

Quantitative analysis, characterization and Management of MSW in CIT Campus, Kokrajhar, Assam

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ABSTRACT:

Solid wastes (SW) are all the waste arising from human and animal activities that are normally solid and that are discarded as useless or unwanted. Urbanization and population growth result in generation of solid waste and the problem of management of solid waste effectively by the municipal body globally. The fast growing urban environment in the CIT campus has increased the generation of solid waste and the proper management of solid waste from the campus is the need of hour. For the successful and effective management of the SW, quantitative and qualitative study and composition analysis has to carry out properly. The present study was conducted in CIT campus to overview the sources, quantification, composition, collection, transportation, storage, treatment and disposal of solid waste. For this work the factual data were collected from various section of campus by individual field visit and observation, waste generation from the campus were collected and segregated. This study reveals the CIT campus generated approximately 462.33kg of solid waste per day which contains high percentage of organic waste followed by paper and plastic etc. the study also reveals CIT Campus need quantification of solid waste and systematic approach for the proper management of solid waste.

Key words: CIT campus, quantification, composition, solid waste, field visit, Kokrajhar, food waste.

Introduction

The term solid waste includes all those solid and semi-solid materials that are discarded by a community. The solid waste generated through domestic and commercial activities is classified as MSW, and is also called 'refuse'. Solid waste management is becoming a major public health and environmental concern in urban areas of many developing countries. India is the second

largest nation in the world, with a population of 1.21 billion, accounting for nearly 18% of world's human population. According to Census, Provisional Population Totals, India, (2001) the annual rate of growth of urban population in India is 3.35%, but it does not shows much efficiency in energy use or sustainability. As per Asnani Et al(1992), (Bhide Et al 1976) more than 65% of India's 250 Million population is living in class 1 town and 23 cities getting distinction of being metropolises, solid waste management is an integral part of urban and environmental management of each city. Solid waste management is one such service where India has an enormous gap to fill.

According to M. S. Kadam et al. (2016), Once the waste is generated it need to be collected, recycling, composting and remaining for waste to energy for effective waste handling. The last option is open burning and unsanitary landfills.

Existing scenario of CIT campus

Central Institute of Technology (CIT), Kokrajhar is situated in Kokrajhar District of Bodoland Territorial Council (BTC) in Assam. It is a Centrally Funded Institute under the Ministry of Human Resource Development, Government of India. The institute was established on the 19th of December 2006. The institute is spread across 120 acres in the area of Debargaon-Tinali Patch, Kokrajhar. Due to increase in the population density, food habits, standard of living, commercial activities result in generation of large quantities of solid waste within the campus and due to unavailability of proper facilities for the treatment and disposal of those solid waste and lack of awareness and knowledge among the CIT college community, managing solid waste is becoming the one of the current issue at the CIT campus.

Currently 68 sweepers are engaged in the campus for collecting the solid waste from dustbin placed in the various section of campus. The waste collected from the staff quarters, hostels etc. are taken by tractor every alternate day and transported to the dumping area of the Kokrajhar town i.e. the Samshanghat. Since the waste are dumped at the disposal site without any segregation, its optimal reuse and recycling is not possible, however some amount of organic waste such as Food waste from campus are taken by nearby villagers for feeding their livestock.



