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Research Article

Investigation of Attitudes and Behaviors Towards Recycling with Theory Planned Behavior

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ABSTRACT

Recycling is defined as the re-inclusion of wastes that can be reused in the production process by undergoing various processes. At the same time, recycling is seen as the most important environmental behavior that reduces the amount of solid waste and conserves resources. Considering the importance of recycling for a sustainable future, it is of great importance to determine the factors affecting the recycling behavior of individuals. Due to the rapid increase in environmental problems and their extremely negative impact on life, it is necessary to determine the environmental and recycling behaviors of individuals and produce solutions. In this study, attitudes and behaviors towards recycling were investigated with the help of a model proposed within the scope of Theory Planned Behavior (TPB). The analysis of the data was made using the Partial Least Squares Structural Equation Modeling (PLS-SEM) Smart-PLS software, which can be used successfully in small-volume samples and does not require the assumption of multivariate normality. It was determined because of PLS-SEM fit criteria that TPB is suitable for explaining recycling attitudes and behaviors. As a result of the analysis, it was revealed that attitude, subjective norm, and perceived behavioral control positively and significantly affect recycling intentions.

Keywords: Recycling, attitude, behavior, Theory of Planned Behavior (TPB), Partial Least Squares Structural Equation Modeling (PLS-SEM)

1. Introduction

Rapid urbanization and population growth, in parallel with industrialization and technological developments, are rapidly increasing the pressure of human activities on the environment in our country as well as all over the world (Kaçtıoğlu & Şengül, 2010). For the continuation of a sustainable life, it is very important for individuals to exhibit environmental attitudes and behaviors in terms of protecting natural resources. Besides providing environmental benefits, environmental awareness and behavior should also be seen as an attitude to save resources economically and create new resources (Yılmaz & Doğan, 2017).

The importance of recycling and environmental behaviors in the process of preventing the emergence of environmental problems is increasing day by day. One of the ways to solve the environmental problems that arise is to raise the awareness of the society about the environment. The way for people to increase sensitivity, interest and awareness about the environment can only be with the help of environmental education (Çimen & Yılmaz, 2012, 2015).

"3R" is mentioned so that individuals can consciously support a sustainable life. It is explained as reducing (Reducing), reusing (Reusing) and recycling (Recycling). It is thought that this classification, which is accepted by most of countries, can reduce the negative effects on the environment by preventing wrong environmental attitudes and behaviors. King and Lessidrenska (2010) describe these processes as: Reducing; it is to reduce the consumption of energy and water as much as possible in order to produce as little waste as possible and to save energy. Reuse; they are efforts to reuse a product or energy after a one-time use, if possible. Recycling; it is only applied to materials and products that are not likely to be reused (Gelibolu & Madran, 2012).

Recycling is considered an effective economic investment in the long run. Economic problems arise due to the rapid depletion of natural resources, the decrease in the supply of raw materials used in the production sector and the increase in raw material prices. It is of great importance in terms of economic sustainability that some of the raw material needs in all sectors are met from wastes that can be recycled and have economic value. An efficient recycling system will contribute to sustainable economic growth by reducing the dependence of sectors on imports of raw materials and intermediate goods (Altınışık, 2014; Ak & Genç, 2018).

Lifestyle changes in urban areas have started to cause serious waste problems in Turkey. Changes in the lifestyles of individuals have affected their consumption habits, and this situation has affected the environment and revealed the problems of "environmental protection and recycling". Although recycling has been a way of life in developed countries for many years, it is still not common enough in our country. Considering the importance of recycling for a world where sustainable life can exist, it is of great importance to determine the factors affecting attitudes and behaviors towards recycling.

It should not be forgotten that the best thing that can be done for all living things in nature is to protect the environment and nature. Considering the importance of recycling for a sustainable future, it is of great importance to determine the factors that affect the recycling behavior of individuals. Due to the rapid increase in environmental problems and the extremely negative impact on life, it is necessary to determine the environmental and recycling behaviors of individuals and produce solutions. In this study, a questionnaire was utilized to measure the recycling attitudes and behaviors of individuals. In the study, the relationship between the attitude dimension, social norms, perceived behavioral control and recycling behavior, which consists of environmental knowledge and awareness that leads consumers to recycling intention, has been tried to be examined with the help of a structural equation model (SEM) proposed within the scope of the Theory of Planned Behavior (TPB).

Considering the importance of recycling for a sustainable future, it is of great importance to determine the factors that affect the recycling behavior of individuals. For this reason, due to the rapid increase in environmental problems and their extremely negative impact on life, it is necessary to determine the environmental and recycling behaviors of individuals and produce solutions. When the literature is examined, the factors affecting the recycling behavior have been researched for a long time, and research on this subject still continues (Sorkun, 2018, Wan et al., 2017; Yılmaz and Doğan, 2017, Arı and Yılmaz, 2016; Botetzagias, 2015; Park and Ha, 2014).

