A Project report on

Waste Management System 2020-21

(An Internal Project of SRC)

Shri Ram College

A Report on waste management System (Organic and inorganic)

Project run by

Shri Ram College Muzaffarnagar

INTRODUCTION

Waste management that is environmentally sustainable is a difficult task. It entails the reuse and recycling of all types of waste, from organic to inorganic (non-degradable). Waste management technologies must be developed in order to promote waste reuse, recycling, and waste to energy operations. Rapid economic growth is causing urbanisation and industrialization, which generate waste and harm the environment. As a result, converting waste into a useful product appears to be critical for economic, social, and environmental sustainability. Shri Ram Colleges (SRC) has taken a step forward in addressing the serious issue of waste management on their campus.

Management of waste in an environmentally sustainable manner is a challenging task. It involves reusing and recycling of all types of waste ranging from domestic waste to industrial waste. Technologies have to be developed for tackling Waste Management and promoting its reuse, recycling and waste to energy operation. Rapid economic growth is leading to urbanization and industrialization generating waste which is adversely affecting the environment. Hence, converting the wastes into some useful product seems to be of utmost importance for the economically, socially and environmentally sustenance. To address this serious issue of waste management, Shri Ram College (SRC) has put a step forward in SRC campus. The mission started when some professors and research scholars from SRC campus.

Indeed, they incorporated Shri Ram College into their Blocks (A,B,C,D,E) and sample will be evaluated into a waste management display lab, it's a multi-

disciplinary approach to understand waste management in block like canteen and other area higher to low with strategies that diminish greenhouse gas emissions and provide enterprise opportunities for marginalized populations. It comprised of studies for zero-waste strategies in cities in Africa, India, and Latin America; examines different models of collection, recycling, organic management and businesses developed in low-income settings; and researches public policy that supports sustainable, integrated, solid waste management systems. Student teams develop waste management businesses and entrepreneurial

training modules in partnership with waste-pickers and and workesrs of SHRI ram college over the course of the term that culminate in a two-week trip to places where students implement zero waste strategies, including waste sector businesses, and enterprise learning modules.

Therefore to work on waste management project in the collaboration committee has been formed in SRC under the able guidance of our honorable chairman Dr. S. C. Kulshreshtha. This waste management project has been categorised into two parts.

1) **Organic waste food etc**
2) **Inorganic waste.**

SRC WASTE MANAGEMENT LAB

The committee was made up of faculty members as well as students from relevant fields such as civil engineering. Mechanical engineering, architecture, biosciences, and business management are all options. [This includes (Dr. Asif (PhD, IIT Roorkee) from the ME Department, Dr. Ashwani and Ms Ruchi from the Bio Science Department, Mr Gaurav and Mr Rishabh from Civil Engineering, Mr Aditya from Planning, and Ms. Shruti from the Business Department. Six students from Civil Engineering, four from Architecture, five from Bio Science, and two from Business have also been added to the committee.] Dr. Ashif coordinated the entire programme from the SRC side, which was carried out in all identified wards and waste analysis was done through visual inspection. Furthermore, the A to E plant has been visited.

PATRONS OF PROJECT

S.no	NAME	DESIGNATION
1	Dr. S.C. KULSHRESTHA	FOUNDER OF SHRI RAM COLLEGES

SOLID WASTE MANAGEMENT TEAM

S.NO	NAME	DESIGNATION	WORK
1.	Dr. Saurabh Jain	Head, Deptt of Bio-Science ,SRC	Project Head
2.	Dr. Naim Ahmad	Head, Deptt of Agriculture, SRC	Supervision
3.	Mr. Rajat Dhariwal	Assist. Professor, Deptt of Bio-Science ,SRC	Project Assist.
4.	Mr. Rishab Bhardwaj	Head, Deptt of Chemistry, SRC	Project Assist.

Volunteer

S.NO	NAME	DESIGNATION	DEPARTMENT
1	**Ritik Kumar**	Student	Deptt of Bio-Science, SRC
2	**Sachin Kumar**	Student	Deptt of Bio-Science, SRC
3	**Km. Prachi**	Student	Deptt of Bio-Science, SRC
4	**Km. Mahima**	Student	Deptt of Bio-Science, SRC

Collection Segregation Head		
1.	**Mr. Sandeep**	**Supervisor**
Sweeper		
1.	**Mr. Akash**	
2.	**Mr. Gautam**	

GUIDE FOR SEGREGATION

ITEM NO.	CATEGORIES	WEIGHT
ORGANIC WASTE		
1	Food Scrapes	
2	Yard Waste	
3	Other Biodegradable Waste	
PAPER		
4	White Paper	
5	News Paper	
6	Other Paper	
7	Cardboard	
PLASTIC		
8	Films And Sheets	
9	Plastic Bags	

10	Styroform	
11	Thick Pet Bottles	
12	HDPE Container	
13	Other Plastic	
MIXED MATERIALS		
14	Tetrapak	
15	Chip Bags And Packets	
METAL		
16	Aluminum	
17	Steel	
18	Other Metal	
GLASS		
19	Clear	
20	Brown	
21	Green	
22	Broken Pieces Of Glass	

TEXTILES & SANITARY		
23	Textiles	
24	Sanitary Napkins And Tampons	
CHEMICALS		
25	Hazardous	
26	Nonhazardous	
CONSTRUCTION		
27	Concrete	
28	Cement	
29	Other	
OTHER		
30	Wood	
31	Carpet	
32	Other Material	

WASTE AUDIT WORKSHEET

1. Date:

2. Day of the week:

3. Area being covered:

4. Estimated population of the area:

5. class of the area (circle all that apply):

6. Did it rain (circle all that apply)?

Yesterday Earlier today Now

7. How wet is the waste?

Wett not wet A little wet

8. Start and End time of

Start Time

End Time

9. Name of the auditor:

10. Names of the waste collection team(s):

WHAT WE FOUND...

