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Do culture and consciousness matter? A study on motivational drivers of household food waste reduction in Turkey

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ABSTRACT

Food waste reduction has taken a remarkable place in the objectives of the United Nations' Sustainable Development Goals and it has been considered a relevant topic by scholars, companies, and governmental organizations. This study aims to design and compare two competing models describing the influence of personally (consciousness) and socially (culture) determined factors on consumers' intention to reduce household food waste in Turkey. To do so, a cross-sectional study was conducted in three metropolitan cities of Turkey: Ankara, Izmir, and Adana. The primary data were collected from 710 individuals via face–to–face interviews and analyzed through two Structural Equation Models (SEM) based on the Motivation-Opportunity-Ability theoretical framework. Results from the SEM model investigating the role of cultural factors identify motivation as a significant driver of food waste reduction, which is directly influenced by religiosity, media effects, and good provider identity. Results from the SEM model related to consumer consciousness also show that motivation is a significant and robust driver of intention and that economic consciousness has a strong effect on motivation, while environmental consciousness has a weak influence on intention to reduce food waste. Findings of this study increase the knowledge of consumers' drivers to reduce food waste in an emerging country as Turkey and provide policymakers and practitioners insights to elaborate interventions to reduce household food waste tailored on consumers' cultural and consciousness factors.

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1. Introduction

Along the food supply chain, household food waste accounts for roughly one-third of the total (FAO, 2011) and, over the last twenty years, reducing food waste has been considered a crucial action by the United Nations to achieve the Sustainable Development Goals (SDGs). In particular, SDG Target 12.3 specifically aims at "*halving per capita global food waste at the retail and consumer levels and reducing food loss along production and supply chains (including post-harvest losses) by 2030*". This target also co-contributes to achieving other SDGs such as Zero Hunger goal (SDG 2), Sustainable Water Management (SDG 6), Climate Action (SDG 13) and terrestrial ecosystems, forestry, biodiversity (SDG 15) (FAO, 2019). Given this prominent role, an in-depth comprehension of behavioral factors influencing household food waste reduction is crucial in defining effective actions, policies, and strategies.

Household food waste has been generally considered a relevant problem particularly in developed countries and big efforts have been taken there to provide effective policy interventions while preserving the sustainability of the food system (Stenmarck et al., 2016). However, in recent years, food waste has become a top-line topic also in emerging countries, where food waste reduction policies and interventions are adopted with increasing frequency (UNEP, 2021).

On the other hand, most of the scientific studies on the determinants of household food waste still remain focused on European countries, in particular Italy, Romania, United Kingdom, Switzerland, and Germany, as well as in Japan and the USA. Since food waste drivers can be highly context related (van Geffen et al., 2020a), this lack of case studies from many areas of the world might cause a gap in the literature, which this work contributes to fill.

Although cross-country comparability is not always straightforward, this study aims to contribute to the literature on the analysis of behavioral drivers of household food waste in a country that is rising in this field of research and constitute a bridge between Europe and Asia: Turkey. According to United Nations Environmental Programme (UNEP), around 7.7 million tons/year of food waste is generated in Turkish households, a value considerably higher than some countries in Europe (4.0 million tons/year in Italy; 3.6 million tons/year in Spain) and Western Asia (4.7 million tons/year in Iraq; 3.6 million tons/year in Saudi Arabia). Also, the yearly average per capita of food waste

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generated in Turkey is higher than the global average, with 93 kg against 74 kg globally (UNEP, 2021).

This work investigates the behavioral drivers of household food waste in three Turkish metropolitan cities, Ankara, Izmir, and Adana. These three cities account for the 14,7 % of the total population of Turkey allowing to reach consumers from different age groups, income and educational level, and facilitating comparability with other studies related to food waste, since big cities are generally preferred as case studies.

To investigate the impact of behavioral drivers on household food waste reduction, this study adopts two competing models grounded on the widely recognized Motivation-Opportunity-Ability (MOA) framework. The MOA describes food waste as an unplanned consequence of decisions and behaviors related to household food management, driven both by individual (Motivation and Ability) and contextual (Opportunity) factors (van Geffen et al., 2020a). This study aims to expand the knowledge on the role of Motivation in individuals' propensity to reduce food waste in context of Turkey. In particular the two competing models explore the role of culture and consumer consciousness. These drivers refers both influence individual motivations but refer to two different dimensions, one personally determined, defined by consumers' awareness and attitude (consumer consciousness) and one socially determined, influenced by the social context (cultural factors).

To the best of the authors' knowledge, this study is the first to investigate motivational drivers affecting the intention to reduce food waste in Turkey. This study contributes to food waste literature from different perspectives. First, it contributes to the still limited literature on food waste reduction in emerging countries. Second, it provides findings on the effect of motivation as a mediator between cultural factors and consumer consciousness and the reduction of food waste. Within the former, it investigates the direct and indirect effects of culture, considering media effects, good provider identity, and the still underinvestigated religiosity. Within the latter, it explores the direct and indirect effects of consumer consciousness in the form of its three subdimensions, environmental consciousness, economic consciousness, and ethical consciousness, on individual intention to reduce household food waste.

2. Literature review

Scientific literature has focused on exploring the complexity of factors influencing the generation of food waste at household level like consumers' demographic characteristics (Grasso et al., 2019; Jungowska et al., 2021; Stancu et al., 2016) and behavioral drivers such as attitudes, social norms, perceived control (Neff et al., 2019; van Geffen et al., 2020b; Vittuari et al., 2021), food purchasing and preparing routines (Delley and Brunner, 2017; Liang et al., 2021), knowledge (Kavanaugh and Quinlan, 2020; Quested et al., 2013; Richter, 2017) and awareness (Attiq et al., 2021; Jarjusey and Chamhuri, 2017; Qi and Roe, 2016). Previous studies have suggested that personal motivations (Pappalardo et al., 2020; Vittuari et al., 2020) are a relevant driver of the intention to reduce food waste, while being affected by social and cultural factors as religion, media effects, cultural specificities (Aktas et al., 2018; Elshaer et al., 2021), and sustainability consciousness (Hansen, 2022). However, there is still a gap in understanding the direct and indirect effects of cultural factors and of consumer consciousness on the intention to reduce food waste.

A theoretical approach widely adopted to describe the relations between the behavioral drivers of consumers' food waste is based on the Motivation-Opportunity-Ability (MOA) framework developed in the seminal work of Rothschild (1999) and extended to the food waste domain by van Geffen et al. (2016). This framework describes the drivers of human behaviors and choices related to social issues and public health behaviors as influenced by a combination of personal (Motivation and Ability) and contextual (Opportunity) factors (see Fig. 1).

