over reducing food waste is high, their moral responsibility to perform this behavior increases. Linderhof et al. (2019) emphasize that perceived control is an important factor in individuals' support for moral norms towards food waste. This shows that individuals with high levels of perceived behavioral control tend not to waste more due to moral norms.

H_6: Perceived behavioral control over food waste has a positive effect on moral norm.

Direct and Indirect Effects of Moral Norm on Non-Waste Intention

Moral norm is whether the behaviors exhibited are morally appropriate or not. Norms shape our behaviors and have the ability to influence our decisions (Sarikhani and Ebrahimi, 2022). Therefore, it can be said that moral norms have an effect on many of our behaviors. One of these situations is the behaviors of individuals towards food waste. The higher the moral norms of individuals, the more inclined they are to not waste food (Wang et al., 2021). According to the study conducted by Arslan and Aydın (2019), in addition to different variables, moral norm also has a significant effect on the intention not to waste food. According to the results of the study conducted by Karakaş (2019), moral norm has a significant effect on the intention not to waste food. According to Misiak et al. (2020), people who evaluate the act of wasting food as immoral exhibit food wasting behavior less. However, in reality, it was determined that they do not waste less food than people who do not evaluate the act of wasting food as immoral. In the study conducted by Teoh et al. (2022), it was concluded that moral norm affects food waste. According to the study conducted by Bhatti et al. (2019), moral norm does not significantly affects the intention to reduce food waste. According to Ding (2022), the perceived competence of restaurant customers to reduce food waste positively affects their intention to reduce food waste, and customers' moral judgments mediate this situation.

The following hypotheses were created in line with the literature review and the objectives of the research.

H_7: Moral norm has an impact on the intention not to waste food.

There are several studies in the literature supporting the mediating role of moral norms in the effect of attitudes towards food waste on intention not to waste. Misiak et al. (2020) showed that individuals' perception of food waste as a moral problem strengthens their intention not to waste. When individuals see food waste as immoral, these attitudes positively affect their intention not to waste. Similarly, Arslan and Aydın (2019) found that moral norms are an important element in the intention to prevent food waste and support individuals' intention not to waste by positively affecting their attitudes. Liu et al. (2019) revealed that moral norms strengthen the effect on intention not to waste by reinforcing individuals' positive attitudes towards preventing food waste. Teoh et al. (2022) showed that moral norms increase individuals' intention not to waste by interacting with anti-waste messages spread on social media. These studies clearly emphasize that moral norms play a mediating role, strengthening the effect of individuals' attitudes towards food waste on their intention not to waste.

