

Waste Characterization of Karaman Province and Determination and Comparison of Individuals' Waste Approaches

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Highlights:

- The rate of those who say that they separate the waste is 21%
- 30% of the wastes in karaman are recyclable wastes.
- Waste production amount per person is 1.15 kg

Keywords:

- Integrated Zero Waste
- Waste Characterization
- Waste Attitudes of Individuals
- Recycle
- Karaman

ABSTRACT:

The most basic building block of solid waste management is to determine the amount of waste generated by individuals in a day. As it can be understood from here, the most important issue in solid waste management is individuals. Therefore, all kinds of waste management studies should be based on the individual. In our study, a questionnaire was applied to 1 263 people residing in Karaman. In addition, according to income levels, 5 pilot regions were determined and characterization studies were carried out in different time periods. Of the wastes generated as a result of characterization, 45.08% of kitchen wastes, 3.41% of park and garden wastes and 30.36% of recyclable wastes. Only 18.6% of the recyclable waste potential is collected with the existing system. Within the framework of the survey, the rate of those who collect recyclable waste separately is 21%. In addition, it is understood from the survey study that individuals do not know what type of waste is produced in their homes. In this framework, waste collection and evaluation suggestions were presented by determining the waste potentials with the characterization study and the individual attitudes with the survey study.

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This Study was produced from Yusuf Alparslan ARGUN's PhD thesis.

Ethics Committee Approval: Ethics committee approval was obtained from the scientific research and publication ethics committee of Karamanoğlu Mehmetbey University for the studies included in this article with the letter dated 06.11.2020 and numbered 24496.

INTRODUCTION

The change in attitude and behavior in people has turned people into a living creature that consumes more, with the living standards tending to consume more than they need. This excess consumption habit that occurs in humans also causes many environmental problems such as the increase in the amount of waste generation and therefore the increase in environmental problems day by day, the depletion of underground and surface resources and the increasing severity of climate change. With the correct management of wastes, the consumption rate of natural resources should be slowed down in a way that will be less harmful to human and environmental health, and these wastes should be made into an economic value. Prioritizing recovery and recycling for wastes in economic input and output problems is a valuable economic attitude (The Ministry of Science, Industry and Technology, 2014). In particular, environmental and recycling should be transformed into a country policy, and the problematic parts in these areas should be identified and eliminated as a result of a good planning (Sakai et al., 1996; McDougall and White, 2001; Ulaşlı, 2018).

One of the most important elements of waste generation is individuals. In waste calculations, calculations are made based on how much waste an individual creates in a day. This shows us that the most important element of waste management is individuals. Therefore, it is inevitable to plan waste management based on the individual by researching the waste generation habits and waste approaches of individuals (Tchobanoglous et al., 1977).

Establishing an integrated waste management is essential for the effective implementation of zero waste. All processes, from the formation of waste to its disposal, should be evaluated effectively and attention should be paid to every level. Especially on an individual basis, it is necessary to increase the level of consciousness and turn waste management and zero waste approach into a culture and philosophy. Transforming recycling into an indispensable part of production and consumption economy in waste management, which is planned in a way that will receive support from citizens, is seen as the most important part of the zero waste strategy (Ulaşlı, 2018).

Solid waste characterization is a method used to determine the contents of domestic solid waste. It is certain that the differences, increases and decreases in the amount and variety of solid wastes vary according to the population changes, living conditions, socio-economic structure of the region, the living standards of the people in the region, and their daily life activities. The most basic factor in solid wastes is individuals, so individual attitudes directly affect the diversity and amount of substance in solid waste. The amount of waste generation and their characterizations vary depending on the culture, education level, income level, consciousness level, consumption habits, waste disposal habits and seasons of individuals. It is possible to observe changes between countries, between provinces and even between regions in the same province. (Özcan et al., 2005; Yenice et al., 2009).

The results of the characterization process alone cannot provide sufficient data for the determination of the wastes and solution methods in the city. Characterization processes should be supported by determining the waste approaches of the public. For this reason, a questionnaire should be applied in order to determine the individual approaches to waste management in parallel with the characterization processes.

In this study, based on zero waste, in Karaman, waste characterization and determination of waste attitudes of individuals were made, the relationship with each other was examined and waste management solutions were presented.

