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College Students' Perceptions and Attitudes Toward the Use of Plastic Bags in Turkey and Puerto Rico

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Abstract

Plastic is a man-made material and the most ubiquitous consumer item in the world mainly because of their convenience. Since 1980s, single-use plastic bags have replaced paper and reusable bags because they are stronger, cheaper, and more convenient to use. Customers at grocery and department stores all around the world have used single-use plastic bags to transport goods and food items to their homes. However, plastic bags pose serious environmental and health problems in humans and animal. Therefore, a growing number of states and governments are taking action to ban single use plastics all around the world. Recently, some plastic bag bans are being reversed for a certain period in several US states because of the coronavirus pandemic. In this study, a questionnaire was used to assess the perceptions and behaviors of college students in two countries (Turkey and Puerto Rico) regarding use of single-use plastic bags at grocery stores and supermarkets. Each of the four-year college student populations was contacted with a web link to complete the survey. Survey results showed that policies to reduce single-use plastics have been effective in both countries. More than 85 percent of the participant indicated that since the ban of plastic bags they have been using reusable bags at the stores to carry their items. Ninety five percent of them pointed out that they are aware of the damage created using plastics bags and they think paper bags are more sustainable than plastic bags.

Keywords: Bag, consumer, plastic, pollution, survey

1. INTRODUCTION

In the last decades, use of plastic bags increased dramatically. They were introduced firstly in the late 1970s and those low-cost, disposable single-use plastic bags were quickly accepted by retailers and became very popular amongst consumers for their convenience and utility. They are produced in large amount across the world and Figure 1 provides information on the production of plastic in Europe and all around the world. Plastic shopping bags have replaced paper and reusable bags because the primary incentive for consumers to use those bags is simply that they are the cheaper and convenient alternative for carrying anything from stores. For several decades, plastic shopping bags with their advantages of light-weight, durable/ resistant, waterproof and generally free of charge, have been very common item in the world. Someone could think that plastic bags have been provided for free but not, they have a cost, especially for environment. Many of those bags are usually thrown away as waste after single use.

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Due to some reasons, rates of recycling for plastic bags are low and they do not degrade quickly. For that reason, the impact of plastic bags on landfill, landscapes, wildlife and water and sewer systems is a problem. Many programs around the world have adopted to reduce litter and pollution of those single use disposable plastic bags [1].

