

A Study on The Recycling Practices and The Reasons of The Increase in Domestic Wastes in Turkey

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Abstract

Recycling is the re-processing activity in which wastes with different characteristics are regained in the economy. Waste management includes the collecting, transportation, recycling, destroying, or storing of wastes in a managerial approach.

Turkey is a country with a high waste potential with its young and increasing population. As a natural result of this, the amount of wastes is increasing day by day. When the economic value is considered, the recycling of wastes, the reasons of the increase in wastes and sharing relevant suggestions on these issues gain much more importance.

The aims of this study are;

Determining the data on the waste management and recycling activities in Turkey in terms of their economic effects,

Determining the reasons that cause the increase in the amount of waste with their importance levels.

The study was conducted with these purposes and it was determined that solid wastes contain serious threats for human health, and the recycling of these wastes has important economical dimensions.

It has been determined that the amount of the annual waste produced in Turkey is 32.000.000 tons and 3,8-4 million tons/year of this amount is recyclable. It has also been determined that 60 thousand people were employed in this field in 2013. After the questionnaire on the issue, it became clear that the reasons that cause the increase in solid wastes are; the increase in population, the increase in income status of people; and as a last item, "wastefulness", as it may contribute to the literature as a new term.

Keywords: Municipal solid waste, packaging waste, recycling, reverse logistics, wastefulness

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INTRODUCTION

The processes of social activities, the steps taken by public institutions in terms of public responsibilities, the consumption of the households performed to endure life, and services, commerce and production activities that are intended to cover the needs of human beings cause different types of wastes. Therefore, the term 'waste' in itself carries the meaning that there is life in the place where there are wastes, and in a place where there is consumption, it is inevitable that there are also wastes as well.

Solid wastes that have to be got rid of by their producers and which are unwanted for the good of the society and to protect the environment are called domestic wastes or "solid wastes". The term "**domestic wastes**" means the solid wastes from houses, gardens, parks and picnic areas and are not dangerous or harmful; "**compost**" means the soil-improving material, which is produced by separating the organic-based wastes with or without oxygen [1].

Since wastes are a result of production and consumption, it may be expected that the amount of wastes increases depending on the increase in population and welfare standards. In this context, as it is the case in the whole world, the amount of wastes is increasing day by day due to the increase in the population and the improvements in the economy. What is more, the fast migration from rural areas to urban areas and the decrease in the soil-dependent

life with this fast urbanization have decreased the natural recycling rate of the waste materials. Consequently, a bigger increase in the amount of wastes is observed than it normally would be in population and individual income increases.

Technological developments, the shortening life spans of products and fast disappearance of fashionable products and the fast widening in the perception of needs have caused that many products are now considered as basic needs. The products that connect with fashion have also caused to an increase in the amount of wastes with changing purchase behaviors.

When it is considered that wastes have many different types such as medical, chemical and material, it becomes obvious that many factors like conscious level in the use of medication can affect the increase in the wastes.

We will handle "wastefulness" in this study, which can be considered as a factor that increases the amount of waste materials.

These fast-increasing wastes have both an economical value and affect the environment and human health in a negative way. As the world is polluted in a fast pace, the resources are consumed in a similar speed and are spent extravagantly. This makes the control, recycling and the regaining of wastes in economy necessary, and also their storage so as they do not harm the nature, or their dismissal a compulsory issue in today's world.

Recycling as a Reverse Logistic Process

Recycling is an activity in which wastes with different characteristics are re-processed so as they are regained in the economy. Reverse logistics are the type of logistics which is performed from the consumer to the producer for the purpose of maintenance-repair or refilling of the products. Also, there is the purpose of collecting the wastes and reprocessing them so as new products are produced [2]. Recycling is one of the processes performed in the scope of Reverse Logistics, perhaps the most important process of all in this sense.

Reverse Logistic Process and recycling is given in Figure 1.

As it is obvious in Figure 1, there is a reverse flow in logistics that is from the supplier to the customer; however, in reverse logistics, this process occurs from the customer to the supplier. In reverse logistics the packing materials or some containers are returned back to the suppliers or to the producers without recycling. In the second process, municipalities or collection units return the wastes back to the recycling centers and the recycling occurs in these centers. Here, if the wastes have to be converted into raw

materials, these wastes are transferred to raw material producers.

In Figure 2, the integration of reverse logistics and waste management is given [3].

As it can be seen in Figure 2, wastes are collected and stored and then the recycling or destroying processes start. After the recycling process, either energy is obtained or re-production is started or natural recycling process is performed. Therefore, recycling has an important role in the reverse logistics process and wastes are thus regained in the economy.

How the re-produced product will be reused in reverse logistics depends on which level it has returned to in the supplier chain. The recycling of some products is in the shape of reuse or resale and no changes are made in the products. If the raw material is to be regained, then recycling process applies. If there is no possibility for the product to be used again, then such products are disposed of or burnt to obtain energy.

The right order of priorities in the recycling process, which has a privileged importance in waste management, has been determined by the Ministry of Environment [4].