MATERIALS AND METHODS

Current Situation of Karaman Province

Urban solids in Karaman province are classified as wastes collected by Karaman Municipality Cleaning Affairs Directorate. The wastes of the district municipalities, the wastes collected by the Special Provincial Administration and the wastes of the industrial establishments are not included in the urban solid wastes. Existing waste management information and other equipment information were obtained from the Karaman Municipality Cleaning Affairs Directorate.

The daily, monthly and annual waste amount scale data collected by Karaman Municipality were obtained from the Karaman Municipalities Association. Daily, monthly and annual waste data were obtained by filtering only the wastes from the regions of Karaman Municipality from the weighbridge data.

Packaging waste information was obtained from Yunus Emre Cultural Foundation Economic Enterprise, which has a collection and separation facility license, which has an agreement with Karaman Municipality.

Information on the population of Karaman and the population of the neighborhood was obtained from the official website of the Karaman Governorship Provincial Directorate of Population and Citizenship.

Characterization of solid waste

A permit was obtained from the Karaman Municipality for the characterization of the wastes collected by the Karaman Municipality Cleaning Affairs Directorate and for the analysis of the waste management approaches of the Karaman Municipality. Solid waste characterization-matter analysis method was determined by the American Standards Technical Methods (ASTM American Society for Testing Materials) Standard Method for Determination of Compositions of Untreated Urban Wastes. Accordingly, the method is as described below.

A list of materials

- Weighbridge, Shovel, rake, broom, gloves, mask, boots, hard hat, glasses
- Fixed volume container (1m*1m*1m or 1m*1m*0.5m)
- Plastic ground cover (5m*10m)
- Plastic or metal container (according to the number of solid waste components)
- Notepad, pen (to record weighing results)

In Karaman, samples were taken from different points of the province (market, industry and according to income level; low, medium, high) with separate waste collection vehicles on a Tuesday every 2 months for a year. The points where these wastes are brought for characterization and their amounts are close to each other. The area where the Waste Characterization is carried out has a flat floor and a durable plastic cover of 5m*10m was laid on the floor while the process was being carried out. The scale was calibrated before weighing. The wastes in the waste collection vehicles from different regions were emptied to form a separate pile. Then the piles are flattened separately. From the waste pile of each region, enough waste to completely fill the fixed volume container (0.5m*1m*1m) was placed in equal amounts from each part of the heap. Labels with the names of the substance groups (plastic, metal, glass, etc.) on the containers to be separated are affixed to avoid confusion.

Characterized parts are as follows;

- Kitchen waste, Food scraps, bread, vegetables, fruits, etc.,
- Paper newspaper, magazine, notebook,

- Cardboard milk box, juice box, tetrapak,
- Bulky cardboard, cardboard boxes,
- Plastic, all plastic..
- Glass, glass bottle, glass cup, jar.
- Metal tin can, fork, knife
- Bulky metal, metal cabinet, table, etc.
- Waste electrical and electronic equipment telephone, radio
- Hazardous waste batteries, paint cans, detergent cans, medicine cans
- Park and garden wastes (Branches, pieces of wood, grass, etc.)
- Other non-combustible wastes (Stone, sand, dust, ceramics)
- Other combustible waste (Fabric, diapers, shoes, slippers, pillows, carpets, rugs, bags)
- Other combustible bulky wastes (Furniture, wooden materials, etc.)
- Other non-combustible bulky waste

Determination of Individual Approaches to Waste Management

In order to determine individual approaches to waste management, first of all, 53 open-ended questions were asked to a sample group of 30 people by interview method. By evaluating the answers received as a result of the interview, multiple-choice survey questions consisting of 39 questions were formed. In the 9th, 10th, 13th, 23rd, 32nd, 35th and 37th questions of the survey questions, the participants can mark more than one option. The reason why more than one option can be marked is that individuals' thoughts on that subject can be fully revealed and the level of consciousness about the content of the question can be measured. In other survey questions, participants can mark only one option. Multiple choice survey questions consisting of 39 questions were applied to 1 263 people. A letter of conformity was obtained from the scientific research and publication ethics committee of Karamanoğlu Mehmetbey University for the survey study.

Statistical analysis of the survey study, all the answers given to the survey questions were entered into the IBM SPSS Statistics 22 program and frequency analysis was performed for each survey question (Büyüköztürk, 2018).

