

A Managerial approach for Waste Management: A Case Study of Solid and Liquid Waste Management into Solid and Liquid Resource Management

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Abstract

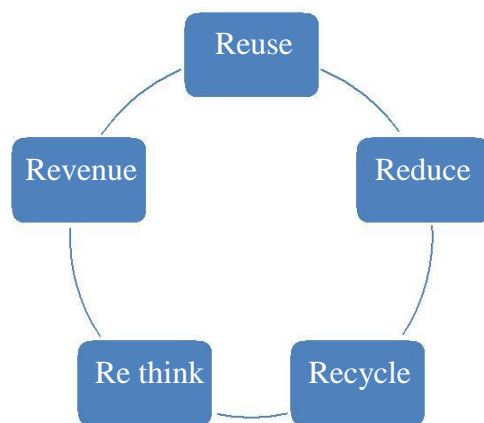
The study focus on managing waste household resources such as Citric fruits peel, cattle non-edible items, cotton, coconut, tender coconut shells, wood and twigs, non-vegetarian waste, husk sponge, cattle edible leaves (garden waste), Areca nut leaf plates, seeds, reaper leaf, food waste and other materials which are segregated into organic and inorganic materials which are classified into two colored baskets per household where bio-degradable waste are placed in the green basket and non-biodegradable waste in the red basket respectively. Many Self-help Groups (SHG) are involved in this segregation process which we call it as Primary source segregation of waste materials obtained from home shops, markets, households. This segregation helps to pool all the waste resources in useful organic material used in agriculture production process. At this point the question arises how much quantity can be managed by these SHG or any parties involved in waste management process. Because many research studies on especially municipal waste reveals that around 366 cities in India are accounted for 31.6 million tons of waste in the year 2001 where as now it has increased to grow around 47.3 million tons, which reveals about 50 per cent growth in span of one decade. Now the challenge is how these wastes can be managed or these wastes can be dumped into oceans which act as new uncontrolled dumpsites. However, there are some islands creating unfavorable for aquatic habitat environmental growth. Hence to resolve these kind of problem, this study suggests the importance of Solid and Liquid Waste management (SLWM) into Solid and Liquid Resource management (SLRM) which is predominantly used and practiced as SLRM model in Kurudam palayam near Coimbatore and the Plastic waste burns to give cooking gas Model developed in NIT Calicut are major innovations used for household waste management into useful resource in production.

Keywords: SLRM- Solid and Liquid Resource Management, Urbanization, Municipal Solid waste Management, Resource Management

Introduction-SLRM in organic waste at Kurudampalayam

Kurudampalayam village panchayat is located adjacent to Coimbatore Corporation, which is close to Thudiyalur. It is split into 15 wards; each ward consisting of 500 to 1500 houses and a total of 13600 houses. Its total population is about 33000. The advanced SLRM project covers approximately 3,600 houses in 8 wards, approximately 9000 people reside in these 6 wards. 3 tonnes of waste is collected daily from these wards and turned into lucrative resources. From the waste they are generating Rs'3 lakh per month. They are using 'Integrated and sustainable Solid & Liquid Resource Management' model. This is a DRDA initiative, joining hands with AAGNE and VANAVIL self help group. This panchayat comes up with a state of the art waste management system. They are resourcefully converting their day-to-day residential waste into wealth and products. Kurudampalayam have a well-established cyclic process for waste collection, segregation and recycling .After ten years of experimentation and refinement, using ancient wisdom and the current technology, now advanced SLRM has become a viable solution and successfully implemented in Kurudampalayam.

5R model in SLRM



The specialty of this model is integrated sustainable .There are 7 programs running under this project, with 43 members. Those are the following Packing , Dispatch and waste material collection- 4 members, Accounts and administrative help-1+1,Cooking-4 members,Gardening-3 members, Cattle management-1+2 members, Organic product manufacturing -2 members, Collection and segregation of waste-27 members

Waste segregation process

There are 43 workers in the Advanced Solid and Liquid Resource Management (ASLRM) team, with split up schedules for each day according to the team which sets out to collect waste from the houses allotted to them .The waste collection takes place twice a day in shifts; the first shift is from morning 6:30am to 11:30 am and the second from 3:30 pm to 6:30 pm. The waste is collected in specially designed vehicles (Tricycle.).