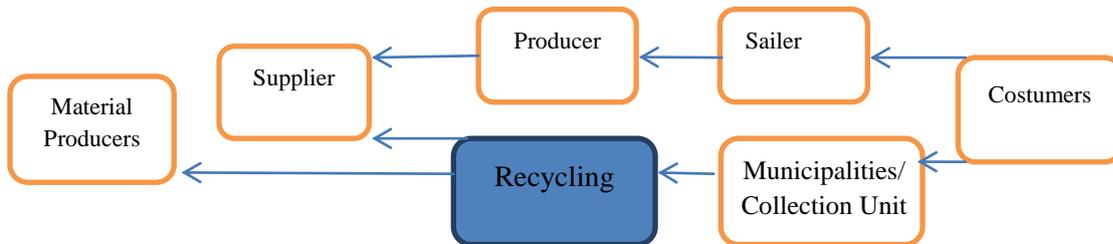


Figure 1. Recycling and Reverse Logistics

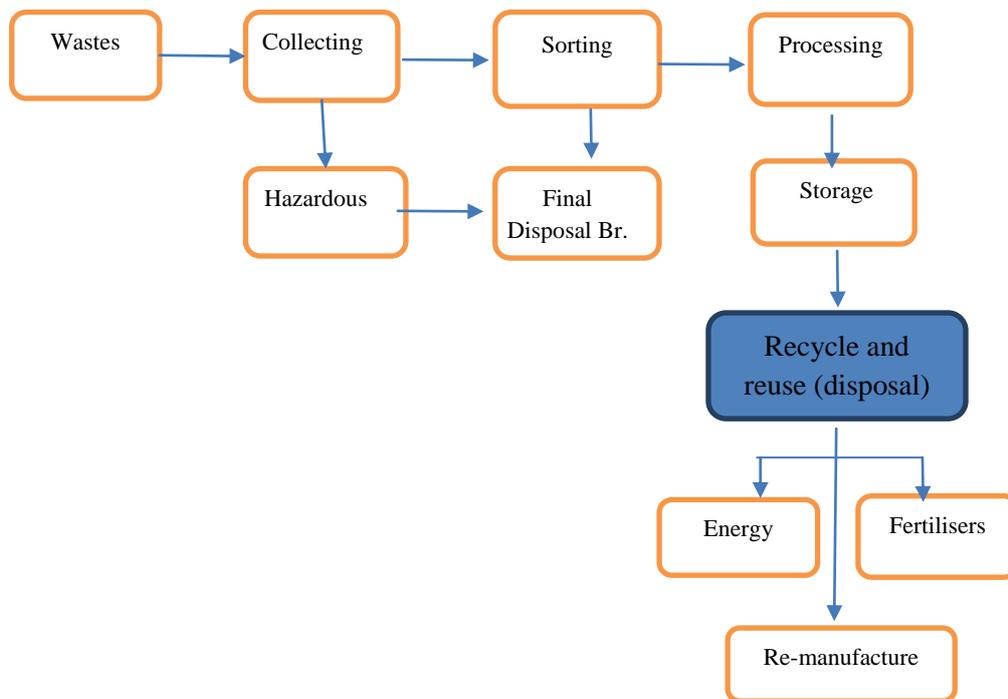


Figure 2. Integration of Waste Management and Reverse Logistics.

- * Prevention
- * Reduction in Source
- * Re-use
- * Recovery/Recycling
- * Pre-treatment (including incineration) and
- * Disposal

When the added value and ecology are considered in the recycling process, it becomes clear that re-use, service repairs, re-production, recycle and incineration steps should be followed respectively. For the waste management to be successful, it is necessary that recycling and re-using processes should be preferred rightfully, and the success also depends on reverse logistics network design to be performed in accordance with the logistics principles framework.

Wright et al (2011), who examined recycling as a part of reverse logistics, suggested that a supply & demand balanced system would contribute more than a supply-centered system for the recycling process. According to him, the dismissal of wastes with wrong methods gives harm both in local level and in global level, and also causes other unwanted results; however, the use of recycled materials brings advantages in terms of raw materials and energy. For example, plastic, newspaper and glass, which are produced from recycled materials, require less raw materials and consume less energy. Another example is the aluminum. Aluminum, which is produced from recycled aluminum, requires 90% less energy than the new produced aluminum. Similarly, producing recycled paper decreases the need for wood; and producing recyclable plastic decreases the need for petroleum [5].

Reverse logistics and closed-cycle supply chain and similar strategies are related mainly to profitability, and companies are constantly seeking new opportunities to decrease the environmental damage and to ensure social sustainability. If the reverse logistics do not have economic value for companies, the involvement of companies in recycling activities will be difficult [5].

“In a study conducted in North America (Grove, 1994) it was determined that companies which are involved in recycling process receive \$40 per ton; however, it was also determined that the expenses for collection and transportation of recyclable materials exceed 175\$”[6]. This kind of recycling activities are not possible to be sustained.

Ecological and Economic Dimension of Recycling

Solid wastes are considered as important environmental problems in Turkey as they are in other developing countries. The issue of dismissal of wastes without damaging the environment or recycling them so that they contribute to the economy are important issues for the human health and the economy of the country.