The main purpose of this study is to investigate attitudes and behaviors towards recycling within the scope of the TPB. The structural relationships in the proposed model were tested with partial least squares structural equation modeling (PLS-SEM). Theoretically, while this study provides a more detailed examination of the variables in the TPB and their effect on recycling behavior, in the field of application, understanding how these variables affect recycling behavior will enable policy makers and managers to better design recycling programs.

After this section, the concept of recycling, the state of recycling in Turkey, research model-hypotheses design, and analysis with PLS YEM are given.

2. Recycling

The concept of recycling is the process of collecting and processing materials that are discarded as garbage and transform this waste into new products. The purposes of recycling are to prevent excessive consumption of resources, to save energy, to minimize the damage to nature and to contribute to the country's economy. It is commonly done with iron, steel, copper, lead, paper, plastic, composite, glass, electronic waste, etc. The recycling and reuse of materials will prevent the depletion of natural resources. Recycling is one of the ways to reduce environmental impact and resource consumption. Therefore, recycling can reduce the use of energy and materials per unit output, thus providing enhanced eco-efficiency (Birsen, 2020).

Metal, plastic and glass wastes used in food and beverage packaging, as well as paper and cardboard, constitute a significant part of the recyclable materials in waste. The recycling process goes through certain stages. These stages are: collection, separation, evaluation and bringing the new product into the economy (Şengül, 2010).

1. Collection: The recycling process of waste begins the moment the products are consumed. Waste must be collected in a certain and economical way in a regular place. Collection includes a complex process that requires detailed planning (Birsen, 2020). Two basic collection methods are used; the first is the consumer's bringing it, and the other is the consumer's reaching out and receiving it. Milk Run is a collection system that has recently been developed especially for the collection of packaging waste. In this system, the vehicles through which the products are distributed collect the packaging and other usable materials from the same point after leaving the product at a point (retailer). In this way, the company can ensure the transformation of most of the packaging material used in production.
2. Separation (Classification): Separation of wastes is associated with the recovery of waste. The methods used in the recovery of wastes as energy are separation (classification) methods (Birsen, 2020). In addition, unwanted substances mixed in the collected material are eliminated at this stage. Separation types; Primitive separation, Separation at source; it is carried out in four ways: separation during collection and separation at the separation facility.

3. Evaluation: It is the economic recycling process of separated, cleaned and reprocessed materials. In this process, the material undergoes chemical and physical changes and returns to the economy as a new material.

4. Bringing the New Product Back to the Economy: Bringing the new product back into the economy is the reuse of the recycled product (Birsen, 2020).

Not every product can be recycled. The "♺" logo should be used on products suitable for recycling. The recycling process takes place in the form of collecting the waste, separating it in the recycling center, granulating the separated products to create raw materials, and making new products from this raw material and reaching the consumer.

Thanks to recycling, great gains are made in energy saving. Paper, glass, iron, aluminum, copper, stick yellow, red yellow, zinc, bronze, lead, tin, nickel are some of the most preferred products in recycling. Copper, aluminum and magnesium are 100% recyclable without any problems. The collection and recovery of recyclable wastes is economically very important. The preferred recycling products can be listed as iron, copper, aluminum, zinc, paper, composite waste, glass and oils (Ilgar, 2020).

Significant progress has been made in the recovery and recycling of solid wastes in Turkey since the 1990s. Metin, Eröztürk and Neyim (2003) estimated that the recycling figures for Turkey in 2000 were around 30%. However, most of this activity is in the hands of private entrepreneurs and street waste collectors (Bayraktar & Çobanoğlu, 2016).

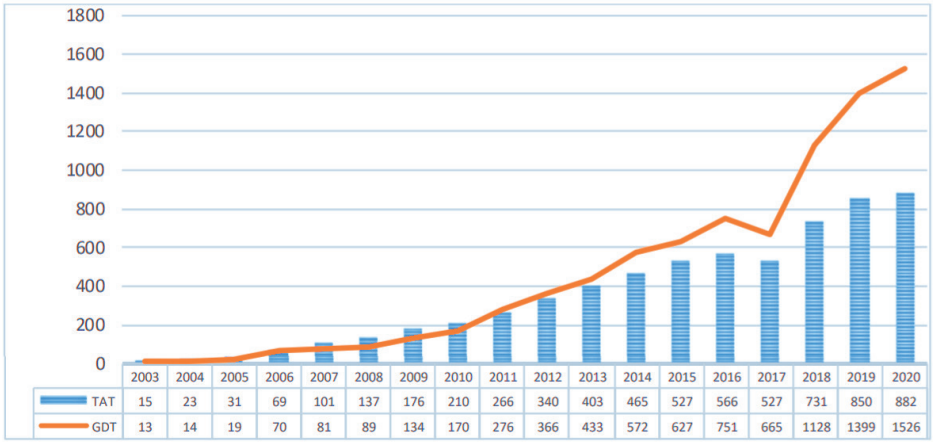
More than half of the wastes produced in Turkey are recyclable. Waste, which is an environmental problem, requires financial resources for disposal and is an important input for production; the advantages it will provide in areas such as employment creation, effective use of natural resources, economic benefits and environmental improvement are very important in increasing national welfare. In this context, in addition to the various advantages provided by recycling, considering the wastes that exist in this field and cannot be fully evaluated in our country, the need to prepare a national strategy specific to this issue has arisen. Within the scope of the strategy preparation, the problems related to the recycling system in our country have been identified and the "National Recycling Strategy Document and Action Plan" has been created in order to ensure that the sector has a sustainable and effective structure by searching for solutions. The existing "National Recycling Strategy and Action Plan" reveals the current situation of our country in recycling and draws a road map for the works to be done in the coming period (Altınışık, 2014).