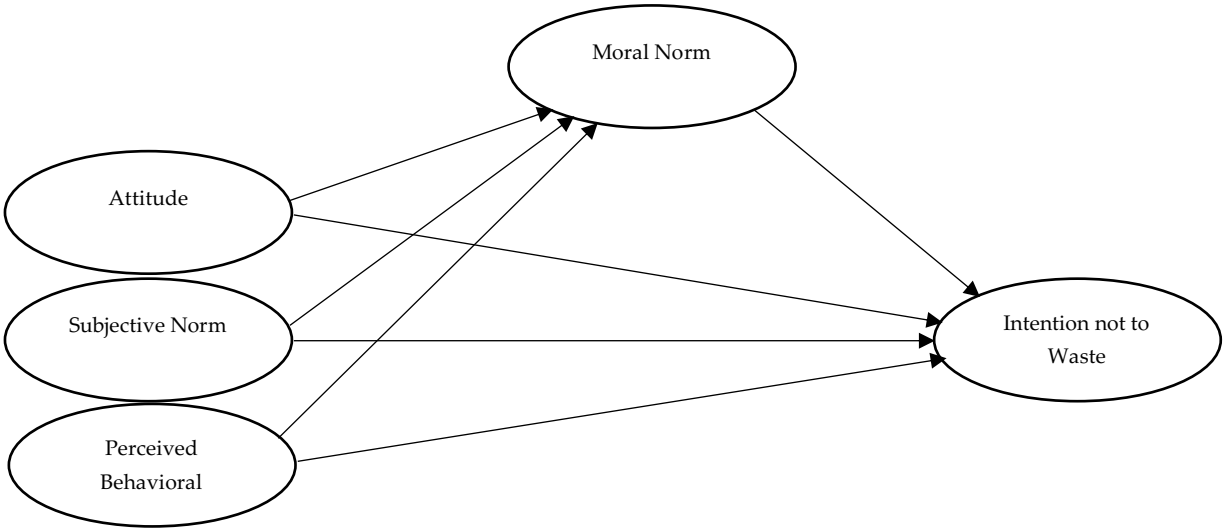

Figure 1. Research Model

H_8: Moral norm has a mediating role in the effect of attitude towards food waste on intention not to waste food.

H_9: Moral norm has a mediating role in the effect of subjective norm towards food waste on intention not to waste food.

H_{10}: Moral norm has a mediating role in the effect of perceived behavioral control towards food waste on intention not to waste food.

The model created within the scope of the research objectives is as follows.

Methodology

In the method section of the research, the scales used in the research, the data collection method, the analyses used, and research ethics were discussed.

Scales Used in the Study

The attitude towards food waste, subjective norm and perceived behavioral control statements used in the study were prepared within the framework of the "theory of planned behavior" (Ajzen, 1991). The study of Stancu et al. (2016) was used for the scales moral norm and intention not to waste.

Data Collection Method

Within the scope of the research, the survey form was prepared online and delivered to the participants and the data was collected in this way. The online survey form was delivered to individuals aged 18 and over with different demographic characteristics via platforms such as e-mail and social media. The attitudes, subjective norms and perceived behavioral control used in the research, as well as the statements regarding moral norms and intention not to waste, were prepared using 5-point Likert type (1-Strongly Disagree, 2-Disagree, 3-Neither Agree, Nor Disagree, 4-Agree, 5-Strongly Agree). In addition, the participants were asked about their lifestyles as well as demographic variables. A total of 423 usable data was used for analysis within the scope of the research. The data obtained in the research were collected between December 2022 and January 2023.

Analyses Used

In this study, the data analysis process was carried out using SPSS and SmartPLS software. First, descriptive analyses were conducted to see the distribution of demographic variables and the general structure of the data. Then, explanatory and confirmatory factor analysis (EFA and CFA) and structural equation modeling (SEM) were applied to examine the relationships between variables. For reliability and validity tests, values such as Cronbach's Alpha, composite reliability (CR), and average variance extraction (AVE) were calculated to test the consistency of the measurement structure of the model.

Research Ethics

This study was conducted in accordance with the principles of research ethics. Information was provided about the purpose, scope and rights of the participants and informed consent was obtained from the participants. Data were collected through an online survey, and the identity of the participants was kept confidential and anonymity was ensured. All data obtained were analyzed only within the scope of this research and were not shared with third parties. The research was conducted with ethical approval from the Bursa Technical University, Science, Engineering and Social Sciences Research Ethics Committee. During this process, full compliance with the principles of research ethics was ensured and the confidentiality and privacy of the participants were protected.

Findings

Demographic Characteristics of Participants

Demographic information about the participants (gender, age, income, education level, occupation, marital status and lifestyle) is shown in Table 1.