Motivation (M) describes the personal willingness to take actions to reduce or avoid consequences of their doings, as the generation of household food waste. It includes awareness about the consequences of food waste, concerns about its financial and environmental impacts, and concerns for food safety (Principato et al., 2015; Setti et al., 2018; Vittuari et al., 2020). Motivation also encompasses intentions, attitudes, injunctive norms, and moral norms as well as perceived behavioral control (Stancu et al., 2016), subjective norms, and the good provider identity (Aktas et al., 2018; Schanes et al., 2018; Stangherlin and de Barcellos, 2018).

Opportunity (O) refers to the possibility to access external materials and resources allowing behavioral change (Shwom and Lorenzen, 2012). In the food waste domain, Opportunity includes the availability of time to be dedicated to food preparation, the possibility to schedule food management activities, kitchen materials, and technologies, and infrastructure such as, portion or package size, discount promotions in shops, etc. (Stancu et al., 2016; van Geffen et al., 2020a).

Finally, Ability (A) includes the knowledge and skills needed to manage food in an efficient way, thus minimizing the generation of food waste. Most relevant are the proficiency in understanding food labels and in estimating the edibility of food (Smith and Landry, 2020; van Geffen et al., 2020a), food preparation skills, and more in general, the proficiency to solve the problems encountered during the process of behavioral change, as the overcoming of consolidated habits and routines and the contrasting arguments of peers (Rothschild, 1999). The MOA framework has been adopted in studies related to different countries,

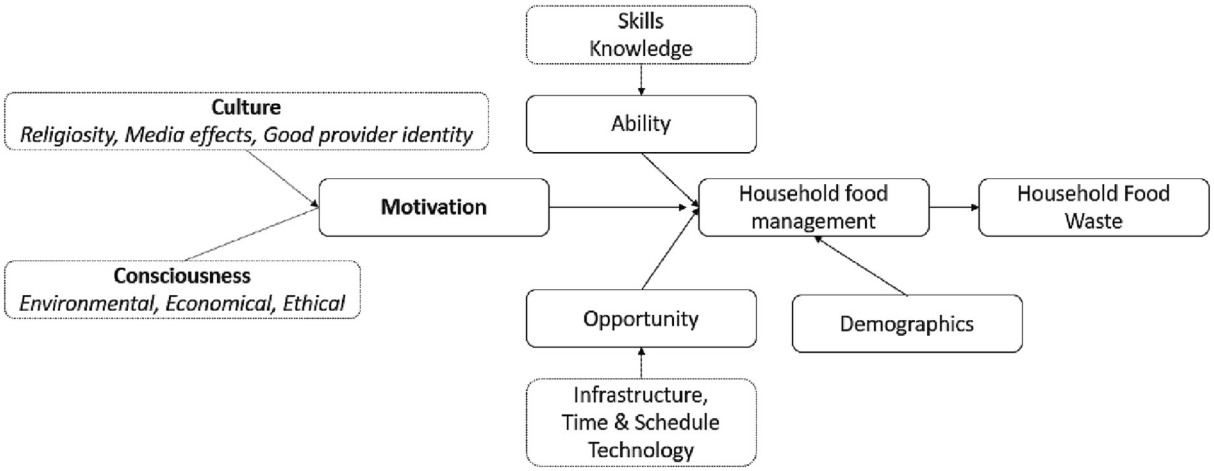


Fig. 1. The Motivation-Opportunity-Ability (MOA) theoretical framework.

as Italy (Masotti et al., 2023; Vittuari et al., 2020), Canada (Soma et al., 2021), the Netherlands (Aramyan et al., 2021; Masotti et al., 2023; Vittuari et al., 2021).

2.1. Two competing models linking motivation and intention to reduce household food waste

Within the theoretical setting of the Motivation-Opportunity-Ability framework, defines 6 research hypotheses on the relations between Motivation and a set of behavioral drivers related to culture and consciousness.

Hypothesis 1. Motivation is directly associated with the intention to reduce food waste.

Hypothesis 2. Behavioral factors referring to Motivation are related to two different dimensions, one personally determined (consciousness) and one socially determined (cultural factors).

Literature on behavioral drivers of household food waste explored motivational factors influencing its generation. Those drivers can be categorized in factors determined by social elements, as the cultural factors (Graham-Rowe et al., 2015; Visschers et al., 2016), and elements determined by intrinsic personal characteristics like consciousness (Abeliotis et al., 2014; Stancu et al., 2016). This study explores whether a stronger motivation to perform a goal is correlated with a stronger intention to enact a particular behavior (Iwasaki et al., 2021; Schanes et al., 2018). Since consumers generally perceive food waste as an unethical behavior (National Academy of Science, 2020; Roodhuyzen et al., 2017; Setti et al., 2018) this work explores the level of concern about the effects of household food waste expressed by Turkish consumers, since the issue is considered to have relevant moral and ethical consequences. Also, it explores how this concern is influenced by personally or socially determined Motivation-related factors.

Hypothesis 3. Cultural factors (religiosity, media effects and good provider identity) are directly associated with the intention to reduce food waste.

Hypothesis 4. Motivation has a mediating effect between cultural factors and the intention to reduce food waste.

In this study, religiosity, the influence of media, and good provider identity are considered to reveal the effect of culture on food waste related behavior and on individual motivation to reduce food waste. Culture is broadly defined by Tylor (1871) as "that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society". (Solomon et al., 2013) underline that consumption choices can only be figured out in their cultural conditions. Considering culture as a holistic system, previous studies highlighted a strong relationship between culture and behaviors related to food purchasing, management, preparation, and consumption, (Nemeth et al., 2019; Sibal, 2018; Thyberg and Tonjes, 2016). Other authors emphasized that also food waste generating patterns are shaped by cultural beliefs and habits (Aschemann-Witzel et al., 2015; Pelau et al., 2020; Phasha et al., 2020). Among cultural factors, religiosity is considered to play a relevant role in the individual intention to reduce household food waste (Nemeth et al., 2019). So, behaviors aimed at avoiding wasting food might be shaped by ethical values, rules, doctrines, or norms derived from religious precepts (Aschemann-Witzel et al., 2015).

