

WASTE MANAGEMENT OF PET BOTTLES

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ABSTRACT

This study was based on finding out the existing waste management system with reference to PET (polyethyleneterephthalate) bottles in Mumbai. The sample of the study consisted of, "Packager", the Commercial user (hotel airline and caterers), the garbage collectors and the recyclers (of PET bottles). Questionnaire and interview schedule was administered to find out waste generated by the use of PET bottles, the methods of disposal and recycling and to identify problems if any of disposal/ collection and recycling of these bottles. The results indicated that an average 25,03,334 virgin PET bottles were used for packing carbonated soft drink and water bottles per month average consumption of Hotels, Airline and Caterers was 7.5 kg/day, 70.25 kg/day and 11.75kg/day respectively. These bottles were sold to recyclers at the rate of Rs 5-10/kg. These bottles were finally recycled into various products like fibres, strapping, sheets etc.

Key Words: Waste management, PET bottles, Recycle of bottles, Biodegradable.

INTRODUCTION

We are running out of room for our garbage. Landfills all over the world are literally spilling over, and the oceans, once treated cavalierly as an infinite waste depository, have begun to wash back our own refuse to our shores.¹ Though there are other wastes that form a part of garbage but plastics; being non-biodegradable are more visible than other trash, which are mostly biodegradable. This is especially true in case of PET (polyethyleneterephthalate) bottles.²⁻⁴ These bottles not only result in waste of expensive material but also increase plastic waste which can cause environment pollution in the form of their disposal. Today, PET bottle waste are seen everywhere: on the road, in garbage bins, railways tracks, play grounds etc. if it is possible

to distribute a product over a wide area to a diverse population of end users, why should it not be possible to get the refuse from the product back to its source to be recycled/reused to a new product. "The term recycling refers to a system of empty container recovery, collection and reprocessing of the materials of construction to be used as a resource in the manufacture of a new product." Recycling is not always a close loop i.e. PET bottles are generally not remade into new PET bottles.^{5,6} With this question in mind the researcher felt it would be worthwhile to find out what happened to the garbage generated by use of PET bottles by commercial users, different methods of recycling/searg PET bottles, and find out where there was a problem for disposal/ collection and recycling of PET bottles.⁷

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METHODOLOGY

An exploratory research was conducted in the city of Mumbai. The sample of the study consisted of packers (packagers of PET carbonated soft drink and water bottles), commercial users which comprised of ten hotels, four catering companies and four airlines, ten garbage collectors and recyclers. In order to fulfil the objectives of the study, separate questionnaires and interview schedules were formulated which had both structured and open ended questions in order to maintain uniformity while getting information. The sample was analyzed to

ascertain the amount of PET bottles packed for consumption and the subsequent amount of waste generated, the methods of disposal, and recycling. Problems if any, related to its collection/disposal and recycling were also ascertained.^{8,9}

RESULTS AND DISCUSSION

The primary objective of this study were to evaluate a) what happened to the garbage generated by use of PET bottles by commercial users b) Different methods of recycling PET bottles c) where there was a problem for disposal/collection and recycling of PET bottles.

Table 1 : Feasibility of reuse/recycling of the pet bottles and its impact on environment

Factors	Feasible	Not Feasible
Recycling	100%	0%
Harmful impact on Environment	0%	100%

All the Packager (100%) agreed that with a proper chain, PET bottles could be recycled into various products like fibres, sheets, strapping, toys, etc.

As compared to PVC, (polyvinylchloride) PET although not biodegradable, was recyclable and thus was not harmful to the environment.

Table 2 : Consumption of PET bottles per day (KG)

Consumption/day (kg.)		No. (%)
Hotels	5-Jan	9 (45)
	10-Jun	6 (30)
	15-Nov	3 (15)
	16-20	2 (10)
Average	7.5 kg/day	20 (100)
Airlines	Oct-50	2 (50)
	51-90	1 (25)
	91-130	-
	131-170	1 (25)
Average	70.25kg/day	4 (100)
Caterers	5-Jan	-
	10-Jun	2 (50)
	15-Nov	1 (25)
	16-20	1 (25)
Average	11.25kg/day	4 (25)

The consumption of PET for packaging of carbonated soft drink and water bottles among commercial users was 1-170 kg/day

where in the average consumption in hotels was 7.5 kg/day whereas in airlines 70.25 kg/day and among caterers it was 11.75 kg/day.