Table 1. Demographic Findings

Gender	Frequency	%	Marital Status	Frequency	%
Male	221	47,8	Single	230	54,4
Female	202	52,2	Married	193	45,6
Education Level	**Frequency**	**%**	**Income**	**Frequency**	**%**
Primary School Graduate	44	10,4	5000 TL and less	125	29,6
High School Graduate	118	27,9	5001-7000 TL	66	15,6
Associate Degree Graduate	60	14,2	7001-9000 TL	53	12,5
Bachelor's Degree Graduate	156	36,9	9001-11000 TL	64	15,1
Master's Degree Graduate	40	9,5	11001 TL and above	115	27,2
Doctorate Graduate	5	1,2	**Occupation**	**Frequency**	**%**
Lifestyle	**Frequency**	**%**	Private Sector	103	24,3
I live alone	48	11,3	Student	88	20,8
I live with my family (My spouse; my children; my mother and father; etc.)	343	81,1	Civil Servant	87	20,6
I live with my friends (Co-worker; schoolmate; etc.)	32	7,6	Unemployed (Not Working)	40	9,5
			Self-Employed	38	9,0
			Worker	25	5,9
			Housewife	24	5,7
			Retired	15	3,5
			Farmer	3	0,7
Total	**423**	**100**	**Total**	**423**	**100**

The number of returned surveys within the scope of the research was 441. However, after excluding 18 surveys filled out incorrectly, analyses were conducted with 423 usable surveys. According to the data in the table, 47.8% of the participants are male and 52.2% are female. In terms of marital status, 54.4% are single and 45.6% are married. When we look at the level of education, 36.9% have a bachelor's degree, 27.9% have a high school degree, 14.2% have an associate's degree, 9.5% have a master's degree, and 1.2% have a doctorate degree.

In terms of income distribution, 29.6% of the participants are in the income group of 5000 TL and below, while 27.2% earn 11001 TL and above. In terms of employment status, 24.3% work in the private sector, 20.8% are students, 20.6% are civil servants and 9.5% are unemployed.

In addition, the average age of the participants is 32.8. According to the data, 81.1% of the participants live with their families, 11.3% live alone, and 7.6% live with friends.

After examining the demographic characteristics of the individuals participating in the study, descriptive statistics regarding the statements used in the study were determined.

Descriptive statistics are shown in Table 2.

Descriptive Statistics Regarding the Scales Used in the Research

Within the scope of this research, 5 different variables were considered. Descriptive statistics for the scales used to measure these variables are presented in the table below.

When Table 2 is examined, the 3 statements with the highest averages are attitude3, attitude1 and attitude5, respectively. The 3 statements with the lowest averages are subjective4, subjective5 and subjective3, respectively.

Testing the Measurement Model

After this stage, explanatory factor analysis, confirmatory factor analysis, CR (composite realiability), AVE (Average variances extracted), HTMT ratio and Fornell-Larcker Criterion were examined in order to determine the validity and reliability levels of the scales used in the research.

Table 2. Descriptive Statistics

	Statements	**Avg.**	**S.D.**
att1	It is important for me not to waste food	**4,624**	0,845
att2	Wasting food is not welcomed by our society	4,104	1,064
att3	Wasting food is bad	**4,638**	0,870
att4	I usually try not to waste food	4,459	0,912

att5	We can contribute to our budget by not wasting food	**4,546**	0,914
att6	I do not leave food on my plate	4,232	1,029
att7	I put as much food as I can eat on my plate	4,284	0,999
att8	I buy as much as I need when buying any food product	4,187	1,021
att9	I use any food in different ways instead of throwing it away	4,078	1,038
att10	Excess food should not be thrown away, it should be consumed later	4,260	0,997
subj1	My family and people around me do not waste food	3,853	1,038
subj2	Many people who are important to me expect me not to waste food	3,991	1,086
subj3	People around me can influence me not to waste food	**3,844**	1,131
subj4	My family and friends warn me not to waste food	**3,664**	1,294
subj5	My environment and friends think that I should not waste food	**3,697**	1,219
subj6	My family informs me about the importance of not wasting food	4,012	1,147
cont1	It is very easy not to waste any food	4,059	1,050
cont2	It is in my hands not to waste any food	4,349	0,929
cont3	Without wasting food There are many alternatives to consider	4,492	0,884
cont4	It is easy to prepare enough food so that you don't throw away too much	4,284	0,939
cont5	It is very easy not to buy more than you need	4,213	1,052
norm1	Wasting food makes me feel guilty about people who don't have enough food	4,349	0,976
norm2	Wasting food makes me feel guilty about the environment	4,267	0,969
norm3	Wasting food makes me feel guilty	4,234	1,020
int1	I intend not to waste food	4,416	0,877
int2	My goal is not to waste food	4,482	0,790
int3	I will try not to waste food	4,447	0,855

