

**FOOD WASTE BEHAVIOR OF ORGANIC FOOD CONSUMERS IN TURKEY**Assoc. Prof. (Ph.D.) Bilge Öztürk GÖKTUNA\* Asst. Prof. (Ph.D.) N. Merve HAMZAOĐLU\*\* **ABSTRACT**

While the problem of food waste is alarming, the existence of people suffering from hunger points to the inefficient allocation of food. Food waste is an economic problem as well as an environmental problem. Thus, reducing food waste behaviour will be crucial in promoting sustainability and fighting against climate change. A widespread sustainable agricultural food production method is organic agriculture whose demand is globally increasing with one of the main motivation, environmental concern. In this study, we reveal the food waste behaviour of organic food consumers. We have conducted an econometric analysis using data from 250 organic food consumers in five main districts of Istanbul. Our findings indicate that the frequency of organic food consumption negatively correlates with food waste. We see a general trend of low food waste among organic consumers, whereas their food waste behaviour varies regarding their organic food consumption frequency and product types.

**Keywords:** Food Waste, Organic Food, Consumer Behaviour, Sustainable Consumption.

**JEL:** D12, D91, Q18.

**TÜRKİYE’DE ORGANİK GIDA TÜKETİCİLERİNİN GIDA İSRAFI DAVRANIŐI****ÖZET**

Dünyada atık veya israf edilen gıda miktarı giderek artmaktadır. Gıda atık sorunu endişe verici iken, açlık sorunu gıdanın etkin tahsis edilememesinden kaynaklıdır. Gıda atığı sadece ekonomik bir sorun deđil, aynı zamanda bir çevresel sorundur. Bu nedenle, gıda atık davranışının azaltılması, sürdürülebilirliđin desteklenmesinde ve iklim deđişikliğine karşı mücadelede büyük önem arz etmektedir. Sürdürülebilir tarım ve gıda üretiminde en yaygın olan yöntem organik tarımdır. Organik gıda talebinin en önemli motivasyonlardan biri olan çevresel konularda endişe tüm dünyada artmaktadır. Çevreye ve sürdürülebilirliğe katkıda bulunmaya motive olmuş organik tüketiciler de sürdürülebilir tüketimin bir parçasıdır. Bu çalışmada, organik gıda tüketicilerinin gıda atık davranışları incelenmektedir. Bu kapsamda, İstanbul’un beş ilçesinde yaşayan 250 organik gıda tüketicisinin verileri kullanılarak ekonometrik bir analiz gerçekleştirilmiştir. Bulgular, organik gıda tüketim sıklığının gıda

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*atık davranışı ile negatif yönde ilişkili olduğunu göstermektedir. Organik gıda tüketicileri genel olarak düşük gıda atık eğiliminde, gıda atık davranışları organik gıda tüketim sıklıklarına ve ürün türlerine göre değişmektedir.*