The wastes which are deliberately, carelessly or unconsciously left or released to the environment without recycling affect the nature, vegetation and the air in a negative way and destroy the balance of the nature.

Antimon, which is mainly used in batteries and painting materials, is assessed as being carcinogenic; and the cadmium, which is existent in waste batteries, is known to cause renal failure and lung diseases.

Also, it is known that materials such as chromium, copper, cadmium, zinc, quicksilver and arsenic can easily be contacted in the environment, in water, soil, some foods; and then cause diseases in kidneys, lungs and stomach and damages chromosomes and brain functions.

The wastes which are left unconsciously to the nature may damage human health terribly. The situation is like this for human beings who can take precautions for themselves and discriminate between the good and bad sides for their health, while the situation is very bad for vegetation and animals which are subject to negative effects and which cannot take precautions for themselves.

The recycling of waste is important for the gorgeous balance in the nature and for the environment and human health as well as having economic value. Some of the assessments in this issue are like this: “Glass bottle disappears in 4 thousand years in the nature, plastic in 1000 years, chewing gum in 5 years. By recycling 1 ton of glass waste, 100 petroleum is obtained; and by recycling 1 ton of rubber waste, 95% energy is saved; and when aluminum wastes are recycled, the pollutant chimney gas emission is reduced by 99%. By recycling half of the paper consumption of the world, 8 hectares of forests are saved each year; and with the recycling of 1 ton paper/cardboard wastes, 17 trees are saved from being cut” [8].

This simple calculation should be assessed in terms of environmental damage because of cutting down trees; and due to this reason, the decrease in cleaning the air; the resources to be spent to cut the trees and the wastes that will appear due to these reasons.

Another dimension of the recycling to the economy is the economic value of the recycled material and the employment during recycling activities. The present data about recycling and a comparative employment data will reveal the situation.

According to the data of Ministry of Environment and Urbanization, 1,3 billion Turkish Liras were regained in the economy with recycling activities in 2013 in Turkey. When the recycling services that were performed with disassembling of older ships that were brought from abroad are added to this amount, the economy regain reaches 2,1 billion Turkish Liras. 5 thousand people were employed in recycling field in Turkey in 2002 while this figure became 60 thousand employees in 2013 [9].

Solid Waste Management and It's Importance

Solid waste and domestic waste management are critical issues when the increase in population is considered because it causes health problems as well. The rightful and efficient management of these wastes may bring benefits in many fields such as heating and energy production [9].

Waste management consists of processes such as minimization of medical, domestic and dangerous wastes, collection of wastes in their origins, temporary storage of wastes before transportation, transfer centers for wastes when necessary, transportation, running the facilities for regaining of wastes and dismissal of wastes, closure and maintenance-follow-up-control activities [4].

The purpose of waste management as an approach which includes collecting wastes so that recycling is included in this process, transportation of wastes, recycling of them, destroying or storing of wastes is the dismissal of wastes without damaging the environment and gaining the maximum economic benefit. The easiest way of this is decreasing the amount of the wastes or recycling them in their original places if possible.

Solid waste management expresses the whole of the processes like collecting, transporting, re-gaining and dismissal of wastes which include the use of limited resources like energy, raw material and similar natural resources in a way that will give maximum efficiency, encouraging the production with less waste, re-gaining and

re-use of wastes, destroying the wastes without damaging the air, water, soil and creatures. This is an important activity which is in multilateral interaction with technical and social disciplines [4].

However, today the increase in the amount and types of wastes has made the waste management extremely difficult and made it necessary to examine the issue in an integral method. For this reason, it is crucial that this issue is handled with a management system which is in accordance with all the relevant sectors.

Due to the increase in the population, changing demands, expectations, and increasing amounts and types of wastes, waste management has become an even more important and complex issue. As stated above, it is now inevitable and covers the amount of wastes, their share in the production and the percentage of systematic recycling.

Firdaus and Ahmad (2010) examined the effects and problems of wastes to the physical environment and drew attention to the relationship between the fast population increase and the amount wastes [10]. The daily amount of wastes in Turkey is over 1 kg [4]; and the annual amount of waste in Malaysia, which is a country of 26 million population, in 2007 is 17.000 tons [11]. The amount of wastes increases with the population and “is expected to be 27 billion tons in the whole world in 2050” [12]. Here it can be concluded that the wastes and waste management are important for different countries as well.

The variation of waste combination, the damage done to the environment, the health problems and the economic value of wastes make the waste management vital for countries.

The welfare level and fast urbanization as well as the increase in population are important in the increase of the wastes. The increase in the welfare level causes the increase in consumption; and the consumption, in turn, increases the amount of wastes. Urbanization has also become an important issue in that it affects the amount of wastes. With urbanization, the lifestyle which is dependent on soil decreases and the natural recycling of wastes into the soil in their origins decreases. And this can be shared as a situation which causes for an increase in the amount of wastes.