Recycling in Turkey; it is regulated by the Environmental Law and the regulations issued pursuant to this law. These regulations are (Şengül, 2010);

- Regulation on Control of Waste Batteries and Accumulators
- Packaging Waste Control Regulation
- Regulation on Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls
- Waste Oil Control Regulation
- Regulation on Control of Waste Vegetable Oils
- Regulation on Control of End-of-Life Tires
- Regulation on General Principles of Waste Management
- Hazardous Waste Control Regulation

According to the regulations, packaging waste collection-separation facilities and recycling facilities must obtain licenses from the Ministry. Licensing was started for the first time in 2003. The distribution of licensed facilities by years is given in Figure 1 (Ministry of Environment and Urbanization, 2022).

The "Packaging Information System" was created by the Ministry of Environment and Urbanization in order to create an inventory of packaging and packaging wastes within the scope of the Packaging Waste Control (PWC) Regulation. System users; Ministry, Environment and Urbanization Provincial Directorates, packaging manufacturers, suppliers, businesses that put their products on the market as packaged, packaging waste collection, sorting, recycling and recovery facilities, authorized organizations and municipalities. According to 2020 packaging information system data, approximately 3.7 million tons of packaging was put on the market throughout Turkey and 2.3 million tons of packaging waste was recovered (Ministry of Environment and Urbanization, 2022).



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TAT	15	23	31	69	101	137	176	210	266	340	403	465	527	566	527	731	850	882
GDT	13	14	19	70	81	89	134	170	276	366	433	572	627	751	665	1128	1399	1526

Figure 1: Number of packaging waste processing facilities with temporary activity certificates/licenses (Ministry of Environment and Urbanization, 2022)

TAT: Collection Separation Plant, **GDT**: Recycling Plant

2.1. Theory of Planned Behavior (TPB)

TPB is one of the most influential and widespread psychological theories used to explain pro-environmental behavior (Botetzagias, 2015). TPB, which includes attitude, subjective norm, perceived behavioral control and intention factors, is a widely used theory to determine a wide variety of intentions and behaviors (Armitage and Conner, 2001). TPB states that an individual's intention to perform a behavior is explained by a positive evaluation of the behavior (attitude), the social pressure that encourages the behavior (subjective norm), the perceived ease of performing such behavior, or the individual's perceived ability to perform the behavior (perceived behavioral control) (Ajzen, 1991).

There are many studies in the literature investigating recycling within the framework of TPB (Tonglet et al., 2004; Ramayah et al., 2012; Park and Ha, 2014, Chan and Bishop, 2013; Arı and Yılmaz, 2016; Yılmaz and Doğan, 2017; Wan et al., 2017). Chan and Bishop (2013), in their study investigating recycling behavior by adding the moral norm variable to the TPB model, stated that the moral norm can replace the attitude to predict recycling intention. Park and Ha (2014) investigated recycling behaviors with a comprehensive model by combining TPB and NAM (Norm Activation Model) models. Botetzagias (2015) investigated recycling behavior by adding moral norms and demographic variables to the TPB model, and found that moral norms had more of an impact on recycling behavior than attitude. Arı and Yılmaz (2016) investigated the recycling behavior of housewives within the scope of the TPB model. Similarly, Yılmaz and Doğan (2017)

investigated students' behaviors towards recycling within the scope of TPB. Wan et al (2017) investigated the effect of attitude and subjective norm on recycling behavior. Sorkun (2018) investigated how social norms affect recycling behavior in societies.

In this study, on the basis of TPB, which is one of the strongest psychological behavior theories, moral norm, environmental knowledge, and environmental anxiety variables were added to the model and the relationships between the factors were investigated in detail in order to understand the recycling behavior.

