



Surveys

A proposed structural model for housewives' recycling behavior: A case study from Turkey

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ABSTRACT

Recycling is a major factor in environmental behavior as it supports the conservation of natural resources and reduces the amount of solid waste. In addition to its environmental benefits, recycling is also an effective way to fundraise. Although recycling is commonplace in many countries, it is still relatively rare in Turkey. In this study, the attitudes and behaviors of housewives toward recycling were investigated using Ajzen's Theory of Planned Behavior (TPB) and the proposed Structural Equation Model (SEM). It was found that the Housewives' Recycling Model (HRM), obtained as a result of the analysis, could be employed to explain their recycling behavior. In particular, the research established that the positive ideas housewives have in terms of their perceived behavioral control and the individuals in their immediate social surroundings, whose opinions they value, have a positive impact on guiding their recycling behavior.

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1. Introduction

While population growth brings with it rapid urbanization, development in industry and technology increasingly leads to the exhaustion of natural resources. Consequently, unnecessary and excessive consumption also increases, leading to soaring levels of waste. In order for consumers to safeguard sustainable living in a conscious way, the '3Rs' have been adopted: reducing, reusing and recycling. Acknowledged by most developed countries, this classification is considered to help reduce the adverse effects on the environment by counteracting false or erroneous attitudes and behaviors. King and Lessdrenska (2010) defined these processes as follows: Reducing implies generating the lowest levels of waste possible, and reducing energy and water consumption as much as can be achieved, in order to save energy. Reusing implies an effort to reuse a product or energy, if feasible, rather than single-use. Recycling, in turn, is applied only to those materials and products that cannot be reused. In addition, another aspect of this three-way classification is recovery. Recovery implies the value created from the production of energy from solid waste, which cannot be reduced at source, reused or recycled. It should be kept in mind that for humans the conservation of nature and the environment is one of the most important tasks. Reducing the amount of garbage, through the utilization of waste that can be recycled, environmental pollution can be prevented. Furthermore, reusing waste can contribute to the economy.

Being one of the most important eco-friendly attitudes and behaviors, recycling is not only a crucial part of creating a sustainable future, but it is also recognized as an effective way of generating new resources.

All individuals should be sensitive about recycling. However, the attitudes and behaviors of family members who are more active in housework are even more important for achieving positive outcomes in recycling. Generally speaking, rather than being formally employed, the majority of the female population in Turkey is responsible for housework. According to a household labor force survey, the employment rate in 2013 among the population of 15 years of age or above was 65.2% for males and 27.1% for females. Taking the employment rates in the European Union into consideration, the highest and lowest women employment rates were observed in Sweden and Greece in 2013 with 72.5% and 39.9%, respectively and the average female employment rate in the European Union Member States (28 countries) was 58.8% (TUIK, 2014). These statistics indicate that a vast majority of female population in Turkey can be described as housewives, who work in the home. Moreover, for most of the families that adopt the traditional culture of family life in Turkey, in addition to chores such as cleaning, washing the dishes and doing the laundry, the decision on how to dispose waste materials is also taken by women, regardless of whether or not they are employed. Also, as on the whole in Turkey the kitchen is considered to be the living space for woman, cooking, the disposal of kitchen waste and recycling are also deemed to be their concern and responsibility.

In a world that is becoming increasingly globalized, the amount of waste is increasing due to reasons such as rapidly growing economy,

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technological developments, population growth, advances in industry, and increasing consumption. Approximately 25 million tons of domestic waste, 1.2 million tons of industrial waste, 100,000 tons of medical waste and 530,000 tons of e-waste have been generated in Turkey alone in 2014 (Yetim, 2014: 11).

While the US, Europe and a number of Asian countries, such as China, have been making progress for years in this area, in Turkey this process has a history of only a little over two decades. In keeping with the Regulation on the Control of Solid Waste, issued by the Ministry of Environment in 1991, recycling has become a statutory obligation for local administrations and the relevant industrial enterprises (Metin, www.evkuilur.com). The minimization of domestic, medical, hazardous and non-hazardous waste, the separate collection of waste at source, interim storage, recycling, recovery and disposal are the processes carried out as part of waste management (Republic of Turkey Ministry of Science, Industry and Technology, 2014).

With regard to the implementation of these decisions, administrators should be methodical when responding to public demands and problem solving. The public perceives the effectiveness of these decisions and this in turn reflects on their behavioral intentions or moral motives (Berglund, 2006: 560; Huang et al., 2014: 107). Therefore, due to reasons such as a lack of household participation and qualified manpower, the irregular collection of garbage, use of inappropriate equipment for waste collection, an insufficient legal infrastructure and resource constraints, these decisions cannot be properly implemented (Ramayah et al., 2012: 141).

The figures produced for Waste Disposal and Recycling Plants, a study conducted by the Turkish Statistical Institute in 2012 through surveys carried out at all certified recycling plants, or recycling plants operating on interim operating certificate, at storage, incineration and compost facilities being operated even without license by municipalities or on behalf of municipalities, indicate that:

- In 2012, there were 672 facilities in operation, 83 waste disposal facilities and 589 recycling plants.
- Twenty-four million tons of waste was disposed of at 80 sanitary landfills, where the total capacity was 480 million m³.
- Moreover, at 36 sterilization facilities with 116,000 ton/year capacity operating in 2012, 46,000 tons of medical waste was sterilized, and while 43% of the sterilized medical waste was disposed of at sanitary landfills, 57% were delivered to municipal dump sites.
- At three incineration facilities with a total capacity of 61,000 ton/year, 50,000 tons of waste, 47,000 tons of which were hazardous, and 3000 tons were non-hazardous, were processed.
- At six compost facilities with a total capacity of 389,000 ton/year, 159,000 tons of waste was processed and 26,000 tons of compost produced. Furthermore, at 32 co-incineration facilities with waste recycling licenses, energy was recycled through the incineration of 539,000 tons of waste. At 551 certified waste recycling plants, in turn, 9.5 million tons of waste metal, plastic, paper, etc. were recycled (TSI, 2012).

More than half of the waste generated in Turkey is of a recyclable nature (Ministry of Science, Industry and Technology 2014–2017: 7). The collection of activities such as separate collection, differentiated in terms of type, conversion into secondary raw materials or agricultural inputs through physical, chemical or biological processes of recyclable solid waste is called recycling (Republic of Turkey Ministry of Environment and Urbanization, Tekirdağ Governorate, Provincial Directorate of Environment and Urbanization, 2012).

Even though waste collection and recycling is the duty of government agencies, householders play a crucial role in terms of separating the recyclable domestic waste and disposing of it in the correct containers (Alpizar and Gsottbauer, 2015: 366). The recyclable items that go to waste is valued at around 1.5 billion TL per year. In this respect,

housewives, being much more culturally engaged in housework, play a crucial role.

In general, population attitudes and behaviors toward recycling could be affected by a country's socioeconomic conditions, the level of development and education, sources of income, life styles and culture. In Turkey, which is a developing country, the interest shown toward recycling has been increasing in recent years. Ranked 7th in the survey conducted by the Ministry of Development in 2011 on the socioeconomic development of provinces and regions, Eskişehir is a prominent city and the 25th largest city in the country. With a population of 826,216 (Republic of Turkey Ministry of Development, 2013), the city has two large and well-established universities, industrial organizations, cultural and artistic events.

The city center of Eskişehir comprises two large districts, namely Odunpazarı and Tepebaşı. The recycling services, which are under the auspices of these districts' municipalities, are carried out at the premises of two companies, Benli and Ak. In accordance with the Packaging Waste Management Plan drawn up by the municipality in January 2007, the Odunpazarı Recycling Project was implemented. The project provides services to 98,000 dwellings, as well as industrial sites, the organized industrial zone and all public institutions. The blue plastic bags, which are reserved for residents to dispose of their paper, plastic, metal and glass packaging waste are collected from their homes twice a week. Within the scope of Odunpazarı Recycling Project, since 2007, 80,731 tons of packaging waste have been stored separately at source. Taking into consideration the gains made by the country and the environment owing to the collection of this waste, the felling of 666,000 trees has been avoided, and 90,477 tons of oil and 409,435 Mwh of electricity have been saved, and the emission of 1428 million tons of CO₂ into the atmosphere has been prevented (Odunpazarı Municipality Projects).