Another important point to be emphasized here is the wastes that occur due to wastefulness. Wastefulness increases due to welfare level and as a result of unconsciousness, thus causing to a huge increase in the amount of wastes. The reason which makes wastefulness important is that these wastes which occur due to wastefulness, have economic values, in their present situations other than being mere wastes.

Recycling plays an important role in solid waste management. “The advantages of recycling are: It provides raw material, water and energy, it increases the useful lifespan of sanitary landfills, decreases the public expenses and provides employment opportunities” [9].

The targets defined by the EU Packaging and Packaging Waste Directives on the recycling process of package wastes, which form an important percentage in domestic wastes, are given in Table 1. [13].

In the re-gaining process of wastes, some directives, targets and obligations which have been defined in regulations of Ministry of Environment have been provided. The part of these targets for the year 2011 and further periods is given in Table 2 in years [14].

As it is clear in Table 2, the waste regaining target has been planned so as to catch-up with the EU Directives in the year 2020.

Table 1. Waste Type and Recycling Targets in EU Directives

Waste Type	Recycling Target (%)
Glass	%60
Paper and paperboard	%60
Metals	%50
Plastics	%22,5
Wood	%15
General Recycling	%55-80
General Recovery	>60

Table 2. Pack Waste Recycling Ratio Targets Turkey

Yıllar	Annual Recycling Targets (%)			
	Glass	Plastics	Metals	Paper/Paper board
2011	38	38	38	38
2012	40	40	40	40
2013	42	42	42	42
2014	44	44	44	44
2015	48	48	48	48
2016	52	52	52	52
2017	54	54	54	54
2018	56	56	56	56
2019	58	58	58	58
2020	60	60	60	60

MATERIAL AND METHODS

The aims of this study are;

Determining the data on the waste management and recycling activities in Turkey in terms of their economic effects,

Determining the reasons that cause the increase in the amount of waste with their importance levels.

In accordance with the literature [15, 16, 12, 10] which emphasize that there is a relationship among the population, the amount of income and the amount of solid wastes, the hypothesis of the study have been defined as:

H₁: There is a relationship between costumer income and the increase in the amount of wastes.

H₂: There is a relationship between population and the increase in the amount of wastes.

Moreover, by assessing that the issue of wastefulness is also effective in the increase in the amount of wastes; The third hypothesis have been established.

H₃: There is a relationship between wastefulness and the increase in the amount of wastes.

In the scope of these purposes and the defined hypotheses, the data from the Turkey Institution of Statistics and Ministry of Environment were gathered, and second-hand data from previous studies were also collected, and the relationship among the parameters like the amount of wastes, the increase in population and

income levels in Turkey and in the world have been examined.

Moreover, waste recycling facilities, the data on their capacities and storage areas in our country are given.

In the light of the examinations, the reasons which cause the increase in the amount of solid wastes have been considered. In this context, fifteen reasons that cause the increase in solid wastes have been defined; and by taking these reasons as the basis, the “factors scale” that cause the increase in domestic wastes has been developed. By making use of the Data Collection Tool which was formed with this scale and with judged exemplification method [18], a face-to-face questionnaire study on 50 students from Mechanical Engineering Department and 50 students from the Business Management Department, totally 100 students, was conducted.

Here, the issue of how important the students find the 15 factors that were considered to affect the amount of solid wastes were examined and the rating was done as: Important (3 points), No idea (2 points), Unimportant (1 point).

In the lights of the derived conclusions, the importance levels of the factors have been defined as low (1,00-1,67), medium (1,67-2,33) and high (2,33-3,00). The issues, whether there is a statistically meaningful difference among the students in terms of preferring the choices, the importance levels given by the students on the factors that cause the increase in the amount of solid wastes and whether there are differences in terms of gender and department were tested with X² analysis [19].

In this study, different from other studies, a relationship between the increase in the amount of solid wastes and

wastefulness has been established and tested to contribute to the literature.

As a last item, the measures in previous studies to decrease the amount of wastes and the priority order of waste management were examined and suggestions on what to do to provide an effective waste management and to decrease the amount of wastes and to increase the recycling rates have been developed.

RESULTS

In this chapter, the relationship between the income levels and the population rates in different parts of the world, the data from TÜİK (Turkey Institution of Statistics) and Ministry of Environment on the waste management and recycling applications in Turkey, and the results of face-to-face questionnaires with students on the reasons that cause the increase in the amount of wastes have been shared.

Income, Population and Solid Waste Amount in The World

Figure 3. show the relationship population and wealth level (Gross Domestic Product) with the solid waste amount for different continents [15].

As it may be seen in Figure 3., there is a direction way relationship between population and wealth level with solid waste in four different continents.

The types of wastes differ according to the increase in population and income levels as well as the life standards of people in a country. This situation is shown in Figure 4 [16].