Since religion is a cross–national phenomenon, studies from different countries can contribute to better understand how religiosity affects individual food waste related behavior and what are the differences among communities from a religious point of view. For example, some authors explored the effects of religiosity (Elshaer et al., 2021) or religious rituals like Ramadan on food waste in Qatar (Aktas et al., 2018), in Egypt (Abdelradi, 2018). In particular, Elshaer et al. (2021) found that religious beliefs indirectly affect intentions to reduce food waste as a mediator between different factors, as the intensity of religious beliefs, precepts, and restrictions related to food consumption and management. Also, even if religiosity has an influence over individuals' attitudes or behaviors, as mentioned by Elshaer et al. (2021), the attitudes or behaviors are influenced by the intensity of the religious sentiment. So, people belonging to a community may comply to religious practices, doctrines or values from religious beliefs with different degrees of intensity. In Turkey, the most common religion is Islam, that is adopted by the 99.8 % of the population. Islam states that all opportunities (materials or assets) are donated to people by Allah and accepted as trusts. They should be used for purposes that are suitable for gaining Allah approval and bringing happiness to people. Following that, the Holy Quran states that "*Children of Adam! beautify yourselves for every act of worship, and eat and drink (freely), but do not waste: verily, he does not love the wasteful*" in surah al-Araf. Another verse in this holy book points out that "*And render to the kindred their due rights, as (also) to those in want, and to the wayfarer; but squander not in the manner of a spendthrift*" in surah al-Isra. Also, in surah al-Furkan, it is suggested that "*'They are' those who spend neither wastefully nor stingily, but moderately in between*". As McDaniel and Burnett (1990) stressed, this teaching may generate individual commitment to following the teachings of God. In Turkish culture, it can be observed that even these teachings have impact on community life, people's final behavior is quite varied as many other countries.

The second element of cultural identities explored in this work is the role of media. Media has an influence on individuals' food purchasing and eating habits and as a consequence, on the generation of household food waste (Monteiro et al., 2013). Recently, Turkish and international mass media produced an increasing quantity of content related to food, as TV programs conducted by food celebrities, food competitions, and other typologies of culinary activities. These productions received public attention and stimulated consumers to try and consume an increasing and excessive quantity of food of different varieties (Temeloğlu and Taşpinar, 2018). A consequence of this exposure of food related content in media might result in an increase in food waste at the household level. Moreover, posts on social media about food consumption have an impact on eating preferences, in particular by stimulating overbuying and impulsive buying of food products that often requires high preparation skills (Azazz and Elshaer, 2022; Lahath et al., 2021), indirectly increasing the production of food waste (Seçer and Boğa, 2017).

While some studies explore the effects of social media on consumers' intention to reduce food waste (Ponis et al., 2017; Wakefield and Axon, 2020; Young et al., 2017), to the best of the authors' knowledge, there are no studies exploring the effects of mass media and social media on consumers' motivation and intention to reduce food waste in Turkey.

Finally, the "Good Provider Identity" is recognized as one of the main motivational factors influencing food waste generation (Stangherlin and de Barcellos, 2018). When receiving guests, parents, partners, or friends, individuals tent to increase their propensity to buy, prepare and present an amount or variety of food greater than those that will be consumed by hosts, as a sign of their hospitality and caring (Graham-Rowe et al., 2014; Visschers et al., 2016; Werf et al., 2019). In other words, having stronger willingness to be a good provider may create a conflict with individuals' intention to reduce food waste and the propensity to generate it.

Hypothesis 5. Consumer consciousness is directly associated with the intention to reduce food waste.

Hypothesis 6. Motivation has a mediator effect between consumer consciousness and the intention to reduce food waste.

Consciousness is defined as "the ability of a person to recognize her/himself and her/his surroundings" and an individual is aware of her/his activities and behaviors through consciousness (Zureik and

Mowshowitz, 2005). In this study, consumer consciousness about consequences of food waste is considered in its three sub-dimensions: environmental, ethical, and economic.

Environmental consciousness is defined as a person's judgments, attitudes, awareness, and motivation regarding environmental problems (Fujiki and Zheng, 2013; Takács-Sánta, 2007). According to this definition, involvement in pro-environmental behaviors is associated with individuals' beliefs, knowledge, and a favorable tendency towards personal activities that can have positive effects on preserving the natural environment. An increasing number of research shows that environmentally conscious consumers who are aware of the negative effects of food waste, as the increase of greenhouse gases emissions, energy consumption, and soil contamination, may be more propense to adopt actions and behaviors aimed to reduce it (Elhoushy, 2020; Neff et al., 2015; Russell et al., 2017).

The economic perspective of consumers is influenced by their experiences, knowledge, and social relations with peers (Annunziata et al., 2020; Hao et al., 2022). Also, productive and distributive inefficiencies related to food waste can have disruptive effects on social equality, welfare, and well-being of consumers, (Morone et al., 2018). Hence, it is fundamental to promote the development of sustainable and efficient food systems, that minimize the quantity of wasted food waste (Buerke et al., 2017; Graham-Rowe et al., 2014). On this basis, literature found that an increased consumer consciousness on economic impact of food waste can affect consumers' motivation to minimize it (Hao et al., 2022; Setti et al., 2018; Stancu et al., 2016).

Huh (2011) stressed that individuals tend to adhere to ethical values when purchasing food and consider them as a relevant parameter of choice. Ethical consumption is defined as "*the conscious and deliberate decision to make certain consumption choices due to personal moral beliefs and values*" (Crane and Matten, 2007). As Budhathoki et al. (2019) noted, an increasing number of studies aim to understand ethical consumption behavior both adopting qualitative and quantitative approaches. Other studies found that individuals are propense to consider ethical values such as fair trade, animal welfare, labor right, or sustainability through their consumption patterns and behaviors (Bray et al., 2011; Sebastiani et al., 2013; Zollo et al., 2018). So, the increase of consumers' consciousness about economic, social and environmental impacts of food waste might be an incentive to reduce it (Stancu et al., 2016).

3. Materials and methods

3.1. The questionnaire and the sample

A cross–sectional study based on the results of a consumer survey was conducted to investigate the behavioral factors affecting consumers' intention to reduce food waste among Turkish citizens living in Ankara, Izmir, and Istanbul. This subsection introduces the questionnaire design, sample size, and the data collection process.

The questionnaire included five sections. Section A investigated the consumers' demographic characteristics, Section B included questions related to consumers' motivation to reduce food waste, Section C presented questions on cultural factors, and Section D and E focused on consumer consciousness. Sections B to E were central for the definition of the factors included in the two models describing the role of Motivation on consumers' intention to reduce household food waste. In particular, Section B investigated consumers' habits related to food management and disposal waste, as the share of food wasted in the household, the communication channels through which information about food is collected, and the perceived reasons for food waste in the household. Then, Section C investigated the self-reported motivations to reduce food waste through questions on perceived factors influencing its generation. Section D measured the consumer consciousness about food waste consequences through questions concerning environmental, ethical, social, and economic consciousness. Finally, section E measured food-waste related behavior specific for the Turkish context, as influence of religiosity, mass-media effects, and country specific eating and good-provider identity habits.