**Keywords:** *Gıda İsrafi, Organik Gıda, Consumer Behaviour, Sustainable Consumption.*

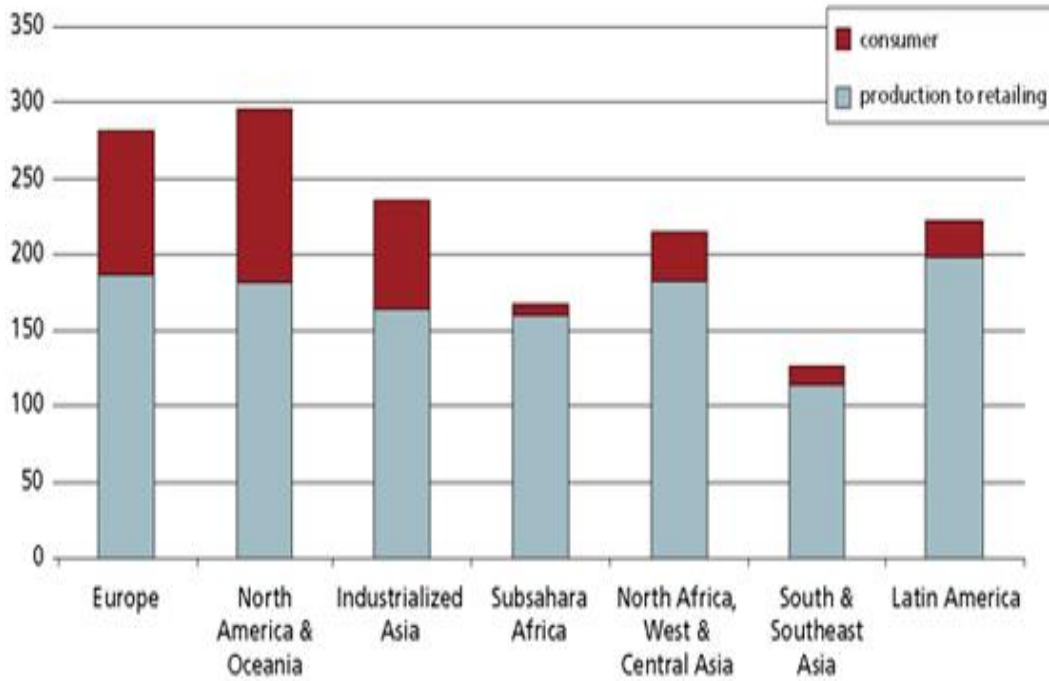
**JEL:** *D12, D91, Q18.*

## 1. INTRODUCTION

UNEP (United Nations Environment Programme) has pointed to the importance of the food waste and called for action against this global problem by stating that every year, approximately one-third of the food produced for consumption is wasted (UNEP, 2021). There are various reasons for food waste and these can be categorized regarding the stages of production: production, processing, packaging, transporting, exporting/ importing, retailing, and cooking; moreover, on consumption side, unconsumed food and plate waste is another reason. Food losses at the retail and final consumption are rather referred to as food waste (Parfitt et al., 2010). FAO (2014) defines food losses and waste as “the edible parts of plants and animals produced for human consumption but are not ultimately consumed by people” whereas Buzby et al. (2014) defines food loss or food waste as “the amount of edible food, postharvest, that is available for human consumption but is not consumed for any reason”. As resource depletion has been addressing the sustainability problem worldwide, the food waste problem constitutes a large part of the waste of the resources in food production; thus, solving this problem must be a priority both at national and global levels.

Roughly 680 billion US dollars worth of food waste is generated in industrialized countries, whereas this number is nearly 310 billion US dollars in developing countries. It is noteworthy to mention that consumers from rich countries almost waste the food amount needed to end hunger in Sub-Saharan countries (UNEP, 2021). The estimate of food waste is 30-40% of the food supply of which 31% generated at the retail and consumer levels. FAO (2011) has estimated that in Europe and North America, yearly per capita food loss (280-300 kg/year) is nearly twice the loss in sub-Saharan Africa and South/Southeast Asia (120-170 kg/year). Regarding the food waste, yearly per capita food waste in Europe and North-America (95-115 kg/year) is nearly more than ten times the waste in sub-Saharan Africa and South/Southeast Asia (6-11 kg/year). We can see that there are differences at the levels where food loss and waste occur; while in developing countries the food loss is crucial at post-harvest and processing levels, in industrialized countries, food loss and waste at retail and consumer levels are alarming. Figure 1 shows per capita food losses and waste by regions to illustrate regional differences.

**Figure 1 Per Capita Food Losses and Waste (Kg/Year) by Regions<sup>1</sup>**



Source: FAO (2011).