RESULTS AND DISCUSSION

Current Situation of Karaman

The population of which waste collection service is provided by Karaman Municipality is 161 946 people. There are 63 neighborhoods in the center of Karaman. An average of 179 013 kg of waste is collected per day by Karaman Municipality. The amount of waste per capita in Karaman is 1.15 kg.

There is no clear information about bulky waste, vegetable waste oils and construction and demolition waste. The data of hazardous waste, waste mineral oil, waste accumulator and batteries and expired tires obtained from Karaman Provincial Directorate of Environment and Urbanization are values reported by industry and industrial facilities. The medical waste data obtained from the Provincial Directorate consists of the data reported by the health institutions in Karaman.

Packaging waste data includes packaging waste information collected from Karaman within the scope of separation at source project. There are 433 recycling bins placed in Karaman by the licensed company. In addition, there are 5 950 indoor boxes distributed to households and workplaces. In the source separation processes applied in Karaman, an average of 10 380 kg of recyclable waste per day is collected by licensed collection and sorting facilities.

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The amount of packaging waste collected by the licensed facility in Karaman corresponds to 5.6% of the solid waste generated. Detailed information about the wastes generated in Karaman is given in Table 1 and Table 2.

Table 1. Waste production amounts per capita in Karaman and Türkiye (ÇŞB 2021)

Year	Karaman Municipality Population Served	Annual Waste Amount (ton/ year)	Waste Production Rate per Capita in Karaman Province (kg/ person.day)	Turkey Average Per Capita Waste Production Rate (kg/ person.day)
2008	151 822	86 204	1.56	1.15
2010	159 834	62 843	1.08	1.14
2012	165 564	72 469	1.20	1.12
2014	172 322	82 025	1.30	1.08
2016	180 165	79 285	1.21	1.17
2017	182 510	68 588	1.03	1.17
2018	188 664	63 822	0.93	1.16
2019	161 946	64 445	1.09	
2020	161 946	68 270	1.15	

Table 2. Amount of recyclable waste collected separately at source in Karaman

Period	Quantity (kg)	Period	Quantity (kg)
Oca.18	413 420	Tem.19	537 760
Şub.18	433 600	Ağu.19	501 800
Mar.18	620 680	Eyl.19	507 340
Nis.18	430 800	Eki.19	617 040
May.18	321 500	Kas.19	507 340
Haz.18	404 140	Ara.19	485 760
Tem.18	420 460	Oca.20	201 100
Ağu.18	484 380	Şub.20	201 820
Eyl.18	550 000	Mar.20	424 980
Eki.18	560 000	Nis.20	443 720
Kas.18	400 000	May.20	325 920
Ara.18	530 440	Haz.20	420 940
Oca.19	428 600	Tem.20	237 340
Şub.19	330 270	Ağu.20	272 520
Mar.19	350 600	Eyl.20	238 720
Nis.19	480 000	Eki.20	346 980
May.19	367 900		
Haz.19	540 920		
2020 Monthly average (kg)		311 404	
Daily average (kg)		10 380	

Characterization of Solid Wastes

Looking at the characterization data in Karaman, we can say that there is seasonal variation. In all 5 pilot regions, the organic waste rate in the hot seasons was lower than the organic waste rate in the cold seasons. When evaluated within the framework of recyclable wastes (Paper-Cardboard, Plastic, Glass and Metal Derivatives), it was observed that the rate of recyclable waste in hot seasons is higher than the rate of recyclable waste in cold seasons in all of the 5 regions determined. Here, stove heating is applied in Atatürk and Sanayi areas. Çarşı district has natural gas heating and has a density of workplaces. The majority of Tabduk Emre has natural gas heating. The rate of use of the stove heating system in Yunus Kent right location is limited. Although there are seasonal variations of

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recyclable wastes in Yunus Kent right location and Tabduk Emre locality, it has a difference between 1% and 3%. However, there is a clear seasonal difference in regions with a stove heating system. The rate of park and garden wastes in cold seasons is lower than the rate in warm seasons. The rate of other non-combustible wastes (stone, sand, dust, ceramics) in cold seasons was higher than the rate in hot seasons. It is possible to say that it creates an increasing curve for all regions for hazardous wastes. A higher rate of hazardous waste was found in each analysis made after the first analysis. It has been observed that this continuous increase has accelerated especially after March 2020. This acceleration in hazardous wastes can be associated with the pandemic process. The annual average waste characterization data of the plot regions is given in Table 3, the waste distribution graph is given in Figure 1 and the distribution graph of recyclable wastes within itself is given in Figure 2.