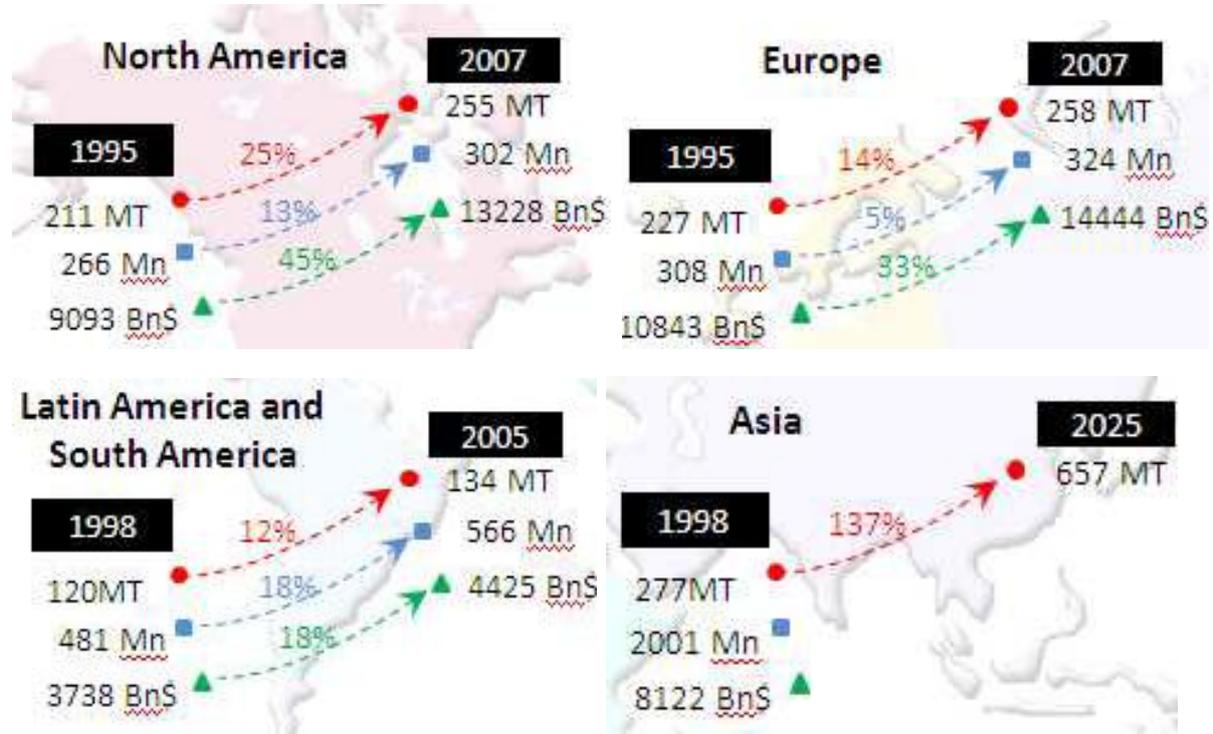


Figure 3. Population, wealth level (Gross Domestic Product) and Solid Waste Amount Relationship

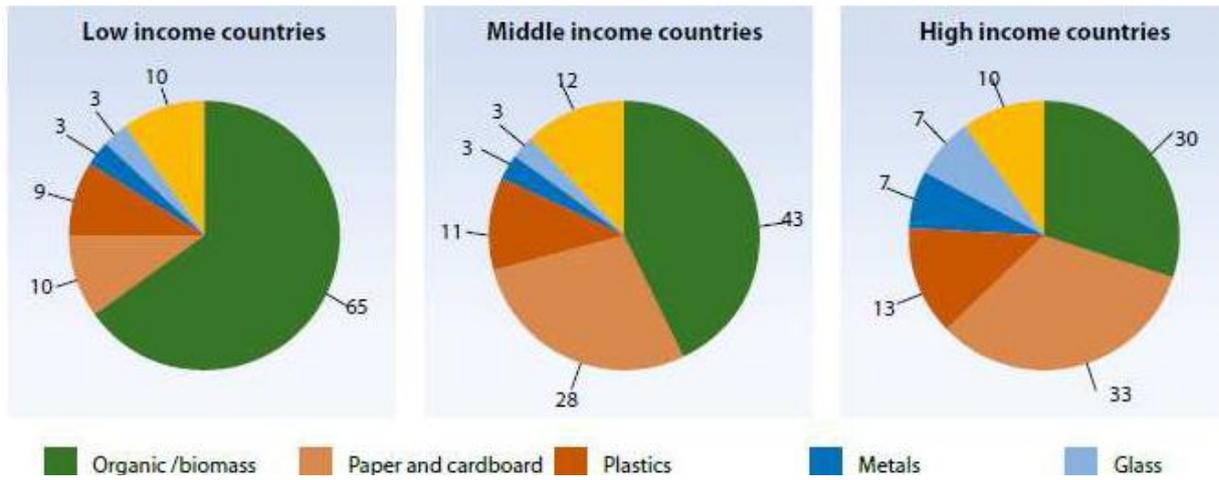


Figure 4. The Relative Prosperity of Countries with Level Solid Waste Relations

As it is clear in Figure 4; as the income level increases, so do the organic waste amounts and the amount of glass wastes.

When considered generally, it can be assessed that there is a relationship between urbanization, wealth and the amount of solid wastes. The world population increases year by year and the level of economic welfare increases in the certain countries day by day. For this reason, the importance of waste management increases day by day.