- **Average waste produced per person per day is 0.3376Kg.**
- **Population in SRC limit is average 5K (approx.) Thousand.**
- **Total SRC waste Produced is 0.3376 x 5000 = 1688 kg/per day.**

हमने क्या पाया...

- **प्रतिव्यक्ति प्रतिदिन औसतन 0.045 किलोग्राम कूड़ा उत्पादित करता है।**
- **SRC के क्षेत्र में लगभग जनसंख्या 5200**
- **SRC से प्रतिदिन निकलने वाला कुल कूड़ा 0.045X 5200= 234 avg किलो प्रतिदिन**

What are people's thoughts on waste?

Opinion	facts
Undesirable	needs proper treatment
Useless	desirable
Dirty	valuable
Unhygienic	useful
Stinky	

श्री राम कॉलेज के कूड़े में क्या होता है???

- जलपान गृह का कूड़ा
- कन्स्ट्रक्शन वेस्ट
- कपड़ा
- काँच
- फुलवारी आदि का कूड़ा
- प्लास्टिक
- एल्युमिनियम फॉयल
- गत्ता
- सैनेट्री वेस्ट धातु
- कागज
- ई-वेस्ट आदि....

WHAT CAN BE USED AGAIN?

- **Kitchen Waste**
- **Plastic**
- **Cloths**
- **Cardboard**
- **Yard Waste**
- **Metals**
- **E-waste**
- **Aluminum Foil**
- **Paper &Sanitary Waste**
- **Hair**
- **Glass**
- **Inert**

CONCLUSIONS

- **Waste is valuable and currently the full value of waste is not recognized neither by households nor by the system**
- **all block wise waste is being collected through the current system There is a need for greater personal responsibility for waste disposal and segregation**

निष्कर्ष

- **कूड़ा की वास्तविक कीमत अभी तक ना तो हम लोग जान पाये हैं न ही प्रशासन ।**
- **वर्तमान प्रणाली द्वारा अभी तक श्री राम कॉलेज का सम्पूर्ण कूड़ा एकत्र नही किया जा रहा है।. अब आवश्यकता है कि हम कूड़े के सही पृथ्थकरण व निस्तारण को स्वयं की जिम्मेदारी समझें तथा इसे अमल में लायें ।**

SUGGESTIONS...

- **Raise Awareness for the personal responsibility.**
- **Encourage college population to segregate the waste and provide different bins for collecting the waste.**
- **Better implementation of Rules and Regulations.**

सुझाव

- **लोगों को उनकी जिम्मेदारियों के लिये जागरूक करना ।**
- **लोगों को कूड़े के पृथ्क्कीकरण के लिये प्रोत्साहित करना तथा अलग अलग प्रकार के कूड़े के लिये अलग अलग कूड़ेदान उपलब्ध कराना।**
- **सही नियमों का बनाया जाना तथा उनका सही प्रकार से लागू होना।**

Waste Management

Solid waste management:

- To reduce waste at institute, students and staff are educated on proper waste management practices through lectures, advertisement on notice boards, displaying slogan boards in the campus.
- Waste is collected on a daily basis from various sources and is separated as **dry and wet waste**.
- Color coded dustbins are used for different types of wastes. Green for wet and blue for solid waste.
- Daily garbage is collected by housekeeping personnel and handed over to authorized personnel of Waste management lab in charge (SRC) for further processing. All waste water lines from toilets; bathrooms etc. are connected with Municipal drainage mains. Waste material like plastic, papers etc. are collected and sold out to scrap vendor from time to time.


PAPER
PLASTIC
GLASS
METAL


31/05/2022 12:48

Waste Collection

- Efforts have taken to produce compost manure from the canteen solid waste and waste from other sources and efficiently run by the students. Manure is used for the purpose of herbal garden as well or for planted tree.

Liquid waste management:

- The waste chemicals mixed water from laboratory passes through concealed pipe line into soak pit & recycled water is used for the watering trees or non-potable usage.

- Liquids are diluted by getting mixed with the washroom and toilet liquid wastes in to the common drainage.

Figure – liquid chemical waste

Figure – liquid waste drainage

Hostel Liquid Waste

E-waste management

- The E-waste collected is stored in store room and disposed every year accordingly.

- The buyback system is followed for pharmacology rotating drums beyond repairable conditions. Empty toners, cartridges, outdated computers and electronic items are sold as scrap to ensure their safe recycling.

- Old monitors and CPUs are repaired by our technician and reused.

Legal and policy framework for waste management in India

Though there are policies governing the handling and processing of MSW in India, there is no clear implementation and monitoring of these policies. In this chapter, we will discuss the existing policies and regulations governing waste management in India, in order to understand the institutional framework within which the decision support tool should operate.

2.1 Policies and regulations

The formulation of municipal waste policy and administration is done at the national level by the Ministry of Environment, Forest and Climate Change (MoEF), the Ministry of Urban Development and the Central Pollution Control Board. The Ministry of Environment, Forest and Climate Change is empowered by Environment (Protection) Act, 1986 to provide the regulatory framework for managing municipal solid waste and various other waste types in India. However, the

responsibility of funding and monitoring is done at the state government and the urban local bodies (ULBs) level. According to the Indian Constitution, solid waste management is a state subject and included in the 12th Schedule of the Constitution (74th Amendment) Act of 1992. State laws governing the ULBs stipulate MSWM as an obligatory function of the municipal governments (Mani and Singh, 2016).ULBs are in charge of the actual service delivery either by itself or through public private partnerships. ULBs are classified into four major categories: municipal corporation, municipality, town area committee and notified area committee. The major policies governing waste management in India are detailed below.