The food loss and waste has various implications on economic development as well as environment and they are on the agenda of authorities, NGOs and international organizations calling for action to solve the problem of sustainability in food production and consumption<sup>2</sup>. First, the resources used in food production are wasted and moreover, as the production of wasted food leads CO<sub>2</sub> emissions, there is an environmental impact in addition to financial loss. UNEP (2021) estimates that 8-10% of greenhouse gas emissions will occur due to the production of food that is either wasted or lost. Second, almost 1/9 of the world population deals with hunger today while 12,9% is undernourished; in order to fight hunger and ensure food safety, actions and calls to reduce food waste are in order. The increasing trend in the world population amplifies the problem of undernourishment and hunger as the world population is 7.6 Billion as of 2018 and the estimated numbers are 8,5 billion in 2030 and 9,7 billion in 2050<sup>3</sup>. This will increase agricultural output by an additional 50% (Müller et al., 2017). The value of wasted food is more than enough to feed hungry population<sup>4</sup>. Table 1 shows the most wasted food products in the world. Fruits and vegetables have the

<sup>1</sup> Source: FAO, “Global food losses and food waste-Extent, causes and prevention”, Study conducted for the International Congress “Save Food” at Interpack, Düsseldorf, Germany, 2011, p5.

<sup>2</sup> Sustainability has been on the global agenda since the rising environmentalism in the 1970s in developed countries. In 1987, the Brundtland Report defined sustainable development as: “Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Rising environmental concerns became more evident and radical in the 1960s as the anxiety of continuity of human survival while endangering ecology and depleting natural resources were so familiar. These concerns stimulated the concept of sustainable development (Du Pisani, 2006).

<sup>3</sup> <https://www.un.org/en/desa/world-population-projected-reach-98-billion-2050-and-112-billion-2100>

<sup>4</sup> FAO (2011) indicates that food waste costs almost 750 billion US dollars annually, which can be more than enough to feed hungry people worldwide.

highest rates of food waste, followed by tubers, meat, and dairy products. To conclude, the statistics show a social disparity in terms of nutrition and the access to food worldwide (FAO, 2018).

Food loss and waste amounting to 26.04 Million/year is a problem in Turkey as well with the most wasted food product type fruit and vegetables (Salihoğlu et al., 2018). As Table 2 shows, the produced food gets lost or is wasted mostly during the agricultural production with fruit and vegetables the mostly lost items. As Turkey is a major producer of fruit, vegetable, nuts, and wheat, agriculture plays a crucial role in the economy. In Turkey, almost 18 million of food is thrown away yearly. Food waste is mainly generated during the preparation and storage stages and due to oversupply and over-production due to wrong estimates in planning (Türkiye UN, 2021).

**Table 1. Most Wasted Foods in the World**

Food Type	Share in world food waste (%)
Potatoes, beets, radishes, and carrots	46.2
Fruits and vegetables	45.7
Tuna, salmon, shrimp, and other seafood	34.7
Cereal, bread, and rice	29.1
Lentils, green peas, chickpeas, and seeds that make oil	22.1
Chicken, beef, and pork	21.5
Milk, yogurt, and cheese	17.1

Source: Earth.org website (2021), <https://earth.org/most-wasted-types-of-food-in-the-world/>.

**Table 2. Share of Food Losses and Waste in Turkey of Each Type of Product in Different Stages<sup>5</sup>**

Product Type	Share of Loss and Waste (%) During				
	Production	Postharvest Handling and Storage	Processing and Packaging	Distribution	Consumption
Cereal	5.1	4	2	1	5
Roots and tubers	7	6	2	3	2
Oilseeds and pulses	15	5	7	1	4
Fruit and veg.	20	8	10	10	5
Meat	10	0.2	5	0.5	1
Fish and seafood	10	0.02	0.04	0.01	2
Milk	10	1	1.5	6	1.5
Eggs	6	1	2	1	0.01

Source: FAO (2013)

The food loss and waste problem is a heavy burden from many perspectives. We can see that it is part of the environmental agenda as it creates depletion of natural resources and policies aiming at reducing food waste are crucial in promoting sustainability and fighting against climate change. In this study, we would like to investigate whether there is a relationship between food waste behaviour and environmental attitude. We have focused on consumers of organic food because organic agriculture