Vehicle features

- The vehicle is designed and promoted by DRDA, Coimbatore .It operates on battery and does not require registration or licensed drivers, anyone above the age of 18 are eligible to drive it. For battery they are using solar energy created from the solar panel at Kurudanpalayam
- The vehicle takes 8 hours to charge and runs for 80 km at a stretch, at a maximum speed of 25km/hr.
- The vehicle has both front as well as rear gears. It has a total load capacity of 300kg apart from the driver load
- Three passengers can travel on the vehicle in its front seat.
- The vehicle is exclusively designed for waste collection and segregation; the container which carries the load is split into three compartments with removable partitions.

First level segregation –segregation at home

Initially in order to give awareness to all the families in the panchayat, the ward counselor, Panchayat president and a few workers go on an orientation walk to all houses to guide them with the first step of collecting waste in different baskets. Based on whether it is organic or inorganic waste, they are all supplied with two colored baskets per household where bio-degradable waste are placed in the green basket and non-biodegradable waste in the red basket respectively. Primary source segregation - from home shops, markets, households. the Self-help Groups (SHG) and below poverty line people and physically challenged people are working in the primary segregation part . One deaf and dumb and mentally challenged persons are working in the packing section.

This step concludes the first level of waste segregation that takes place at home. When the waste collection vehicle comes for collection twice a day, the wastes are filled in respective portioned portions of ten vehicle. Based on the average amount of waste collected in each portion in a particular ward, the partition in the vehicle is adjusted so as to provide more space for biodegradable or non-biodegradable waste accordingly.

Second level segregation

The waste thus collected is brought to the waste segregation shed for second level segregation. Though proper guidance and awareness has been given to the families, many people fail to segregate the waste perfectly; hence all the wastes are collected and re-segregated as per different categories of waste material and their respective usages. In shed, the workers classify the waste into different categories based on type of materials and accordingly they are segregated by collecting in separate containers. Then these materials are sub divided into 20 groups of containers and 21 containers for inorganic which makes the difference between organic and inorganic waste. Later only organic content waste is used as farm manure for agriculture fields.

Organic waste types:

Citric fruits peel, cattle non-edible items, cotton, coconut, tender coconut shells, wood and twigs, non-vegetarian waste, husk sponge, cattle edible leaves (garden waste) Areca nut leaf plates, seeds, reaper leaf, food waste, bones eggshells. The organic waste are used for different self-sustainable works within the centre and the remaining organic wastes are processed and used in the manufacturing of household commodities such as dishwasher powder, toilet cleaners etc.

Coconut waste recycling process-coconut shells are processed and the sponge are separated, collected and is distributed to rope making factories. The shell portion is used for manufacturing several articles such as mosquito coils, Ice-cream box, and to manufacture a main component of a water purifier I unit. Egg shell recycling process- Egg shells are used for making fertilizer as it is rich in nitrogen, phosphorous, potassium and calcium. The eggs shells are washed initially and then dried, after a couple of days it is crushed and sold at a rate of 350-400/kg. The egg shell powder is used as fertilizer for rose gardens and roof gardens.

Fruit peel recycling: The citric fruits peel is used for making washing powder and toilet cleaning powder

Compost bed process

The organic waste which are not edible for cattle and not suitable for any other process collected together processed to form a compost bed which has chain of processes and applications. There are two type of compost bed formed, indoor and outdoor compost bed. The only difference between the indoor and outdoor compost bed is that in the outdoor bed, the job of fish is replaced by ducks or frogs. The ducks feed on the larvae and some portion of organic waste. Generally ducks lay around 15-18 eggs. However, since they get a lot to eat, they lay up to 25 eggs per month. These eggs are believed to have medical values such as treatment for piles.

A herd of 12 cows feed on organic waste material. A minimum of 35kg of food should be fed to these cattle. From the time of feeding, it produces dung in 8 hours. It produces around 10-15 kg of dung per day. Cow's urine has its own medical and commercial value. Hence it is collected and stored for several purposes. Cow's urine left after taking away the required quantity for production is pumped and sprayed over the plantations inside the premises for better yield.