Tepebaşı Municipality, in turn, has been pursuing recycling activities since 2009. While awareness-raising activities on packaging waste has been ongoing in all neighborhoods, the firm that provides recycling services has been carrying out its activities with 28 waste collectors in all 51 neighborhoods of the district. A control team was established to raise awareness among the population living within the municipal district and to control the process. Owing to the significance of women in this respect, two of the employees in this control team are female (Eskişehir Tepebaşı Municipality, 2016).

In light of these discussions, the intentions and behaviors of those housewives who spend much of their time doing housework (cleaning, cooking, etc.), a habitable environment is considered to be of great importance. The purpose of this study was to analyze the intentions and behaviors about recycling of 400 housewives, who live in Eskişehir, one of the metropolitan cities of Turkey. The data was collected using a face-to-face survey and aimed at revealing the reactions, opinions and behaviors of housewives concerning recycling. In the study, the relations between the attitudes, subjective norms, perceived behavioral control and recycling behaviors that affect recycling intentions were established using a TPB research model.

2. Literature Review, Conceptual Framework and Data

Oom Do Valle et al. (2005) examined the perceived behavioral control, an aspect of TBP, while including external and internal conditions in their study, which estimated participation in recycling by combining behavioral theories. Mosler et al. (2008) examined the intentions and behaviors that affect recycling of waste in a study conducted on 257 households in Santiago, Cuba, and discussed the development of environmentally responsible purchasing behavior. Similarly, in his study on recycling Barr (2007) revealed that there are statistically meaningful relationships between recycling behavior and subjective norms and facilitating factors.

Sidique et al. (2010a) examined the factors affecting recycling in Minnesota in their study, and showed that communication studies

and training to raise awareness on recycling motivate individuals to adopt recycling behavior. Moreover, in another study, [Sidique et al. \(2010b\)](#) concluded that demographic variables (education, age, size of households etc.) have an impact on recycling attitudes and behaviors. Similarly, in a study on the ecological attitudes and behaviors of the public in Poland, [Grodzinska-Jurczak et al. \(2006\)](#) pointed out that as a result of the success of a training campaign, the amount of recycled waste and the number of people participating in recycling increased.

[Ho \(2002\)](#) employed the TPB model in his comparative study examining the possible causes of recycling behaviors of households in Singapore, in which it was indicated that perceived social pressure regarding the recycling of domestic waste increased in Singaporeans who migrated to Sweden, and as a consequence, recycling intentions increased accordingly.

In a study conducted with 252 participants in Scotland, concerning the role of habitual behavior in the disposal of household waste, [Knussen and Yule \(2008\)](#) investigated the role of habit, using two potential measures of habitual recycling behavior. The study pointed to a perceived lack of habit as the cause of failed recycling behavior. Furthermore, the study concluded that the reason for failing to recycle was an inadequate attitude toward treating recyclables as garbage.

[Schwab et al. \(2014\)](#) investigated the effect of emergent norms on attitudes toward recycling behavior. In order to reveal attitudes and perceptions of students living in a hall of residence about recycling, they employed a version of dynamic social impact theory, i.e., the theory of reasoned action and its components.

In the study conducted by [White and Hyde \(2012\)](#) regarding the role of Australian householders' self-perception toward their recycling behavior, it aimed at predicting their recycling intentions and behaviors within the theory of a planned behavior framework. In addition to factors, such as subjective norm and perceived behavioral control, the study also addressed self-identity and conscientiousness in analyzing recycling intentions and attitudes. The study was carried out with 200 participants. In order to reveal the correlations between factors regarding attitudes, subjective norms and recycling intentions related with the theory of planned behavior, Structural Equation Modeling was applied.

[Tang et al. \(2011\)](#) conducted their study of 756 participants, regarding the identification of socio-psychological drivers of rural household recycling behavior in developing countries. The study addressed factors such as, subjective norm, perceived usefulness, moral norm, reason for recycling and attitude toward recycling. The study found that the effect of perceived usefulness on recycling attitude was positive.

[Knussen et al. \(2004\)](#) used TPB to examine the attitudes and intentions of the population on the recycling of domestic solid waste in Glasgow. In addition to TPB variables, past recycling behavior and perceived recycling habits were also taken into consideration in this study, the sample for which comprised 252 participants. The TPB components contributed 29% to the variance recycling intention; attitudes and perceived behavioral control were significant on entry. Past recycling behavior and perceived recycling habits made significant independent contributions. Contrary to expectations, there was evidence suggesting that (1) the past behavior–intention relationship was stronger for those with no perceived habit of recycling, and (2) the attitude–intention relationship was stronger for those who had recycled more in the past.

[Hornik et al. \(1995\)](#) categorized the variables that affect recycling behavior of consumers under four theoretical groups. These were intrinsic incentives, extrinsic incentives, internal facilitators, and external facilitators. Those were obtained from a meta-analysis of 67 published and unpublished experimental research studies. Of these sets of variables, the strongest predictors for recycling were internal facilitators; specifically, consumer knowledge and commitment to recycling were internal predictors of a propensity to recycle. External incentives, in particular, monetary rewards and social influence, were the next strongest predictors. Finally, these relationships were further examined to isolate the impact of moderator variables. The sample size of the study, the

location where the research was conducted, and the mode of data collection were indicated as three influential variables. The authors proposed a model based on these results, and suggested practical recommendations to encourage consumer participation in a solid waste sorting program.

[Oskamp et al. \(1991\)](#) compiled data by means of interviews conducted with 221 subjects selected by telephone, in order to investigate their attitudes, behavior and knowledge on recycling. With regard to tenants and residents living in apartment buildings, the study specified that homeowners recycled more, despite the fact that they utilized the same recycling services in the same city. The most remarkable result of the study was that the recycling behavior of friends and neighbors acted as a social influence and had a positive impact on the subjects' involvement in recycling. In a nutshell, social pressure was found to be an effective way of ensuring that large communities participated in recycling.

The objective of a study by [Kirakozian \(2016\)](#) was to understand the determinants of households' selective waste sorting behaviors. This study was based on questionnaires completed by 694 participants living in a region of the French Alps that had a low rate of recycling. The results of the study showed that a household's environmental preferences were important determinants and considerably affected recycling. In order to modify their waste policies, Municipalities responsible for managing domestic waste should obtain more information by conducting surveys on households in their area of jurisdiction. In contrast to the findings addressed in the literature, the study identified that social impact had a negative effect on recycling.

[Ramayah et al. \(2012\)](#) studied the determinants of recycling behaviors among 200 students at a university in Malaysia using TPB. Students were specifically selected as subjects for the research, as they are the country's future consumers and because environmental sustainability will be related to their consumption patterns. In particular, the scale of information and awareness of the environment, which steer their attitudes toward recycling, and the relationship between social norms, were studied in the research, together with perceived behavioral control and recycling behavior. It was concluded that environmental consciousness regarding recycling affects recycling attitudes, and in these in turn positively affects recycling behavior. Moreover, it was established that subjective norms concerning recycling also positively affect recycling behavior. In another study conducted by [Hassan et al. \(2010\)](#), which considered environmental consciousness among secondary school students in Malaysia, it was once again determined that while their environmental consciousness was high, they faced difficulties in improving their environment and taking action.

[Klößner and Oppedal \(2011\)](#) presented recycling behaviors exhibited in 697 Norwegian student houses, using a multilevel structural equation model based on TPB. The study concluded that perceived behavioral control positively affects recycling behavior. In another study, which analyzed recycling behavior with TPB, [Tonglet et al. \(2004\)](#) revealed that opportunities, means and information on recycling affect recycling behavior.

[Mahmud and Osman \(2010\)](#) showed in their study based on the TPB model, regarding the intentions and behaviors of secondary school students on recycling, that behavior is a much more significant factor affecting recycling than are subjective norms. In another study conducted on 206 parents and children, regarding how parents affect the recycling behavior of their children, [Matthies et al. \(2012\)](#) concluded that mothers affect their children's recycling behavior through sanctions and their own behavior.

[Wan et al. \(2014\)](#) conducted research in Hong Kong into the perceived effectiveness of administrative measures on recycling behavior. The TPB and norm activation model (NAM) were used, both of which have been widely employed in previous research on recycling attitudes and behaviors. It showed that recycling behavior and support for administrative measures were affected by recycling intentions. In a similar study conducted by [Wan and Shen \(2013\)](#), a relationship was asserted

between perceived policy effectiveness as a factor affecting recycling behavior, yet this claim was not empirically tested.