Determination of Individual Approaches to Waste Management

The questionnaire study was applied to 1 263 people living in Karaman through online questionnaires. The people reached in the survey are generally people who are water subscribers in Karaman Municipality. For this reason, 69.6% of the respondents are men and 30.4% are women.

Table 3. Annual characterization average of pilot regions

Site:	Sanayi	Yunus Kent sağ	Çarşı	Tabduk emre	Atatürk	Karaman mean values
Waste Component	%	%	%	%	%	%
Kitchen Waste Food residues, bread, vegetables, fruits,	24.20	57.08	46.09	48.23	49.80	45.08
Paper Newspaper, magazine, notebook,	5.28	4.55	4.63	5.15	2.80	4.48
Cardboard, Milk box, juice box, tetrapak,	0.54	1.08	1.54	1.76	1.15	1.22
Bulk Carton, Cardboard boxes.	6.48	1.78	2.49	3.17	3.12	3.41
Plastic, All plastic..	11.42	12.65	14.87	15.61	14.22	13.76
Glass, Glass bottle, glass cup, jar.	12.97	3.59	7.16	3.83	5.65	6.64
Metal Tin can, fork, knife	1.66	0.54	0.81	0.62	0.69	0.86
Bulky Metal, Metal cabinet, table etc.	-	-	-	-	-	-
Waste electrical and Electronic Equipment Telephone, radio	1.25	0.28	0.34	0.26	0.20	0.47
Hazardous Waste Battery, paint can, detergent can, medicine cans	6.03	1.42	4.12	2.91	1.63	3.22
Park and Garden Wastes (Branches, pieces of wood, grass, etc.)	1.63	3.12	5.49	2.53	4.27	3.41
Other non-combustible wastes (Stone, sand, dust, ceramics)	20.33	6.87	5.97	6.73	8.25	9.63
Other Combustible wastes (Fabric, diapers, shoes, slippers, pillows, carpets, rugs, bags)	3.89	6.43	6.06	8.05	7.81	6.45
Other Combustible Bulky Wastes (Furniture, wooden materials, etc.)	4.31	0.60	0.42	1.16	0.40	1.38
Other non-combustible bulky wastes	-	-	-	-	-	-
Density of Waste (Kg m ⁻³)	131	174	140	144	158	150

