



**INTERNATIONAL JOURNAL OF RESEARCH –  
GRANTHAALAYAH**  
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**MUNICIPAL SOLID WET WASTE MANAGEMENT BY PUBLIC  
PARTICIPATION**

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**ABSTRACT**

The municipal solid wet waste is an organic fraction that contributes to around 40% of total waste and it is biodegradable. In the present scenario, wet waste is generally mixed with other kinds of waste that is not bio-degradable. The foul smell is generated from the wet waste if not disposed within 24 hrs. This smell creates problem for people exposed to handling and management system. All biological treatment technologies applied to the wet (organic) waste treatment would require segregation of biodegradable and non-bio-degradable components. Once the waste of different categories is mixed it becomes very difficult to segregate them effectively. Many large size plants in the country are constructed to treat biodegradable waste with the objective to recover energy and produce organic manure but its smooth operation faces great challenge of accurate segregation resulting into plant break down and failures irrespective of robust technology. This research paper focuses on unique approach of public participation for segregation at source by deploying micro level biological treatment plants of capacity ranging from 1.0 MT/d to 5 MT/d. With the implementation of above approach and treatment technology, huge efforts that are presently put to segregate the waste will be eliminated. In addition to this, the energy and organic manure as end product obtained from the treatment plant makes it as self-sustainable.

**Keywords:**

*Solid Wet Waste, Biodegradable, Self-Sustainable.*

**INTRODUCTION**

The Municipal Solid Waste (MSW) is mainly characterized in three categories,

1. Wet biodegradable waste: Vegetable, fruit, food, garden leaves & grass etc.
2. Dry incinerable waste: Paper, wood, cotton pads, cloths etc.
3. Recyclable waste: Metal, plastic, glass etc.

Waste category 1 imposes severe problem due to associated bad smell and provide tough conditions for treatment and its recycling into energy and organic manure. Whereas other two categories are simple to handle if separated from category 1. In reality all the three categories are mixed and then disposed into bins/collection vehicles provided by civic bodies. The mixing of all three categories of waste result into compounding of problem. The categories 2 & 3 of waste which is supposed to handle, treat and recycle easily also become part of the problem as associated with category 1. The most common practice adopted for the mixed MSW is dumping on to land fill where neither the organic value nor the energy value of wet waste is realized. The practice of land

fill dumping also result into land, air, water pollutions and Green House Gas (GHG) emission into the atmosphere. There are efforts made at various municipal corporations to segregate the three categories of waste at a common treatment facility and do aerobic composting for realizing organic value of the waste for recycling back to irrigation field, but the sustainability of operation of such plants are not demonstrated mainly due to poor quality of organic manure and limited revenue generated from sale of organic manure. The aerobic composting does not provide opportunity of energy recovery.

The urban sector in the country therefore faces severe problem in treatment and management of Municipal Solid Waste, and the root cause of the problem is non participation by the individual dwelling that generate all kind of waste. Their participation is necessary and must, as they know the kind of waste being generated and they are in best position to easily segregate the entire category and put into different supply channel for further treatment by civic body. To command their participation, this paper defines collection system and treatment practices that addresses most of the problems and simplify the whole collection and treatment systems.

## **MATERIAL AND METHODOLOGY**

The paper proposes following approach for commanding public participation

### **Collection**

- Civic body to provide small vehicle with 1.0 Metric ton capacity for door to door collection with a team of two person, one driver and second kachara mitra (waste friend). This vehicle should have three compartments, one for each category. Each compartment could have individual tilting mechanism for unloading.
- Kachara Mitra (KM) to play an important role for commanding public participation while collecting waste into the vehicle, this is the only point where
  - KM meets with Waste Generator (WG)
  - KM takes opportunity to communicate with WG.
  - KM defines role and responsibility of all stake holders.
  - KM explains importance of segregation to each and every WG and encourages him to cooperate in the endeavour of effective segregate.
  - KM identifies and correct problem if WG is not segregating waste and exercise control.
  - KM ensures that only segregated waste goes into the respective compartments
  - KM has now converted waste into resource.
- Any person failing to drop his waste into vehicle require to carry his waste himself to the treatment facility, where again operating team ensures that person carrying waste has segregated it accurately.

### **Treatment**

The Continuously Stirred Tank Reactor (CSTR) anaerobic treatment of **organic biodegradable waste** is a robust biological treatment technology that has following steps:

- Grinding
- Hydrolysis
- Feeding
- Acidification
- Methanization
- Pumping out
- Dewatering & drying

- Post treatment of dried sludge (**useful end product 1**)
- Post treatment of filtrate (liquid waste) for final disposal in drains
- Biogas recovery,
- Biogas storage,
- Biogas purification by H<sub>2</sub>S stripping &
- Power generation. (**useful end product 2**)

These plants are easy to set up with in colony gardens without destroying their beauty. There are good success stories exists in the country for plant capacity of 1 to 10 MT/d using above technology, demonstrating consistent result for more than 5 years. The treatment of other two categories of waste is not proposed to carry out at above treatment facility. The incinerable waste is to be re-transported to another central bigger facility to produce power through Rankin Cycle mode and whereas recyclable waste to dispose to Kabadi or dealing agencies. Therefore the entire outlets from the treatment facility are no more waste.

## RESULTS

Treatment plant key data						
Plant waste treatment capacity	MT/d	1	2	3	4	5
Dry Solid of raw waste	%	25%	25%	25%	25%	25%
Dry Solid quantity	MT/d	0.25	0.5	0.75	1	1.25
Dry solid at feed slurry	%	10%	10%	10%	10%	10%
Dry solid in digester	%	10%	10%	10%	10%	10%
Volatile solids in MSW organic fraction	%	75%	75%	75%	75%	75%
Biogas generation (conservative data)	M <sup>3</sup> /d	65.625	131.25	196.875	262.5	328.125
Electricity generation	KWH/d	98.4375	196.875	295.3125	393.75	492.1875
Calculated Generator capacity	KVA	8.203125	16.40625	24.609375	32.8125	41.015625
Proposed Generator capacity	KVA	12.5	20	32	40	50
Organic manure production	Kg/d	233.678	467.357	701.035	934.714	1168.39

## DISCUSSION

The end products like treated organic manure and electricity to be given back to the waste generator may be in the form of:

- Electricity for street lighting
- Organic manure to their garden, pots (gamalas), tree plantation on the streets

Providing above useful end products back to the waste generator is a close loop in the whole participation chain that would reinforce the sustainability of the entire waste collection treatment and management system effectiveness. An aggressive written communication to be demonstrated as feedback to participants of the program as success of their efforts in actual reliable measurable numbers with full traceability like cumulative KWH generated and cumulative Metric Tons of

organic manure produced per unit time. The knowledge of success data to the participating WG shall give immense satisfaction that collective efforts are resulting into overall cleanliness of the surrounding, air, soil, water pollution and GHG emission reduction.

The civic body gets following benefits:

- Significant reduction in tipping cost
- Saving in their electricity bill of street lighting
- Man power cost reduction
- Greenery and plantation in the city through recycling of organic manure

A further detailed study on cost and saving may reveal interesting facts like payback on capital investment and employment generation.

### **REFERENCES**

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