In all sections of the questionnaire questions asked to indicate the level of agreement with specific statements according to a 5-point Likert scale, with categories ranging from strongly disagree (1) to strongly agree (5). Items adopted in the questionnaire were designed from validated questions from previous studies (Aktas et al., 2018; Stancu et al., 2016; Visschers et al., 2016), with some new ones developed by the authors. Questions were also adapted to represent the common habits and traditions of consumers in Turkey. The questionnaire was developed in English, translated in Turkish by the authors, validated by three Turkish-speaking external experts and pilot-tested with 20 respondents. The final version of the questionnaire was developed and adopted for data collection The English version of the questionnaire is included as Supplementary material.

Primary data was collected face–to–face by a professional research company between March and April 2021 in Turkey. To obtain a representative sample of the citizens of Ankara, Izmir, and Adana, sample size was defined in 710 respondents distributed considering the population size of the three cities: 303 respondents from Ankara, 205 from Izmir, and 202 from Adana. The sample was designed to represent the research area in terms of socio-demographic and economic characteristics using adequate quotas in terms of gender, age and income. Respondents were selected among individuals aged between 18 and 65 years, equally divided across genders. They were also selected according to their income level, close to the country average, and their role and responsibility in food preparation within the household. The respondents represented their household to avoid duplicated answers.

Although surveys on food waste are well established in the literature, they present some limitations that should be considered. First, self-declarations of respondents on self-perceptions may present social desirability biases and incorrect estimation of purchased and discarded food. Also, even if the questionnaire was validated by experts and tested through pilot submissions, differences between English and Turkish languages may lead to slight misinterpretation of the meaning of questions and answers. Both shortcomings are considered to have a small impact on this research since, this work is not focused on the precise estimation of food waste quantities generated by respondents and the face-to-face interviews allowed respondents to clarify their doubts with the interviewers.

3.2. Data analysis

Survey data were analyzed in three stages. First, descriptive statistics (frequencies, ratios, and averages) were calculated to explore the socio-demographic characteristics of the sample. Then, a confirmatory factor analysis was implemented to describe the structures of the latent factors. Finally, the relationship between consumers' intention to reduce food waste and its Motivation-related determinants were investigated through a Structural Equations Modelling (SEM) approach. The competing roles of consumer consciousness and cultural factors on the intention to reduce household food waste are disentangled in the two models highlighting which dimension, between personally and socially determined ones, better describe the intention of respondents to reduce household food waste.

Structural Equation Model is one of the most adopted methodologies to elaborate behavioral and survey data since it allows to simultaneously analyze many relationships and includes latent constructs in the analysis as explanatory variables.

4. Results

4.1. Socio-demographic characteristics

The sample represents the demographic structure of the population of Adana, Ankara, and Izmir. It is slightly unbalanced towards women

Table 1
Demographic characteristics of respondents.

Char.	Groups	f	%	Char.	Groups	f	%
Provinces	Adana	203	28.6	Age	18–29	292	41.1
	Ankara	302	42.5		30–39	255	35.9
	İzmir	205	28.9		40–49	115	16.2
	Total	710	100.0		50–65	48	6.8
Gender	Woman	395	55.6		Total	710	100.0
	Man	315	44.4		Average	33.4	
	Total	710	100.0	Occupation	Private sector	274	38.6
Education Level	Primary Sch.	21	3.0		Government staff	81	11.4
	Secondary Sc	12	1.7		Self-employed	93	13.1
	High Sch.	292	41.1		Retired	24	3.4
	Undergraduate	319	44.9		Unemployment	54	7.6
	Postgraduate	66	9.3		Housekeeper	69	9.7
	Total	710	100.0		Student	115	16.2
					Total	710	100.0

(55.6 % of the total) and the most represented age classes are 20–29 (41.1 % of the sample) and 30–39 years old (35.9 % of the total). The majority of the sample has at least a high school diploma (95.3 % of the total), and the most common occupations, beside students, are employed in private sector and government staff, with shares of 38.6 % and 11.4 % of the total of the respondents (Table 1).

Almost 60 % of households are composed of 3 or 4 members, while the remaining 40 % is divided almost equally between small families of 1–2 members and large households, with >5 members. Moreover, 21.4 % of households have 1 child, and almost 10 % have 2 or more children. Concerning income level, the households interviewed in this study are almost equally distributed between the three income classes, with a small prevalence of low-income families (income lower than 4000 Turkish Liras per month), while the high-income households (income higher than 7001 TL per month) represent the relative minority of the sample (Table 2).

4.2. Model 1: the role of cultural factors on intention to avoid food waste

Confirmatory factor analysis is adopted to identify the items at the base of the latent variables of cultural factors (Intention to avoid food waste = Int; Religiosity = Rel; Media Effect = ME and GPI = Good Provider Identity) to be included in the Structural Equation Models. Latent variables are assessed through factor loadings, that represent the correlation coefficient for the variable and factor, Cronbach's alpha values, composite reliability (CR), and average variance extracted (AVE). All factor loading estimates are above 0.5 and significant at the 1 % level ($p < 0.001$) (Table 3) meaning that all items are strongly correlated to the assumed latent variables. The Cronbach's Alpha test is used to measure the internal consistency of each factor indicating reliability for the model. Generally, the values ensuring a high level of consistency of the data are >0.7. In the study, Cronbach's alpha value for each factor is also found to be above cut-off level ranging from 0.724 to 0.872 (0.797 for intention, 0.872 for motivation; 0.724 for religiosity; 0.790 for media effect; 0.809 for good provider identity). CR and AVE values are also evaluated to confirm the internal reliability and convergent validity, respectively. As Fornell and Wernerfelt (1987) suggested the CR values, being above 0.70 for each factor (from 0.82 to 0.96), showed that all factors had high internal reliability. Furthermore, AVE values give information about convergent validity that must be above 0.50 (Fornell and Larcker, 1981). In this study, AVE values for all factors were found to be around 0.50 (from 0.46 to 0.58). However, as Malhotra and Dash (2011) suggested, since CR values give better information on the convergent validity of the construct, those values confirm that this model satisfies the requirement s for convergent validity.

The path analysis can be adopted to investigate the results since the measurement model satisfies the requirements. Goodness of fit values (χ^2/df = 4.774; CFI = 0.869; RMSEA = 0.073; RMR = 0.077; NFI = 0.840; NCP = 913,235; SRMR = 0.0646) confirmed that the model is fitting the data from the results of the survey ($R^2 = 0.52$). All variables covariate significantly in the same direction. All mediating effects are tested with the Bootstrap ($n = 2000$, 95 % Cl) method. Fig. 2 describes the direct and indirect effects of cultural factors, and motivation on intention to reduce food waste, with motivation as mediating factor. According to the results of the analysis, motivation has a significantly positive impact on the intention to reduce food waste ($\beta = 0.71$). In other words, more motivated consumers have more tendency to reduce food waste. Religious sentiment is positively associated with motivation ($\beta = 0.186$). It can be assumed that religious people may have a better consciousness of wood waste as an issue related to society and the environment.