Waste Distribution Chart

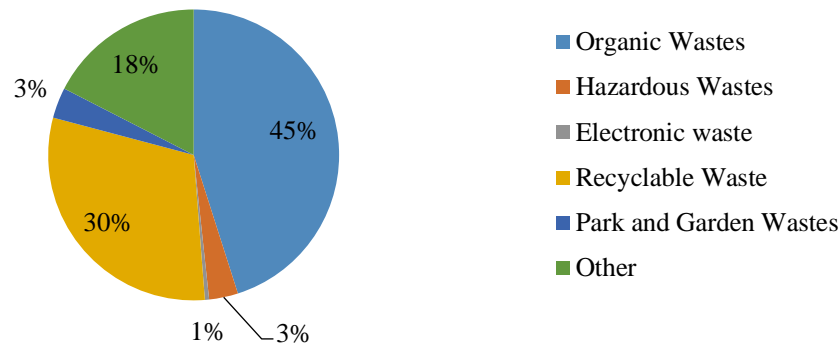


Figure 1. Waste distribution graph

Distribution of Recyclable Wastes in Itself

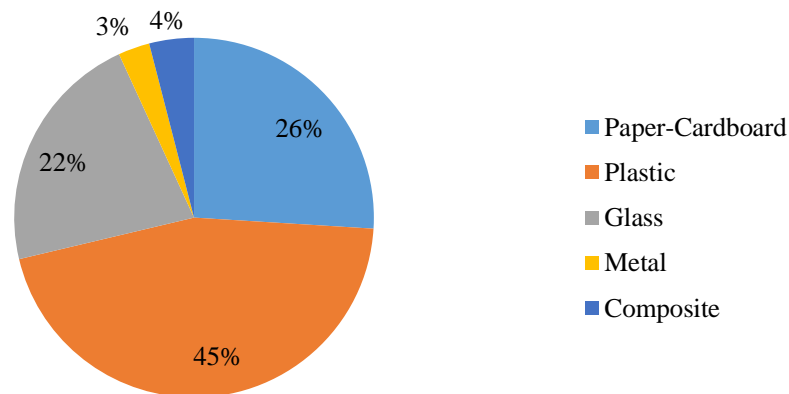


Figure 2. Distribution of recyclable wastes within itself

The highest sensitivity to survey participation was shown by undergraduate graduates with 30.7%, followed by associate degree graduates with 28.8%. This is an indication that as the level of education increases, the level of sensitivity and sensitivity increases. In the evaluation of income level, it is stated as very low, low, medium, high and very high, and monetary amounts are not mentioned here. The aim here is to determine at what level people see themselves. As a result of the survey, 70.9% of the participants describe themselves as middle-income. 78.3% of the respondents provide heating with natural gas, while the rest provide heating with coal systems. While 48.9% of the participants in the survey did not receive any training on the environment, the remaining participants received training at least once. In the survey question in which the daily amount of waste generated at home was evaluated, 27.3% reported less than 1kg and 41.3% reported it as 1-2 kg. While the daily waste production rate per capita in Turkey is 1.16, the daily amount of waste produced per capita in Karaman is 1.15. According to the 2017 statistical data of TUIK, there is an average of 3.20 people per household in Karaman and an average of 3.68 kg of waste per household is generated. In the light of these results, the participants think that the amount of waste they create in their homes is less than the amount of waste generated. These data play an important role in reducing waste at its source. While the rate of those who say the frequency of discharge of waste every morning has the highest value with 27.8%, it is followed by the rate of those who say it every evening with 24.9%. These results are important in determining a time-based waste removal efficiency in a region. In the survey question

about the harms of wastes where more than one option can be marked by the participants, 4.8% of the participants think that it is harmless and 95.2% is harmful. It is understood that only 18.1% of the participants are aware of the extent of the damage of the wastes. The answer to the question "What type of waste is generated in your home where more than one option can be selected by the participants?" was answered as 93.3% organic wastes, 51.5% recyclable wastes, 24.2% vegetable waste oils, 2.4% hazardous wastes and 1.3% medical wastes. These results show that the participants do not have full knowledge of the types of waste generated in their homes. The fact that they are not fully informed will complicate the separation at source within the framework of zero waste. Since they do not know the types of wastes in their homes, they will not know which wastes they should separate. When asked whether you intend to reduce the waste in your home, 10.4% of the participants answered that I do not think, 46% do, and 43.6% answered that they would think if I knew how to reduce it. This shows that 90% of people think about reducing their wastes, but they do not know how to reduce it. To the question of what do you do with the solid waste (garbage) left in your home where more than one option can be marked, 60.7% replied that they throw them all in the same trash can, while 36.1% said that they sorted them out and put them in the relevant waste bin. Other options received a response of 9.4%. It is understood from this that those who throw all of the waste in the same garbage container sometimes apply other options. The rate of those who say that they separate the hazardous wastes in your home and throw them into the relevant waste bin is 47.4%. To the question of what do you do with the recyclable wastes in your home, 44.1% of the participants answered that they sorted them and put them in the relevant waste bin. When asked whether you collect the solid wastes in your home separately, 48.8% of the participants do not collect, 21.1% only collect recyclables, 11.6% collect, 12.7% sometimes collect, 5.9% They replied that if I had knowledge, I would collect. In the light of these results, we can say that 32.7% of the participants have made separation at source a culture and habit. The answer to the question "Why do you collect the solid wastes in your house separately" comes to the fore with a 51% response to be beneficial to the environment and nature. When asked why you do not collect the solid wastes in your house separately, I collect 27%, 35.2% do not save because there are no containers that we can throw separately, 15.7% do not collect because they are not collected separately, 6.2% do not save because they think it is not beneficial for them, and 10.1% replied that they do not collect separately, because the municipality does not care. The answers given to the question "What encourages you to collect the solid wastes in your home separately" are in line with the previous question, and 34.9% of the participants stated that the increase in collection point, 35.6% of the participants stated that were environmental awareness and 29.5% of the participants stated that financial and moral contribution can be encouraging. 46.5% answered yes to the question "Do you know the locations of special waste containers for separate collection of wastes in the region you live in?" 53.5% answered no. To the question of whether there are special waste containers for the separate collection of wastes in the region where you live, They replied that 13.3% available, 27.1% available but not sufficient, and 59.6% not available. In the survey question in which we asked their opinions about the benefit of recycling, where more than one option could be marked, the least marked "useful for the individual" was. This result is an indication of the existence of the idea that recycling is not beneficial for individuals and may be one of the reasons for those who do not contribute to separation at the source. To the question "Where do you dispose of the wastes you collect separately (food scraps, recyclable wastes, hazardous wastes, waste oils) in your home", only 21.8% of the participants answered that they dispose of them in special waste containers. When asked what do you do with the bulky wastes (cabinet, table, washing machine, sofa, etc.) in your home, they answered as