Chen and Tung (2010) conducted a study on the effect of a perceived lack of premises on recycling intentions in Taiwan, as nowadays Municipal Solid Waste Management has become a concern. The study intended to analyze the effect of a perceived inadequacy of recycling plants on the factors addressed in the theory of planned behavior.

Abbott et al. (2011) sought to explain the variation by using a new data set of waste recycling rates and policy determinants for all of the UK's 434 local authorities over the period 2006 Q2 to 2008 Q4. The study revealed that waste collection methods chosen by policy makers is a significant factor that affects recycling rates. They also found an inverse relationship between the frequency of residual waste collection and the recycling rate.

Sterner and Barteling (1999), analyzed disposal, recycling and the sorting of solid waste in the municipalities located in the south of Sweden. The researchers had access to actual measured data on waste disposal at household level in addition to survey data for the same households, for a residential area called Tvååker. The most important determinants of each individual household's waste generation were composting of kitchen waste, living space, age and attitudes concerning the difficulty of recycling various materials.

Pettifor (2012) investigated whether women carried out waste separation, in addition to domestic routines, such as preparing food, cooking and cleaning at home. The data obtained from Understanding Society for 2009/2010 were used in this study. The relationship between waste separation and housework was examined for 2312 single men and women as well as 3002 married or cohabiting couples. A modest correlation was identified in the study between waste separation and housework. It was concluded that single women were more involved in waste separation than single men, who found household chores rather difficult. With regard to men and women living together, where decisions on housework are somehow a consequence of their relationship, waste separation in the household was found to be as likely regardless of whether the man or the woman did more housework.

2.1. The Theory of Planned Behavior (TPB)

By pointing out that an individual's behavior is not solely based on their will but also by factors such as perceived behavioral control, TPB improved on the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980). Liska (1984) argued that the implementation of many behaviors would be constrained by the appropriate opportunities, abilities and resources. In this respect, in addition to the variables in TRA, TPB includes a third variable to the model, i.e. the perceived behavioral control that measures the ability of the individual to perform the behavior in question.

Being one of the theories widely acknowledged by researchers, and developed in order to explain behavior in many fields, such as sociology, psychology, education and marketing, Planned Behavior Theory is the most comprehensive of the behavioral models, and one that describes behaviors with the least number of variables (Lim and Dubinsky, 2005). Tonglet et al. (2004) define TPB as a systematic framework that serves to define the precursors of behavioral choices.

TPB suggests that three factors affect behavior, including attitudes toward behavior (personal attitude and individual conduct), subjective norms (influence of significant others; perceived social pressure), and perceived behavioral control (Ajzen, 1991). The Theory of Planned Behavior model is shown in Fig. 1 (Ajzen, 1991; Ajzen and Fishbein, 2000).

The attitudes of individuals are modeled in such a way that they always constitute a bridge between an individual's beliefs and intentions. The attitude of an individual regarding a certain behavior affects the individual's intention toward performing that behavior, which in turn affects the actual behavior (Lee et al., 2007). Subjective norms or social pressure are functions of the perceived expectations of persons or

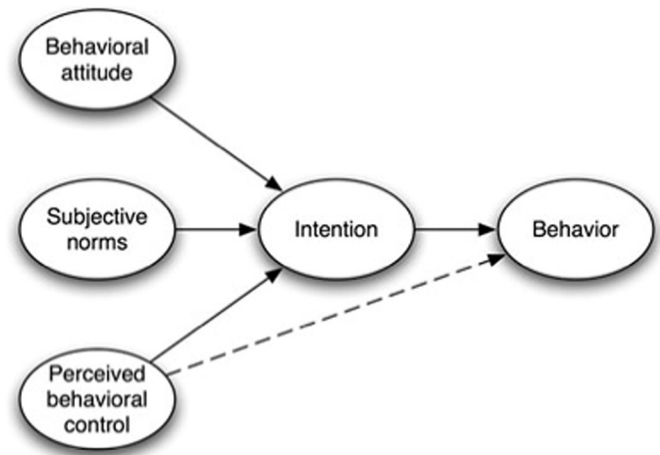


Fig. 1. The theory of planned behavior.

groups close to the individual or significant others (such as friends, neighbors etc.), and the willingness of the individual in meeting these expectations (Fishbein and Ajzen, 1975). In social psychology, intention is the most crucial aspect of behavior (Abraham and Sheeran, 2003).

TPB provides a framework that systematically determines the factors affecting recycling behavior. TPB is preferred, as it has been proved to be useful in much research on recycling (Tonglet et al., 2004; Ramayah et al., 2012; Ho, 2002). In various studies, indicating that perceived behavioral control does not have a significant effect on predicting recycling behavior, it has been suggested that other variables, which are believed to affect recycling, might be included in TPB (Davies et al., 2002). In fact, Ajzen and Fishbein admitted that there are factors other than the TRA: for instance, experiences and demographic variables may influence behavior. However, they claimed that such effects are indirect, and are governed by the model's elements. Furthermore, TPB also allows additional variables to be integrated in the model (Ajzen, 1991).

2.2. Questionnaire Design and Data Collection

The data collection tool employed in the study was configured on the basis of studies conducted by Wan et al. (2014), Ramayah et al. (2012), Klöckner and Oppedal (2011), Sidique et al. (2010b), Oom Do Valle et al. (2005) and Tonglet et al. (2004). In order to specify the reliability criterion of the data collection tool, a pilot study on 100 housewives was carried out and consequently various complicated questions were excluded from the questionnaire and some questions were rephrased. The designed data collection tool was called the Housewives' Recycling Behavior Questionnaire. In the first part of the data collection tool, questions on the demographic characteristics of the housewives (age, marital status, educational status, employment status etc.) were asked. In the second part, questions on the housewives' attitudes, subjective norms, perceived behavioral control, intention and behavior regarding recycling were asked. In the survey, a five point Likert scale was used to measure attitude statements (1: strongly disagree; 5: strongly agree). Similarly, for behavioral statements, the scale 1: never; 5: always, was used. The construct reliability of the factors included in the designated data collection tool was between 0.58 and 0.92, whereas the explained variance was estimated to be in the range of 0.45 and 0.80, and the Cronbach's Alpha Coefficient was calculated as 0.80.

The research sample consisted of 400 housewives randomly selected from socioeconomically diverse neighborhoods of Eskişehir, with a population of 750,000, and according to a survey conducted by CNBC-e Business magazine, rank third among the most liveable cities in Turkey. For the sample design, based on the assumption that there is a

strong correlation between recycling processes and the socioeconomic levels of households, according to stratified sampling method, neighborhoods were primarily grouped as low, medium and high in terms of their socioeconomic conditions. Then, three neighborhoods were selected randomly for each stratum. The neighborhoods selected from the central district of Eskişehir were Büyükdere, Kumlubele, Gündoğdu, 71 Evler, Çamlıca, Yenibağlar, Kırmızı Toprak, Erenköy and Yenikent. The sample was divided into nine neighborhoods, according to proportional distribution, based on the ratio of neighborhood populations to the total population of Eskişehir. The questionnaires were conducted face-to-face with housewives living in the designated houses of these neighborhoods. Demographic data for the sample are given in Table 3.

First of all, the unidimensionality of the measurement tool was investigated using confirmatory factor analysis (CFA). Fig. 2 illustrates the outcome regarding the unidimensionality of the measurement tool. Since the result of the analysis indicated $\chi^2/df = 15.68 > 3$ and $RMSEA = 0.192 > 0.08$, indicating that a multidimensional factor structure was present, the unidimensional structure of the measurement tool was rejected.

When the multi-factor structure was analyzed using exploratory factor analysis, it was noted that the explained variance was 73.985% and a structure consisting of five factors was at stake, as shown in Tables 1 and 2.

2.3. Research Model and Design of Hypotheses

The research model utilized in the study is given in Fig. 3. The research model was constructed on the basis of TPB. In designing the research model used in the study, we made use of the study of Tonglet et al. (2004), Ramayah et al. (2012) and Wan et al. (2014).

The review of the literature in the field suggests that there is a significant correlation between a positive attitude toward recycling and the behavior. Bratt (1999) and Kelly et al. (2006) pointed out that a positive attitude toward recycling noticeably affects recycling behavior. Similarly, Chan (1998) stated that the most important determinant of behavior is attitude. In a study conducted in the United Kingdom on kerbside

Table 1
Result of exploratory factor analysis.