Media effect is also positively related to motivation ($\beta = 0.139$), while good provider identity has a slight negative association with intention to reduce food waste ($\beta = 0.044$). When considering direct effects, religiosity, media effects and good provider identity do not have a significant impact on the intention to reduce food waste. Moreover,

Table 2
Household characteristics of respondents.

Char.	Groups	f	%	Char.	Groups	f	%
Household Size	1–2	150	21.1	Family	Single person household	94	13.2
	3–4	424	59.7	Type	Married without children	65	9.2
	5+	136	19.2		Married with children	522	73.5
	Total	710	100.0		Parents with children living out	2	0.3
Number of children below 12 years old	0	490	69.0		Single parent family	1	0.1
	1	152	21.4		Extended family	26	3.7
	2 and more	68	9.6		Total	710	100.0
	Total	710	100.0	Food	<100	190	26.8
Income	<400	269	37.9	Expenditure	100–200	304	42.8
Level (TL/Month)	400–700	241	33.9	(TL/Month)	201-	201	28.3
	701-	200	28.2		Total	695	97.9
	Total	710	100.0		No answer	15	2.1

Note: income levels and food expenditure are expressed in Turkish Liras (TL) per month. 20 TL = 1 Euro (December 2022).

Table 3
Factor loadings for cultural factors.

Items			Coeff.	S.E.	C.R.	*P*-value
Intention						
Int1: eating all purchased foods	<	Int	1.000			
Int2: using all leftovers	<	Int	0.695	0.051	13.771	0.000
Int3: reducing food waste in the near future	<	Int	0.895	0.048	18.638	0.000
Int4: tell friends and family to reduce food waste	<	Int	0.677	0.051	13.211	0.000
Int5: trying very hard not to throw away food	<	Int	0.961	0.048	19.904	0.000
Motivation						
Mot1: feeling bad about discarding food	<	Mot	1.000			
Mot2: feeling of obligation	<	Mot	0.958	0.058	16.427	0.000
Mot3: discarding food is contrary to my principles	<	Mot	1.009	0.066	15.407	0.000
Mot4: being educated to not waste food	<	Mot	1.066	0.062	17.327	0.000
Mot5: reducing FW leads to better quality of life	<	Mot	1.176	0.064	18.247	0.000
Mot6: preventing FW is everyone responsibility	<	Mot	0.866	0.054	15.934	0.000
Mot7: seeing FW gives me bad feelings	<	Mot	0.883	0.053	16.723	0.000
Religiosity						
Rel1: abundance of food preparation in general during Ramadan month	<	Rel	1.000			
Rel2: abundance of food preparation for guests during Ramadan month	<	Rel	1.074	0.105	10.204	0.000
Rel3: abundant of food preparation for guests during Eid festivals	<	Rel	1.985	0.159	12.447	0.000
Rel4: weddings, births and funerals cause FW	<	Rel	1.811	0.147	12.345	0.000
Media effect						
ME1: food advertisements cause food waste	<	ME	1.000			
ME2: posts on social media increase food waste	<	ME	1.016	0.065	15.659	0.000
ME3: TV programs on cooking increase food waste	<	ME	1.387	0.088	15.750	0.000
Good provider identity						
GPI1: I always have abundance of fresh products	<	GPI	1.000			
GPI2: I buy fresh products regularly	<	GPI	1.156	0.086	13.475	0.000
GPI3: I cook more than necessary for the family	<	GPI	1.439	0.100	14.334	0.000
GPI4: feeling of preparing food more than necessary when having guests	<	GPI	1.391	0.095	14.639	0.000
GPI5: feeling of preparing a large variety of foods more than necessary for guests	<	GPI	0.813	0.072	11.271	0.000

$^{***}p < 0.001$ $^{**}p < 0.01$ $^{*}p < 0.05$.

motivation has a significant mediating effect between religiosity (β = 0.139), media effect (β = 0.139) and good provider identity (β = 0.139) and intention to reduce food waste. Since those factors are not significantly associated with intention, motivation acts as full mediator between these factors and intention (Table 4).

4.3. Model 2: the role of consumer consciousness on intention to avoid food waste

According to the results of confirmatory factor analysis of consumer consciousness concept (Intention to avoid food waste = Int; Environmental Consciousness = EnvC; Ethical Consciousness = EthC; Economic Consciousness = EnvC), all factor loading estimates are above 0.5 and were significant at 1 % level ($p < 0.001$) (Table 5). The Cronbach's Alpha values ranged from 0.796 to 0.829 (0.809 for intention; 0.822 for motivation; 0.796 for environmental consciousness; 0.829 for ethical consciousness; 0.825 for economic consciousness). In this study, AVE values were found above 0.50 (ranging from 0.50 to 0.64) and CR values were gathered larger than 0.70 (ranging from 0.86 to 0.93). Given the values of the compliance indicators, results from factor analysis can be the starting point for the following Structural Equation Model.

According to path analysis results, goodness of fit values ($p < 0.01$; $\chi^2/df = 4.362$; CFI = 0.927; RMSEA = 0.069; RMR = 0,059; NFI = 0.908; NCP = 420,262; SRMR = 0.0636) confirmed the validity of the model. Covariance analysis showed that all variables covariate significantly in the same direction, and all mediating effects are tested with the Bootstrap method (n = 2000, 95 % CI). The direct and indirect effects of the intention to reduce food waste and the consumer consciousness concept mediating motivation are shown in Fig. 3.

According to the results of the analysis, motivation has a significantly positive impact on the intention to reduce food waste (β =0.544). Considering motivation, economic consciousness has a consistent positive impact with this factor (β = 0.553). Also, environmental consciousness (β = 0.146) and ethical consciousness (β = 0.120) have a positive impact on motivation to reduce food waste, even if with a lower magnitude than the economic motivation. So, individuals who are more aware of the consequences of food waste may be more motivated to act to reduce it.

Also, the model shows that ethical consciousness has a negative direct impact on individual intention to reduce food waste (β = −0.166), while economic consciousness has a positive direct impact (β = 0.123) on it. Moreover, economic consciousness has a positive relationship with intention mediating motivation (β = 0.301), while environmental consciousness (β = 0.079) and ethical consciousness (β = 0. 065) have less impact on intention mediating motivation, they are positively associated with intention to reduce food waste.