63.8% of the participants give them to the needy, 13.6% sell them and 12.9% put them next to the trash cans. Bulky waste is currently a waste group for which data is not available for Karaman. There is no data on how much waste potential there is, how much waste has been generated or how much waste will be generated. The main reason for the lack of data on bulky waste is that the attitude of individuals towards bulky waste makes it difficult to record.

To the question of whether there should be a tax on the wastes you throw away, 80.4% of the participants answered no. 81.5% of the participants answered yes to the question of whether there should be a penalty if the wastes are not disposed to the right container. 75.4% answered yes to the question "Should there be incentives or rewards for the waste to be disposed to the right container". When evaluated in the light of these results, individuals did not want to be taxed on waste, but they thought that it would be appropriate to punish those who do not evaluate their wastes correctly and to reward those who evaluate their wastes correctly.

81.2% of the participants want it to be known how much waste they waste and how much they contribute to recycling. Again, 88.6% of the participants think that a clean future is possible with zero waste. In addition, 90.1% of the participants declare that they want to cooperate in studies on the environment and waste. It is understood from this that individuals show high sensitivity when it comes to the environment, even if they do not know its content.

To the question of what are your thoughts about zero waste (more than one option can be marked) 13.3% of the participants think that have no information, 1% are unnecessary, 32.7% think that the institutions do not give enough importance. In the question of what are the barriers to reducing and recycling wastes (zero waste) in which more than one option can be ticked, 48.8% of the participants Public institutions and organizations do not give enough importance to this issue, 42.9% lack of equipment (vehicle, container, personnel, etc.) in institutions, 25.9% did not works on incentives and rewards, 59.5% have no sense of responsibility, 30.5% lack of audit, 20.6% no tax or penalty and 52.7% think that there is a lack of knowledge and education. It is still not fully understood what zero waste is, and people have pointed out that applicability can be increased with rewards and punishments, as well as awareness and responsibility. It is also understood that individuals are concerned that the issue of zero waste will remain only in words.

To the question of whether you are satisfied with the waste collection system (waste management) in the area you live in, 22.9% of the participants answered that I am satisfied, 8.5% is undecided, 30.8% is less satisfied and 37.8% is not satisfied. When these results are evaluated, it is understood that there is a waste collection system in the region and studies have been made to improve it, but the studies have not reached a level that will satisfy everyone yet.

CONCLUSION

An average of 179 013kg of waste is collected per day by Karaman Municipality. The amount of waste per capita in Karaman for 2020 is 1.15kg and the waste generation rate of Karaman in 2018 is 0.93kg. According to TUIK 2017 data, the average of Turkey is 1.16 kg per person. Even though the waste production rate of Karaman is below the Turkey average, it is necessary to reduce the waste production rate to at least 2018 data and below with effective and applied awareness and training within the framework of the principle of reducing zero waste at the source.

In Karaman, only some of the recyclable packaging wastes are separated by double separation, and all of the remaining waste is disposed of in the sanitary landfill. There is no clear information

about bulky waste, vegetable waste oils, hazardous waste, waste mineral oil, waste accumulators and batteries, end-of-life tires and construction and demolition wastes.

The purpose of landfill is the controlled storage of wastes that cannot be evaluated in any other way or disposed of more appropriately. For this reason, the amount of waste going to landfill should be reduced by establishing pre-treatment facilities and increasing recovery and recycling. Likewise, the EU Landfill Directive emphasizes this issue and demands that the biodegradable wastes going to landfill to be reduced gradually (Erdem et al. 2008; Öztürk, 2015).