First, explanatory factor analysis was performed and a total of 27 statements were included in the factor analysis. The KMO value was 0.952 and the Bartlett significance level was 0.000. According to the KMO and Bartlett tests, factor analysis can be applied to this data set (Tabachnick and Fidell, 2015). The factor analysis results are shown in Table 3.

To determine the factor structures of the scales, explanatory factor analysis was performed first. Structures with an eigenvalue greater than 1 were accepted as factors. The variance explained by the factors ranged from 10.26 to 35.94. The alpha values of the scales also ranged from 0.872 to 0.940. The expression Attitude2 was removed from the scale because it had a low factor loading.

When the table is examined, 5 different factors emerged in accordance with the research model. The factor loadings of the statements forming the factors are seen to be between 0.621-0.805 for attitude, 0.520-0.892 for subjective norm, 0.595-0.806 for perceived behavioral control, 0.697-0.821 for moral norm and 0.637-0.725 for intention.

Table 3. Exploratory Factor Analysis Results

	Factors					Eigenvalue	Explained Variance	Cronbach Alpha
Statements	Attitude	Subjective Norm	Per. Beh. Cont.	Moral Norm	Intention			
att4	,805							
att1	,799							
att5	,777							
att3	,775							
att7	,776					4,863	35,94	0,940
att6	,710							
att8	,698							
att10	,627							
att9	,621							
subj4		,892						
subj5		,862						
subj3		,710						
subj6		,696				3,094	22,86	0,872
subj2		,544						
subj1		,520						
cont5			,806					
cont4			,718					
cont2			,708			2,480	18,33	0,918
cont1			,678					
cont3			,595					
norm3				,821				
norm1				,740		1,707	12,62	0,923
norm2				,697				
int1					,725			
int3					,676	1,388	10,26	0,934
int2					,637			

After this stage, confirmatory factor analysis (CFA) was performed and the CFA results are given in the table below.

The confirmatory factor analysis results in the table show the construct validity and factor loadings of the variables used in the study. In the Partial Least Squares (PLS) based CFA, factor loadings are expected to be above 0.70 (Hair et al., 2010). The loadings of the Attitude factor vary between 0.747 and 0.898, and high loadings indicate that this factor has good construct validity. The Subjective Norm factor has factor

loadings ranging between 0.758 and 0.799, which indicates that the statements related to subjective norm are consistent and reliable.

Table 4. Confirmatory Factor Analysis

Statements	Attitude	Subjective Norm	Per. Beh. Cont.	Moral Norm	Intention
att1	0.898				
att10	0.766				
att3	0.850				
att4	0.857				
att5	0.866				
att6	0.784				
att7	0.840				
att8	0.795				
att9	0.747				
subj1		0.758			
subj2		0.799			
subj3		0.764			
subj4		0.775			
subj5		0.790			
subj6		0.779			
cont1			0.836		
cont2			0.907		
cont3			0.859		
cont4			0.889		
cont5			0.847		
norm1				0.930	
norm2				0.930	
norm3				0.931	
int1					0.932
int2					0.945
int3					0.944

The factor loadings in the Perceived Behavioral Control factor vary between 0.836 and 0.907, and these high loadings indicate that the construct validity is strong. The factor loadings for all statements in the Moral Norm factor are quite high (0.930-0.931), which indicates strong convergent validity. The Intention factor was structured with loadings between 0.932 and 0.945, which shows that this factor is in high compliance with the measured expressions. In general, it is seen that all factors have high factor loadings.