Motivation to reduce household food waste is then influenced by environmental, ethical, and economic consciousness and acts as mediator between these three constructs and the intention to reduce food waste (Table 6). Since consumer consciousness has also direct and positive effects on intention to reduce food waste, it has a partial mediating role between these constructs.

5. Discussion

This study focuses on how cultural factors and consumers' consciousness can be considered as precursors of consumers' motivation to reduce food waste at household level. When comparing results from the two proposed competing models, data shows that the one describing the impact of cultural factors better explains data collected though the household survey. Therefore, socially determined factors better explain the consumers' intentions to reduce food waste, when compared to personally determined ones. Results from Model 1, investigating the role of cultural factors on intention to reduce food waste, suggest that motivation is its strongest driver (H1) coherently with previous results found in literature (Russell et al., 2017; Vittuari et al., 2021). Results of the model show also no direct effects of religiosity on the intention to avoid food waste (H2). However, religiosity has an

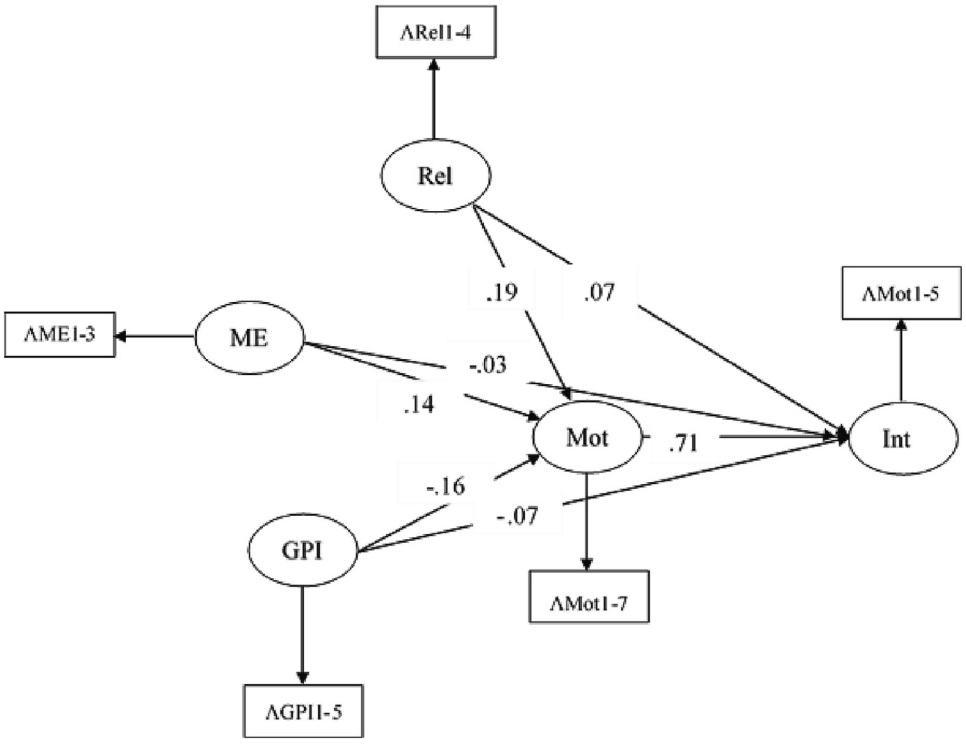


Fig. 2. Impact of cultural factors on individual intention to reduce food waste.

indirect positive effect on the intention to avoid food waste, acting as a full mediator on respondents' motivation (H3). Given this relationship, it is expected from people who have more religious beliefs to have stronger feelings, attitudes, and personal norms against food waste (Graham-Rowe et al., 2014; Russell et al., 2017).

Results also highlight the presence of a gap between religiosity and consistency to reveal these beliefs into real actions for Turkish consumers. This result is in line with Elshaer et al. (2021) that find religion to have a significant positive effect on intention to reduce household food waste. Furthermore, Elhoushy et al. (2021) also found similarly that religiosity is positively associated with personal norms. By contrast, in some cultures, religious implications may lead to an increase of food waste related to over-consumption, especially during religious holidays and events. For example, some food related habits during Ramadan month may increase food waste quantity as a result of higher food consumption, as found for Qatar (Aktas et al., 2018).

Results from this study show also that media exposition has a small indirect effect on the intention to reduce food waste, since it directly influences motivation (H3). Recently, information campaigns to promote food waste reduction and to increase the awareness on its consequence of this issue are being promoted in Turkish mass media, but probably they could not lead to significant reduction of food waste produced by Turkish households. Also, some trends of new television productions focused on food may stimulate consumers to prepare more food than they can consume, thus generating food waste. Similarly, a study from China also revealed that social media has only quite a limited positive effect to change consumer behavior towards food waste generation (Tsai et al., 2020).

Also, the good provider identity presents a negative indirect impact on intention, while being a full mediator with the motivation to reduce food waste (H3). This result is coherent with previous findings from literature, showing that people who would like to be generous and good hosts have a high propensity to present food more than they would consume (Graham-Rowe et al., 2014; Visschers et al., 2016; Delley and Brunner, 2017). This propensity derives from personal expectations and cultural habits that push consumers to over-prepare and over-purchase food to offer to hosts, to follow strong hospitality traditions and behaviors.

Results from Model 2, related to the impact of consumer consciousness on individual intention to reduce food waste, show that motivation is one of the most robust drivers of willingness to waste less food (H1). In this model, the strongest factor to increase individual motivation to reduce food waste is economic consciousness (H4). Being aware of the financial cost of food waste is usually indicated by other authors as driver of food waste stronger than other factors related to environmental, ethical, or social consciousness (Graham-Rowe et al., 2014; Palmieri and Perito, 2020). The indirect impact of economic consciousness on intention through motivation is also an important role even being relatively lower than the direct effect (H5).

Results of this study found that environmental consciousness has no significant direct effect on intention to reduce household food waste (H4). This contrasts with other studies (Amirudin and Gim, 2019; Katt and Meixner, 2020; Lin and Guan, 2021) that found positive correlations between individuals' environmental awareness and intention to decrease the quantity of food waste generated in their households.

Table 4
Impact of cultural factors on individual intention to reduce food waste.

Hypothesis path	Coefficient	S.E.	P-value	Results
Religiosity – motivation	0.186	0.060	0.001	Accepted
Media effect – motivation	0.139	0.039	0.003	Accepted
GPI - Motivation	−0.157	0.044	0.003	Accepted
Motivation - intention	0.714	0.066	0.001	Accepted
Religiosity – intention	0.074	0.063	0.114	Rejected
Media effect – intention	−0.028	0.042	0.464	Rejected
GPI - Intention	−0.065	0.047	0.133	Rejected
Indirect effect 1: religiosity – motivation - intention	0.133	0.041	0.001	Accepted
Indirect effect 2: media effect – motivation - intention	0.099	0.038	0.005	Accepted
Indirect effect 3: good provider identity - motivation - intention	−0.112	0.034	0.001	Accepted

$R^2 = 0.52$.