<sup>5</sup> Source FAO, "Food Losses and Waste in Turkey Country Report", FAO Official Website: <http://www.fao.org/3/a-au824e.pdf>. 2013: 2.

is a well known environmentally friendly as well as socially sensitive production process as it can contribute to ecological health, international markets, agricultural productivity, rural livelihoods, and local food security (Scialabba and Hattam, 2002). Moreover, organic agriculture has become a lifestyle where even small households conduct organic food production in small family gardens and benefit from it (Sarker et al., 2021) by applying several organic-specific methods, including composting. It is essential to note that home composting is a way to reuse not-eaten food products (EPA, 2022). As many countries aim the transition to organic farming by the 2030s, it is worth mentioning that a higher level of transition to organic farming will result in the reduction of food waste (Kuczuk and Widera, 2021).

This study aims to reveal food waste behaviour of organic food consumers thereby investigating the relationship between the consumption of environmentally friendly products and the food waste. The second section provides a brief literature review on food waste behaviour. In the third section, we present the econometric analyses using data collected from a survey conducted to 250 organic food consumers in Turkey. In the fourth section, we discuss our concluding remarks.

## **2.LITERATURE REVIEW**

Food waste behaviour has been investigated scholarly in several disciplines related to sustainable production and consumption. Therefore, there is a vast literature examining consumer behaviour with ethics, green consumerism, shopping behaviour, and household consumption. Food waste behaviour is related to several factors. Quedstedt et al. (2011) define food waste as not a sole behaviour; indeed it is a result of the interaction of multiple behaviours such as planning, shopping, storage, preparation, and food consumption.

**Socio-demographic factors:** The literature shows mixed results about the relationship between income and food waste behaviour. Ganglibauer et al. (2013) and Stancu et al. (2016) have shown that consumers with higher income tend to waste more food, whereas Setti et al. (2016) have found that in Italy, mid-to-low income consumers purchase higher amounts of lower quality products and waste more food. There are also studies finding no correlation (Koivupuro et al., 2012; Visschers et al., 2016). Regarding lifestyle patterns, Parizeau et al. (2015) expressed that family lifestyle is linked to less food waste and social, cultural, economic, and institutional factors influence household food waste practices.

**Psychological factors:** Food waste is also linked with morality. Aydın and Yıldırım (2021) found a negative relationship between moral attitudes and food waste. In contrast, McCarthy and Liu (2017) found the impact of guilt and anxiety about wasting food and the knowledge of expiry dates on lowering levels of food waste. Jagau and Vyrastekova (2017) study food waste problem in a behavioural context. The experiment on university students reveal that social emotions of guilt and shame are factors affecting food waste. Russell et al. (2017) found habits and emotions as important determinants of food waste behaviour; more negative emotions are associated with increased intention to reduce food waste, and greater negative emotions are associated with greater food waste.

**Social environment:** Social and cultural interactions affect food waste behaviour. In this sense, religion and food behaviour are examined in the literature. We see a high level of food waste in Muslim countries during Ramadan (Ahmad, 2022). Minton et al. (2020) express that restrictive religious norms (e.g., rules about food consumption, fasting) lead to tremendous food waste, but supportive religious norms (e.g., sharing food) lead to reduced food waste. Abdelradi (2018) found that religion positively promotes wasting less food. Aydın and Yıldırım (2021) found the indirect impact of shopping habits such that consumers who do not shop more than needed report less food waste.

**Environmental awareness:** Reduction of food waste and being aware of the negative consequences of food waste behaviour are rarely investigated in the literature. Pocol et al. (2020) segment Romanian consumers regarding their food wastes as careless (wasting carelessly), pre-cautious (responsible people who do not throw away food and are well-informed), and ignorant (who do not consider themselves responsible for food waste).