Municipal Solid Waste Management Rules 2000.

The Municipal Solid Waste Management Rules, 2000 were India's first set of waste management rules. SWM management is the responsibility of the respective Urban Local Bodies (ULBs), which include municipal corporations, municipalities, nagar panchayats, and so on (collectively referred to as the 'Authorities'). The Municipal Solid Waste (Management and Handling) Rules, 2000, issued by the MoEF, Government of India, under the Environment (Protection) Act, 1986, prescribe how authorities must collect, segregate, store, transport, process, and dispose of municipal solid waste generated within their jurisdiction under the governing legislation.

Compliance with the MSW Rules requires that appropriate systems and infrastructure facilities be put in place to undertake scientific collection, management, processing and disposal of MSW. However, the Authorities are often unable to implement and sustain projects to enable scientific collection, management, processing and disposal of MSW (Annepu, 2012) due to resource and expertise constraints.

2.1.1 National Urban Sanitation Policy

The policy was prepared by the Ministry of Urban Development in 2008. The objective of the policy is 'to transform urban India into community-driven, totally sanitized, healthy and livable cities and towns'. The policy stresses upon awareness and behavior change, open defecation free cities and integrating sanitation in all the other aspects of cities (TERI,2015).

2.1.2 Swachh Bharat Abhiyan

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2.1.3 Municipal Solid Waste Rules, 2016

In 2016, the MoEF revised the Solid Waste Management Rules after sixteen years. The applicability of the new rules extended beyond municipal areas and to urban agglomerations, census towns, notified industrial townships, areas under the control of Indian Railways, airports, airbase, port and harbor, defense establishments, special economic zones, State and Central government organizations, places of pilgrims, religious and historical importance.

The Municipal Solid Waste Rules, 2016 has created a provision for making waste processing facilities mandatory in local bodies with a population of 1 million or more within two years. In the case of census towns with a population below 1 million, setting up common, or stand-alone sanitarily and fills by, or for all local bodies having 0.5 million or more and for setting up common, or regional sanitary landfills by all local bodies and census towns under 0.5 million will have to be completed in three years. A sanitary landfill is a pit with a protected bottom where trash is buried in layers, compacted (pressed down to make it more solid), and covered. A sanitaryl and fill can reduce harm from waste that has collected, and is safer than an open dumping site.

2.2 Institutional frame work for MSW in India

Below depicts the institutional framework of municipal solid waste management in India. The two common methods employed by the ULBs are either handling waste management Operations can be done by their own or by a private sector player (private waste management company) through a public private partnership (PPP).

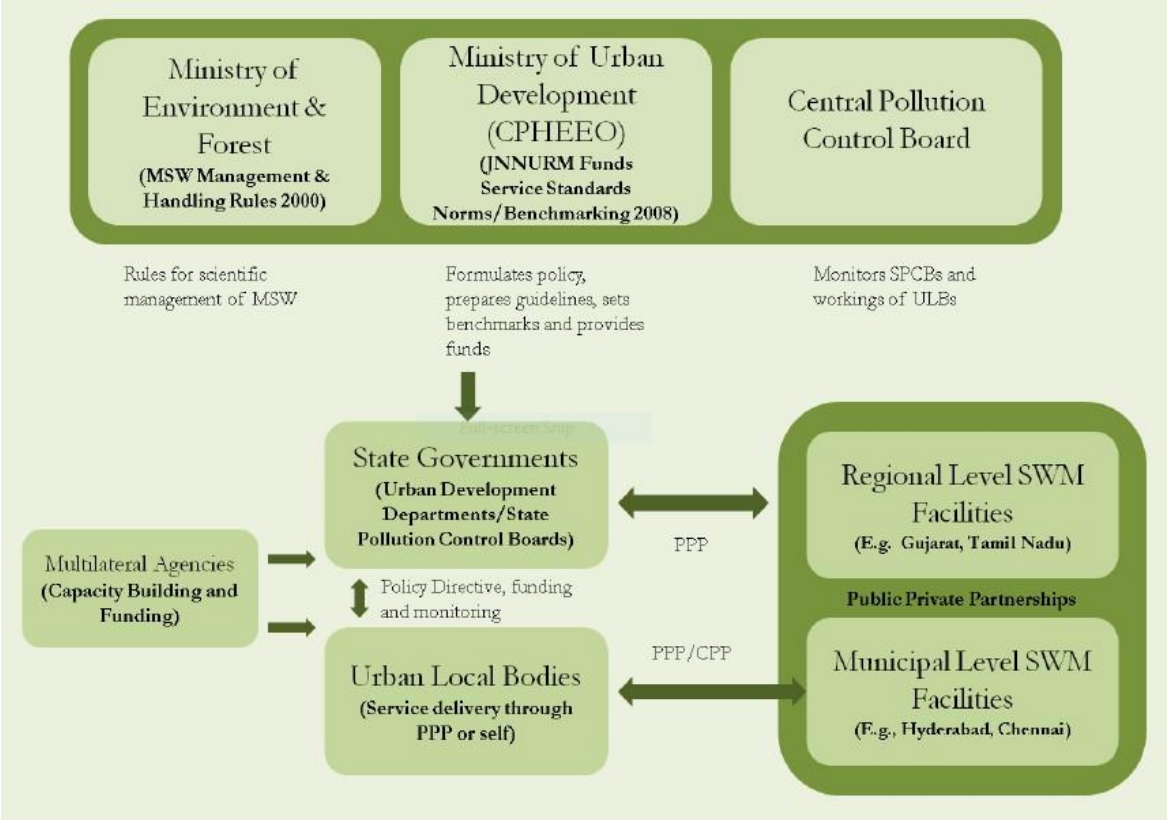

Figure 2-1: Institutional Framework for MSW Management (Athena, 2012) Legend: CPP-Community Participation Partnership, MSW-Municipal Solid Waste, PPP- Public Private Partnership, SPCB - State Pollution Control Board, SWM – Solid Waste Management, ULB-Urban Local Body

Urban local bodies

The responsibility for SWM management lies with the respective urban local bodies (ULBs), consisting of municipal corporations, municipalities, nagarpanchayats etc.With the implementation of the SWM Rules, 2016, more emphasis has been placed by the Indian government in making sure that college population waste is processed or disposed of in a sanitary landfill. There are around 5000 population in charge of waste management.