When evaluated within this framework, in order to establish and operate an integrated solid waste management system, first of all, separate collection equipment and separate collection systems should be established for waste groups for which there is no data available or for which sufficient data is not available. Collection points should be established in various parts of the province for waste vegetable oils, hazardous wastes, batteries and accumulators. In addition, citizens should be able to contact the municipality for bulky waste, waste tires and various oil groups, similar to the system implemented in Muratpaşa Municipality, and the municipality should reward these citizens with incentives. A storage area should be determined for construction and demolition wastes and uncontrolled discharges outside this area should be prevented. Recycling possibilities should be evaluated by using these construction and demolition wastes as building and infrastructure materials, as recommended by the EU directives and the Ministry of Environment and Urbanization (Aygül and Yıldız, 2018; Gürer and Demirci, 2020; Anonymous-1, 2021).

Looking at the annual general average waste distribution graph of the regions, it is striking that there is 45% organic waste, 3% park and garden waste and 30% recyclable waste. In addition, the distribution of recyclable wastes is 45% plastic, 26% paper-cardboard, 22% glass, 4% composite and 3% metal waste. The amount of packaging waste collected by the licensed facility in Karaman is 10380 kg per day, corresponding to 5.6% of the solid wastes generated. The ratio of the collected packaging waste to the recyclable waste amount is 18.6%.

It is stated that the rate of recyclable waste in the wastes announced by TÜİK and TUDAM varies between 19%, and in other studies it varies between 20% and 25% (Köse et al., 2015; TUDAM, 2016; Anonymous-2, 2021; Anonymous-3, 2021). However, when we look at the results of the characterization, it would not be wrong to say that the rate of recyclable waste going to landfill is around 30% on average, even when it is included in the collected waste, there is a recyclable waste rate of around 35-36%. Our characterization studies support our results. These results are an indication that recyclable wastes cannot be collected effectively.

In order to increase the collection efficiency of recyclable wastes, increasing the number of recycling containers and equipment, increasing the amount of indoor boxes and recycling collection bags distributed to public institutions and organizations and apartments, and collecting them at the specified day and time, and active participation of citizens who want to contribute to recycling should be ensured. As can be seen in the results of the survey, most of our people are unaware of the existence or whereabouts of the recycling container. This again affects the efficiency of collection. For this reason, individuals should be made aware of the container's location and location, and this should be supported by mobile and e-applications. In addition, it is expected that there will be encouraging and encouraging factors such as an increase in the collection point of individuals in the tendency to throw waste, receiving rewards or money in return, being honored and witnessing the benefit of what they do. This expectation is also present even among those who already support recycling with environmental awareness. For this reason, it is necessary to establish a system in which wastes with

material value will be honored in return for prizes or money, wastes that have no monetary value and need to be collected and disposed of separately if they are thrown or brought by individuals (Gürer and Demirci, 2020; Anonymous-1, 2021).

45% of the urban solid wastes generated in Karaman are from kitchen wastes (organic waste) and 3% from park and garden wastes (organic waste). This value is an indication that 48% of the total waste consists of organic wastes. When evaluated within this framework, 48% of urban solid waste, ie 91 900 kg of organic waste per day, has the potential to be used as compost raw material. Separation at source is essential for the recycling and recovery of wastes in accordance with their values. In addition, before the wastes are disposed of in the landfills, a pre-treatment facility should be established, where recyclable materials and materials that could be compost should be separated, thereby increasing the recycling recovery rate and reducing the amount of waste that will go to landfill (Gödel, 2019).

Due to the pandemic in our country and in the world, the rate of wastes that fall into the hazardous waste group such as disinfectants, cleaning chemicals and products, masks and gloves has increased. This waste group comes to the sanitary landfill without any separation in the wastes coming from the households. For wastes in the medical waste and hazardous waste group, they should be disposed of with thermal facilities such as sterilization and incineration facilities (Kemirtlek, 2005).

When the survey results are examined, the following findings have been reached:

Participants think that the amount of waste they create in their homes is less than the amount of waste generated. It will also be difficult to implement waste reduction under the zero waste principle for people who think they are generating less waste. These data play an important role in reducing waste at its source. Regarding the damage of waste, 4.8% says it is harmless, while 48.3% says it is harmless as long as it is collected. This high rate of misperception among individuals can be a major obstacle to reducing waste and separating it at its source.

