Waste Audit at an Educational Institution in Chennai

The management and faculty at Dr.P.Venkataramana Higher Secondary School, Pughs Road were interested in managing their waste better. CAG researchers undertake a waste and brand audit, and the results showed practical ways to manage their organic waste in situ and reduce all inorganic waste.

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CAG
Citizen consumer and civic Action Group

1. Introduction

The Solid Waste Management Rules were notified in 2016 to provide a solid framework of scientific waste management across urban agglomerations. A pioneering feature of the SWM rules is its mandate to bulk waste generators: entities that generate over 100 kg waste or spread over an area of 5,000 sqm are recommended to segregate waste at source and handover recyclable material to either authorised waste pickers or recyclers, or to the urban local body. The act expressly instructs bulk waste generators to manage biodegradable waste within their premises by means of composting or bio-methanation. This report studies the waste generated at Dr. P. Venkataramana Higher Secondary School, a residential school within the Greenways slum community which houses nearly 230 students and 7 support staff. It was undertaken with a view to enable the school to adopt a more sustainable waste management practice, and to reduce the impact of its waste on the community. Currently, the school's unsegregated waste is being dumped into common dumpsters, which has pernicious effects on both the community and the residents who live near the school.

2. Methodology

An audit was carried out in the school over three days, of which two were general working days and a third, when the school celebrated with a food festival coinciding with Pongal. To study waste generated in the school, a mixed method was adopted. Semi structured interviews were carried out with the non-teaching staff and 10 randomly selected students. Questions on the food menu of the week, frequency of celebrations in the school and the student's knowledge of waste disposal were chosen to reflect the school's current waste management protocol. For the quantitative study, waste generated at different locations in the school campus was collected and sorted as biodegradable and non-biodegradable waste. Non-biodegradable was further classified into recyclable waste (cardboard, paper, newspaper, glass, metal, tin foil, PET bottles, milk packets, stationery plastic) and non-recyclable waste (paper cups, paper plates, LDPE plastic, Styrofoam, thin film plastic, cloth) . Biodegradable waste was weighed in kilograms and non-biodegradable waste was stacked and measured. Horticultural waste and sanitary waste were also audited separately. Since the study restricted itself to two major streams of waste, no recommendations are made for sanitary waste disposal. Student volunteers were given a brief introduction about the audit and the different categories waste was to be sorted into. They were also educated about the types of plastics and their ill-effects.

Image 1: Brief on sorting materials

Image 2: Students sorting waste

Image 3: Multi-layered plastics

Image 4: Milk cartons being weighed

Image 5: Horticultural waste weighed by students

3. Findings

3.1.1 Primary audit

On a regular working day when the food is prepared and served on campus, the school generates 65 kg of waste on an average. This forms three quarters of the total waste. The non-biodegradable waste was dominated by recyclable waste, such as paper and cardboards, followed by reusable waste, such as cloth. Hard plastics from stationery boxes and old toy pieces dominated plastic waste, followed by single-use materials such as packaging film, multi-layer cutlery, and styrofoam. Interestingly, we found several medical packaging wastes, such as syringes, tablet foils, and bottles. We learnt that the school was frequently used as a site for medical camps conducted by several private charitable trusts, which left behind their waste in common bins on the school premises. About 20 kg of horticultural waste is generated in the campus every day. All the waste is disposed in the common dumpster outside the school.

The school receives philanthropic donations in the form of breakfast, lunch or dinner at least once a month. The waste generated on this day was nearly 100 Kg, higher than the waste generated on regular days. More than three-quarters was biodegradable waste and rest was non-biodegradable waste. On these days, food and beverages were typically served in disposable cutlery and not the regular stainless steel cutlery available in the school.

3.2 Secondary audit

A brand audit of multi-layered plastics was carried out to identify responsible brand owners. The audit was also an opportunity to educate the students about the problems such plastics cause to human health and environment. Nearly 300 pieces of branded plastic materials were audited and found to be mostly food packaging, including chips, candies, and biscuits. Interviews indicated that the students themselves purchased these items from local stores, besides these being part of donations to the school. Pepsico India, Parle, Nestle, Britannia and ITC were identified as the top five offending brands (Image 6).