Limitations -Many of the urban local bodies do not have the expertise or the resources to handle SWM as stipulated in the SWM Rules, 2016. This has resulted in many of the ULBs out sourcing their waste management operation to private waste companies.

BULK GENERATORS

OF WASTE

IN

SHRI RAM COLLEGE

PUT WASTE IN THE RIGHT PLACE

REUSE
REDUCE
RECYCLE

BULK GENERATORS

- **HOSTEL**
- **CANTEEN**
- **GROUND**
- **ADMINISTRATIVE OFFICE**

Main Observation Site-

- ***Canteen***
- ***Hostel***
- ***Ground***
- ***Labs***
- ***Faculty Room***

OBJECTIVE:

- **Determine how much and what kind of waste is produced by bulk generators, and how it is disposed of.**
- **Evaluate and recycle the organic waste for use in the production of fertilizer.**
- **Determine the recycling of plastic and other types of waste for brick manufacturing.**

RESEARCH METHODOLOGY

Research Methods-

- **Interview with the bulk generators.**
- **Analysis of Segregation site and dumping yard.**
- **Collect the data from different sites like segregation unit, and bulk producers.**

Interview Question to be asked sweeper?

- **Type of plastic waste and others materials.**
- **Quality of organic food.**
- **Location and methods of segregation and dumping site.**
- **Data of vendors**

TYPE OF WASTE

1) **Organic**
2) **Inorganic**

1) WHAT IS ORGANIC WASTE

Organic wastes are materials originating from living sources like plants, animals, and microorganisms that are biodegradable and can be broken down into simpler organic molecules.

- Organic wastes produced in nature by various means can exist either in a solid-state or liquid state.
- Solid organic waste is primarily understood as organic-biodegradable waste, and it contains about 80-85% moisture content.
- The most common sources of organic wastes include agriculture, household activities, and industrial products.

- Green waste like food wastes, food-soiled paper, non-hazardous wood waste, landscape waste, and pruning wastes are some of the examples of biodegradable or organic wastes.
- Even though most of the organic wastes in the soil add up nutrients and minerals for soil fertility and plant growth, inappropriate disposal practices might cause severe damage to the environment.
- Recently, however, the concept of organic waste management and recycling has been introduced and implemented.
- Organic wastes have been an important source of pollution in the environment. Some of the common types of organic wastes usually found in nature include the following;

1. Municipal solid wastes

- Municipal solid wastes include the more common wastes that are generated in our daily life in the form of product packaging, grass clippings, furniture, clothing, bottles, food scraps, appliances, paint, newspapers, and batteries.
- These wastes are generated from residential areas, schools, hospitals, and businesses.

2. Cattle wastes

- Cattle wastes are animal wastes that are of animal origin and act as good resources of organic matter.
- Cattle waste is also an important soil fertilizer that provides a high concentration of micro and macronutrients for crop growth and soil fertility.
- Cattle manure and fodder constitute organic wastes in the form of cattle wastes. Besides, poultry wastes and piggery wastes also add the number of organic wastes from animal origin.

3. Food wastes

- Food wastes account for about 30% of total organic waste in nature via natural and artificial means.
- Some of the examples of food wastes include peelings, cores, leaves, fruits, twigs, outer skins, and sludges.
- Fruit and vegetable canning industries, frozen vegetable industries, and fruit drying industries, along with residential areas and hotels or restaurants are the major producers of food wastes.

Figure food waste

What is organic waste recycling?

Organic waste recycling is the process of organic waste management where organic wastes are recycled or converted into useful matter by different recycling methods.

- The need for organic waste recycling has increased over the years as waste management became an emerging issue in most metropolitan cities.
- Organic waste account for most of the waste created in nature which then directly affects urban living systems due to their high moisture content.

- The excess moisture content increases the volume of waste while lowering their incinerator temperatures, causing an overall load of waste disposal.
- In order to deal with these issues, various treatment methods and practices have been formulated and implemented throughout the world.
- The utilization of microorganisms in organic waste management is also a viable means of improving soil fertility while disposing of such wastes.
- During the process of organic waste recycling, the wastes are subjected to different forms of treatments, resulting in the conversion of waste into compost or vermicompost that can then be utilized as natural fertilizers.
- Biological treatments are among the most convenient and effective alternative for treating organic waste.
- These treatments help maximize recycling and recovery of waste components.
- The primary objective of organic waste recycling is to maintain a sustainable cycle where the biodegradable fraction of organic waste is converted into useful organic manure or fertilizer through various recycling techniques.

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Methods of Organic Waste Recycling

There are different methods of organic waste recycling, each of which can be used for a particular group of waste to produce some form of useful organic matter. Some of the common methods are described below:

1. Animal feed

- One of the most common and efficient ways of recycling organic waste is by giving agricultural and food waste to cattle and other animals as food.
- Feeding organic waste to animals is a simple and easy method of waste recycling.
- People can contact some farmers and donate their kitchen wastes so that the animals can take them up.
- However, the direct feeding of organic waste to animals might result in some health issues in such animals.
- Therefore, different countries like the US have made regulations on the extent of food and type of food given to the animals.
- Recycling of food through animal feed has many advantages like reduced pressure on landfills, reduced methane productions from fruits and vegetables, and the lack of need to convert organic waste into some other forms.
- This also helps the farmers as they do not have to buy extra animal feed and eventually, helps the economy.