In addition to food losses during production, conventional agriculture contributes to environmental problems such as water pollution, deforestation, carbon emission, and land erosion (European Environment Agency, 2015; Mateo-Sagasta et al., 2017; FAO, 2021). Sustainable ways to produce food with the minimum use of artificial inputs, local production and environment-friendly use of resources are encouraged, thereby leading to the increasing use of sustainable methods of production. It is noteworthy to mention that the demand for organic food products has been rising worldwide and one of the primary consumer motivations to consume organic is environmental awareness (Jonas and Roosen, 2005; Tsakiridou et al., 2008; Do Prado and Moraes, 2020; Ahmed et al., 2020). As a major agricultural producer, Turkey adopted organic agriculture in the mid-1980s, and the demand for organic food has doubled in recent years. Environmental concerns are one of the motivations for organic food purchases (Yılmaz and İlter, 2017; Göktuna and Hamzaoglu, 2018). Among organic consumers, food waste behaviour is rarely analysed. McCarthy and Liu (2017) found that green consumers are similar to mainstream food waste behaviour regarding environmental awareness. Additionally, they found no linkage between organic food consumption and reducing food waste (McCarthy and Liu, 2017). This study aims to close this gap.

### **3. SURVEY RESULTS AND ECONOMETRIC ANALYSIS**

#### **3.1. Data Description**

In this study, a consumer questionnaire of 97 different questions regarding food waste, environmental concerns and organic food consumption habits is conducted to 250 organic food consumers who live in Istanbul. We have chosen five central and populated districts: Beşiktaş, Fatih, Bahçelievler, Beykoz, Maltepe. We used a stratified random sample of participants and applied quotas based on age, gender, education, and district populations from the statistical document of Turkish



Statistical Institute (TURKSTAT, 2016). A private data research company conducted the questionnaire. Table 3 presents the socio-demographic characteristics of the sample.

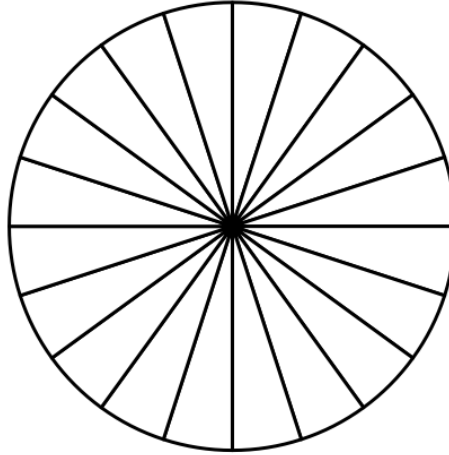
We should emphasize that all participants have stated that they consume organic food. In addition to socio-demographic questions, the survey includes questions regarding organic food preferences, environmental attitude and awareness and waste behaviour. More specifically, we measure the food waste behaviour as follows: we present a hypothetical plate to participants and ask them to show on the graph (Figure 2) how much of the food product they throw away recently by food types: dairy, egg, meat, oil, chicken, dried nuts, fish, snacks, bread, bakery, fresh food, and vegetables. Each slide on the graph represents 5% of a regular plate. Table 4 represents statistics of share of food waste regarding food types<sup>6</sup>. None of the participants declared to waste more than 30% of the hypothetical plate. 28 out of 191 participants reported that they never waste food; 85% of participants waste almost 5% of their plates.

**Table 3. Socio-Demographic Characteristics (Share %)**

Districts		Age	
Beşiktaş	23.90	18-24 years	9.96
Fatih	19.92	25-34 years	26.29
Bahçelievler	19.92	35-44 years	31.87
Beykoz	16.33	45-54 years	17.93
Maltepe	19.92	55-64 years	13.94
Employment Status		Children	
Public officer	4.80	0	39.84
Private sector employee	46.80	1	17.93
Self-employed	6.80	2	33.07
Unemployed	2.00	3	7.17
Housewife	27.60	4	1.59
Student	4.00	5+	0.40
Retired	8.00	Gender	
Marital Status		Male	70.00
Single	28.80	Female	30.00
Married	63.60	Household size	
Widow	7.60	1 person	8.40
Education		2 people	26.40
Primary-Middle School	12.00	3 people	22.80
High School	44.40	4 people	31.60
College-Master/PhD	43.60	5 people and more	10.80