3. Development of research model and hypotheses

3.1. Attitude

Attitude is one of the 3 important predictors of intention in TPB. Attitude towards behavior expresses the degree to which a person evaluates the behavior in question as positive or negative (Ajzen, 1991; Klockner, 2011). In studies on recycling, Attitude has been evaluated from a utilitarian perspective with questions such as "recycling can save energy", "recycling benefits the environment" (Öztürk and Erten, 2020; Chen and Tung, 2010; Tonglet et al., 2004). In some studies, it has been addressed as awareness of consequences that refer to the consequences and cost-benefits of recycling behaviors (Bratt, 1991; Davies et al., 2002; Do Valle et al., 2005). Wan et al (2017) handled the attitude factor from both perspectives in the recycling study and revealed its positive effect on intention.

When the literature is examined, it has been revealed that the attitude factor is among the most important determinants of behavioral intentions in studies on recycling (eg, Botetzagias et al., 2015; Arı and Yılmaz, 2016; Yılmaz and Doğan, 2017). Arı and Yılmaz (2016), in their study investigating housewives' intentions towards recycling with TPB, stated that attitude has a positive and significant effect on intention.

In the light of the studies revealed, the following hypothesis has been proposed to investigate the relationship between attitude and intention towards recycling:

H1: The recycling attitudes of the participants positively and significantly affect their recycling intentions.

3.2. Subjective norm

In TPB, social influence is represented by the concept of subjective norm. (White et al., 2009). It has been defined as social pressure from significant others that has an impact on individuals' behavioral intentions (Ajzen, 1991). The main source of social influence is the individual's immediate environment, such as family members, friends and neighbors. As the individual considers the social pressure from other people, the subjective norm either encourages or inhibits how the individual behaves (López-Mosquera et al., 2014). People act in response to social norms because they seek the approval of the immediate environment and avoid blaming others (Wan et al., 2017). When the literature is examined, the positive effect of the subjective norm on recycling intention has been revealed in various studies (Cheung et al., 1999; Knussen et al., 2004; Ramayah et al., 2012; Botetzagias, 2015; Arı and Yılmaz, 2016; Wan et al. , 2017). For example, Cheung et al. (1999) revealed that the subjective norm positively affects the intention to recycle waste paper. Shaw (2008) has shown that an individual's intention to recycle is significantly influenced by social norms that he or she believes are adopted by other people or social groups whose opinions are important to them. The results show that when the individual perceives a strong social impact towards recycling, the intention to perform the recycling behavior becomes stronger. In the light of the information obtained, the following hypothesis was proposed between subjective norm and intention.

H2: Recycling subjective norms of the participants positively and significantly affect their recycling intentions.

3.3. Perceived behavioral control

Perceived behavioral control (PBC) is defined as an individual's perceived ease or difficulty in performing a certain behavior (Ajzen, 1991). In some studies, it has been determined that the long distance to the recycling bins reduces the level of recycling behavior. (Sidique et al., 2010; Tadesse, 2009). When the literature is reviewed, in recycling studies, PBC has been investigated and confirmed as an important determinant of behavioral intention (Botetzagias et al., 2015; Arı and Yılmaz, 2016; Wan et al., 2017; Yılmaz and Doğan, 2017). Similarly, since it is thought that perceived behavioral control may affect intention and behavior towards recycling, the following hypotheses have been proposed:

H3: Recycling perceived behavioral controls of the participants positively and significantly affect their recycling intentions.

H4: Recycling perceived behavior controls of the participants positively and significantly affect their recycling behavior.

3.4. Intention

Ajzen (1991) defines intention as an individual's level of desire to perform a behavior and the intensity of the effort he plans to put forth. When the literature is examined, it is seen that intention is important before the behavior occurs in recycling studies (Arı and Yılmaz, 2016; Yılmaz and Doğan, 2017). For example, Yılmaz and Doğan (2017) revealed that recycling behavioral intention is highly effective in realizing the behavior. Arı and Yılmaz (2016) concluded that the recycling intentions of housewives affect behavior. Research shows that intention in TPB helps to predict whether a behavior will occur or not. In the study, the following hypothesis was proposed to test the relationship between recycling intention and behavior:

H5: The recycling intention of the participants affects their recycling behavior positively and significantly.

3.5. Data collection tool and sampling

The data were collected with the help of an online questionnaire. The survey consists of two parts. In the first part, there are demographic questions, while in the second part, there are attitude items with 10 Likert "1. totally disagree-10. totally agree" and behavioral items with 10 Likert "1.Never-10.Always". Items 11, 14, 20, 22, 24, 26, 27, 28, 30, 33, 34, 35 in the questionnaire were taken from Yılmaz and Doğan (2017) and 9, 15, 17 from Arı and Yılmaz (2016).