By-products from organic waste generated at Kurudampalayam Panchakavyam production

A highly effective organic fertilizer named "Panchakavyam" is produced from a combination of a various by-products: it is a liquid which is made up of a mixture of milk, cow dung, ghee, cows's urine, jaggary (Karupetti), curd, banana, and tender coconut. This mixture is incubated and liquidized after 15 days. This panchakavyam is manufactured by mixing the above combinations. This fertilizer is effective in strengthening the plants and generating extra yield from the plant. It can also be used to bring a decaying plant back to life. All its features have been tested and documented and the chemical composition of this fertilizer has been tested and statistically proven by "ALPHA LABS", Coimbatore.

Poochiverati: Its highly commercial product. It is an insect and fly repellent. This repellent does not kill the insect, but merely repels them.

Methane gas production

Cow dung is also used for producing methane gas. Which is used for cooking within the premises. 300 kg of cow dung is capable of producing enough methane gas to fill a commercial cylinder if extracted effectively. The produced methane gas is collectively stored in a gas balloon of 60 cubic meters and supplied to the community kitchen for cooking. Each day up to 200-250 people are served from the food prepared in this kitchen. They are using Dheenabandhu model.

Vermi cast

The methane extracted slurry is pumped and passed into the earthworm production centre. African earthworms are more effective in reproduction and it produces more useful by-products such as phosphorus, potassium and nitrogen hence African earthworms are most sought after. These earthworm are bought as a one-time investment and then onwards it is internally bred and reproduced in a continuous cycle. While vermicast production, the tank consisting of a complete set of manure is watered twice a day. This water flows through all these layers and also include the sweat of the worm and collectively flows down to the underground tank through the filter. This liquid collected in the underground tank is known as “**Vermi wash**” which is a strong and effective plant fertilizer which helps in expanding the life span of plants and increasing its yield. Thus this vermicast production center becomes self-sustainable and does not require any foreign raw material for production.

Tertiary segregation- Inorganic waste-

The inorganic wastes collected from the secondary segregation sites are brought to the tertiary segregation site for splitting it into its subcategories based on its commercial usage and value. Inorganic waste will sell to scrap dealers. The products at the advanced SLRM site are produced and marketed by Aagne (Association for Augmenting Green Natural Environment) is an NGO. Awareness programs are doing in community level and schools level and household are charging Rs.1 per day. Students from Various schools visit the advanced SLRM site regularly. They have a vague idea about what pollution is and the causes of it. However, this knowledge is mostly theoretical. When they visit the project site, they get practical knowledge of how to manage the waste that is produced and turn it into resources. The student population is very eager to take steps towards protecting and nurturing the environment. They have the energy and enthusiasm and the advanced SLRM has the solution. The only thing needed now is to channel this energy in the right direction and a clean green environment will not be far off.

Inorganic waste recycling

The quantum of plastic waste generation in 60 cities of the country is estimated to be over 15,342 tonnes per day while more than 6,000 tonnes remain uncollected and littered. Team of researchers from the National Institute of Technology, Calicut (NIT-C), has developed a

technology that converts plastic waste into cooking gas, without causing pollution. The cost-effective and eco-friendly breakthrough was achieved through a thermochemical decomposition of the shredded waste plastic at an elevated temperature in the absence of oxygen. “As much as 750 ml of gas can be produced from a mere four grams of plastic waste using the technology (750 liter from 4 kg), Apart from the gas, other costly chemicals including the plasticizers employed to make plastic more pliable, can also be extracted during the process. Unlike in the existing recycling system, no plastic item is rejected in the new method. “The trials have been successful in disintegrating all kinds of plastics including polythene, bottles, bags, tyres, charring plastics such as toffee covers and thermocol..14.2 kg cooking gas can be generated from 29.3 kg plastic waste.

A plant for processing 100 tonnes of plastic waste daily can be set up at an estimated cost of Rs.2.5 crore. “This includes machinery and storage facilities for gas in liquid form as it is done in refineries. The team has submitted the project to various State and Central funding agencies, including the Department of Science and Technology of the Union government for approval. “The patent filing process also is in progress.

Challenges in Waste management

Management of solid or liquid wastes is much easier and profitable business in both rural and urban areas of India. Public and Private mode is the best viable option for effective waste management which is only possible by better coordination. In addition to coordination, extension workers has greater role in disseminate waste and also information share about the importance of waste dumping in the sensitive areas where waste dumping creates various health hazards if not managed to decompose well. All these issues can be sorted out only with the help of public and better local governance which plays crucial role in development and management of waste resource into useful resources especially in resource poor areas where it can be used as perfect input for further agriculture production process.

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