2. Composting

- Composting is the process of decomposition of organic material where the organic material is acted on by soil organisms resulting in the recycling of nitrogen, phosphorus, potassium, and other soil nutrients into humus-rich components.
- Composting is an aerobic process that takes place under correct conditions of moisture and biological heat production.
- Even though all organic matter can be composted, some materials like woodchips and paper take much longer to compost than food and agricultural wastes.
- However, some amount of woodchips is essential to increase aeration in the composting process.
- The overall process of composting includes both the composting time followed by a period of stabilization to produce a final stable product that can then be applied to the land.
- There are different composting systems ranging from simple, low-cost bin composting to highly technical high-cost reactor systems.
- Compost bins are most suitable for use in houses to compost simple kitchen waste and garden cuttings. One of the major issues with compost bins is the time taken for the completion of the process.

- Large scale composting is conducted in large reactors with an automated supply of oxygen and moisture to generate large tons of compost for industrial applications.

3. Anaerobic digestion

- Due to the negative impacts of land filling and incineration, anaerobic digestion has been proposed due to the cost-effective technology for renewable energy production and treatment of high moisture and energy-rich material.
- During the anaerobic digestion process, anaerobic microorganisms convert different types of biomass and other organic wastes into biogas and nutrient-rich residue that can be used for lap applications.
- The biogas produced by anaerobic digestion includes gases like methane, carbon dioxide, and a trace amount of hydrogen and hydrogen sulfide.
- When compared to other methods, this method can utilize a much wider range of substrates, even those with high moisture content and impurities.
- Some of the commonly used substrates for anaerobic digestion include wastewater, sewage sludge, and animal manure.

4. Rendering

- Rendering is the process of conversion of waste animal tissues into stable and usable forms like feed protein.
- During the rendering process, fatty tissues, bones, and animal carcass are exposed to a high temperature of about 130°C and then pressurized to destroy pathogens.
- Rendering can be carried out on both the kitchen and industrial scale.
- Some cases of non-animal products can also be rendered down to form pulps.
- The products of rendering can be applied in different forms where the solid particles are used in pet food products, and the fat is added to soap making operations.
- Rendering, however, has some disadvantages like it cannot completely degrade waste products like blood.

5. Rapid thermophilic digestion

- Rapid thermophilic digestion is the process of rapid **fermentation** of organic wastes by activating fermenting microorganisms at high temperatures.

- A rapid thermophilic digester works six to ten times faster than a normal biodigester.
- In a thermophilic digester, the feedstock is fed into the digester with air forced through the material to support the growth of aerobic microbes.
- The process of thermophilic digestion is an exothermic process that maintains a thermophilic condition at 55-65°C.
- The product of rapid thermophilic digestion is a biofertilizer that can be used on the soil to increase soil fertility.
- The most common application of thermophilic aerobic digestion is in the wastewater industry for the treatment of sewage sludges.

6. Immobilized enzyme reaction

- The use of enzymes over chemical catalysts in the treatment of wastewater and other similar waste products reduces the formation of by-products and significant energy inputs.
- However, some challenges like maintaining the stability and performance of enzymes require the development of stabilized energy systems.
- The use of immobilized enzymes during organic waste recycling allows the degradation activity even under non-ideal environments.

- Immobilization of enzymes also supports the reuse of biocatalysts for multiple processes which then reduces the cost of chemical and enzymatic processes.
- Immobilization techniques like adsorption, entrapment, and encapsulation can be applied.
- The use of enzymes for the conversion of organic waste into reusable forms allows important modifications like oxidation, hydrolysis, acylation, and phosphorylation.
- Enzymes like esterases can be used to esterify oils to form biodiesel. Similarly, sugars can also be esterified to use as surfactants.
- All of these processes allow for a more economical and efficient way of waste management.

Process (General steps/ mechanism) of organic waste recycling

The overall process of organic waste recycling begins with the collection of waste materials which are then passed through various steps to obtain a usable form of organic matter. The general steps/ mechanism of organic waste recycling can be explained as below;

1. Collection

- The first step in the organic waste management of recycling is the collection of waste materials which can either be on a small scale in a kitchen or on a large scale in industries.
- A sufficient amount of waste matter needs to be collected in appropriate bags so that they can be moved to the site of recycling.
- In the case of composting, the organic waste is collected in a pit, whereas that in a digester is collected in the digester.

2. Decontamination

- An important step in organic waste recycling is the decontamination of waste in order to avoid its harmful effects.
- This step is particularly important while dealing with organic waste from industries.

- Besides, any non-biodegradable substance like glass, plastic, and bricks, if present, should be removed during this step.

3. Preparation

- Before the organic waste is added to a recycling system, it should be prepared.
- The method of preparation employed depends on the type of recycling method chose. For, e.g., composting requires shredding and stacking of organic waste, whereas an immobilized enzyme system requires immobilized enzymes.
- Some methods might even require a period of stabilization prior to recycling, in which case, the time should be designated.

4. Recycling process

- Depending on the nature of the organic waste and desired end products, an appropriate method of recycling should be adopted.
- Human wastes like sewage and fecal wastes should be recycled via anaerobic digestion whereas sewages can be treated with thermophilic digesters.

5. Screening and grading

- The obtained residues or compost are then screened into different sizes to be used for different purposes.

- Depending on the application of the end products, grading and screening are essential.