Component	Eigenvalues	% of Variance	Cumulative %
1	3.524	27.110	27.110
2	2.122	16.323	43.434
3	1.621	12.470	55.904
4	1.232	9.474	65.377
5	1.119	8.607	73.985

recycling (Nigbur et al., 2010), it was observed that attitude affects recycling intention, and recycling intention in turn affects recycling behavior. Research conducted by Ramayah et al. (2012), Wan et al. (2014) and Tonglet et al. (2004) on recycling also indicated that attitude has a significant effect on recycling intention and behavior. Therefore, in general, the literature supports the theory that there is a significant correlation between attitude toward recycling and the intention of recycling. In light of this information, the following hypothesis can be suggested:

H₁. As housewives positive attitudes toward recycling increase, their intention to recycle increases.

Numerous studies have revealed that the recycling behaviors of individuals are largely influenced by the social norms believed to be adopted by significant others or social groups (Shaw, 2008; Tucker, 1999; Ramayah et al., 2012). The beliefs that determine subjective norms are called normative beliefs. According to Ajzen and Fishbein (1980, 2000), if an individual recognizes the importance of what others think about her/his actions, s/he will be more likely to display a certain behavior. In light of this information, the following hypothesis can be suggested:

H₂. Subjective norms of housewives toward recycling affect their intention of recycling.

Ajzen and Fishbein (1980, 2000) asserted that the actual behavior of an individual is determined and shaped under the influence of the

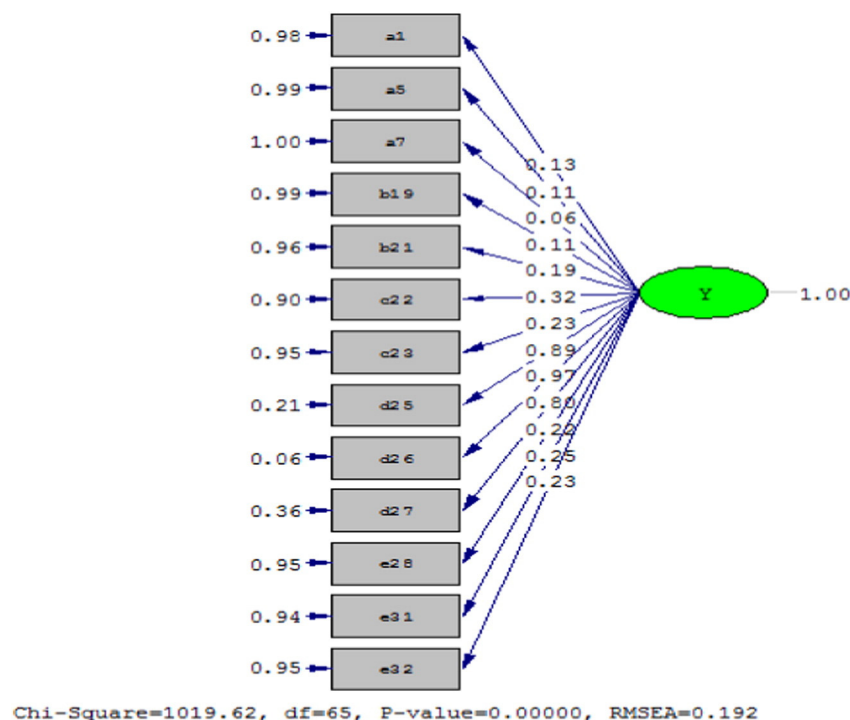


Fig. 2. CFA result regarding the unidimensionality of the measurement tool.

Table 2

Principal component analysis. Rotation method: Varimax with Kaiser normalization.

Item	Component				
	D	A	E	B	C
d26	0.934				
d25	0.916				
d27	0.872				
a5		0.867			
a1		0.833			
a7		0.785			
e31			0.824		
e28			0.783		
e32			0.775		
b19				0.852	
b21				0.840	
c23					0.821
c22					0.807

A: Attitude toward Recycling. B: Subjective Norm toward Recycling. C: Perceived Behavioral Control regarding Recycling (PBC). D: Recycling Intention and E: Recycling Behavior.

perceived behavioral control factors of her/his perceived behavior. Oom Do Valle et al. (2005), in turn, indicated that perceived behavioral control regarding recycling has an influence on recycling intention and behavior. Likewise, Wan et al. (2014) pointed out that perceived behavioral control has a significant effect on behavioral intention. As a consequence the following hypotheses can be suggested:

H₃. The perceived behavioral control of housewives regarding recycling affects their intention of recycling.

H₄. The perceived behavioral control of housewives regarding recycling affects their recycling behavior.

Ajzen (1991) and Ajzen and Fishbein (1980, 2000) demonstrated a correlation between intention and actual behavior in their research. In consequence, the following hypothesis can be proposed, asserting that the intention of recycling is a strong determinant of behavior:

H₅. As housewives' intention of recycling increases, recycling behavior increases.

In order to test the hypotheses designed and based on the literature, Housewives Recycling Model – (HRM) is proposed as a research model. This research model is illustrated in Fig. 3.

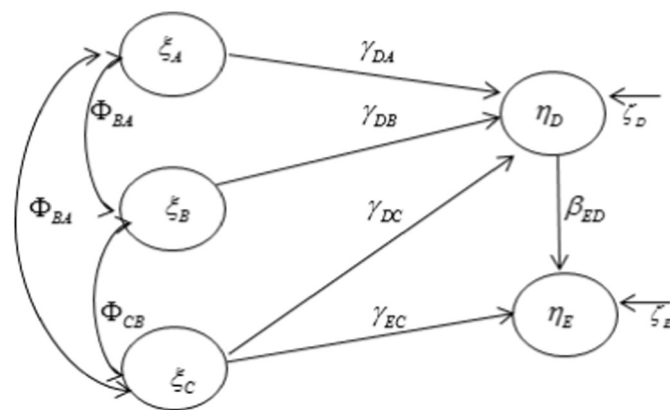


Fig. 3. Housewives Recycling Model (HRM) A: Attitude toward Recycling, B: Subjective Norm toward Recycling, C: Perceived Behavioral Control regarding Recycling (PBC), D: Recycling Intention, E: Recycling Behavior.

3. Data Analysis

SEM is a comprehensive statistical method used for testing hypotheses based on causal relationships among observed and unobserved (latent) variables, which has proved to be useful in solving problems and formulating theoretical constructions. SEM can also expand the explanatory ability and statistical efficiency for model testing using a single comprehensive method. Steenkamp and Baumgartner (2000) reflected on the role of SEM in marketing modeling and managerial decision-making, and discussed some of its benefits. The authors underlined that, although SEM has the potential for decision support modeling, it is probably much more useful for testing the theory, which is a key phase in developing models. Applied to data on attitudes, perceptions, stated behavioral intentions, and actual behavior, SEM can be used to specify and test alternative causal hypotheses. Applied to data on attitudes, perceptions, stated behavioral intentions, and actual behavior, SEM can be used to specify and test alternative causal hypotheses. It was found that, as expected, causality is often mutual. The assumption that behavior is affected by attitudes, perceptions, and behavioral intentions without feedback does not hold when it is tested using SEM (for SEM see Reisinger and Turner, 1999; Hoyle, 1995; Joreskog and Sörbom, 1996; Byrne, 1998; Cudeck et al., 2000; Raykov and Marcoulides, 2006).

SEM consists of two components: a measurement model and a structural model. The measurement model assesses latent (unobserved) variables as linear functions of indicators (observed variables). The structural model shows the direction and strengths of the relationships of the latent variables. A typical structural equations model is defined:

$$\eta = B\eta + \Gamma \xi + \zeta \quad (1)$$

where η is a column vector of m endogenous variables, ξ is a column vector of n exogenous variables, B is a matrix ($m \times m$) of coefficients associated with the direct effects of endogenous variable on another endogenous variable, Γ is a matrix ($m \times n$) of coefficients associated with the direct effects of exogenous variable on another endogenous variable, ζ is a column vector of error terms associated with endogenous variables and Φ represents the covariance matrix ($n \times n$) of exogenous variable ξ .