Table 5
Factor loadings for consumer consciousness.

Item			Estimate	S.E	P-value
Intention					
Int1: I always try to eat all purchased foods.	<	Int	1.000		
Int3: I intend to seriously reduce my food waste in the near future	<	Int	0.871	0.050	0.000
Int5: In general, I try very hard not to throw away food	<	Int	1.031	0.053	0.000
Motivation					
Mot1: I feel bad when I throw food away.	<	Mot	1.000		
Mot2: I feel obliged not to waste any food.	<	Mot	0.937	0.042	0.000
Mot3: being educated to not waste food	<	Mot	0.776	0.041	0.000
Environmental consciousness					
EnvC1: FW causes waste of environmental resources	<	EnvC	1.000		
EnvC2: CO_2 emissions are generated from production and transport of food	<	EnvC	1.162	0.086	0.000
EnvC3: loss of biodiversity and desertification are generated from production of food	<	EnvC	1.304	0.089	0.000
EnvC4: global warming and climate change problems are increased by intensive food production and consumption.	<	EnvC	1.379	0.091	0.000
Ethical consciousness					
EthC1: FW is in relation with undernourished people	<	EthC	1.000		
EthC2: reducing FW is a way to save money	<	EthC	1.676	0.095	0.000
EthC3: generating FW would give me a bad conscience	<	EthC	1.573	0.090	0.000
Economic consciousness					
EcoC1: I think that wasting food is a waste of money	<	EcoC	1.000		
EcoC2: FW generates loss of economic resources for the purchase of food that is not consumed.	<	EcoC	1.054	0.039	0.000
EcoC3: reducing FW is a way to save money	<	EcoC	0.847	0.048	0.000
EcoC4: In Turkey, the food waste generated by households has great financial consequences	<	EcoC	0.633	0.046	0.000
EcoC5: Positive economic effects of sorting food waste and garbage	<	EcoC	0.804	0.046	0.000

$^{***}p < 0.001$ $^{**}p < 0.05$.

However, results from Model 2 show that environmental consciousness has a direct positive impact on motivation (H4) and an indirect positive impact on the intention to reduce food waste of Turkish consumers (H5). So, motivation has the role of full mediation between environmental consciousness and intention.

In some cases, consumers do not perceive any association, or perceive a slight correlation between the loss of environmental resources and food waste (Quested and Johnson, 2012; Rasool et al., 2021). Turkish consumers are substantially aware of the direct link between economic loss and household food waste while their awareness of the link between environmental concern and food waste is quite weak in line with the literature that sees consumers generally aware of economic losses of food waste but not of the environmental consequences (Graham-Rowe et al., 2014; Parizeau et al., 2015).

Finally, ethical consciousness has a significant negative indirect effect on intention (H4). Surprisingly, in the same line with the current study, the intention for wasting less food is not determined by ethical aspects in previous studies (Stancu et al., 2016).

5.1. Policy implications

Food waste is well known to have economic, environmental, and social impacts and it is generated by various determinants such as cultural factors, consumer consciousness, and daily food consumption habits. This study revealed the effects of cultural factors (religiosity, media effects, and good provider identity) and consumer consciousness (environmental, economic, and ethical) on the intention to reduce food waste in two competing models. This study has produced results that can be at the base of policy recommendations for both practitioners and policymakers aiming to promote interventions to reduce food waste generated by Turkish households.

According to research findings, cultural factors have a significant impact on the food waste-related behavior of Turkish consumers. Motivation has been found as the most robust driver of intention to reduce food waste in this model. Religiosity may also have a power on the Turkish people to reduce food waste. So, information and motivation campaigns aimed to reduce food waste could adopt strategies relying on messages connected with religion or themes to change individuals' behavior connected to food waste generation.

Model 2 shows that exposition to media effect has an indirect effect on motivation and a direct effect on intention to reduce food waste. This instrument can be used as a lever to increase consumer consciousness and the ability to control food waste. Cooking programs may introduce easy and accessible tools or methods to reduce food waste. Since social media also may be an effective instrument to reach large communities and shape their habits, they can be used to vehiculate information about causes, effects, and potential solutions to the generation of household food waste from governmental, non-governmental, and private organizations to the public in general. Also, tailored social media tools, such as dedicated pages and channels, can help consumers to learn the ways and techniques to manage, store and dispose correctly of food and leftovers.

Concerning consumer consciousness, Turkish consumers' intention to reduce food waste is highly influenced by the awareness of the economic consequences of wasting food and, to a lesser extent, by its environmental consequences.

Consumers tend to consider economic loss coming from food waste instead of the environmental and social effects of this global issue. Governmental organizations can take the lead in supporting and organizing broadcasting about the environmental, economic, and social consequences of generating food waste. Educational organizations might take advantage of traditional and social media spaces to inform consumers about the effects of food waste for future generations and to promote tools and techniques aimed to generate less food waste.

Increasing consumers' consciousness about consequences of food waste and leveraging on cultural factors to promote more sustainable food related behaviors can contribute to a general change of social norms related to food waste. These changes could influence both consumer behavior and the general organization of the food supply chain, that could be encouraged to adopt procedures and standards aiming to satisfy the demand for products and services that generate low levels of food waste (Southerton and Yates, 2014). Also, interventions aiming to enhance the social desirability of food waste reduction can change the perception of what consumers consider as food waste, also reducing concerns related to its safety (Watson and Meah, 2012). Literature describes food waste not as a planned behavior, but as an unintended consequence of actions related to different phases of food management, such as acquiring, storing, assessing, valuing, eating, and disposal.