In this study, a convenience sampling method was used as a method since face-to-face surveys could not be conducted due to the Covid-19 epidemic. The sample units were reached through an online link on social media, and data were collected. Data analysis was performed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) Smart-PLS software, which can be used successfully in small-volume samples and does not require the assumption of multivariate normality. Since PLS-SEM analysis with the Smart-PLS program gave successful results in small samples, a sample volume of e 205 units was considered sufficient. In addition, there are 15 items in the study, and the sample size of 10 times the number of items is considered sufficient (Hair et al.1998; Çakır, 2020; Yıldız, 2019).

The sample consisted of 205 people who voluntarily responded to the online survey on social media in April, May and June 2021. Power analysis was performed for sample size. When the

desired statistical power level = 0.80, the number of latent variables = 5, the number of observed variables (item) = 15, and the probability level 0.05, the minimum sample size was calculated as 200. These results show that the sample size in the study is sufficient.

4. Findings

4.1. Descriptive Statistics

It is seen that 60.49% of the participants who voluntarily participated in the online survey were female and 39.51% were male. Considering the marital status of the participants who answered the questionnaire, it is seen that 66.34% of the participants are single and 33.66% of them are married. When the answers given to the question of your graduation status are examined, 27.80% of them are undergraduate graduates, 24.88% of them are high school graduates, 20.49% are still university students, 12.68% are associate degree graduates, 7.32% are primary school graduates, and 4.39% are secondary education graduates and 2.44% of them are graduates. The participants who answered the survey consisted of individuals from Bursa (122 participants), Eskişehir (21 participants), Izmir (19 participants), Istanbul (15 participants) and other cities (28 participants).

According to the answers given by the participants, 39.02% of the products thrown into the recycling bin are Paper, 32.20% Pet bottles, 19.02% Plastic, 3.90% other, 5.85% Glass. “Is there a recycling bin in your neighborhood?” directed to the participants. According to the answers given to the question, it was concluded that while 72.20% of them had a recycling bin in their immediate vicinity, 27.80% of them did not have a recycling bin in their immediate vicinity. Statistics on the demographic characteristics of the participants are given in Table 1.

Table 1. Demographic characteristics of the participants

Measure	Item	Frequency	%
Gender	Male	81	39.51
	Female	124	60.49
Marital status	Married	69	33.66
	Single	136	66.34
Education status	Undergraduate	57	27.80
	Highschool	51	24.88
	University students	42	20.49
	Associate degree	26	12.68
	Primary school	15	7.32
	Secondary education	8	4.39
	Graduates	6	2.44
Living city	Bursa	122	61.0
	Eskişehir	21	10.0
	İzmir	19	9.0
	İstanbul	15	7.0
	Other	28	13.0
Do you have a recycling bin near you?	Yes	150	72.20
	No	55	27.80
What product do you throw in the recycling bin most often?	Bottle	66	32.20
	Glass	11	5.85
	Paper	79	39.02
	Plastic	39	19.20
	Other	5	3.90

4.2. Validity of the Measurement Model

Three criteria are used to ensure Convergent validity. First, the standardized factor load of the observed variables belonging to latent variables should be greater than 0.50 and be statistically significant (Fornell & Larcker, 1981). Second, the Composite Reliability-CR and Cronbach Alpha (CA) values for each structure should be greater than 0.70 (Hair et. al.1998). Third, the Average Variance Extracted (AVE) value of each latent variable must be higher than 0.50 (Fornell and Larcker, 1981). In addition, it was stated that in cases where the CR values of the relevant factor are greater than 0.60, it is acceptable for the AVE to be less than 0.50 and the construct validity is sufficient (Hair et al., 1998; Çakır, 2020; Yıldız, 2019; Yılmaz & Kinaş, 2020). In Table 2, the CA, CR and AVE values obtained from the Smart-PLS software are given collectively.

Table 2. Cronbach's Alpha, CR and AVE Values

Factors	Cronbach Alpha	Construct reliability (CR)	Average variance extracted (AVE)
ADK	0.823	0.894	0.739
DAV	0.792	0.871	0.695
NYT	0.906	0.941	0.843
TUT	0.906	0.941	0.842
ÖZ	0.724	0.845	0.647

When the construct reliability of the study was checked, it was observed that the CR values were ADK= 0.89, DAV= 0.87, NYT= 0.94, TUT= 0.94, OZ=0.85, and the AVE values were greater than 0.65. The discriminant validity of the measurement model is checked by comparing the square root of the AVE value of each construct and the correlation between that construct and the other constructs. As a result of these comparisons, discriminant validity is ensured if the square root values of the AVE are larger (Fornell & Larcker, 1981).

Table 3. The discriminant validity -Fornell-Larcker criterion

	ADK	DAV	NYT	TUT	ÖZ
ADK	0.859				
DAV	0.388	0.833			
NYT	0.639	0.496	0.918		
TUT	0.659	0.234	0.640	0.917	
ÖZ	0.407	0.463	0.587	0.243	0.804
AVE	0.739	0.695	0.843	0.842	0.647

Note: The diagonal elements in the table are the square root of AVE, and the elements outside the diagonal are the correlation coefficients between the latent variables

As a result of the comparisons in Table 3, it was seen that discriminant validity was achieved because the square root values of AVE, that is, the diagonal elements in the table were larger.