Fig 1: tractor for carrying solid waste from campus

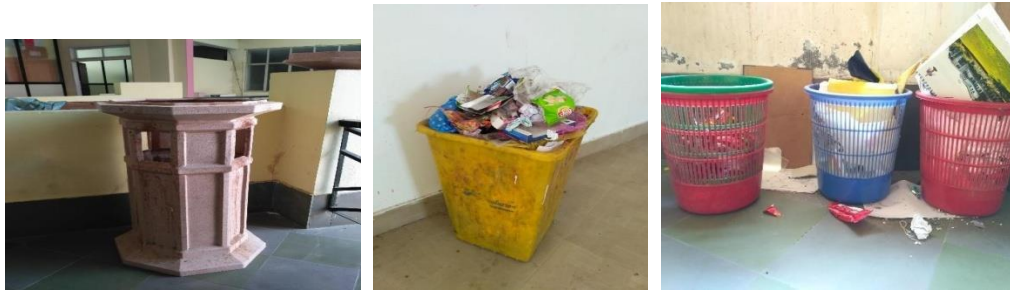


Fig 2: Types of bins used in the campus



Fig 3: food waste from hostel



Fig 4: garbage from JD Boys' Hostel



Fig 5: sweeper collecting the waste for loading in tractor



Fig 6: disposal site (samshanghat)



Fig 7: Unloading of waste at disposal site Fig 8: segregation of waste at the disposal site

Method and Methodology

For the study, campus is divided into four different zones of area as Academic section, Residential area for teaching and non-teaching staffs, Hostels which includes Boys' Hostel and Girls' Hostel, Canteens. The approximate number of residents in the CIT campus was obtained by questionnaire survey from the institute administration.

The project started with the individual visit to determine the sources of waste generation in the campus and then to assess the amount and types of waste generated in the CIT campus. The waste collected from 256 dustbins placed in various locations in the campus was considered for the quantity analysis purpose. For determining the waste composition, segregation was done accurately from the unloaded waste from at the disposal site.

RESULT AND DISCUSSION

Table 1: Types of waste generated from CIT campus

| Sl. N. | Source | Type of Waste |
|--------|------------------|---|
| 1 | Mess and Canteen | Food, Vegetable peels, Plastic, Paper, Dust. |
| 2 | Residential | Food, Vegetable peels, Plastic, Paper, Metal, Glass, Dust, Textile. |
| 3 | Academics | Paper, Plastic, Cardboard, Dust. |
| 4 | Hostel | Food, Glass, Paper, Plastic, Metal, Dust, Cardboard. |
| 5 | Road side | Plastic, Paper, Garden Trimming. |

Table2: Numbers of resident in CIT campus

| Sl. N. | Source | Number of residents |
|--------|--|-----------------------|
| 1 | DwimaluJwhwla (JD) Boys' Hostel | 300 |
| 2 | SikhnaJwhwla (SJ) Boys' Hostel | 332 |
| 3 | JD and SJ Mess | 14 |
| 4 | SujitNarzary Memorial (SNM) Boys' Hostel | 223 |
| 5 | GambariSikhwla (GS) Girls' Hostel | 247 |
| 6 | Staff Quarter A1 | 18 |
| 7 | Staff Quarter A2 | 20 |
| 8 | Staff Quarter A3 | 15 |
| 9 | Staff Quarter B1 | 17 |
| 10 | Health Care Building | 5 |
| Total | | 1191 (Approx.) |

Table 3: numbers of dustbin placed in CIT campus

| S. N. | Source | Number of Dustbins |
|-------|--|--------------------|
| 1 | Academics | 139 |
| 2 | DwimaluJwhwlao (JD) Boys' Hostel | 23 |
| 3 | SikhnaJwhwlao (SJ) Boys' Hostel | 25 |
| 4 | JD and SJ Mess | 3 |
| 5 | GambariSikhwla (GS) Girls' Hostel | 11 |
| 6 | SujitNarzary Memorial (SNM) Boys' Hostel | 12 |
| 7 | Staff Quarter A1 | 3 |
| 8 | Staff Quarter A2 | 3 |
| 9 | Staff Quarter A3 | 1 |
| 10 | Staff Quarter B1 | 3 |
| 11 | Health Care Building | 3 |
| 12 | Madai Canteen | 4 |
| 13 | Central Canteen | 2 |
| 14 | Civil Engineering Lab | 8 |
| 15 | Computer Science Engineering Lab | 5 |
| 16 | Mechanical Workshop | 5 |
| 17 | Recreation Center | 2 |
| 18 | Street Side | 4 |
| Total | | 256 |