Solid Waste and Recycling Datas in Turkey

It should be expressed that there are not relevant data on the amount of wastes according to the types of wastes distributed to years, the amount of recycling and systematic data on the economic value of the amount of wastes. The data on different types of wastes for different years and detailed information for the year 2013 have been given.

The general situation and the present data on waste management in Turkey are given under this title.

Since it is very difficult to develop and apply a certain type of waste management model in many municipalities with different characteristics, cities have been grouped under sub-regions which represent similar demographic and socioeconomic characteristics. During this classification, the population density, GNP per capita, and the average size of houses were taken into consideration. As it is clear in Table 3, Turkey has been divided into 3 regions and 11 sub-regions. These regions and the amount of wastes per capita in these regions are given in Table 3. [4].

In the scope of Solid Waste Master Plan Project, solid waste composition determination studies were also conducted. The conclusions of this study, which gives the distribution of solid wastes according to the types are given in Figure 5.

As it may be seen in Figure 5, the majority of solid wastes consist of kitchen wastes (34%) and solid wastes (11%).

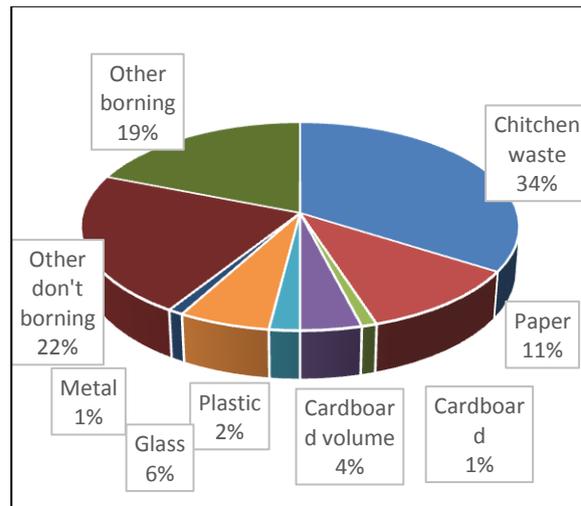


Figure 5. Solid Waste Composition in Turkey

Table 3. Charecteristic Municipal Group in Turkey

No	Region	Sub-region	Solid Waste Kg/person-days	
1a	Marmara / Aegean Region	İstanbul, İzmir (Metropolitan)	1,15	1,28
1b		Other Metropolitan Municipalities	1,12	1,24
1c		Other Municipality (medium/small)	1,10	1,16
2a	Mediterranean/ Black Sea/ Central Anatolian Region	Ankara (Metropolitan)	1,15	1,28
2b		Antalya / İcel (Turism cities)	0,90	1,00
2c		Other Metropolitan Municipalities	0,85	0,94
2d		Other Municipalities, Black Sea (medium/small)	0,85	0,90
2e		Other Municipalities, Mediterranean / Central Anatolian (medium/small)	0,85	0,90
3a	Eastern Anatolia/ Southeastern Anatolia Region	Gaziantep (Metropolitan)	0,85	0,94
3b		Other Metropolitan Municipalities	0,90	1,00
3c		Other	0,75	0,80
Average			0,95	1,06

The data on the wastes in Turkey are given in Table 4; and the waste dismissal and regaining facilities in Turkey and the processed waste amount as of 2012 are given in Table 5. [20].

Table 4. Turkey Waste Data (2002)

Waste	Amount
Daily per person	1,31 kg/person/day
Daily total	88.000 ton/day
Annual total	32.000.000 ton/year
The recoverable amount waste	3,8-4 million ton/year

Table 5. Disposal and Recycling Facilities in Turkey (2012)

Facilities	Facilities Number (number)	Waste Quantity Traded (Ton/Year)
Landfill	80	24.174.502
Incineration Plant	3	50.133
Total Waste Disposal Facilities	83	24.224.635
Compost Facilities	6	158.922
Co-insineration Facilities	32	538.916
Other Recycling Facilities	551	9.581.295
Total Waste Recycling Facilities	589	10.299.133

As it may be seen in Table 5, the waste production per capita is 1,32 kg a day, and the amount of annual solid wastes reaches 32 tons. This figure has reached 40 million tons as of today.

Table 5., shows, disposal and recycling facilities for 2012 in Turkey [20].

Table 6 shows the data on the package and package wastes. As it may be seen in the table, the amount of the package materials sent to the market exceeded 2,5 million tons; and the regained amount of package wastes reached 2 million [21].

In Table 7, the waste types in Turkey as of 2013, and the regained amounts to the economy are given [8].