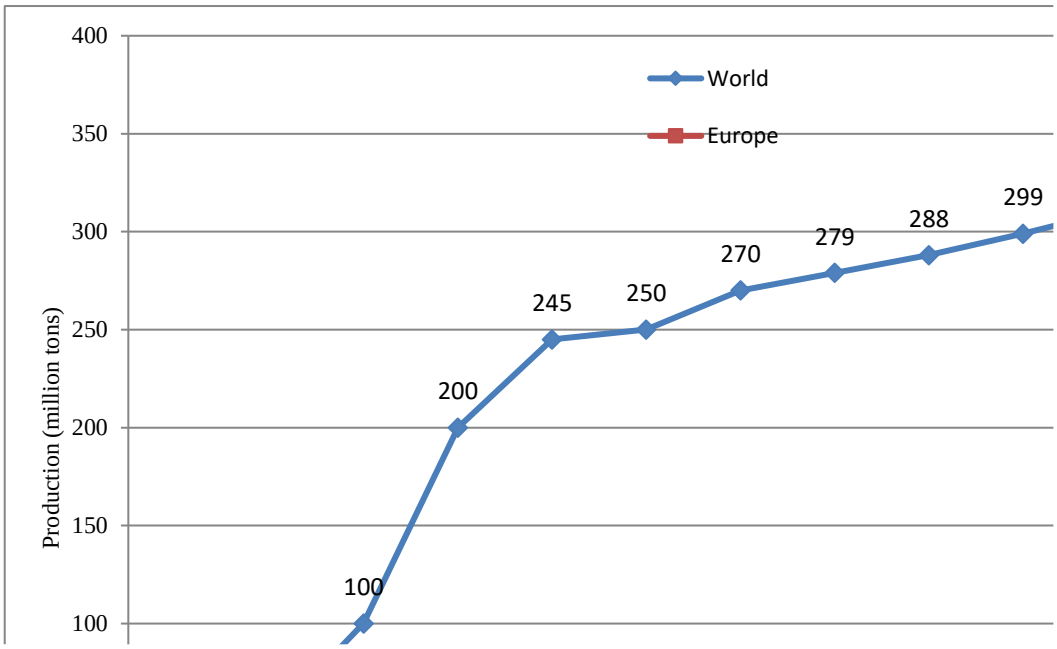


Figure 1. Plastic Production during 1950-2017 period.

Recent studies have pointed out the public cost of single use plastic bags. They can clog drains resulting in many problems, restrain trees growth in the soil, are ingested by animals and their haphazard disposal by incineration can easily pollute the air and releases some toxic substances [2]. Furthermore, plastic bags are also responsible for using up oil to consume a scarce natural source. These concerns have activated governments and countries across the world to limit the use of disposable plastic bags. Different type of regulatory instruments was used for this purpose. These include the pricing of plastic bags, taxes for manufacturing, awareness campaigns and in some cases, a total ban.

In recent years, many countries implemented a levy or fee to purchase of bags. These levies are generally low and symbolic, but has an important effect on consumers. Last years' applications show that effectiveness of such policies is mixed. A complete ban in San Francisco and India have been largely effective but in the case of Bangladesh it seems it did not work [3-4].

Many governments, from developed and developing countries implemented policies to lower the use of plastic bags. Denmark was one of the first country. The government imposed a tax on retailers in 1994 and plastic bag usage decreased %66 [5]. Another example from the developing countries, in 2002, Bangladesh government prohibited the use of plastic bags in its capital and in 2006, Rwanda banned use of plastic bags in the shops. A considerable global interest to lower the usage of plastic bags was attracted by many countries after the success of increased environmental levy on plastic bag in Ireland [6]. However, a similar legislation of product charge implemented in South Africa witnessed a gradual reaction in plastic bag consumption after showing an initial notable reduction [2]. While control policies ensure success in some countries, e.g., Denmark and Ireland, but far from successful in others, e.g., South Africa and Kenya [2]. However, some plastic bag bans are recently being reversed for a certain period in several countries because of the coronavirus pandemic.

The influence of the regulation differs across different countries and groups of people. People attitudes play an important role in reducing bag usage [6-9]. Two main factors affect behavioral difference between supermarkets and open markets. Consumers' demand for plastic bags is lower in the supermarkets because of better prepackaging of goods while in open markets a competitive environment has stronger incentives to supply free bags.

Plastic pollution poses significant risks to public health and marine life as well as to economic sectors such as tourism, fisheries, and shipping [10]. Plastics make up the majority of marine litter and it was estimated that, around 13 million metric tons of plastic entered into our oceans in 2010 and could reach 250 million tons by

2025 [10]. The Caribbean Sea is the second most contaminated sea with plastic waste after the Mediterranean sea. According to the estimates in the studies conducted, the volume of plastic items range from 600 to 1414 per square kilometer in this sea, and this is expected to increase. Over one million tons of plastic were introduced to coastal waters of the West Caribbean Sea in 2015, mainly from land-based sources. Solid waste generation is expected to increase in the region as human populations continue to grow, in the absence of more sustainable production and consumption patterns and adequate solid waste management. Therefore, the countries of this study (Turkey and Puerto Rico) has an importance for plastic pollution.

To help diminish the environmental impact of single-use plastic bags, the government of Puerto Rico signed Act 247 into law in 2015, and it went into effect on January 1, 2017. According to the Act, retailers had over a year to switch to reusable bags and a 6-month grace period without fines. After June 30, 2017 businesses had to pay a $100 fine for a first violation, $150 for a second infraction, and $200 for each subsequent violation. The act forces the stores use paper bags or sell a thicker-plastic bag that can be reused for those customers who do not have their own bags. The goal of charging 10 cents fee per bags is to encourage consumers to reuse the bags they already own. In this study, a questionnaire was used to assess the perceptions and behaviors of college students in two countries regarding use of single-use plastic bags at grocery stores and supermarkets. Each of the four-year college student populations was contacted with a web link to complete the survey. The objective of the survey was to assess usage of plastic bags and their environmental impacts in two countries.