According to the HTMT (Heterotrait-Monotrait Ratio) criterion, it expresses the ratio of the average of the correlations of the items of all the variables in the study (the heterotrait-heteromethod correlations) to the geometric mean of the correlations of the items of the same variable (the monotrait-heteromethod correlations). The authors stated that the HTMT value should theoretically be below 0.90 for close concepts and 0.85 for distant concepts (Henseler et al., 2016; Yıldız, 2020). HTMT values are given in Table 4. When the values are examined, it is seen that the HTMT values are below the threshold value.

Table 4. The discriminant validity - Heterotrait-Monotrait Ratio (HTMT)

	TUT	ÖZ	ADK	NYT	DAV
TUT					
ÖZ	0.322				
ADK	0.748	0.558			
NYT	0.713	0.744	0.744		
DAV	0.261	0.595	0.389	0.521	

4.2.2. Fit criteria of the structural model

After the validity and reliability of the measurement model has been verified, the structural model is evaluated. The structural model usually evaluates the coefficient of determination R^2, the effect size f^2, the path coefficient and t-value, the validity of the estimator Q^2, and the goodness-of-fit index (GoF). In addition, for the fit of the model, the measurements calculated by the Smart PLS software, Standardized Root Mean Square Residual SRMR, Chi-Square and Normed Fit Index (NFI) values are used (Yılmaz & Kinaş, 2020).

In the study, the R^2 values for behavior and intention factors, which are internal latent variables, are R^2 (DAV) =0.255 and R^2 (NYT)=0.629, respectively. f^2 (effect size), in addition to evaluating the R^2values of all endogenous latent variables, the change in R^2value when a particular exogenous latent variable is removed from the model is used to evaluate whether this subtracted construct has a significant effect on the endogenous latent variables. . The effect measure f^2 estimator indicates that a latent variable has a weak ($0.02< f^2 <0.14$), moderate ($0.15< f^2<0.34$), and high ($f^2 >0.34$) effect at the structural level (Cohen, 1988). As a result of the analysis, DAV variable, which is an internal latent variable; ADK (0.011) and NYT (0.140) affect weakly. NYT variable, which is another endogenous latent variable; It affects ADK (0.058) weakly, TUT (0.250) moderately, and OZ (0.366) high. The Q^2 measure is an indicator of the validity of the model's prediction. If the Q^2 value of the structural model is greater than zero, it provides predictive validity. As a result of the analysis, Q2 = 0.524 for intent and Q2 = 0.135 for behavior were calculated. Model validity was provided according to the Q^2 values.

As there is no general fit index in PLS-SEM, the goodness of fit index (GoF) is suggested as a measure of goodness of fit. The GoF index is both the measurement model and was developed to determine the performance of the structural model and to provide a standard measure for the predictive performance of the whole model. The GOF index takes values between 0 and 1. The degrees of fit of the GoF index are GoF<0.10 (less), 0.10<GoF< 0.25 (moderate), 0.25<GoF<0.36 (good) GoF>0.36 (very good) (Tenenhaus et al.,2005). Since GoF=0.82 was calculated in the study, the goodness of fit of the model was evaluated as very good.

In order for the model to have an acceptable fit, the SRMR value is required to be less than 0.10. The SRMR value for the model was calculated as 0.076. The NFI value is required to take a value between 0 and 1. A value close to 1 for NFI indicates that the model has a good fit. The NFI value for the model was calculated as 0.864. In this case, it can be said that the model has an acceptable fit.

Finally, in the evaluation of the model, it should be determined whether there is a multicollinearity between the latent variables. For this, VIF (variance inflation factor) values are examined. A VIF value less than 5 indicates that there is no collinearity between the variables (Hair et al., 2011). For Outer, 1.275< VIF<3.584 and Inner values were calculated as 1.246<VIF<2.010. It can be said that the calculated VIF values are less than 5 and there is no multicollinearity problem.

4.2.3. Path coefficients and hypothesis testing

In Figure 3, a positive relationship was found between attitudes and intentions towards recycling in the model of attitudes and behaviors towards recycling. This value indicates that a one-unit increase in the attitude towards recycling will cause an increase of 0.41 units in the intention to recycle.

A positive relationship was found between the subjective norm towards recycling and the intention to recycle. This value indicates that a one-unit increase in the subjective norm for recycling will cause an increase of 0.40 units in the intention to recycle.

It is seen that there is a positive relationship between perceived behavioral control towards recycling and intention towards recycling. This value indicates that a one-unit increase in perceived behavioral control towards recycling will cause an increase of 0.21-unit in intention to recycle.

A statistically significant relationship could not be determined between perceived control of behavior towards recycling and behavior towards recycling.