Table 6. Package and Package Waste Data (2010)

Packing Type	Packing Quantity Produced (Ton)	Marketed Packing Quantity (Ton)	Recycling Ratio (%)	Amount to be Recovered (Ton)	Amount of Recovered (Ton)	Actual Recycling Ratio (%)
Plastics	1.186.213	812.532	37	37.223	242.039	30
Metals	230.945	119.436	37	7.240	64.950	54
Composite	85.520	67.070	37	5.153	47.502	71
Cartboard	2.590.586	1.024.429	37	71.051	1.423.181	139
Glass	363.024	492.626	37	33.283	160.238	33
TOTAL	4.456.291	2.516.094		153.952	1.937.912	77

Table 7. Waste Types and Benefiting Amounts in Turkey (2013)

Waste Types	Quantity of waste	Amounts contributing into the economy (TL)
Tyre	117.000 Tons	37.500.000
Battery	64.000 Tons	87.500.000
The waste motor oil	18.750 Tons	23.000.000
Scrap vehicles	1.648 Pieces	59.000.000
Package (paper, plastic, etc.).	1.900.000 Tons	1.100.000.000
Ship demolition		800.000.000

As it may be seen in Table 8, 1,3 billion Turkish Liras were regained by the economy in 2013, and with disassembling of old ships, this amount exceeded 2 billion Turkish Liras.

Findings on the Reasons of the Increase in Solid Wastes

50 Students from Business Management and 50 students from Mechanical Engineering Departments, 100 students in total, have commented on how the following statements affect the increase of the solid waste materials. After this assessment, the importance levels of the factors, the test to determine whether there is a meaningful difference between the options, and the independence test X^2 to determine whether there are differences according to the gender and departments of the students are given in Table 8.

As it may be seen in Table 9, it has been determined that the most important reasons in terms of increasing the amount of solid wastes are the increase in population (2,97), the increase in income (2,91), wastefulness (2,83) and the increase in packaged products due to the increase in welfare (2,82).

When the student preferences on how efficient the factors are in increasing the amount of solid wastes are examined, it has become obvious that the preferences are diffused and the figures show that the students think mainly these factors are: Increase in income (165,62), increase in population (182,42) and wastefulness (121,94), ($X^2 > X^2_{2-0,01} = 9,29$); in other words, students think that the factors that are thought to have increased the amount of solid wastes are actually important in increasing the amount of wastes.

Besides this, the issue whether the reasons that increase the amount of solid wastes differ according to gender and department variables has been examined. The table value is $X^2_{2-0,01} = 9,29$, increase in population (0,8376 and 1,0103), increase in welfare level (0,4803 and 2,3034) and wastefulness (5,0872 and 0,0886) factors have been assessed as important regardless of any statistical differences between departments of the students and their genders. In other words, it has been determined that an increase in population, welfare and wastefulness are related to the increase in the amount of solid wastes.

Table 8. Cardinalities for Factors that Cause the Increase in Domestic Wastes and X^2 Results

Measure for factors that cause the increase in domestic wastes	Average and $X^2 - 0,01$	Gender X^2		Department X^2	
		W	M	Mach	Adm
1. The increase in the amount of packages depending on the increase in incomes and consumption rates.	2,91 165,62	2,1765		0,6666	
2. Increase in the population.	2,97 182,42	0,8376		1,0103	
3. The increase in the rate of purchasing packaged products with the increase in welfare.	2,82 129,74	0,4803		2,3034	
4. The increase in welfare causing the increase in the quality of packages and the increase in their size.	2,48 36,98	0,4126		2,2244	
5. Increase in the purchase rates of food from external sources instead of homemade products.	2,71 117,02	7,7800		6,9597	
6. The increase in the awareness in hygiene and health thus causing the increase in the use of cleaning substances and packaging materials.	2,76 120,26	7,2079		3,5503	
7. The increase in the import, export and the use of packaging materials due to globalization.	2,60 59,78	6,0446		3,7303	
8. The increase in package types and in the amount of packaging materials due to the common e-trade marketing.	2,57 63,86	12,1668		44,0000	
9. The increase in the edutainment toys and materials for children.	2,53 51,38	2,1228		3,8561	
10. The out-of-use status of products produced with older technologies in today's fast-developing technology.	2,51 65,66	11,9325		10,9267	
11. The increase in promotion products that are used to introduce products and companies.	2,27 20,18	6,8417		5,4853	
12. The increase in giveaway products for introduction in specific days or in new year activities etc.	2,49 67,22	1,6910		5,8990	
13. Wastefulness.	2,83 121,94	5,0872		0,0886	
14. The increase in single-use materials in personal care and child care.	2,72 102,26	14,5216		4,0197	
15. The repair costs nearing the product prices / changing the products instead of repairs.	2,61 65,06	3,9999		11,1374	

Therefore,

H_1 : There is a relationship between customer income and the increase in the amount of wastes.

H_2 : There is a relationship between population and the increase in the amount of wastes.

H_3 : There is a relationship between wastefulness and the increase in the amount of wastes.

Three hypothesis have been accepted.

The answers of the students in factors like repair, out-of-fashion technology and direct marketing differ in terms of gender and departments of the university.

DISCUSSION

Sluisveld, se A.E. van and Worrell (2013), In the study in which package wastes are the main issue, the work to be done to decrease the solid wastes have been emphasized. A study was conducted by manufacturers to determine which applications were applied in terms of decreasing raw materials and energy consumption for the purpose of decreasing the package materials. At the end of the study, the following issues have been determined to decrease the package materials [22].