The measurement equations relating the latent variables to the measurement variables are:

$$y = \Lambda_y \eta + \varepsilon \quad (2)$$

$$x = \Lambda_x \xi + \delta \quad (3)$$

$y_{(p \times 1)}$ and $x_{(q \times 1)}$ are the column vectors of p measured endogenous variables, and q measured exogenous variables, respectively. Λ_y and Λ_x are the corresponding factor loading (λ_{ij}) matrices. ε and δ are the error terms related to the measured variables and are uncorrelated. In the proposed model, there are three endogenous variables ($m = 2$) and two exogenous variables ($n = 2$). The detailed specified SEM can be laid out in the form of matrices as shown below, based on Eqs. (4)–(5).

$$\eta = B\eta + \Gamma \xi + \zeta \quad (4)$$

$$\begin{bmatrix} \eta_D \\ \eta_E \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ \beta_{ED} & 0 \end{bmatrix} \begin{bmatrix} \eta_D \\ \eta_E \end{bmatrix} + \begin{bmatrix} \gamma_{DA} & \gamma_{DB} & \gamma_{DC} \\ 0 & 0 & \gamma_{EC} \end{bmatrix} \begin{bmatrix} \xi_A \\ \xi_B \\ \xi_C \end{bmatrix} + \begin{bmatrix} \zeta_D \\ \zeta_E \end{bmatrix} \quad (5)$$

3.1. Descriptive Statistics

Data on the demographic characteristics of housewives who participated in the study are presented in Table 3 below.

Table 3
Demographic Information on Participant Housewives.

Demographic information		N	%
Age	18–24	37	9.3
	25–34	96	24.1
	35–44	115	28.8
	45–54	85	21.3
	55–64	42	10.3
	65+	25	6.0
Gender	Married	275	68.8
	Single	77	19.3
	Divorced	25	6.3
	Widower	23	5.8
Educational status	Illiterate	9	2.3
	Primary school	29	7.2
	Secondary school	85	20.5
	High school	176	44.0
The state of recycling opportunities at the apartment where they currently reside	Yes	276	69.0
	No	124	31.0
Number of people in the household	2	120	30.0
	3	124	31.0
	4	117	29.3
	5	56	14.0
	6	12	3.0

According to the data presented in Table 3 on the demographic characteristics of housewives who participated in the study, 9.3% ($f = 37$) 18–24 years of age, 24.1% ($f = 96$) 25–34 years of age, 28.8% ($f = 115$) 35–44 years of age, 21.3% ($f = 85$) 45–54 years of age, 10.5% ($f = 42$) 55–64 years of age, and 6% ($f = 25$) over 65 years of age. 19.3% ($f = 77$) of housewives were single, 68.8% ($f = 275$) were married, 6.3% ($f = 25$) were divorced and 5.8% ($f = 23$) were widowers. A total of 2.3% ($f = 9$) of housewives were illiterate, 7.2% ($f = 29$) were

primary school graduates, 20.5% ($f = 85$) were secondary school graduates, 44% ($f = 176$) were high school graduates, and 26% ($f = 104$) were university graduates. While 69% ($f = 276$) of the housewives who participated in the survey stated that there were using the recycling opportunities in the house where they live, 31% ($f = 124$) stated that there was no such opportunity. Thirty percent ($f = 120$) of the housewives said that there were two persons living in the household, 23.8% ($f = 95$) said that there were three, 29.3% ($f = 117$) said that there were four, 14% ($f = 56$) said that there were five and 3% ($f = 12$) reported six persons living in the household.

3.2. Analysis Results According to the Structural Equation Model (SEM)

In order to specify the factors regarding the housewives' recycling intentions and behavior, and to check construct validity, Confirmatory Factor Analysis was employed in the study. Variables with factor loadings below 0.50 were excluded from the analysis. Factors obtained for the research model as a result of the analysis and the parameter estimates of these factors are given in Table 4. As a result of the t -test, H_1 was not supported, whereas H_2 , H_3 , H_4 , and H_5 were supported.

The goodness of fit criteria for the model developed for the research is given in Table 4, the path diagram regarding the Structural Equation Model is illustrated in Figs. 4 and 5, and the correlation and covariation matrices are given in Appendix A, below.

In the model, $\chi^2 = 104.6644$ ($df = 57$, $p > 0.01$) was computed. The χ^2/df ratios were 1.83, which indicated good fit because the ratio was less than two. Fit measures of the model are calculated as RMSEA = 0.046 (Root-mean-square error approximation), NFI = 0.95 (Normed Fit Index), CFI = 0.97 (Comparative Fit Index) and GFI = 0.96 (Goodness-of-fit). An RMSEA value equal to 0.05 or less reflects a perfect fit, values under 0.10 indicate an acceptable fit and those above 0.10 indicate a bad fit. Other fitness criteria are between 0 and 1 and this means that closeness to 1 shows a better fit for the model (Byrne,

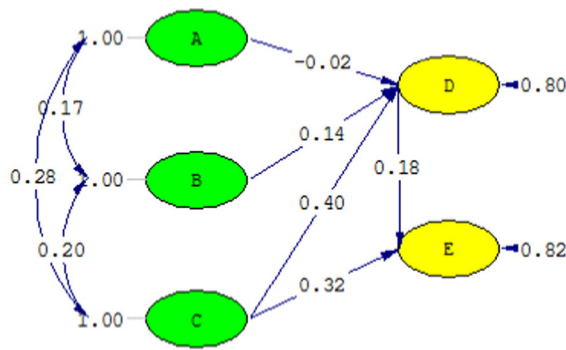
Table 4
SEM results for HRM.

Factors/articles	Standard loadings	t -Value	R^2
Factor A: Attitude toward Recycling (Construct Reliability = 0.80; Explained Variance = 0.58) If I recycled;			
a1. I would save energy.	0.78	15.84**	0.60
a5. I would contribute to the economy.	0.87	17.82**	0.75
a7. I would protect our natural resources.	0.61	12.17**	0.37
Factor B: Subjective Norm toward Recycling (Construct Reliability = 0.64; Explained Variance = 0.50)			
b19. People whom I give credence to would support me if I recycle.	0.60	6.08**	0.36
b21. My friends would perceive it positively if I recycle.	0.77	6.39**	0.59
Factor C: Perceived Behavioral Control Regarding Recycling (PBC) (Construct Reliability = 0.58; Explained Variance = 0.45)			
c22. It is difficult for me to recycle recyclable items such as paper. Glass. plastic etc. in the foreseeable future.	0.68	9.68**	0.46
c23. It is possible for me to recycle recyclable items such as paper. Glass. plastic etc. regularly in the foreseeable future.	0.59	8.91**	0.34
Factor D: Recycling Intention (Construct Reliability = 0.92; Explained Variance = 0.80)			
d25. I will try to recycle recyclable items such as paper. Glass. plastic etc. regularly in the foreseeable future.	0.89		0.79
d26. I am planning to recycle recyclable items such as paper. Glass. plastic etc. regularly in the foreseeable future.	0.98	29.03**	0.96
d27. I will make an effort to recycle recyclable items such as paper. Glass. plastic etc. regularly in the foreseeable future.	0.80	21.34**	0.64
Factor E: Recycling Behavior (Construct Reliability = 0.74; Explained Variance = 0.50)			
e28. Frequency of recycling "Paper" recently	0.69		0.47
e31. Frequency of recycling "Batteries" recently	0.71	10.07**	0.51
e32. Frequency of recycling "Aluminum Cans" recently	0.70	10.04**	0.49
Hypotheses			
H1: $A \rightarrow D$	−0.02	−0.27 ^{NS}	
H2: $B \rightarrow D$	0.14	2.26*	
H3: $C \rightarrow D$	0.40	5.56**	
H4: $C \rightarrow E$	0.18	2.56*	
H5: $D \rightarrow E$	0.32	3.75**	

NS: not significant.

* $p < 0.05$.

** $p < 0.01$.



Chi-Square=104.66, df=57, P-value=0.00012, RMSEA=0.046

Fig. 4. Path diagram of housewives obtained for HRM.

1998; Joreskog and Sörbom, 1996). Consequently, as the Recycling Behavior Research Model (HRM) was assessed as a valid model, as it remained within good-fitting limits.

Initially, in the statistical analysis, the Cronbach's Alpha value was calculated, which indicates the internal consistency coefficient of the data collection tool. Cronbach's Alpha value for the entire data collection tool was found to be 0.80. In order to identify whether the observed variables defined under the latent variables described the constructs with which they were related or not, the construct reliability and explained variance estimates of the latent factors were required. Hair et al. (2006) highlighted that for scale reliability, the estimate of explained variance should be over 0.50. Construct reliability and explained variance values are given in Table 4. When these values were examined, it was seen that construct reliability and explained variance values were within acceptable limits.