2. MATERIAL AND METHODS

A questionnaire was used to assess the perceptions and behaviors of college students in two countries regarding use of single-use plastic bags at grocery stores and supermarkets. The study in Puerto Rico was conducted with undergraduate students studying electrical, mechanical and industrial engineering at Bayamon campus of Inter American University. The campus is a commuter campus and students come from every part of the Island. Turkish part was achieved in Yildiz Technical University, Istanbul with Environmental engineering students. More than 80 % of the Puerto Rican participants were male students whereas opposite was true for Turkish counterpart. Each of the college student populations was contacted with a web link to complete the survey. A total of 152 completed questionnaires were returned. Survey form was not long and complex, including only Yes/No or multiple-choice questions. The sample student groups represented almost all districts of the countries and a range of household characteristics (number of children, level of education, monthly income, etc.). Only volunteering students participated in the survey and they were free to withdraw from the research at any time. The survey form aimed to determine the preferences of the participants for the following questions seen in Table 1.

Table 1. Survey Questions

1) Where do you do most of your food and grocery shopping?
2) What do you use to carry the items you purchased at a grocery/ food store?
3) What do you do with the plastic bags after you use them once?
4) What prevents you from using reusable shopping bags?
5) Do you think plastic bags are better alternative than paper or fabric bags?
6*) Have you increased your use of plastic bags recycled from vegetables/fruits shopping?

* Asked only in Istanbul city.

3. RESULTS AND DISCUSSION

As seen in the survey results, 3/4 of the students in San Juan shop from big supermarkets (Table 2). In the Istanbul group, this rate is about 1/2. Small markets, which are usually in the neighborhood, are used less than 7%. The most important reason for this is that the survey group consists of young students. Although the number of students who purchase plastic bags varies between 7-27%, it is as low as 10-15% on average.

The reason why the purchase rate of reusable bags in the Istanbul group is zero is that many companies and organizations distribute free reusable bags for the promotion. Therefore, people do not need to buy reusable bags. Instead of throwing the plastic bags into the trash or recycle bin, the majority of students and/or their families prefer reuse them in trashcan, animal waste collection, etc. Probably only wet and dirty bags are thrown away. Recyclers are as small as 5% in both cities.

In the Istanbul group, it is asked that if students' use of thin plastic bags has increased for special reasons. As in EU countries, thin plastic bags are provided free of charge in vegetable and fruit departments of the markets in Istanbul. About 50% of the students said that they started to use these bags more because of their various needs in the market. In most cases, these bags are preferred for carrying small items or food instead of purchasing new plastic bags.

According to information received from the Ministry of Environment and Urban Planning, the use of plastic bags in Turkey was reduced by 78% after application of bag fee since January 1, 2019. The number of use per person, which was about 35 per month, has decreased to 10 [11]. However, those numbers are probably related to supermarkets but not to all market. Plastic bag usage is still high. Annual use of plastic bags for shopping in Turkey is around 30-35 billion units, but during the corona virus time plastic bag usage has increased 40-50% [12]. Turkey Retailers Federation President Omer Duzgun said that use of cloth bags was reduced for hygienic reasons since the pandemic started and the use of disposable (only one use) plastic bags increased during this period [12]. Duzgun said, plastic bags consumption increased 40 percent in the March-May period, compared to same period of 2019. The increase in the rate of home delivery service was also effective in the increase of plastic bags usage. By advice of doctors in the media, packaging bags are disposed of directly in the garbage for hygienic reasons. Duzgun also stated that after the shopping bags started to be sold with money, a 50 percent increase was observed in the use of free thin bags used in the purchase of vegetables and fruits in markets.