Significance of organic waste

Organic waste recycling has multiple advantages that help prevent the problems that arise with the accumulation of waste products in nature. Some of the common advantages or significances of organic waste recycling are:

1. Recycling of biomass or biowastes allows for the generation of energy in the form of biogas by recycling processes like anaerobic digestion.
2. The conversion of organic matter into compost helps save resources as compost can be used as a biofertilizer which avoids the use of other chemical fertilizers.
3. The separation of organic and inorganic wastes also improves the efficiency of non-organic recycling.
4. One of the most important significances of organic waste recycling is the reduction of pollution in the air, water, and land as it reduces problems like odor generation or gas emissions.
5. The generation of biofertilizers by recycling process improves the quality of soil, which then increases soil fertility and plant growth.

6. Landfills tend to increase the emission of greenhouse gases, and the recycling of such wastes into less harmful wastes decreases such emissions.
7. Recycling of organic wastes also reduces the concentration of waste remaining for less efficient processes like landfill and incineration.
8. Organic matter recycling increases the organic content of the soil, which improves soil fertility and provides essential nutrients to plant, increasing crop yield.
9. Stabilization of organic wastes adds value in terms of improving nutrient content and availability to be used as fertilizer in agriculture. Also, it introduces new popular concepts like cleaner production, zero-waste policy, sustainability, and bio-based circular economy.
10. Some compost prepared with appropriate substrate work as biocontrol agents to prevent and control plant diseases.

Barriers and challenges of organic waste recycling

1. Even though organic waste recycling is a novice and important method of waste recycling, there are some challenges that limit the use of recycling methods. Some of the most prominent barriers or challenges of organic waste recycling are:

2. Long term application of compost-recycled waste on soil may cause an accumulation of heavy metals, from where they might transfer to different trophic levels of the food chain.

3. Some selected groups of persistent organic pollutants like chlorinated dioxins, polycyclic aromatic hydrocarbons, and organochlorine pesticides are accumulated in solids during the treatment process. These compounds might have harmful effects on lower organisms or in some cases, even on humans and wildlife.

4. The use of bio-fertilizers produced via processes like composting and vermicomposting results in significant input of toxic metals like cadmium and lead, which might have a direct impact on the health of human beings and animals.

5. Recycling process like composting generates odors which might cause air pollution or discomfort.

6. Microbial degradation of organic waste might result in the formation of airborne microorganisms or bioaerosols, which may pose potential risks like respiratory disorders on the plant workers and adjacent residents.