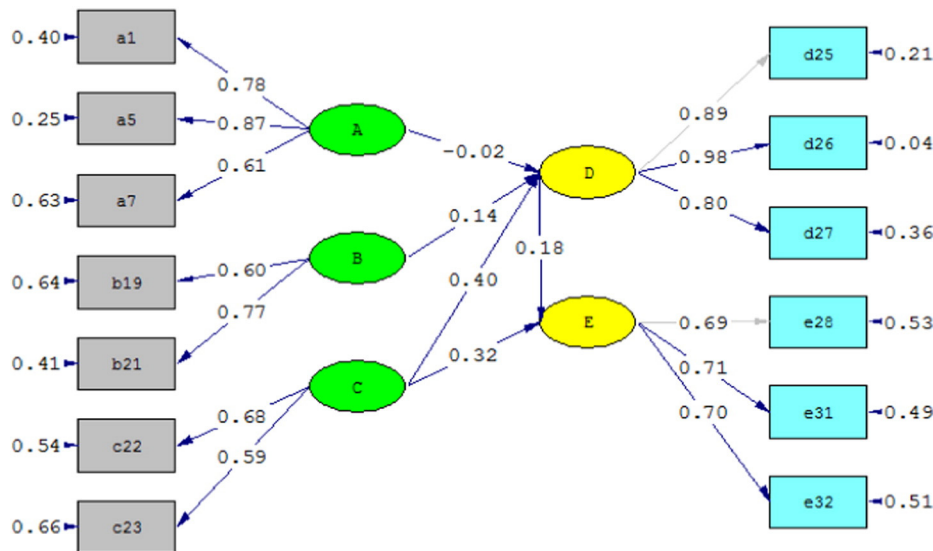
When the results given in Table 4 and Figs. 4 and 5 were analyzed, it was seen that the independent latent variable, Attitude toward Recycling, did not affect the dependent latent variable, Recycling Intention. The path coefficient between the variables attitude toward

recycling and intention was -0.02 . On the other hand, the independent latent variable Subjective Norm toward Recycling positively affected the dependent latent variable Recycling Intention. The path coefficient between subjective norm and intention variables was 0.14 . In other words, a unit increase in the housewives' subjective norm ideas raised their intentions of recycling by 0.14 units. Similarly, the independent latent variable, PBC regarding Recycling, positively affected the dependent latent variables, Recycling Intention and Recycling Behavior. The path coefficient between PBC and intention variables was 0.40 , whereas the path coefficient between PBC and behavior variables was 0.32 . In other words, a unit increase in the housewives' perceived behavioral control ideas lead to a 0.40 unit increase in their recycling intentions and a 0.32 unit increase in their recycling behavior. Finally, it was seen that the dependent latent variable, Recycling Intention, affected the dependent latent variable Recycling Behavior positively with a path coefficient of 0.18 . In other words, a unit increase in the housewives' recycling intentions lead to a 0.18 unit increase in their behavior. The structural equations are shown in Eq. (6).

$$\begin{aligned}\eta_D &= \gamma_{DA}\xi_A + \gamma_{DB}\xi_B + \gamma_{DC}\xi_C + \zeta_D = -0.02\xi_A + 0.14\xi_B + 0.40\xi_C + 0.80 \\ \eta_E &= \beta_{ED}\eta_D + \gamma_{DE}\xi_C + \zeta_E = 0.18\eta_D + 0.32\xi_C + 0.82\end{aligned}\quad (6)$$

These results indicated that there was a causal relationship between the independent latent variables that constituted the subdimensions of the scale, i.e. Subjective Norm toward Recycling, PBC regarding Recycling, and the dependent latent variable, Recycling Intention. Similarly, it could be concluded that there was a causal relationship between the latent dependent variables, Recycling Intention, and Recycling Behavior, and the independent variable PBC regarding Recycling and the dependent latent variable, Recycling Behavior.

When Table 4, where the results of SEM analysis are given, was analyzed, it was observed that the independent latent variable Subjective Norm toward Recycling has two items. The larger of these coefficients pertained to b21 (0.77). This implies that as subjective norms toward recycling increase, housewives were more likely to be of the opinion that, 'My friends will perceive it positively if I recycle'. The latent independent variable PBC regarding Recycling also had two items, as the largest of these coefficients pertained to c22 (0.68). In other words, as



Chi-Square=104.66, df=57, P-value=0.00012, RMSEA=0.046

Fig. 5. Detailed path diagram of housewives obtained for HRM A: Attitudes toward Recycling, B: Subjective Norm toward Recycling, C: Perceived Behavioral Control regarding Recycling (PBC), D: Recycling Intention, E: Recycling Behavior.

housewives' perceived behavioral control concerning recycling increased, the more they were of the opinion that, 'It is possible for me to recycle recyclable items regularly, such as paper, glass, plastic etc., in the foreseeable future'.

The dependent latent variable, Recycling Intention, had three items; the one with the largest coefficient (0.98) of which was d26. As the recycling intentions of housewives grew, the more they were of the opinion, 'I am planning to recycle recyclable items such as paper, glass, plastic etc. regularly in the foreseeable future'. Similarly, the dependent latent variable, Recycling Behavior, also had three items: those with the largest coefficients were e31 (0.71) and e32 (0.70). As the recycling behavior of housewives increased, the more they were of the opinion that, 'I recycle batteries more frequently recently' and 'I recycle aluminum cans more frequently recently.'

4. Discussion

The main objective of this study was to reveal the factors that affect housewives' attitudes and behaviors regarding recycling and with the help of a suggested research model to demonstrate the relationship between these factors. Having reviewed the body of literature on the subject matter, in Turkey, only a limited number of studies investigating the factors that affect housewives' recycling attitudes and behavior, and the relationship between these factors, could be detected. By including in the sample those housewives who take care of housework, as well as waste disposal processes in the household in Turkish culture, the present study was original. For this reason, it is believed that this study will bring a new dimension to the literature, as it was carried out in Eskişehir Province, which in cultural and economic terms is one of the most developed cities in Turkey and as it establishes the SEM analysis of the Housewives Recycling Model-(HRM), which was developed with the help of TPB.

In the majority of households that have adopted the traditional family culture in Turkey, in addition to housework, such as cleaning, doing the laundry and washing the dishes, the role of women in how to dispose of household waste is also prominent. Moreover, the kitchen is almost like a living space for women; therefore, cooking, waste disposal and recycling processes are also within their field of interest and responsibility. It is possible to see the prominent role of women in recycling from Pettifor's (2012) study examining whether women in Britain took responsibility for waste separation. It was concluded that while housework was rather difficult for single men, single women were engaged more in waste separation, and that there was a modest correlation between housework and waste separation procedures for cohabiting couples.

In the study, it was established that the determinants of recycling intentions are perceived behavioral control, regarding recycling, and subjective norm. It is possible to find research that demonstrates results parallel with our study. In their study concerning the role played by perceived effectiveness of administrative measures in affecting recycling behaviors, Wan et al. (2014) found there was a significant relationship between subjective norms, perceived behavioral control and behavioral intentions. Furthermore, the results of this study were in line with the results of empirical studies conducted by Oom Do Valle et al. (2005) and Cheung et al. (1999).

In the study, it has been concluded that the variable attitude toward recycling did not statistically affect recycling intention. This finding is in line with the results of Sidique et al. (2010a); Wan et al. (2014) and Chen and Tung (2010), although it did not overlap with the results of Kelly et al. (2006), Ramayah et al. (2012), Oskamp (1995), Tonglet et al. (2004) and Knussen et al. (2004). Even though Knussen (2004) found a strong correlation between attitudes and intentions to recycle in his study, which investigated people's attitudes and intentions regarding the recycling of domestic solid waste in Glasgow through TPB, the paper could not identify a statistically significant relationship between behavioral attitude and intention.

In the study they conducted on recycling in Malaysia, Ramayah et al. (2012) found that attitudes toward recycling have a significant but relatively small effect on recycling behavior. Moreover, the study addressed the suitability of the existing recycling infrastructure and cost of recycling, as the two components of perceived behavioral control, which in turn revealed that these factors do not have any effect on recycling behavior. These results do not coincide with the results of our study.