Tabel 2. Students' response to survey questions (as %).

	Puerto Rico (93)					Turkey (59)
Number of students	n=15	n=37	n=25	n=16	Avg.	
Q1:						
Supermarket/ food store that charges for plastic bags (Walmart, Econo, SuperMax etc.)	86.7	70.3	76	50.0	**70.7**	**41.4**
Big chain supermarket (COSTCO, SAM'S Club)	6.7	24.3	24	43.8	**24.7**	**51.7**
Smaller supermarket/convenience store	6.7	5.4	0	6.3	**4.6**	**6.9**
Q2:						
I buy plastic bags	6.7	10.8	8	31.3	**14.2**	**10.2**
I buy reusable bags	20.0	10.8	20	12.5	**15.8**	**0.0**
I use my own plastic bags	26.7	10.8	20	18.8	**17.6**	**8.7**
I use my own reusable bags	46.7	67.6	52	37.5	**50.6**	**81.1**
Q3:						
Reuse them(in trashcan, animal waste collect. etc.)	80.0	67.6	88	87.5	**80.1**	**86.2**
Take them somewhere to be recycled	6.7	8.1	8	0	**5.7**	**5.2**
I never use single use plastic bags	0	13.5	4	12.5	**7.5**	**0.0**
Place in regular garbage bag, which goes to landfill	6.7	10.8	0	0	**4.4**	**8.6**
Unanswered	6.7	0	0	0	**1.7**	**0.0**
Q4:						
Forget to bring them	40.0	16.2	32	60.0	**37.1**	-
Prefer plastic bags	0	0	8	6.7	**3.7**	-
Want single use plastic bags for other uses	6.7	2.7	8	6.7	**6.0**	-
Nothing. I always use them.	53.3	81.1	52	26.7	**53.3**	-
Q5:						
Yes	6.7	16.2	28	12.5	**15.9**	**20.3**
No	60.0	75.7	52	68.8	**64.1**	**50.0**
No idea	33.3	8.1	20	18.8	**20.1**	**29.7**
Q6:						
Yes	-	-	-	-	-	**50.9**
No	-	-	-	-	-	**48.3**

It was noticed by one of the authors (G.Kanat) that the trash cans in the districts where his office and house are located had several single-use plastic bags filled with household waste. This might be an indication that people in that district prefer to use recycled plastic bags rather than spending money to buy proper garbage bags. Approximately half of those bags in the trash cans indicates that they were received free of charge from companies but not purchased from supermarkets. Moreover, waste bin observation indicate that majority of the city residents still widely use plastic bags in their daily life activities. Some of the main reasons attributed to the widespread usage are low price, easy availability and light weight. These findings are consistent with

other reports describing that light-weight, cheap price, excellent fitness for use and resource efficiency as main reasons for widespread utilization of plastic bags by billions of customers throughout the world [4]. Similarly it is reported in China, while supermarkets have consumed 25 per cent of all plastic bags; open markets, roadside stores, department stores and all other retailers have consumed the remaining 75 per cent and as a result of mass usage, plastic litter composed of plastic bags constitutes 3–5 per cent of the total landfill solid waste [5, 13].

4. CONCLUSIONS

Survey results showed that policies to reduce single-use plastics have been effective in both countries. More than 85 percent of the participant indicated that since the ban of plastic bags they have been using reusable bags at the stores to carry their items. Ninety five percent of them pointed out that they are aware of the damage created using plastics bags. Only 16 and 20 percent of the participants in Puerto Rico and Turkey, respectively, think plastic bags are more sustainable and therefore better alternative than paper or fabric bags.

Also, the survey results indicate that there is no difference between these two countries. University students are very sensitive to the use of plastic bags and waste. Although the awareness of the students of the Environmental Engineering Department about plastic wastes is quite high, the students of other departments are also high.

Our results further suggest that the regulation would reduce bag consumption to an even higher degree if it was enforced more effectively and if a higher price was charged for the single use bags.

Additionally, it is equally important that the positive impacts of these measures in the short- and long-term have to be studied.

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