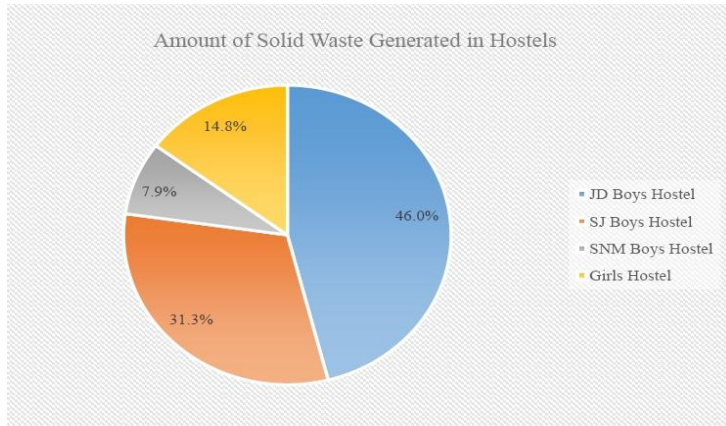


Fig 8: Generation of SW (%) from various hostels

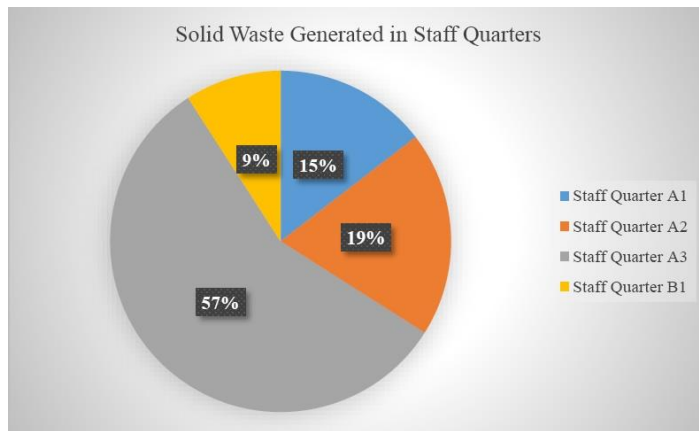


Fig 9: Generation of SW (%) from staff quarters

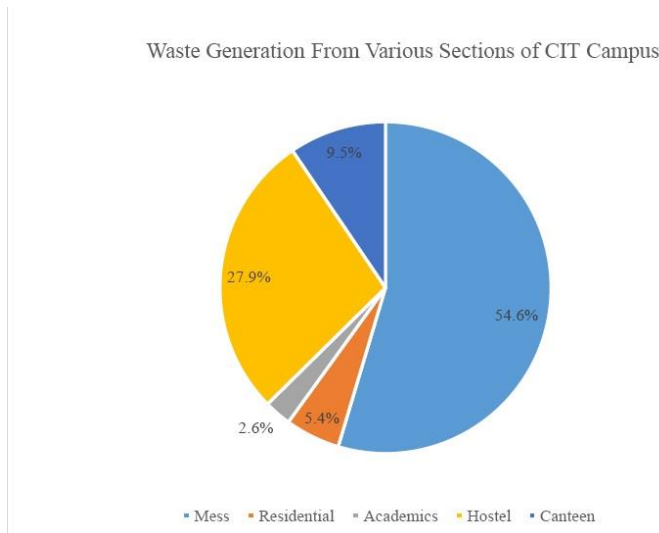


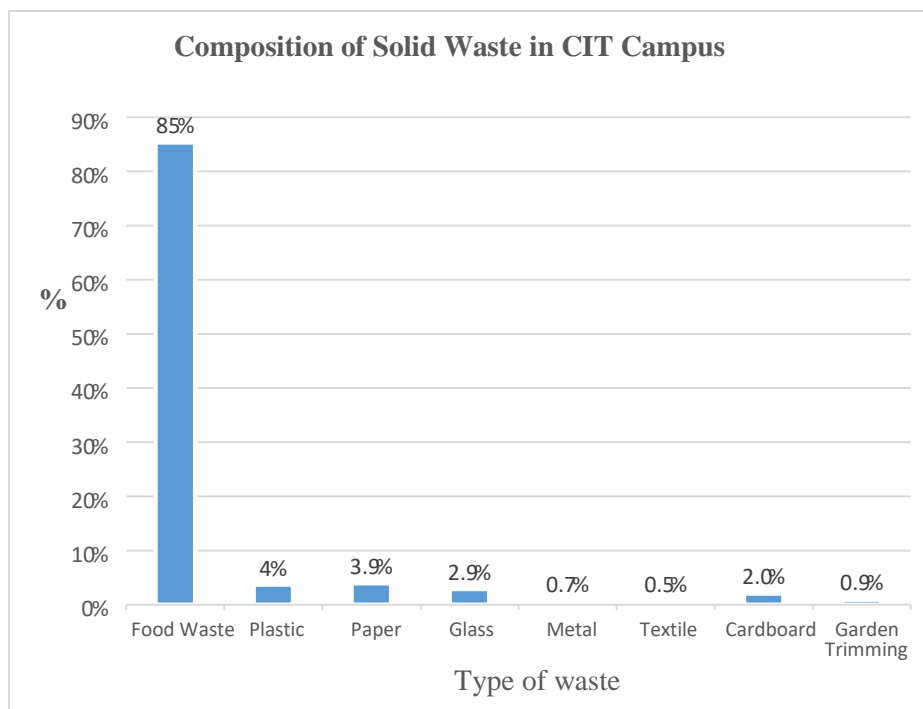
Fig 10: SW generation (%) from various section of CIT campus

Table 4: SW from various sections in CIT campus (kg/day)

| S. N. | Source Area | Amount of Waste (kg/day) | Percentage |
|-------|-------------|-----------------------------|-------------|
| 1 | Mess | 252.5 | 54.6% |
| 2 | Residential | 24.78 | 5.4% |
| 3 | Academics | 12.25 | 2.6% |
| 4 | Hostel | 128.89 | 27.9% |
| 5 | Canteen | 43.91 | 9.5% |
| Total | | 462.33 | 100% |

Table 5: Composition of solid waste in CIT campus

| Sl. N. | Type of Waste | Calculated Amount (kg/day) | Percentage |
|--------|-----------------|----------------------------------|------------|
| 1 | Food Waste | 371.64 | 85% |
| 2 | Plastic | 15.95 | 4% |
| 3 | Paper | 17.15 | 3.9% |
| 4 | Glass | 12.63 | 2.9% |
| 5 | Metal | 3.1 | 0.7% |
| 7 | Textile | 2.31 | 0.5% |
| 8 | Cardboard | 8.81 | 2.0% |
| 9 | Garden Trimming | 4 | 0.9% |



CONCLUSION

From the study it is found out that the campus generates high percentage of food waste, which can be use as alternate source of energy. At present some amount of food waste from all the Hostel Messes and Canteens are being collected by nearby villagers for feeding their livestock and the remaining waste from other sections of the campus are collected by tractor and dumped directly at the disposal site of Kokrajhar town (samshanghat) without any segregation. Leachate from the disposal site pollutes the nearby Gaurang River and contaminating the underground water near the vicinity. Quantity analysis, composition and characterization of solid waste from the CIT campus were determined by systematic approach. At The current solid waste management system in CIT campus was analyzed and it appears to be inadequate and needs up gradation.

Acknowledgement

I thank, Dipankar Das , Siddhanta Rajbongshi , Shivam Choudhary and Dipanjan Ghosh Ex B.Tech students of Civil Engineering Department ,CIT, Kokrajhar for their effort during the field visit ,collecting data required for carrying out the studies.

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