Regarding the wastes that individuals create at home, only 51.5% of them state that recyclable wastes and 24.2% of them are vegetable waste oils. These results show that our people do not have sufficient knowledge and awareness about the waste they create at home. It would not be right to expect people who do not know which wastes in their households to separate these wastes at the source within the framework of zero waste. After awareness raising activities are provided and the necessary equipment is provided and the structure is established, all individuals should be touched and accessed (Demir, 2019). Regardless of age group, socio-cultural, economic, education and training institutions, religious activities, media channels and neighborhood relations should be used to raise awareness of the society actively and quickly, and then social responsibility should be created.

Regarding the reduction of waste, which is the primary principle and one of the most important steps of zero waste, it is seen that 90% of individuals think about reducing their wastes, but they do not know how to reduce it. At this point, the inadequacy of educational activities stands out. Awareness-raising activities should be carried out by preparing practical trainings on how to reduce waste.

Only 36.1% of individuals decompose their waste, and among the reasons for separating their waste, being beneficial to the environment and nature comes to the fore. Considering that there are no other options such as punishment, tax, reward and honor in the current situation, such a result is inevitable. However, when asked what would encourage you, 34.9% stated that an increase in the collection point, 35.6% environmental awareness, and 29.5% financial and moral contribution could be encouraging. Likewise, when individuals receive money in return, as in the case of Muratpaşa, the fact that 64% of those included in the allocation at the source are individuals who have never made any discrimination is a proof of how effective the use of the reward system can be (Aygül & Yıldız, 2018).

53.5% of the people living in Karaman do not know where the recycling containers are. However, there are recycling bins in every market and chain markets in Karaman, as well as in the streets and streets at central points. However, these collection points cannot be noticed because they are far from modernity and are not equipped with elements that attract the attention of individuals. Separate collection equipment should be modernized based on the perceptual selectivity of individuals and awareness of collection points should be increased with the help of websites and mobile applications. Persons who wish should be able to see where the closest separate collection equipment is located.

When asked what do you do with the bulky wastes (cabinet, table, washing machine, sofa, etc.) in your home, they replied as 63.8% of the participants give them to the needy, 13.6% sell them and 12.9% put them next to the trash cans. Bulky waste is currently a waste group for which data is not available for Karaman. There is no data on how much waste potential there is, how much waste has been generated or how much waste will be generated. The main reason for the lack of data on bulky wastes is the lack of an effective management system for these wastes and the attitude of individuals towards bulky wastes, making it difficult to record them. All bulky waste should be managed by the municipality. The municipality should establish a management system for these wastes, collect bulky wastes, make reusable ones ready for use and distribute them to those in need. In this way, data can be generated on how much waste is generated in the local government region and how much of this waste goes to reuse, how much to recycling and recovery, and how much to disposal facilities.

While individuals living in Karaman do not want to be taxed on waste, they thought that it would be appropriate to punish those who do not evaluate their wastes correctly and reward those who evaluate their wastes correctly.

The vast majority of individuals do not have information about the deposit application. In addition, even if they have knowledge about the deposit application, the majority of individuals do not know which products are returnable. Those who use the deposit application are only 17.7%. These results show us that there is a serious lack of knowledge and awareness about the deposit.

81.2% of the participants want it to be known how much waste they waste and how much they contribute to recycling. Again, 88.6% of the participants think that a clean future is possible with zero waste. In addition, 90.1% of the participants declare that they want to cooperate in studies on the environment and waste. It is understood from this that individuals show high sensitivity when it comes to the environment, even if they do not know its content.

The answers given to our question about zero waste show that; It is still not fully understood what zero waste is, and people have pointed out that applicability can be increased with rewards and punishments, as well as awareness and responsibility. In addition, individuals are concerned that public institutions and organizations do not give enough importance to zero waste, and they can only remain in words. Public and private institutions and organizations specified in the zero waste regulation should quickly create their structures and accelerate education and awareness-raising activities.

When the opinions of the individuals living in Karaman about the satisfaction of the waste collection system are examined, it is understood that there is a waste collection system in the region and studies have been made to improve it, but the studies have not reached a level that will satisfy everyone yet. If the above-mentioned issues are implemented within a system, both the satisfaction of the vast majority and integrated zero waste management will be possible.

Conflict of Interest

The article authors declare that there is no conflict of interest between them.

Author's Contributions

The authors declare that they have contributed equally to the article.

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