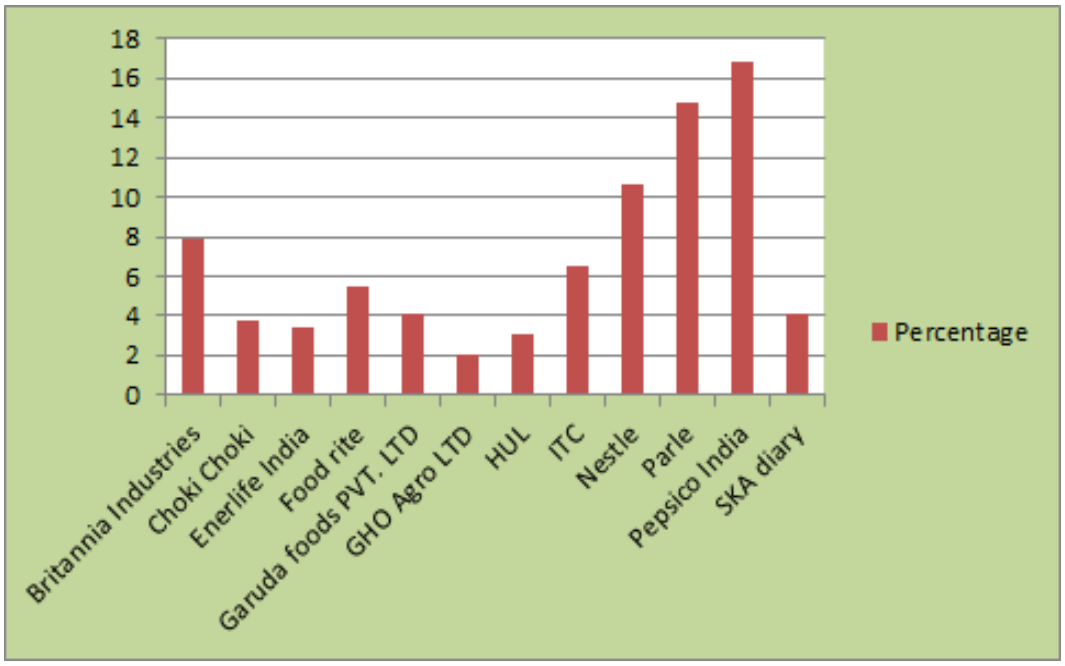

Image 6: Share of top ten brands producing food packaging waste

4. Recommendations

The data from the study offers insight into the problems of poor waste management in a bulk waste generator like a school, and the implications of the same on the community and environment. In order for the school to reduce their waste footprint and comply with the directives of the SWM Rules 2016, the school should set-up an SWM committee through which it could adopt some of the following steps.

i) The school should set up different receptacles/ colour-coded bins for the segregated collection of waste at different locations in campus. The students and staff must be educated on source segregation.
ii) Food waste can be curtailed by both educating students on waste and reducing the amount of food prepared. A daily log of food waste can inform both students on the waste they generate and the kitchen on how much to reduce meal production by. This information also needs to be shared with donors, as the waste is even higher on special event days.
iii) After minimising food waste, the remaining can be composted. Table 1 illustrates the cost of setting up a compost unit based on estimates. Based on the waste audit results, it is recommended that the school set up six compost rings to manage the organic waste. Compost material derived every three months can be utilized for gardening

purpose. Horticultural waste generated in the school campus can be mulched, or fed into the compost unit to enhance decomposition activity.

iv) Recyclable non-biodegradable waste such as paper, cardboard, metals and a few categories of plastic including HDPE, LDPE and PET should be stored and channelled into the informal waste sector stream or handed over to local informal waste pickers or scrap shops. Table 2 indicates the approximate income the school could earn by selling on this waste.

v) Non-recyclable, non-biodegradable waste such as thin film plastic, single use plastics and multi-layered packaging waste pose to be a massive problem, globally. Such waste cannot be recycled or composted. At best, such waste can be reduced at source by refusing the use of such materials. With the ban on single-use plastic in the state, the school should strictly impose this within campus and make the campus free from single-use plastics.

vi) Alternatives to single use plastic during event celebrations must be adopted. This can be as simple as hiring additional stainless steel equipment and utensils for serving and requesting the donors to avoid plastics and multi layered branded products.

vii) Awareness programs for both staff and students can be conducted to highlight the problems of poor waste disposal and plastics. Support from students and staff can be garnered to stop the use of materials that cannot be reused, recycled or composted.

S.No.	**Particulars**	**Quantity**	**Rate per unit (INR)**	**Amount**	**Dimension**
	Non-Recurring Expenditure				
1	Concrete rings	6	1200	7,200	3ft x 2ft
2	Painting charges			200	
3	Metal Mesh (cover for concrete ring)	6	1600	9,600	3 ft diameter
4	Metal sheet/Iron rods/labour charges (optional)	128	225	28,800	(15ftx15ft)
5	Rake	1	200	200	
	Recurring Expenses				
1	Saw dust + Innoculum	15 kg	2	30	
	TOTAL			**46,030**	

Table 1: Indicative cost of setting up composting system for the school*

*This is an approximate estimate of the cost which is likely to be incurred. The total capacity of each unit would be 200 kg. Since the school generates an average of 32 kg of food waste per day, setting up six compost units would be most suited.

Type of waste	Wt /day (kg)	Wt /month (kg)	Rate/ kg (INR)	Amount/month (INR)
Cardboard	1	30	9	270
Paper	3	90	9	810
Aluminum foil	0.04	1.2	8	9
PET bottles	0.015	0.45	8	4
Milk packets	0.11	3	8	26
LDPE plastic	0.566	17	8	136
TOTAL				1,255

Table 2: Projected figures for the sale of recyclables for the school*

6. Acknowledgements

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