Table 3 : Mode of disposal

Mode of disposal		No. (%)
Hotels	Disposal in the garbage bin	3 (15)
	Sell to garbage collector	17 (85)
Airline	Sell to garbage collector	1 (25)
	Send bottles back flight kitchen	3 (75)
Caterers	Sell to the garbage collector	4 (100)

As for the mode of disposal, more than 3/4th of the hotels (85%) disposed their PET bottles waste by selling it to garbage collectors and around 1/6th (15%) of them disposed in the municipality garbage bin. Where as in airlines 3/4th (75%) PET bottle wastes were sent back to the flight kitchens, which catered to them, who in turn sold the whole waste to the garbage collector. 1/4th (25%) sold directly

to the garbage collector. It was significant to note that none of the airlines that were the biggest user of PET bottles disposed them in garbage bins. On the other hand (100%) caterers sold waste to the garbage collectors on a monthly basis who were paid a lump sum every month. This signified that disposal of PET was not a problem as collectors were available on a contract basis.

Table 4 : Segregadtion of waste

Response	No. (%)
Segregated	5 (25)
Did not segregate	15 (75)
Segregated	0 (0)
Did not segregated	100(100)
Did segregated	1 (25)
Did not segregated	3 (75)

It was found that 75% of the hotels did not segregate their waste before its disposal while 25% segregated their waste on the basis of wet, dry, and non-biodegradable waste. Where as in case in airline, they sent back waste to the flight kitchens and a small fraction sold

directly to the garbage collector. The waste that was taken to the flight kitchen was segregated on the basis of wet, dry and non-biodegradable waste. Similarly in case of caterers 75% did not segregate waste and only 25% did the segregation.

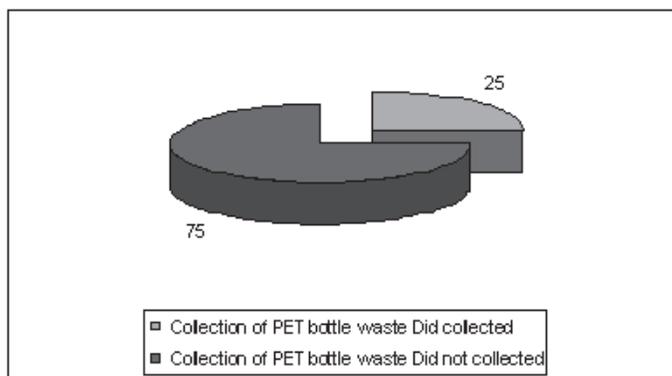


Fig. 1: Collection of PET bottle waste

It was found that 75% of the garbage collectors did not collect PET bottle waste at all. These were mainly roadside shops.

Only 25% of the collectors collected PET bottles waste from rag pickers.

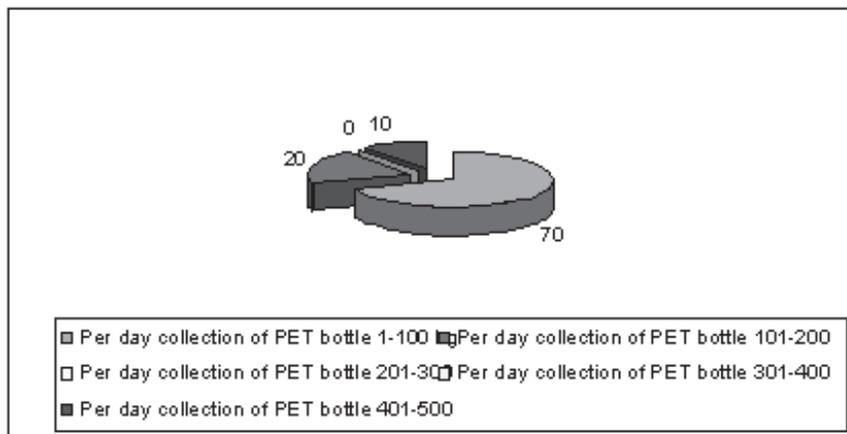


Fig. 2 : Collection of pet bottle waste per day

Among the garbage collectors who collected the discarded PET bottles (70%) collected PET bottles upto 100 kg per day,

whereas 20% collected upto 200kg. Few (10%) collected upto 500kgs, an average of 110.5 kg/day

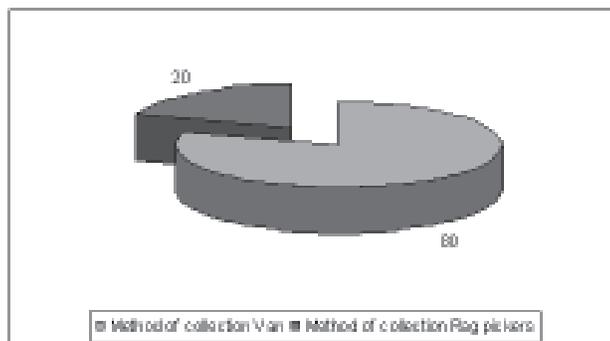


Fig. 3 : Method of collecting pet bottle waste

It was found that 80% of the garbage collectors collected waste including PET bottle waste by mean of a garbage van. And only

20% of the PET bottle waste was collected by rag pickers.