- * Compulsiveness or lack of legal arrangements,
- * Lack of knowledge and
- * The secrecy in differentiating products.

Minoglou and Komilis (2013), A simple mathematical program has been suggested to minimize the carbon

dioxide release and the cost of the solid waste system, and to optimize the purification and dismissal of domestic solid wastes [23].

If the legal sanctions were compulsory enough, all institutions would be more sensitive on recycling processes. Moreover, if people become aware of the contribution of recycling to the economy; and the damages of the wastes to the environment, their participation in recycling activities will also increase. Sometimes the contents of the packages can be kept secret due to classifications and this may cause some difficulties in recycling processes.

In this study, after the information on solid waste conversion in Turkey is shared; a field study on university students has been conducted to reveal the reasons that increase the package wastes and to determine the importance levels of package materials and to determine whether the public opinion changes in terms of gender and education received.

At the end of the study it has been concluded that the solid waste production in Turkey is 1,3 kg/day, and is caused mainly by the increase in population (2,97), the increase in income (2,91), and wastefulness (2,83) factors.

An important point here is that it has been revealed that wastefulness contributes to the increase in the amount of wastes as well as the findings of the studies that suggest that there is a relationship between the increase in the population and incomes of people and the amount of wastes.

CONCLUSIONS AND RECOMMENDATIONS

At the end of the study, it was understood that there were missing parts in statistical data about the wastes and in assessing the issue in terms of history and coverage.

In Turkey 1,32 kg wastes are produced daily per capita and the annual amount reaches 32 million tons. The amount of reusable wastes is 3,8-4 million tons/year.

As of 2012, in 589 recycling facilities, totally 10 million tons waste metals, plastics, papers, etc. were regained. 1,3 billion Turkish Liras were regained by the economy in 2013, and with disassembling of old ships, this amount exceeded 2 billion. Again, in the same year, 60 thousand employees were employed in the recycling area.

After a field study, it has been determined that recycling has great importance both for ecology and health care issues, and for the economy of the country. It has also been determined that the most important reasons which cause the increase in wastes are the increase in population (2,97), the increase in income (2,91), and the issue of wastefulness (2,83).

In the light of the research and examinations, it must be stated that, firstly the products should be used until they run out of their usage durations or their usable parts should be used, the parts that have economic value should not be thrown out but be recycled; in other words they shouldn't be wasted.

As a second item, it has been considered that the amount of the wastes should be decreased in their sources and the wastes should be prevented before they become wastes.

It has been assessed that the recycling activities should be performed in the nearest plants to the sources, and the products with special characteristics should be collected in the collection centers nearby and should be recycled or destroyed.

The following suggestions can be shared about decreasing the amount of solid wastes and increasing the efficiency of recycling.

- * Preparing a national solid waste management plan in universal scales,
- * Establishing dissuading legal measures that will be in accordance with the EU requirements in collecting, storing, transportation and recycling of waste materials,
- * Arousing an awareness in recycling of waste materials in all layers of the society,
- * Preventing wastefulness and conducting studies to arouse awareness in this issue,
- * Ensuring that people live closer to the earth by decreasing the number of multi-storey buildings and ensuring that domestic wastes are recycled in the place where they are produced,
- * Ensuring that single-use products are not used at least in homes and in individual use,
- * Decreasing the amount of packaging materials by purchasing large-scale products,
- * Decreasing the size of the packages by purchasing concentrated products,
- * Planning the printed materials well in activities such as congress and symposiums,
- * Planning the printed materials well in introductory materials of universities etc.,
- * Carrying the archives systems of public institutions to electronic databases,
- * Performing the correspondence in electronic media,

- * Using double-side forms in written documents,
- * Ensuring that the electronic signature becomes widespread,
- * Encouraging the compost materials,
- * Ensuring that solid wastes are put separately into different containers and encouraging the rightful usage,
- * Putting the domestic wastes in different containers according to their types,
- * Preferring smaller capacity solid waste collecting vehicles in small residential areas,
- * Not exceeding (1) day for solid wastes to be left outside,
- * Encouraging the entrepreneurs for investments on proper technologies,
- * Encouraging recycling facilities that are aimed for energy production from waste materials,
- * Encouraging consigned sales,
- * Preventing the use of featureless materials in production,
- * Working with reusable packages,
- * Carrying the products from production units to sales points in reusable containers,
- * Developing rightful recycling facilities and reverse logistics channels; and ensuring that the members in these facilities and channels receive back-payment according to the economic value of the materials, they help to be recycled,
- * Ensuring that it is compulsory to recycle in places such as hospitals, dormitories and military units, etc.,
- * Ensuring that these places work in coordination with eating houses.

In this study, domestic solid wastes are studied. In other future studies, medical wastes, wastes of batteries, chemical wastes and mineral oil wastes can be studied. The ecological and socio-economical dimensions of recycling of these wastes can be determined.

Furthermore, in addition to the assessment of the relationship between wastefulness and the amount of solid wastes, future studies may study the relationship among the young population, welfare level and the wastefulness.

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