<sup>6</sup> Sixty participants who reported not consuming one of these foods are excluded from the sample.  
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**Figure 2. The Hypothetical Plate in the Survey**



The least wasted food types are egg and meat. Then, there is dairy and fish. These products have mostly an expiry date clearly printed and are purchased accordingly. *It is possible that the expiry date requires planning in consumption and this might reduce food waste.* Interestingly, chicken comes only after snacks and dried nuts. The reason may be the fast consumption of these items. As far as the chicken category is concerned, although it is in the same category as meat, organic meat is more difficult to find in the market compared with organic chicken and it is more expensive, thus it has more value. As it can be seen, most organic consumers reported that they do not waste several food products such as dairy products, eggs, and meat, whereas most consumers waste at least 5% of their plate on bread, fresh fruits, and vegetables.

**Table 4. Food Waste Share by Food Type**

Food waste (plate %)	Number of people	Food waste (plate %)	Number of people	Food waste (plate %)	Number of people
Food Type	Dairy	Egg		Meat	
0	158	0	181	0	183
5	28	5	8	5	7
10	5	10	1	10	1
15	0	15	1	15	0
20	0	20	0	20	0
25	0	25	0	25	0
Food Type	Oil	Chicken		Dried nuts	
0	107	0	115	0	122
5	59	5	70	5	61
10	16	10	6	10	7
15	8	15	0	15	1
20	0	20	0	20	0
25	1	25	0	25	0
Food Type	Fish	Snacks		Bread	
0	144	0	143	0	49
5	40	5	42	5	81
10	7	10	5	10	40
15	0	15	1	15	20
20	0	20	0	20	1
25	0	25	0	25	0



Food Type	Bakery		Fresh fruits and vegetables	
	0	104	0	56
	5	81	5	110
	10	3	10	54
	15	3	15	1
	20	0	20	0
	25	0	25	0

### 3.2. Econometric Analysis and Results

We have conducted an econometric model where the dependent variable is the participants' average percentage of food waste. We tried to explain the change in this variable using socio-demographic variables, shopping behaviour, environmental behaviour, and religiosity using OLS estimation<sup>7</sup>. We have added religiosity to investigate the common belief that food waste over Ramadan is very high in Muslim Countries, in contrast with the teachings of moderation and self-discipline in food intake (Ahmad, 2022).

The econometric model is given in Table 4. We see that income has a positive impact on food waste; in other words, those with higher income tend to waste more food in line with the studies showing that higher income households waste more food (Ganglibauer et al., 2013; Stancu et al., 2016; Chalak et al., 2019). Another result supporting the income effect is that organic food consumers shopping from discount markets tend to waste less food. Our result conforms to the intuition, as there is a common belief that discount markets attract low-income consumers. Consumers with low income who shop from discount markets are more aware of food waste. No other socio-demographic category has a significant relationship with food waste behaviour.

In terms of shopping behaviour, we see that those who prefer shopping at discount markets tend to waste less. Similarly, consumers shopping from open bazaars tend to waste less. There may be two reasons behind this. First, open bazaars offer cheaper goods than other retailers in Turkey, those with low income prefer these places, and they are more aware of the food waste issue. Second, when we compare the correlation between the frequency of consumption and buying from open bazaars (0.32,  $p=0.00$ ) and the frequency of consumption and buying from discount markets (0.12,  $p=0.10$ ), we see that the correlation is significant and positive for open bazaar. The frequency of consumption increases as participants choose open bazaars. This is also in with empirical evidence that low-income households buy just enough for the day or a few days. In this case, the food will be fresh and useable. In Turkey, organic bazaars are rare in big cities. Metropolitan shoppers generally purchase organic products from mainstream retailers such as supermarkets. Those who spend time and buy organic products from organic bazaars are more aware of organic authenticity as locality, interaction with farmers, sustainability, and composting.

<sup>7</sup> We have used VIF analysis and correlation matrix to determine and eliminate the multicollinearity problem. To do so, we applied a stepwise selection method and excluded some variables with higher score (greater than 5) from our model.