The study identified perceived behavioral control as the most important determining variable affecting housewives' behaviors and intentions regarding recycling. Klöckner and Oppedal (2011), in their research about the recycling behavior of the occupants of 697 Norwegian student houses, Mosler et al. (2008), in his study about recycling behavior in Santiago, Cuba, and Chan and Bishop (2013), in their study on recycling, all found that perceived behavioral control has a significant effect on recycling behavior.

In the current study, it was indicated that another determinant of recycling intention of housewives is the subjective norm. As significant others, such as friends, relatives etc. provide encouragement and support to housewives, so that they become aware of their responsibilities, the potential to recycle may increase. In their studies, Oom Do Valle et al. (2005), Shaw (2008), Mahmud and Osman (2010), and Ho (2002) revealed that subjective norms are important determinants of recycling behavior. The study of Andersson and von Borgstede (2010) state that in many aspects of everyday life, collectivism is predominant and social pressure plays a crucial part in affecting an individual's behavior. In the study conducted to further understand the solid waste disposal behavior of households in a region of France with low recycling rates, Kirakozian (2016) identified that environmental factors had an impact, while social norms had a negative effect on recycling behavior. Contrary to Kirakozian's (2016) conclusion, the results of our study coincide with Oskamp et al.'s (1991) study, which indicated that social pressure was an effective way of ensuring the participation of large communities in recycling activities.

In this study, it was found that housewives' recycling intentions have a positive impact on their recycling behaviors. With regard to these findings, it could be suggested that decision-makers take the following points into consideration while designing and implementing recycling projects for households:

- By improving the information and comprehension of people on recycling, people's recycling intentions, subjective norms and perceived behavioral control could be improved. For instance, publicity could be used to explain to housewives how to access recycling centers, and how they should separate, store and handle recyclables.
- Public awareness on recycling and to increase the effectiveness of eco-friendly energy use, Turkish government could encourage investments in eco-friendly technology.
- In order to encourage housewives to recycle, the government could place more recycling bins, while also increasing visual variety.
- Steg and Vlek (2009), Wan and Shen (2013), Sidique et al. (2010a, 2010b), Huang et al. (2014) proposed that communication and publicity campaigns, as well as guidance carried out in order to create awareness on recycling, encourage recycling behavior. Making use of these findings, public institutions, municipalities and non-governmental organizations could encourage people to recycle through the use of campaigns and publicity.

In prospective studies we plan to conduct the attitudes and behaviors of working and non-working housewives on recycling. Furthermore, including both single and married men in this study would provide a broader perspective on the issue. In prospective studies, more comprehensive models can be built by including factors that affect recycling behavior, such as Environmental Consciousness, Interest and Awareness regarding Recycling, Perceived Political Effectiveness,

Moral Norms, Demographic Factors, etc. Also, the correlation between political means developed by the government and recycling behavior could be investigated.

Appendix A. Correlation Matrix and Covariance Matrix Obtained as a Result of the Structural Equation Model Analysis

Correlation matrix of independent variables					
	A	B	C		
A	1.00				
B	0.17	1.00			
C	0.28	0.20	1.00		
Covariance matrix of latent variables					
	D	E	A	B	C
D	1.00				
E	0.31	1.00			
A	0.12	0.11	1.00		
B	0.22	0.10	0.17	1.00	
C	0.42	0.40	0.28	0.20	1.00