It is seen that there is a positive relationship between intention towards recycling and behavior towards recycling. This value indicates that a one-unit increase in intention to recycle will result in a 0.42-unit increase in recycling behavior.

Standardized parameter estimates, t-values and structural equations are given in Figure 2 and Table 5.

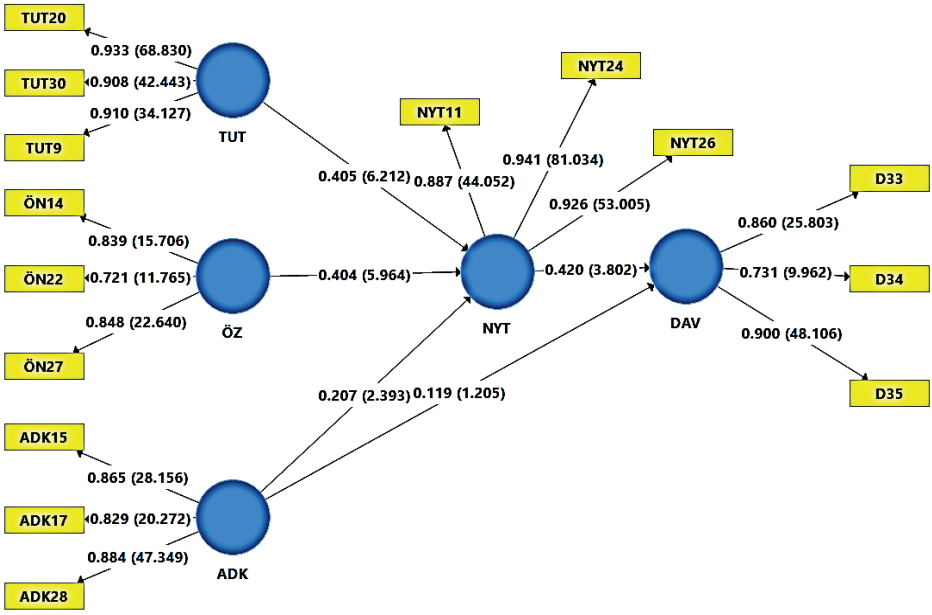


Figure 1: Attitudes and Behaviors towards Recycling - Planned Behavior Theory Model

The values in parentheses are the t values.

TUT: Attitude, ÖZ: Subjective Norm, ADK= Perceived Behavior Control, NYT= Intention, DAV= Behavior

Table 5. Standardized parameter estimates and t values

Hypothesis	Path Coefficients	t-value	P-value	Result
H1: ADK→DAV	0.119	1.205	0.229	Not supported
H2: ADK→NYT	0.207	2.393	P<0.05	Supported
H3: NYT→DAV	0.420	3.802	P<0.01	Supported
H4: TUT→NYT	0.405	6.212	P<0.01	Supported
H5: ÖZ→NYT	0.404	5.964	P<0.01	Supported

5. Conclusion and discussion

Recycling is the most important factor for a livable world. Recycling needs to be expanded and made a responsibility. In this study, attitudes and behaviors towards recycling were investigated with the help of a model proposed within the scope of Theory Planned Behavior (TPB). The analysis of the data was made using the Partial Least Squares Structural Equation Modeling (PLS-SEM) Smart-PLS software, which can be used successfully in small-volume samples and does not require the assumption of multivariate normality. It was determined, because of PLS-SEM fit criteria, that TPB is suitable for explaining recycling attitudes and behaviors.

When Figure 2, in which the results of the PLS-SEM analysis are given, is examined, it is seen that the Attitude (TUT) factor has three observed variables and the highest factor load among them is the expression "TUT9: If I recycle, I will increase the quality of life of future generations (0.910)". The subjective norm (ON) factor also has three observed variables. The highest factor load of these is ON27 with 0.848. He measured the phrase "People whose opinions I care about want me to recycle" in ON27. It is seen that the factor of perceived behavioral control (ADK) has three observed variables and the highest factor load of them is the statement "ADK28: I know how to sort waste for recycling (0,884)". It is seen that the intent (NYT) factor also has three observed variables and the highest factor load of them is the statement "NYT24: I will make an effort to recycle regularly in the coming days (0.941)". The behavior (DAV) factor also has three observed variables. The highest factor load of these is 0.900 and D35. In D35, "How often plastic bottles and plastics are recycled recently" was measured.

When the structural relations are examined, the Intent factor; It is concluded that attitude (0.405), Subjective norm (0.404) and Perceived behavioral control (0.207) affect it. From these results, it can be said that the most important determinant of the intention to recycle is the attitude towards recycling. A statistically significant positive correlation was found between attitude and intention (0.405). A statistically significant positive (0.404) relationship was found between subjective norm and intention. It has been observed that there is a statistically significant positive (0.207) relationship between perceived behavioral control and intention. A statistically significant positive (0.420) correlation was found between intention and behavior. According to the results of PLS-SEM analysis, the model has an acceptable fit.