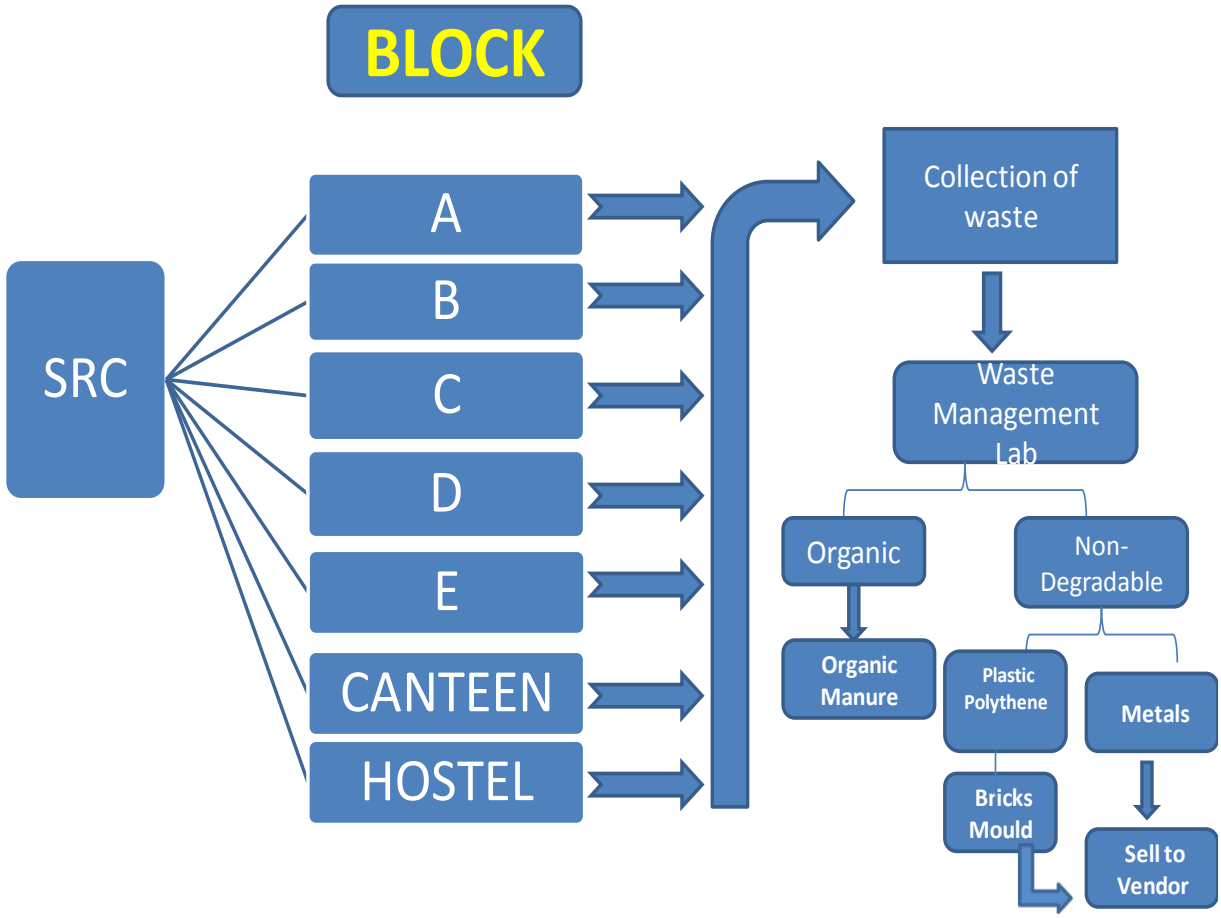
Inorganic waste management

Contaminants such as heavy metals also occur; they are found in small quantities in a range of all the blocks off Shri ram college waste items but are mainly concentrated into a few items such as used batteries, discarded light bulbs and tubes and mercury thermometers. If mixed MSW composting is to be carried out, the operator must be aware that high heavy metals levels (from batteries, etc) may prevent the resulting compost being sold as it would be likely to exceed the legally permissible heavy metal limits. Similarly, the process of biogas derived from waste without sorting would result in less effective production of biogas. For instance if there are materials such as batteries, metal, iron, or plastic in the mixed garbage, this will have a negative impact on the production of methane (CH4) and therefore on the effective production of biogas. The original aspect of this research is that the estimates of waste generated from SRC are based on novel primary data collected from Block surveys conducted in SRC solely for the purpose of the research. The new findings of this research consist of the results of waste generation that determines the potential savings from recovery of inorganic waste estimations; and the result of survey to identify the method of disposal for inorganic and hazardous household waste in order to determine whether waste separation at-source has already taken place. The survey essentially identifies the current practice of household waste disposal in Jakarta. Additionally, due to the absence of specific

policies dedicated to the management of inorganic and hazardous household waste, this study provides a review on existing related policies with scrutiny on the aspects of inorganic and hazardous household waste. This study will be of benefit to policy makers in devising future new policies on the management of inorganic and hazardous household waste by also taking into consideration the generation rates of these types of waste and potential savings from recovery of these wastes. Prior study [3] showed the result of household waste survey that indicated the amount of organic waste that is the basis of the greenhouse gases (GHG) emission estimation. Another study [4] identified the householder rs and for their perceptions regarding the present situation of waste management. Another study focused on the review of policies on general waste management policies in Indonesia [5]. The differences between prior studies with this study are: 1) the focus of the type of waste studied, which is inorganic and hazardous waste; 2) the aim of this study, which is to identify the amount of waste from households by the estimation of waste generation rate based on the categories of waste; estimation of potential saving from recovery of inorganic materials, recycling potentials for each amount of waste per category; as well as current method of disposal for inorganic waste items.

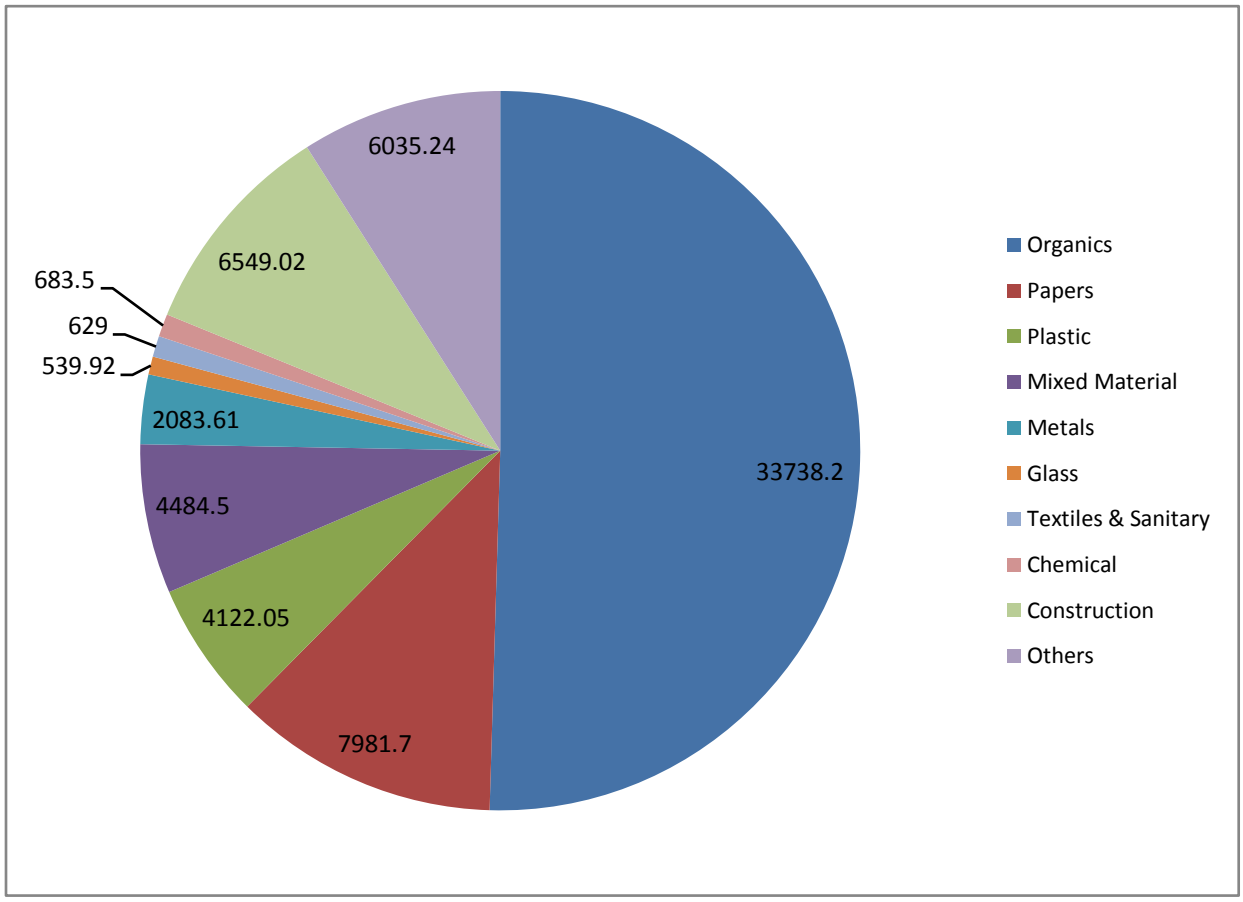
Result

Procedure for Waste Collection-



Collection of data yearly

S. NO	CATEGORIES	Total (Kg)
1	Organics	33378.2
2	Papers	7981.7
3	Plastic	4122.5
4	Mixed Material	4484.500
5	Metals	2083.61
6	Glass	539.92
7	Textiles & Sanitary	629
8	Chemical	683.5
9	Construction	6549.02
10	Others	6035.24
	Total (Kg)	66846.740