After this stage, the validity and reliability of the scales were continued with various analyses. First, CR (Composite Reliability) and AVE (Average Variance Extracted) coefficients were examined.

Table 5. CR, AVE and Alpha Coefficients

Variables	Alfa	CR	AVE
Moral Norm	0.923	0.925	0.866
Per. Beh. Cont.	0.918	0.921	0.754
Intention	0.934	0.936	0.884
Subjective Norm	0.872	0.882	0.605
Attitude	0.940	0.943	0.679

Alpha values for Attitude (0.940), Intention (0.934), Moral Norm (0.923), Perceived Behavioral Control (0.918) and Subjective Norm (0.872) are quite high (≥ 0.70), indicating that all variables are reliable (Nunnally and Bernstein, 1994). High reliability coefficients indicate that the measurement tools work consistently and will give similar results in repeated measurements.

The composite reliability (CR) values for Attitude (0.943), Intention (0.936), Moral Norm (0.925), Perceived Behavioral Control (0.921) and Subjective Norm (0.882) were above the reliability criterion of 0.70 (Hair et al., 2010). This indicates that the measurement items of each variable are compatible with each other and measure the concepts accurately.

The AVE values for Attitude (0.679), Intention (0.884), Moral Norm (0.866), Perceived Behavioral Control (0.754) and Subjective Norm (0.605) are above the validity criterion of 0.50 (Hair et al., 2010). This means that each of these variables can explain at least half of their total variance, indicating that construct validity is achieved.

Table 6. HTMT Ratio

Variables	Moral Norm	Per. Beh. Cont.	Intention	Subjective Norm	Attitude
Moral Norm					
Per. Beh. Cont.	0.755				
Intention	0.776	0.794			
Subjective Norm	0.562	0.605	0.601		
Attitude	0.686	0.770	0.714	0.598	

The HTMT ratio is a modern method used in discriminant validity testing. This ratio measures the similarity (or difference) between two variables. The generally accepted threshold value

is for the HTMT value to be above 0.85. Since this condition is provided, it can be said that there is a strong discriminant validity between the variables (Henseler et al., 2015).

Table 7. Fornell-Larcker Criterion

Variables	Moral Norm	Per. Beh. Cont.	Intention	Subjective Norm	Attitude
Moral Norm	**0.930**				
Per. Beh. Cont.	0.698	**0.868**			
Intention	0.723	0.740	**0.940**		
Subjective Norm	0.533	0.568	0.563	**0.778**	
Attitude	0.640	0.716	0.672	0.569	**0.824**

The Fornell-Larcker criterion is used to test the discriminant validity between the variables in the model. According to the Fornell-Larcker criterion, the square root of the AVE (Average Variance Extracted) value of each variable should be higher than its correlations with other variables (Fornell and Larcker, 1981). As a result, this table shows that each variable exhibits a different structure within itself and is sufficiently separated from other variables.

After all these results, it can be said that the scales used in the study provide sufficient validity and reliability conditions.

After this stage, the structural model was tested.

Testing the Structural Model

Before proceeding to the analysis of the structural model, some information about the fit of the model was examined. The fit of the structural model shows the extent to which the independent variables of the model explain the dependent variables and how well the model fits the data in general. Measures such as R-square, F-square and SRMR were used to evaluate this fit.

The R-square values used to evaluate the fit of the structural model show that a large portion of the dependent variables are explained by the model. R-square was calculated as 0.541 for Moral Norm and 0.654 for Intention. This shows that the model explains 54.1% of Moral Norm and 65.4% of Intention, thus having a good fit (Hair et al., 2010). In addition, the SRMR value is 0.069, which indicates that the model is generally compatible with the data (Hu and Bentler, 1999).