As a result of the t test; attitude of gender; (female mean: 9.3898, male mean: 8.8107; t=2.881, p=0.005), there is a significant difference in perceptions above. The average attitude towards recycling is higher among women. According to gender, no significant difference was found between the mean of the subjective norm (female mean: 7.4946, male mean: 7.3621; t=0.511, p= 0.610). There is a significant difference between the mean of perceived behavioral control (female mean: 8.9167, male mean: 8.1770; t=3.288, p= 0.001) by gender. It was determined that there was no significant effect of gender on recycling behaviors (female mean: 6.5484, male mean: 6.8313; t= -0.944, p= 0.347). In short, as a result of the t test, gender; while it was concluded that there was

no significant difference in the perceptions of the subjective norm factor and the behavior factor, it was found that there was a significant difference in the perceptions of gender on the factors in all other factors.

As a result of the Anova test, the level of education; While it was determined that there was no significant difference between the factors of Intent (F= 1.435, p= 0.203), Behavior (F= 0.480, p= 0.823), Attitude (F= 2.649, p= 0.017), Subjective norm (F= 3.166, p= 0.005) and Perceived behavioral control (F= 3.663, p= 0.002) factors were found to have significant differences. It has been determined that while the attitude towards recycling has the biggest impact among the determinants of recycling intention, it is the perceived behavioral control that has the lowest impact.

In the study, a positive relationship was found between recycling intention and perceived behavioral control. Similar to the results of the study, Klöckner and Oppedal (2011) determined that there is a positive relationship between the intention to recycle and the perceived behavioral control. Mosler et al. (2008) concluded in their study that perceived behavioral control positively affects the behavior towards recycling. The results show that individuals' perceived ease about recycling and adequate external conditions for recycling positively affect their recycling intentions.

TPB argues that subjective norm also has an impact on the determinants of individuals' behavioral intentions. It is accepted that suggestions and criticisms received from the environment affect the formation of subjective norms and, in short, measure social pressure (Yılmaz & Doğan, 2017). In the study, it was determined that the second most important determinant of the intention to recycle is the subjective norm for recycling. Encouraging and supporting individuals by people whose opinions they value in order to realize their responsibilities can increase the possibility of recycling. Similar to the study result, Cheung et al., (1999) stated that the subjective norm positively affects the intention to recycle waste paper. Botetzagias et al. (2015) revealed that there is a positive significant relationship between subjective norm and recycling intentions. These results reveal that subjective norms play a key role in determining how appropriate individuals find recycling action. The attitude factor towards recycling significantly affects the intention to recycle. In TPB, he argues that an individual's intention is shaped by the influence of his attitudes. In short, every individual who believes that recycling protects the environment can intend to recycle. Klöckner and Oppedal (2011) determined that there is a positive relationship between the intention to recycle and the previously acquired habits that affect it. They also found that perceived conditions and situations have a direct effect on recycling behavior. Mosler (2008) stated in his study that perceived conditions affect behavior positively, and in this study, it was concluded that perceived behavioral control positively affected behavior towards recycling.

By making arrangements that will make it easier for individuals to recycle, the reasons that prevent recycling behavior can be eliminated. The number and variety of recycling bins can be increased. Individuals can be provided with more space to recycle. Sensitivity levels can be increased by providing information about the materials they will reserve for the boxes. In order to make the boxes more visually appealing, campaigns can be organized to encourage individuals to recycle. It is possible for consumers to be directed to a sustainable consumption behavior. In this way, community behavior can also change quickly.

In addition, by local governments; various campaigns can be organized to raise awareness of individuals, public service announcements can be increased, and brochures emphasizing the importance of recycling can be distributed to raise awareness of all individuals in the household. Giving bonuses to individuals who recycle, taking into account the type and amount of recycling, granting scholarships to students with the revenues obtained from recycling, and organizing so-

cial activities for students with the revenue obtained from recycling can significantly contribute to increasing the recycling rate.

In order to strengthen the sensitivity of individuals towards the environment, information can be provided with the help of more social activities and especially social media tools. Sidique et al. (2010) found that communication and education efforts made to raise awareness about recycling encourage recycling behavior. Encouraging and supporting individuals by people whose opinions they value in order to realize their responsibilities can increase the opportunity to recycle. Therefore, in future studies, the research model can be expanded by adding variables such as environmental knowledge, environmental benefit, and moral norm to the TPB model.

In future studies, by considering qualitative and quantitative methods together, more detailed information about the psychological state of individuals can be provided, and recycling attitudes and behaviors can be explained more comprehensively. The individuals included in this study do not represent the whole society, because the majority of the participants are from Bursa. The validity of the study results on other population subgroups can be examined in more comprehensive studies.

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