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A World of Waste in One Cubic Meter – Portraying Waste to Life

Figure 1: Aerial View of Karadiyana solid waste site – University of Moratuwa is in the background

Rapid economic growth, urbanization, and increasing population have caused resource consumption to increase, and the consequent release of large amounts of waste to the environment. By 2050, the amount of waste generated in developing countries will see a threefold increase. The Asia and Pacific region will generate most of the world's waste- a considerable 23%. In developing nations, recyclables as plastic and paper, metal, and glass make up a substantial fraction of waste streams, ranging from 16% in developing countries [1]. We need to bring in circularity to avoid an environmnetal catastrophe and assessing circularity is the first step in this right direction. The study focuses on the composition of waste in a one cubic meter and identify the potential of resource circularity while justifying the economic value of the waste. Understanding the economic value of waste would lead to a better understanding of opportunities that lie hidden. With this goal, the Karadiyana site, which is adjacent to University of Moratuwa was studied from an urban waste generation perspective. Waste generated in the Biyagama Industrial Zone was also studied from a mixed industrial waste perspective. The valuation of garbage mounds and practices in these two places was an objective. When value is realized the circularity is increased.

Methodology

Methodology derives from the Biocube concept of evaluation of bio-diversity. The interest in emulating the Biocube program was inspired by a

Figure 2: Karadiyana Waste site

Figure 3: Mixed waste at Biyagama Industrial Zone

Figure 4 : Sample analysis at Karadiyana and Biyagama EPZ

feature article in the National Geographic [2]. The cubes were from around the world and highlighted several things about biodiversity in small spaces, including a staggering number of nook and cranny species . Amost every cubic foot sampled yielded hundreds of species.

The concept was developed to analyze the material categories in a typical Municipal Solid waste site and the waste generated in industrial sector. The cube here would yield potential 'cradle' value. The sample volume size is selected as one cubic meter as it can directly link with the sample density in the experiment. The experiment is conducted for fresh non-biodegradable waste coming into the waste site and waste generated in industrial zone. The main environmental burden is evident, as these waste categories mainly comprise of (waste of paper, cardboard, plastic, metal, rubber, leather, glass, clothes, e-waste & offensive waste). Results are identified by segregation and weighing the categorically segregated waste samples. Garbology is a fascinating subject of looking at waste in deciphering behaviour and potential.

Analysis

A specially designed One cubic meter frame is used for sample collection. Ten test samples were analyzed out of 65 waste trucks that are carrying fresh waste from the household to the waste site. In the industrial waste analysis, 10 random samples were analyzed from mixed waste received from textile and apparel sector industries in the zone.

Results and discussion

Main waste categories in the Karadiyana waste site were identified as Paper and cardboard 28.4%, Mixed plastic 28.36%, Clothes 7.73%, Mixed waste 11.08% as major waste streams above 3kg on a weight basis in one cubic meter volume. The average specific density of the test cube was 49kg/m3.

Paper(29%), cardboard(28%) , plastic (15%), polythene (8%) and fabric (4%) were the main waste categories identified in the Biyagama Industrial Processing Zone. The average specific density of the test cube was 30.8 kg/m3.

Economic value of one cubic meter of waste

Karadiyana waste site (waste of household)

Following the visual inspection of the 49kg of waste in one cubic meter volume, it was identifies that 42.64kg of waste can be diverted to material or energy recovery with direct waste material value

Figure 5 : Waste inspection visit at Karadiyana waste site

Figure 6 : Waste analysis at Karadiyana

of approximately 1299 LKR (recyclate valued at October 2021 rates). However, waste management expenditure such as segregation, transportation yard management etc, and the environmental impact of mismanagement of waste were not considered .

Biyagama Industrial zone

The Economic value of one cubic meter volume of industrial waste was approximately 1622 LKR. The Cube also enabled industry to identify the potential almost immediately.

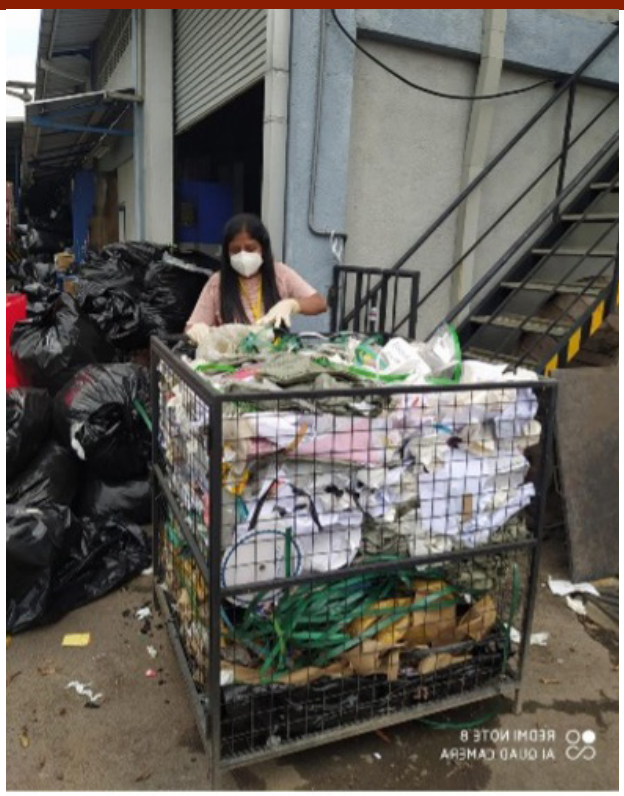

Figure 7: Waste analysis at Biyagama EPZ

A surprising observation was the closeness of municipal solid waste to the industrial waste value assessment. This is however a comparison that has not been done before for the same time period.

Reference

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