According to F-square (effect size) values, the effect of Perceived Behavioral Control on Moral Norm shows a medium effect with 0.193, and the effect on Intention shows a medium effect with 0.121 (Cohen, 1988). The effect of Subjective Norm on Intention has a low effect size with 0.020, which shows that subjective norms do not have a significant effect on intention. The effect of Moral Norm on Intention is medium with 0.145, and it can be said that moral norms have a significant effect on intention (Cohen, 1988).

Table 8. Direct Effects Analysis

Relationships Between Variables	Std. Beta	T Value	P Value	Hypothesis	Result
Attitude -> Intention	0.161	1.689	0.091	H_1	Rejected
Subjective Norm -> Intention	0.106	2.269	0.023	H_2	Accepted
Per. Beh. Cont. -> Intention	0.334	4.597	0.000	H_3	Accepted
Attitude -> Moral Norm	0.240	3.198	0.001	H_4	Accepted
Subjective Norm -> Moral Norm	0.144	2.949	0.003	H_5	Accepted
Per. Beh. Cont. -> Moral Norm	0.445	6.122	0.000	H_6	Accepted
Moral Norm -> Intention	0.330	5.868	0.000	H_7	Accepted

The effect of attitude on moral norm is significant (Std. Beta: 0.240, T: 3.198, P: 0.001), which supports hypothesis H_4. However, the effect of attitude on intention (Std. Beta: 0.161, T: 1.689, P: 0.091) was not found significant. In this case, hypothesis H_1 was rejected. It is seen that attitude has no significant effect on intention, but its effect on moral norm is significant (H_8).

The effect of subjective norm on moral norm (Std. Beta: 0.144, T: 2.949, P: 0.003) and its effect on intention (Std. Beta: 0.106, T: 2.269, P: 0.023) are statistically significant. These findings support hypotheses H_5 and H_2. While subjective norms have a significant effect on individuals' moral norms, their effect on intention is also low-level significant.

The effect of perceived behavioral control on moral norm (Std. Beta: 0.445, T: 6.122, P: 0.000) and intention (Std. Beta: 0.334, T: 4.597, P: 0.000) are also highly significant, which ensures that hypotheses H_6 and H_3 are accepted. Perceived behavioral control positively affects both moral norms and intentions of individuals.

According to the analysis results, the effect of moral norm on the intention not to waste food (Std. Beta: 0.330, T: 5.868, P: 0.000) is quite strong and significant. This supports hypothesis H_7 and shows that moral norms positively affect individuals' intention not to waste food.

As a result, hypotheses H_2, H_3, H_4, H_5, H_6 and H_7 were supported, but hypothesis H_1 was rejected. While moral norms and perceived behavioral control are effective on the intention not to waste food, attitude has no direct effect.

Table 9. Indirect Effects Analysis

Relationships Between Variables	Std. Beta	T Value	P Value	Hypotheses	Result
Attitude -> Moral Norm -> Intention	0.079	2.806	0.005	H_8	Accepted
Subjective Norm -> Moral Norm -> Intention	0.048	2.460	0.014	H_9	Accepted
Per. Beh. Cont. -> Moral Norm -> Intention	0.147	4.335	0.000	H_{10}	Accepted

According to the path analysis results for indirect effects, the indirect effect of attitude on the intention not to waste food through moral norm was found to be significant (Std. Beta: 0.079, T: 2.806, P: 0.005). This shows that hypothesis H_8 is accepted.

Similarly, the indirect effect of subjective norms on intention through moral norm is also significant (Std. Beta: 0.048, T: 2.460, P: 0.014), leading to the acceptance of hypothesis H_9.

The indirect effect of perceived behavioral control on intention through moral norm is quite strong (Std. Beta: 0.147, T: 4.335, P: 0.000), therefore hypothesis H_{10} is accepted. In general, it is seen that moral norm plays an important mediating role in the effect of attitude, subjective norm and perceived behavioral control on intention.