Table 5 : Cost of Selling PET bottles

Cost of selling PET bottles	Percentage	Price in Rs
Normal days	60%	5-6 Rs/kg
	40%	7-8 Rs/Kg
Monsoon	100%	2 Rs/kg
Peek season	100%	1 Rs/ Bottle

It was found that 60% of garbage collectors sold PET bottles waste to recyclers at the rate of 5-6/kg while the remaining 40% sold at the rate of Rs.7-8/kg. However during

monsoon, the PET bottles were priced much lower- as little as Rs 2/kg, due to less market demand whereas in peek season it was sold at Rs. 1/bottle.

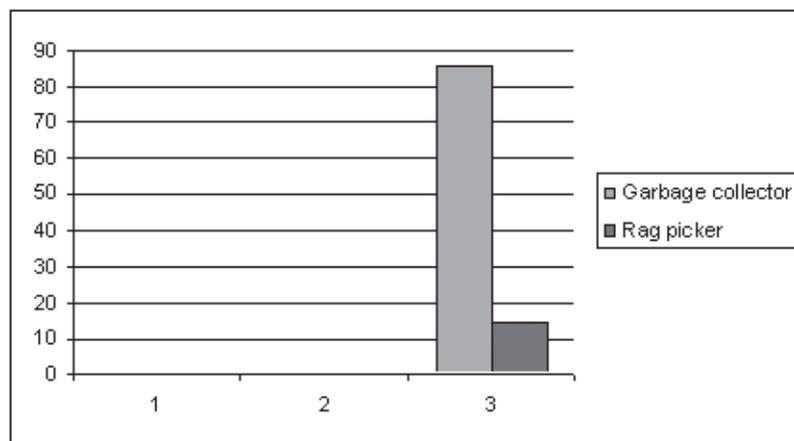


Fig. 4 : Means of collecting PET bottles

Around 85.71% of supply of PET bottles waste for recyclers was through garbage collection, while a few (14.28%) of the recyclers hired rag pickers for PET bottle waste collection. It was found that majority of the recyclers in Mumbai (57.41%) converted PET bottle waste into flakes which were then sent outside Mumbai to places like Gujarat, Vapi, Daman etc. for manufacturing recycled products mainly fibres.

CONCLUSION

The astounding development of PET bottle packaging cannot be compared with anything else in the history of packaging. But one of the inherent disadvantages has been the quantum of waste generated. Among the various technical options viz. land filling, recycling and incineration, recycling is the best option to combat this problem.

The purpose of conducting this study was to find out the existing waste management system with reference to PET bottles, the amount of waste generated by the use of PET bottles, the method of disposal and reuse and recycling adopted for PET bottles and to identify whether there were any problems in the process of disposal/collection/ and recycling of PET bottles.

It was concluding that averages of 25033334 virgin PET bottles were used for packaging carbonated soft drinks per month. All the packagers agreed that reusing PET bottles was not possible because it became toxic with multiuse. As far as recycling of PET bottle waste was concerned, all manufacturers agreed that PET bottles could be recycled into various products like sheets, strapping, toys, fibres, ropes, etc. in order to make use of waste product to the maximum.

All the packers felt that PET bottles were Eco-Friendly and did not harm the environment.

As far as mode of disposal was concerned, majority of the hotels (85%) disposed PET bottles by selling to the garbage collector. Where as (75%) Airlines sent their waste back to the flight kitchens, and caterers directly sold waste to the garbage collectors.

Surprisingly it was found that (75%) of the general garbage collectors did not collect

PET bottles waste because it was a bulky, troublesome material and not economic to buy in small quantities.

The rate of PET bottle waste varies according to the season. In peak season its cost goes up to 1 Rs/bottle where as during off season it cost 2 Rs/ kg. And the garbage of the PET bottle is collected by the garbage collector and in small amounts by Rag pickers.

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