References

- Abbott, A., Nandeibam, S., O'Shea, L., 2011. Explaining the variation in household recycling rates across the UK. *Ecol. Econ.* 70 (11), 2214–2223.
- Abraham, C., Sheeran, P., 2003. Acting on intentions: the role of anticipated regret. *Br. J. Soc. Psychol.* 42, 495–511.
- Ajzen, I., 1991. The theory of planned behaviour. *Organ. Behav. Hum. Decis. Process.* 50 (2), 179–211.
- Ajzen, I., Fishbein, M., 2000. Attitudes and attitude behavior relation: reasoned and automatic processes. *Eur. Rev. Soc. Psychol.* 10, 1–33.
- Ajzen, I., Fishbein, M., 1980. Understanding attitudes and predicting social behavior. Prentice-Hall, Englewood-Cliffs, NJ.
- Alpizar, F., Gsottbauer, E., 2015. Reputation and household recycling practices: field experiments in Costa Rica. *Ecol. Econ.* 120, 366–375.
- Andersson, M., von Borgstede, C., 2010. Environmental information-explanatory factors information behavior. *Sustain. Waste Manag.* 2, 2785–2798.
- Barr, S., 2007. Factors influencing environmental attitudes and behaviors: a UK case study of household waste management. *Environ. Behav.* 39, 435–473.
- Berglund, C., 2006. Analysis the assessment of households' recycling costs: the role of personal motives. *Ecol. Econ.* 56, 560–569.
- Bratt, C., 1999. The impact of norms and assumed consequences on recycling behaviour. *Environ. Behav.* 31, 630–656.
- Byrne, M.B., 1998. Structural Equation Modeling with Lisrel, Prelis and Simplis: Basic Concepts, Applications, and Programming Vol. 396. Lawrence Erlbaum Associates, London Mahwah-New Jersey.
- Chan, K., 1998. Mass communication and pro-environmental behaviour: waste recycling in Hong Kong. *J. Environ. Manag.* 52, 317–325.
- Chan, L., Bishop, B., 2013. A moral basis for recycling: extending the theory of planned behaviour. *J. Environ. Psychol.* 36, 96–102.
- Chen, M.-F., Tung, P.-J., 2010. The moderating effect of perceived lack of facilities on consumer recycling intentions. *Environ. Behav.* 42, 824–844.
- Cheung, S.F., Chan, D.K.-S., Wong, Z.S.-Y., 1999. Reexamining the theory of planned behaviour in understanding wastepaper recycling. *Environ. Behav.* 31, 587–612.
- Cudeck, R., Toitt, D.S., Sörbom, D., 2000. Structural equation modeling: Present and future. first ed. Scientific Software International Inc., Lincolnwood.
- Davies, J., Foxall, G.R., Pallister, J., 2002. Beyond the intention-behaviour mythology: an integrated model of recycling. *Mark. Theory* 1, 29–113.
- Eskişehir Tepebaşı Municipality, 2016. Geri Kazanım Uygulaması. (Web address:) http://www.tepebasi.bel.tr/mud/cevre/cevre_alt.asp?id=11 (Access date: 16.04.2016).
- Fishbein, M., Ajzen, I., 1975. Belief attitude, intention and behavior: an introduction to theory and research, reading. Addison-Wesley Publishing Company, MA.
- Grodzinska-Jurczak, M., Törnå, P., Tarabala-Fiertak, M., Nieszporek, K., Read, A.D., 2006. Effects of educational campaign on public environmental attitudes and behaviour in Poland. *Resour. Conserv. Recycl.* 46, 182–197.
- Hair, J.F., Black, W., Anderson, R., Babin, B.R., Tatham, R.L., 2006. Multivariate data analysis with readings. Mcmillan Book Company, London.
- Hassan, A., Noordijn, T.A., Sulaiman, S., 2010. The status on the level of environmental awareness in the concept of sustainable development amongst secondary school students. *Procedia Soc. Behav. Sci.* 2, 1276–1280.
- Ho, Y.Y., 2002. Recycling as a Sustainable Waste Management Strategy for Singapore: An Investigation to Find Ways to Promote Singaporean's Household Waste Recycling Behaviour Vol. 42. Environmental Psychology Unit. Lund University.
- Hornik, J., Cheria, J., Madansky, M., Narayana, C., 1995. Determinants of recycling behaviour: a synthesis of research results. *J. Socio-Econ.* 24 (1), 105–127.
- Hoyle, R.H., 1995. Structural equation modeling: concepts, issues and applications. first ed. Sage Publications, Inc., California.
- Huang, W., Wang, J., Dai, X., Li, M., Harder, M.K., 2014. More than financial investment is needed: food waste recycling pilots in Shanghai, China. *J. Clean. Prod.* 67, 107–116.
- Joreskog, K., Sörbom, D., 1996. Lisrel 8: structural equation modeling. Scientific Software International Cop, Chicago, p. 378.
- Kelly, T.C., Mason, I.G., Leiss, M.W., Ganesh, S., 2006. University community responses to on-campus resource recycling. *Resour. Conserv. Recycl.* 47, 42–55.
- King, M., Lessdrenska, T., 2010. Ttransient caretakers: Making life on earth sustainable). Translated by Neşe Akin and Esra Eğilmez, Caretta books, 11, Istanbul.
- Kirakozian, A., 2016. The determinants of household recycling: social influence, public policies and environmental preferences. *Appl. Econ* 48, 1481–1503.
- Klöckner, C.A., Oppedal, I.A., 2011. General vs. domain specific recycling behaviour-applying a multilevel comprehensive action determination model to recycling in Norwegian student homes. *Resour. Conserv. Recycl.* 55, 463–471.
- Knussen, C., Yule, F., 2008. "I'm not in the habit of recycling". The role of habitual behavior in the disposal of household waste. *Environ. Behav.* 40 (5), 683–702.
- Knussen, C., Yule, F., Julie, M., Wells, M., 2004. An analysis of intentions to recycle household waste: the roles of past behaviour, perceived habit, and perceived lack of facilities. *J. Environ. Psychol.* 24, 237–246.
- Lee, H.Y., Qu, H., Kim, Y.S., 2007. A study of personal innovativeness on online travel shopping behaviour- a case study of Korean travelers. *Tour. Manag.* 886–897.
- Lim, H., Dubinsky, A., 2005. The theory of planned behavior in e-commerce: making a case for interdependencies between salient beliefs. *Psychol. Mark.* 22 (10), 833–855.
- Liska, A.E., 1984. A critical examination of the causal structure of the Fischbein/Ajzen attitude-behaviour model. *Soc. Psychol.* 47, 61–74.
- Mahmud, S.N.D., Osman, K., 2010. The determinants of recycling intention behavior among the Malaysian school students: an application of theory of planned behaviour. *WCLTA. Procedia Soc. Behav. Sci.* 9, 119–124.
- Matthies, E., Selge, S., Klöckner, C.A., 2012. The role of parental behaviour for the development of behaviour specific environmental norms—the example of recycling and personal and social factors that influence pro-environmental behavior: a review 35 reuse behaviour. *J. Environ. Psychol.* 32, 277–284.
- Metin, E., d. Packaging waste in Turkey, recycling practices and recycling industry <http://www.evkultur.com/cevre/turkiyedeambalajatiklari/turkiyedeambalajatiklari.htm> (Date of access: 23.08.2015).
- Mosler, H.-J., Tamas, A., Tobias, R., Rodríguez, Caballero, 2008. Deriving interventions on the basis of factors influencing behavioral intentions for waste recycling, composting, and reuse in Cuba. *Environ. Behav.* 40, 522–544.
- Nigbur, D., Lyons, E., Uzzell, D., 2010. Attitudes, norms, identity, and environmental behaviour: using an expanded theory of planned behaviour to predict participation in a curbside recycling programme. *Br. J. Soc. Psychol.* 49, 259–284.
- Oom Do Valle, P., Rebelo, E., Reis, E., Menezes, J., 2005. Combining behavioural theories to predict recycling involvement. *Environ. Behav.* 37 (3), 364–396.
- Oskamp, S., 1995. Resource conservation and recycling: behaviour and policy. *J. Soc. Issues* 51, 157–173.
- Oskamp, S., Harrington, M.J., Edwards, T.C., Sherwood, D.L., Okuda, S.M., Swanson, D.C., 1991. Factors influencing household recycling behavior. *Environ. Behav.* 23 (4), 494–519.
- Pettifor, H., 2012. Patterns of household practice: An examination into the relationship between housework and waste separation for households in the United Kingdom. ISER Working Paper Series No. 2012–14.
- Ramayah, T., Lee, J.W.C., Lim, S., 2012. Sustaining the environment through recycling: an empirical study. *J. Environ. Manag.* 102, 141–147.
- Raykov, T., Marcoulides, G.A., 2006. A first course in structural equation modeling. Lawrence Erlbaum Associates, Mahwah, NJ, p. 238.
- Reisinger, Y., Turner, L., 1999. Structural equation modeling with lisrel: application in tourism. *Tour. Manag.* 20, 71–88.
- Republic of Turkey Ministry of Development, 2013. İllerin ve bölgelerin sosyo-ekonomik gelişmişlik sıralaması araştırması (SAGE-2011). (Web address:) [https://www.google.com.tr/#q=T.C.+Kalk%C4%B1nma+Bakanl%C4%B1%C4%9F%C4%B1%2C+\(2013\).+%C4%B0llerin+ve+b%C3%B6lgelerin+sosyo-ekonomik+geli%C5%9Fimi%C5%9Flik+s%C4%B1ralamas%C4%B1+ara%C5%9F%C4%B1rmas%C4%B1+\(SAGE-2011\).+](https://www.google.com.tr/#q=T.C.+Kalk%C4%B1nma+Bakanl%C4%B1%C4%9F%C4%B1%2C+(2013).+%C4%B0llerin+ve+b%C3%B6lgelerin+sosyo-ekonomik+geli%C5%9Fimi%C5%9Flik+s%C4%B1ralamas%C4%B1+ara%C5%9F%C4%B1rmas%C4%B1+(SAGE-2011).+) (Access date: 16.04.2016).
- Republic of Turkey Ministry of Environment and Urbanization, Tekirdağ Governorate Provincial Directorate of Environment and Urbanization, 2012n. Recycling applications in waste management.
- Republic of Turkey Ministry of Science, Industry and Technology, 2014o. General directorate of industry national recycling strategy document and action plan, 2014–2017.
- Schwab, N., Harton, C.H., Cullum, J.G., 2014. The effects of emergent norms and attitudes on recycling behavior. *Environ. Behav.* 46 (4), 403–422.
- Shaw, P.J., 2008. Nearest neighbour effects in kerbside household waste recycling. *Resour. Conserv. Recycl.* 52, 775–784.
- Sidique, S.F., Joshi, S.V., Lupi, F., 2010a. Factors influencing the rate of recycling: an analysis of Minnesota countries. *Resour. Conserv. Recycl.* 54, 242–249.
- Sidique, S.F., Lupi, F., Joshi, S.V., 2010b. The effects of behaviour and attitudes on drop-off recycling activities. *Resour. Conserv. Recycl.* 54, 163–170.
- Steenkamp, B.E.M., Baumgartner, H., 2000. On the use of structural equation models for marketing modelling. *Int. J. Res. Mark.* 17, 195–202.
- Steg, L., Vlek, C., 2009. Encouraging pro-environmental behaviour: an integrative review and research agenda. *J. Environ. Psychol.* 29 (3), 309–317.
- Sterner, T., Barteling, H., 1999. Household waste management in a Swedish municipality: determinants of waste disposal, recycling and composting. *Environ. Resour. Econ.* 13, 473–491.
- Tang, Z., Chen, X., Luo, J., 2011. Determining socio-psychological drivers for rural household recycling behavior in developing countries: a case study from Wugan, Hunan, China. *Environ. Behav.* 43 (6), 848–877.

- Tonglet, M., Phillips, P.S., Read, A.D., 2004. Using the theory of planned behaviour to investigate the determinants of recycling behaviour: a case study from Brixworth, U.K. *Resour. Conserv. Recycl.* 41, 191–214.
- Tucker, P., 1999. Normative influences in household waste recycling. *J. Environ. Plan. Manag.* 42, 63–82.
- Turkish Statistical Institute (TSI), 2012. Statistics on waste disposal and recycling facilities. <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=16177> (Access Date: 33.08.2015).
- Turkish Statistical Institute (TUIK), 2014. İstatistiklerle Kadın. (Web address:) <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=18619> (Access date: 16.04.2016).
- Wan, C., Shen, G., 2013. Perceived policy effectiveness and recycling behaviour: the missing link. *Waste Manag.* 33 (4), 783–784.
- Wan, C., Shen, O.G., Yu, A., 2014. The role of perceived effectiveness of policy measures in predicting recycling behaviour in Hong Kong. *Resour. Conserv. Recycl.* 83, 141–151.
- White, K.M., Hyde, M.K., 2012. The role of self-perceptions in the prediction of household recycling behavior in Australia. *Environ. Behav.* 44 (6), 785–789.
- Yetim, A., 2014. Overview of recycling industry in the world and its status in Turkey. *Ar&Ge Bülten* (R&D bulletin), June-sectoral.