Conclusion

This study aimed to investigate the factors affecting individuals' intentions to prevent food waste by focusing on the mediating role of moral norms within the framework of Ajzen's (1991) Theory of Planned Behavior (TPB). The findings of the study emphasize that moral norms, perceived behavioral control, subjective norms, and attitudes are critical in shaping intentions to prevent food waste. The results show that moral norms and perceived behavioral control have significant direct effects on intentions to prevent food waste, while attitudes have an indirect effect through moral norms. Subjective norms play a smaller but significant role.

Perceived behavioral control emerged as a significant determinant of both moral norms and intention to prevent food waste. This finding suggests that individuals who believe they have the ability to control food consumption and waste are more likely to comply with moral norms and intention to prevent food waste. Furthermore, the strong positive relationship between moral norms and intentions to prevent food waste highlights how important personal ethical standards are in guiding environmentally friendly behaviors. As individuals internalize their moral obligations, they are more likely to take actions to reduce food waste.

Although attitudes towards food waste did not have a significant direct effect on intentions, the indirect effect through moral norms was found to be significant. This suggests that although attitudes towards food waste do not directly lead to behavioral change, they do guide intentions by influencing individuals' moral frameworks. In addition, subjective norms, which represent the social pressures and expectations of significant others, had a small but statistically significant effect on both moral norms and intentions.

Ajzen and Fishbein, who developed the Theory of Planned Behavior (TPB), suggested that attitudes generally affect behavioral intentions. However, they also acknowledged that this relationship may not always be strong or direct. Similarly, Ajzen and Fishbein (1977) examined in detail the complexity of the relationship between attitude and behavior and the situations in which this relationship may be weak. In their various studies, Ajzen and Fishbein accept the existence of situations where attitude does not affect intention or its effect is weak. In support of these, Zaikauskaitė et al. (2023) determined that attitude has a strong effect on intention. However, when the moral norm variable was added to the model, it was found that the effect of attitude on intention weakened. In addition, Teoh et al. (2022) found that attitude had no effect on intention in their study on social media and food waste.

In conclusion, this study reaffirms the utility of the TPB model in explaining food waste behaviors while highlighting the mediating role of moral norms. The findings suggest that intentions to prevent food waste are largely influenced by individuals' moral beliefs, not just external pressures or internal attitudes. Addressing these factors is critical for designing effective interventions to reduce food waste at the household and societal levels. Accordingly, policymakers can emphasize the moral dimensions of reducing food waste. Additionally, communication strategies can appeal to intrinsic motivations by emphasizing the attribution of responsibility and personal norms and foster a sense of ethical obligation to reduce food waste.

Discussion

The findings of this study contribute to the literature on food waste reduction, highlighting the importance of moral norms, perceived behavioral control, and subjective norms in shaping intentions to prevent food waste. Based on the Theory of Planned Behavior (TPB), this study extends previous research by highlighting the mediating role of moral norms between attitudes, subjective norms, and intentions.

As in the studies of Aktaş et al. (2018) and Stancu et al. (2016), perceived behavioral control emerged as one of the most important determinants of both moral norms and intentions to prevent food waste. This suggests that individuals who believe they can control their food consumption are more likely to engage in behaviors aimed at preventing food waste. In practice, interventions aimed at increasing individuals' perception of control—for example, providing tools for better meal planning, portion control, and efficient use of leftovers—can significantly reduce food waste. This finding is also consistent with the work of Graham-Rowe et al. (2015) emphasizing the importance of perception of control in TPB-based models.

This study's emphasis on moral norms provides a deeper understanding of why individuals choose to reduce food waste. Moral norms, that is, personal perceptions of right and wrong, significantly mediate the relationship between attitudes and intentions. This is consistent with the findings of Wang et al. (2021) and Arslan and Aydin (2019), where moral norms were identified as a strong predictor of intentions to prevent food waste. Individuals who view food waste as morally wrong are more likely to act on these beliefs, even if their general attitudes are not very strong against food waste. This finding highlights the importance of moral messages in campaigns to reduce food waste.