6035.24
6549.02
683.5
629
539.92
2083.61
4484.5
4122.05
7981.7
33738.2
Organics
Papers
Plastic
Mixed Material
Metals
Glass
Textiles & Sanitary
Chemical
Construction
Others

Composting is a managed process which utilizes microorganisms naturally present in organic matter and soil to decompose organic material. These microorganisms require basic nutrients, oxygen, and water in order for decomposition to occur at an accelerated pace.

The end-product, compost, is a dark brown, humus-like material which can be easily and safely handled, stored, and used as a valuable soil conditioner. The composting process is dependent upon several factors, including: the population of microorganisms, carbon to nitrogen ratio, oxygen level, temperature, moisture, surface area, pH, and time.

In our campus collection we were found that in a year 2019-20

We collect total 66846.740 kg of total waste.

The value of different type of waste collection is mostly comes from the organic waste like food etc. 33738.2kg total organic collected in a year the most of the organic was collected and decompose via microorganism (mother culture) to making a Fertilizer that will be used for crop and plant growth.

Paper waste which is 7981.7 kg in a complete year and it some amount of sold to venders with the cost of 8-10 Rs per kg and the remaining is reuse.

In our SRC campus we collect the another waste is plastic waste 4122.05 kg the recycle process of plastic is difficult in somehow but our student from B.Tech are used to recycle plastic into brick 30-40%

and remaining of plastic are sold to vendor with the price rate of 6-14rs per kg. And other materials like glass, metals etc were not usable and recyclable so we can sell this material to vendors. Another material like waste of construction and textile waste are used to fulfill the ground.

Conclusion

In the current situation, inorganic and hazardous/toxic wastes on the SRC campus are not properly managed, because Blockholders primarily dispose of these types of waste along with organic waste to make bricks, and some other material to be disposed of at the landfill.

According to the waste composition survey, the SRC canteen's kitchen waste or food scrap has the highest organic fraction (52 percent)

After that, recyclable inorganic waste such as plastic (14 percent),cardboard and paper (12 percent).

While kitchen waste is valuable as compost feedstock, plastic, paper, and cardboard have the potential to be recycled.

Meanwhile, the presence of hazardous waste is low, with only 4% of metal waste - such as batteries and used electronic products - being present. Almost all of the top fractions of inorganic waste from householdsPlastic that is unrecyclable scraps. Other wastes, such as, food packaging (18%), refused plastic sacks (15%), clear plastic beverage bottles/PET bottles (11%) and aluminum beverage cans (8%), can be recycled and would, therefore, have significant economic values in scrap dealing. Although there are valuable resources present in In

terms of household waste, the majority of respondents dispose of recyclable waste alongside other types of waste, including organic waste. Although communal and central composting facilities are available on the SRC campus, the quality of the compost produced is questionable due to the mixed blockholder waste that is frequently delivered to these facilities. Composting operators must be aware of the possibility of high levels of contamination in the compost due to heavy metals, such as e-waste. To address this issue, hazardous waste should be separated either manually (at the source) or automatically (at treatment/disposal facilities using automated sorting equipment).

While the treatment of inorganic waste is not specifically regulated, the treatment of hazardous and toxic waste is regulated particularly by the Regulation No. 74 Year 2001 on the Management of Hazardous and Toxic Waste. The stipulation is that the treatment of hazardous and toxic waste should be undertaken by the government. While there are possible cooperation with the private sector, the roles of the public is in the delivery of the waste to the assigned temporary storages specifically established for collection of hazardous and toxic waste., to provide storage and treatment facilities.

There are currently more than 200+ manufacturing companies that have a storage and treatment licence. However, proper arrangements have been made for the transportation of waste from Blockholders to

these facilities, so Blockholders are responsible for delivery. Because of a lack of awareness, Blockholders commonly dispose of hazardous and toxic waste alongside other household waste.

According to Minister of the Interior Regulation No. 33 of 2010, waste sorting is accomplished through the provision of facilities for organic and inorganic waste separation. However, the actors who should be in charge of providing such sorting facilities are not specified. Such information should be considered when developing future regulations. While the existing policies already lay the foundations for proper waste management, there are several constraints to be addressed, such as the provision of facilities to enable sorting to recover recyclable waste that still bear economic values. It is also suggested that cooperation with manufacturers that produce products which would result in the production of hazardous and toxic waste should be further pursued, - Blockholders to return the used products to the respective manufacturing companies, which is generally applicable for electronic goods, among others.

Furthermore, it is suggested that the government conduct campaigns and/or public information dissemination to highlight the importance of at-source sorting to separate hazardous and toxic waste from the remaining types of household waste. Inform the general public about the dangers of improper hazardous and toxic waste disposal.

Inform the public about the potential consequences of hazardous and solid waste treatment; particularly for residents who live near treatment facilities disclose the potential risks that may arise from improper hazardous and toxic waste treatment

Few glimpse of SRC waste management and management lab.

Figure- collection of waste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SOLID WASTE MANAGEMENT


WASTEWATER MANAGEMENT


SAVE
the
PLANET