We have chosen organic food consumers as this category of food products are produced with environmentally friendly methods. In addition to these, organic food is more expensive compared with conventional alternatives and the intuition suggests that the food would be more valuable and costly to waste. However, we have not found any significant relationship between frequency of consumption and food waste behaviour. The relationship is limited with organic shopping places.

Regarding environmental behaviour, we have four dimensions: membership to environmental groups and organizations, boycotting companies harming the environment, recycling and the use of energy efficient devices. For the membership to environmental groups, there is a significant positive relationship. This may result from the variety of motivations in environmental groups and from the fact that the food waste is seen more from an economic perspective. Participants boycotting products of companies harming the environment waste less. Here, we have more product and content awareness, which can lead to planning in consumption and the awareness about the environmental impact of the production and consumption. For recycling and the use of energy efficient devices, there is no significant relationship.

Religiosity is negatively and significantly correlated with food waste. We see that consumers relate religious statements on reducing food waste as opposed to the evidence in Ahmad (2022) and in line with the study of Abdelradi (2018).

**Table 5. Results of Econometric Estimation**

VARIABLES	Model
age	0.000937 (0.0203)
2.gender	-0.0338 (0.0440)
education	0.00652 (0.0321)
income	0.0138* (0.00795)
2.marital	0.0507 (0.0635)
3.marital	0.126 (0.0876)
hhnumber	0.0292 (0.0213)
childnumber	-0.00102 (0.0331)
freqorg	0.0316 (0.0225)
supermarket	-0.0786 (0.0622)
discount	-0.113* (0.0602)
orgshops	-0.0266 (0.0498)
orgbazaar	-0.0855* (0.0501)
openbazaar	-0.146*** (0.0467)

online	0.144 (0.113)
cooperative	-0.186* (0.105)
special	0.0363 (0.0605)
2.energyefficient	-0.0821 (0.0675)
religious	-0.0647** (0.0270)
envgroup	0.0723** (0.0309)
boycott	-0.118*** (0.0217)
recycle	-0.00288 (0.0201)
Constant	0.801*** (0.218)
Observations	190
R-squared	0.451

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### **4.DISCUSSION AND CONCLUDING REMARKS**

In this study, we have investigated organic food consumers' food waste behaviour in Turkey. As domestic organic food demand has become mainstream, mostly in urban areas by well-informed consumers, we have chosen Istanbul as the largest metropolitan city in Turkey. Organic consumers were targeted so as to acquire information on the perception of food waste problem as an environmental issue. Turkey is a developing country and food waste at the consumer level is very low compared with the waste in developed countries. Our results confirm this empirical fact as we have found that income and food waste has a significant and positive relationship.

Our aim was to find the relationship with environmental awareness. An analysis of different environmental attitudes show that food waste is less common in participants who stop using products because of the environmental harm in their production. This is in line with the intuition as this type of concern is more product oriented, related to the awareness of environmental implications of production and consumption processes. On the other hand, the study did not find any impact of recycling on food waste. It is possible to argue that important policy inefficiency exists as the Ministry of Environment promotes recycling with the "Zero Waste" campaign. The campaign provides the public information on waste types but does not mention food waste (Zero Waste Official Website). Thus, consumers' attention must also be directed to food waste problem. There is a positive relationship between food waste behaviour and being a member of an environmental group. Again, it is seen that environmental groups do not draw attention to the food waste problem adequately.

Regarding the results of this study, several policy recommendations can be made. First, policies targeting consumers with higher income who shop at supermarkets, online, etc. must be informed as the target group in the food waste problem. "Zero Waste" campaigns are done at the national level, a similar

campaign can be adopted. Education about food loss and waste and their implications can be given in schools. Additionally, organic consumers tend to be environmentally aware; thus, campaigns and policies disseminating organic agriculture can also point out the food waste problem. Lastly, information to prevent food waste during Ramadan must be underlined.

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