Interestingly, the direct effect of attitudes on intention to prevent food waste in this study was not found to be significant, which contradicts the previous findings of Russell et al. (2017) who found a significant relationship between attitudes and intentions. However, the indirect effect of attitudes through moral norms suggests that attitudes can affect intentions when framed in a moral context. This finding is also consistent with the study of Chen (2023) who stated that even if attitudes do not directly lead to behavioral change, they can affect intentions by shaping individuals' moral frames.

The role of subjective norms was found to be weaker compared to perceived behavioral control and moral norms, but still significant through its indirect effect through moral norms. This suggests that social influences alone are not sufficient to drive behaviors aimed at reducing food waste, but may strengthen individuals' moral beliefs. Porpino et al. (2015) emphasized the role of subjective norms in food waste behavior, but found a stronger direct effect than observed in this study. This suggests that subjective norms may have a more pronounced effect in cultures or contexts where social pressure for consumption habits is stronger.

The findings of the study also support the arguments made by Just and Swigert (2016) and Gönültaş et al. (2020) that food waste in developed countries is often caused by overconsumption. In these contexts, individuals may be tempted to waste due to a sense of abundance. This study suggests that even in societies with high consumption levels, moral norms and perceived behavioral control play a balancing role in food waste. Campaigns that focus solely on economic or environmental benefits may not be sufficient;

instead, individuals' moral beliefs can be appealed to and a stronger behavioral change can be encouraged.

Finally, although Bhatti et al. (2019) argued that moral norms do not significantly affect intention to reduce food waste, the findings of this study suggest the opposite. A strong mediating effect of moral norms suggests that it bridges the gap between individuals' perceptions and intentions to prevent food waste. This discrepancy may be due to cultural or methodological differences and suggests that more comparative studies should be conducted in different contexts to better understand the role of moral norms in food waste behaviors.

In conclusion, this study suggests that perceived behavioral control and moral norms are key drivers of intentions to prevent food waste. Instead of interventions that only address practical barriers, interventions that also mobilize individuals' moral beliefs about the importance of reducing food waste should be designed. These findings can guide policy makers and campaign designers in developing more effective, multifaceted strategies to reduce food waste at the household and community level.

Future Research

This study provides valuable insight into the psychological mechanisms underlying food waste intentions, as well as several suggestions for future research to further understand this phenomenon. First, longitudinal studies would be useful to examine how moral norms, perceived behavioral control, and subjective norms influence food waste behaviors over time. Additionally, further research could be conducted to understand how demographic variables such as age, income, and household size respond to interventions aimed at reducing food waste.

In addition, future research could expand the scope of the TPB model to include additional variables such as emotional factors (e.g., guilt or shame related to food waste) and environmental awareness. These factors could better explain why even individuals with strong moral norms may continue to waste food. Finally, cross-cultural studies comparing food waste behaviors across regions could reveal how cultural norms and moral beliefs vary across societies and how these differences affect food waste reduction strategies.

Limitations

This study has several limitations. First, data were collected using self-reported measures, which may introduce social desirability bias. Participants may have underreported socially unacceptable behaviors, such as food waste. Second, the study was conducted in a specific cultural and geographic context, which may limit the generalizability of the findings to other regions or populations. Future research should replicate this study in different cultural settings and examine the consistency of the findings.

Another limitation is the cross-sectional design, which limits the ability to identify causal relationships between variables. While the TPB model provides a theoretical framework for understanding food waste intentions, a longitudinal design may provide stronger evidence of causality. Finally, although the sample size was sufficient for the analyses conducted, future studies could use larger sample sizes to increase the robustness and generalizability of the findings. Addressing these limitations in future research will contribute to a more comprehensive understanding of the factors driving food waste behaviors.

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