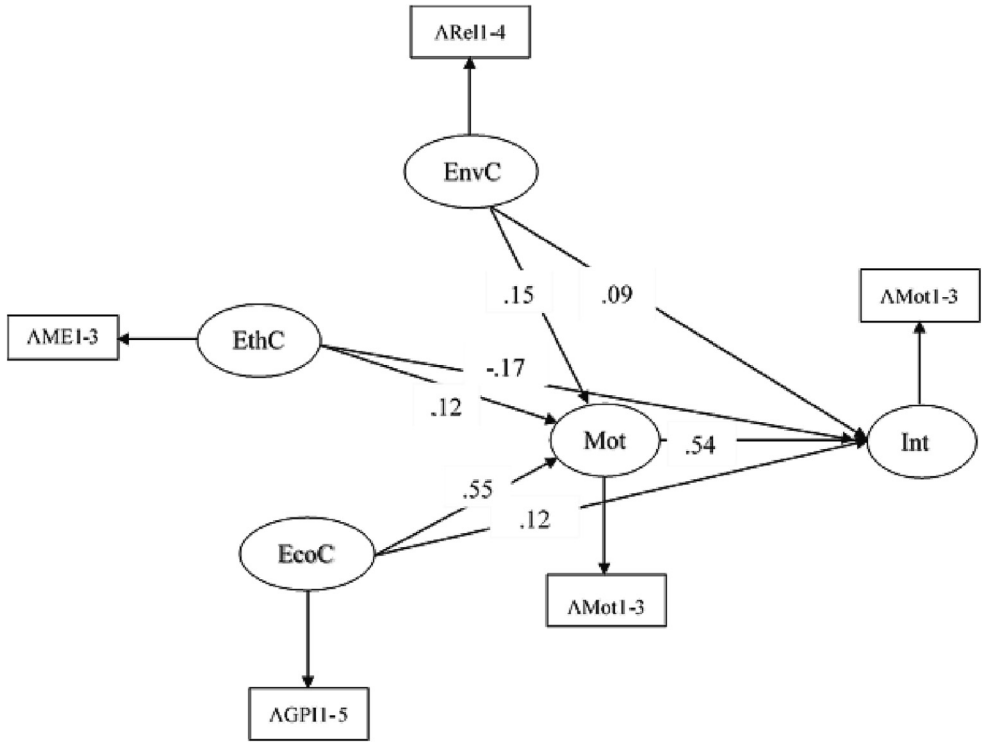


Fig. 3. Impact of consumer consciousness on individual intention to reduce food waste.

(Ganglbauer et al., 2013; Hebrok and Heidenstrøm, 2019; Mavrakis, 2014; van Geffen et al., 2017). So, policy interventions promoting a general change in social norms related to food waste can act as a lever to influence change in behaviors related to all the phases of food management, encouraging consumers to adopt more efficient behaviors in all the stage of food consumption.

6. Conclusions

Starting from the results of a survey conducted among 710 households living in the Turkish cities of Ankara, Izmir, and Adana, this research explores 5 research hypotheses on the behavioral drivers of food waste reduction through a Structural Equations Model approach. The research hypotheses were explored through two competing models describing the impact of cultural factors and consumer consciousness on the intention of Turkish consumers to reduce food waste generated within their households.

The first model identified that personal motivation directly impacts the intention to reduce household food waste and it is influenced by cultural factors. Religiosity and media effect have a positive impact in increasing the personal motivation for food waste reduction, while the good provider identity has a negative impact on motivation. So, cultural factors impact personal intentions to reduce household food waste, even if in an indirect way, shaping the motivation of consumers to decrease the quantity of food they discard. Motivation has then a mediating role between cultural factors and the intention to reduce food waste.

Table 6
Hypotheses testing for consumer consciousness concept.

Hypothesis path	Coefficient	S.E.	P-value	Results
Environmental C-motivation	0.146	0.056	0.000	Accepted
Ethical C. – motivation	0.120	0.063	0.004	Accepted
Economic C. motivation	0.553	0.052	0.000	Accepted
Motivation-intention	0.544	0.067	0.000	Accepted
Environmental C-intention	0.087	0.064	0.072	Rejected
Ethical C. – intention	−0.166	0.072	0.000	Accepted
Economic C. intention	0.123	0.069	0.043	Accepted
Indirect effect 1: environmental C-motivation - intention	0.079	0.049	0.006	Accepted
Indirect effect 2: ethical C. – motivation - intention	0.065	0.047	0.003	Accepted
Indirect effect 3: economic C. –motivation - intention	0.301	0.070	0.001	Accepted

Note: $R^2 = 0.38$.

The second model explored the impact of consumer consciousness, considering its environmental ethical, and economic dimensions, on the intention to reduce household food waste. Findings suggest that the three dimension of consumer consciousness have both direct and indirect effects on the intention to reduce food waste, since they influence individual motivation, that has been proven to have effects on the intention to reduce food waste. Results from this model indicate that motivation has a partial mediating role between consumer consciousness and individual intention of Turkish consumers to reduce household food waste.

Results of the two competing models highlight the prevalent role of socially determined factors related to culture in influencing personal motivation to reduce household food waste. Nevertheless, personally determined factors related to consumer consciousness play a relevant role in shaping consumers motivation for food waste reduction. Among those, economic consciousness registered the most relevant impact.

So, cultural factors related to a more efficient management of food and consciousness about ethical and environmental effects of food waste can act as effective levers to promote behaviors leading to a reduction of household food waste.

Starting from the results of the two competing models, this work investigates implications for policies aiming to reduce household food waste in Turkey. Policy interventions should aim to promote consumers consciousness on negative effects of food waste on society and on single households, taking advantage on the potential of cultural aspects for changing the perception of what is considered food waste. Also, policies should take advantage of the role of motivation, cultural factors, and consumer consciousness on the intention to reduce food waste to promote efficient food management behaviors that could lead to lower

levels of food waste. These changes in consumer behavior could then have impacts on the whole food supply chain, by encouraging all the actors to adopt procedures that minimize the amount of food waste to meet the demand of consumers for more sustainable food products and services.

Some limitations of this research should also be considered. First, the data related to intention and other factors were collected through the self-declaration of respondents on self-perception of individuals. Since all variables are related to moral values, the data may present biases related to the social desirability of the household food waste topic and to incorrect estimation of purchased and discarded food. Also, even if the questionnaire was validated by experts and tested through pilot submissions, differences between English and Turkish languages may lead to slight misinterpretation of the meaning of questions and answers.

Some points could be highlighted for future research. First, this study is focused on consumers as a whole group. Future studies may investigate each demographic group (age, gender, income groups or family) or consumption type (restaurants, hotels, or school canteens,) more in detail. Second, the study included only consumers living in three metropolitan cities of Turkey. Future research could focus on consumers living in rural areas of Turkey or from countries with commonalities in terms of culture, religiosity, and demographics. Third, few studies explored the relationship between religiosity and intention to reduce food waste, and the results on its effects are still controversial. This relation should be investigated more in-depth in future research. Finally, this work investigated the mediation role of motivation between cultural factors and the consumer consciousness on the intention to reduce household food waste. These drivers are likely to be mediated through other behavioral factors such as attitudes, social norms, or personal values. So, the finding of this research suggests investigating more in-depth the different factors affecting motivation and intention to reduce food waste mediated by motivation in further research.

Declaration of competing interest

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

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.spc.2023.03.024.

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