# SOLID WASTE MANAGEMENT & SOCIAL ENTREPRENEURSHIP - *A key to sustainable development*

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## Abstract

The variety of waste which includes organic, Food, Plastics, Pet bottles, Glass, rubber, tin, less scrap value, thin plastic, thick plastic, cardboards, silts, coconut leaves and others were collected from 4 zones of Pammal Municipality region in order to reduce the scope of reducing the land-filling. According to their applications waste material were used for Briquettes making. The Briquettes made from waste material were given to tea shops and ironing shops in order to replace the coal. The uses briquette with coal as when he only uses the briquette, more heat is generated and it might damage the cloth. It indicates that briquette has more calorific value which is been supported by the proximate data analysis or briquette and coal. It comes out to be cost effective. As the cost of briquette is less than coal. Secondly, if we reduce the recycling which we give to vendors then shredding and up-cycling has a huge potential, whereas new buyers can be searched for and briquettes manufacturing can be increased.

**Keywords:** Waste Material, Briquettes,

## I. INTRODUCTION

Managing the waste whether it is solid or liquid, is a major concern of today. Their crisis is apparent in nearly nook and corner of the Nation. Generating waste is as simple today because we live in the era of packing, where everything we buy from the market comes in a well maintained pack. And when we consume the thing, usually we do not ponder that where its packing material will go. We do not even bother to find whether it is recyclable or biodegradable or not. And that very thing creates pollution of our land, air and water which undermines the efforts to improve health and safeguard our environment.

Solid waste management is a biggest challenge to each and every society of the country. Not only rambling in urban areas but also in every part of rural area. The normal trend of the people living in the era of global warming and climate change is to intellectualize the problem at the macro level without even finding the solution of the problem at micro level. And thus this situation has even contributed more to the problem of global warming and allied issues.

However, solid waste management addressed many problems and offers endless opportunities for cleaning up our surroundings on effective methods by tackling the concern at the grassroots level which has alleviated the effects of the impact to whatever degree it can be.

In India, generation of Municipal solid waste, industrial waste, hazardous waste, biomedical waste have been increasing due to population growth, change in life style and economic development. On the other hand, the waste management responses have not been kept pace with the increasing quantities of waste generating and thus, resulting in accumulation of waste, due to poor ways of disposal and treatment.

Whereas, by implementing these projects created the opportunities for many to generate employment and generate income, and also making renewable source of energy. As concerns of environment and energy are

very closely associated, if we are working one issue, other is automatically addressed. The utmost requirement is of generating awareness among people and sensitizing more on the issues of making a clean environment and also adopting ways and means to use renewable energy.

Several organizations apart from the Municipal authorities are working in managing the Municipal Solid Waste comprises of household waste, construction and demolition debris, sanitation residue, and waste from streets.

The Dumping of waste in the recent decades has increased to an extent that the allotted landfills and dump yards have become mountains of waste not only spoiling the aesthetic value of the environment but also seeking clearance from Airport authorities with all these problems associated segregation of waste at the source definitely needs to be paid attention to establish such initiatives taken earlier in the present study an attempts has been taken to study the various procedures adopted in segregating and managing the solid waste generated in the Pammal municipality.

## II. MATERIALS AND METHODS

The Monitoring of the day today solid waste management activities was done for 10 days. The sixteen wards of Pammal divided into four zones comprising of approximately 800 houses were observed to all under 30 green ambassadors who involve themselves in waste collection and segregation at source.

The green ambassadors do the door collection of waste and segregate the recycle, non-recyclable and biodegradable waste instantly. The collected wastes are further sent according to their application either for recycling or for composting or biogas generation units.

The average waste collected has been reported in **Table.1** and **Fig.1** and weekly data from all four zones collected and segregated are represented in **Table.2**

**Table.1 Variety of Waste collected**

| Type of waste | % | Wt. (tons) |
|---|---|---|
| Organic | 20.8 | 7.6 |
| Food | 3.8 | 1.4 |
| Plastics | 0.8 | 0.3 |
| Pet bottles | 0.8 | 0.3 |
| Glass | 1.9 | 0.7 |
| rubber | 1.8 | 0.7 |
| tin | 1.7 | 0.6 |
| others | 7.1 | 2.6 |
| less scrap value | 1.3 | 0.5 |
| thin plastic | 4.0 | 1.5 |
| thick plastic | 5.6 | 2.0 |
| card board | 23.8 | 8.7 |
| silts | 19.8 | 7.2 |
| coconut leaves | 7.1 | 2.6 |

**Table.2 Weekly data collected on waste collection from all 4 zones of Pammal Municipality**

| | Decomposable | | Recyclable waste | | | | | | | Inorganic waste | | | Land filling | Briquette | Total Waste |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Organic | Food | Plastics | Pet Bottles | More Scrap Value | | | others | Less Scarp Value | Thin Plastic | Thick Plastic | Card board | Silts | Coconut leaves | |
| | | biogas | | | Glass | Rubber | Tin | | | | | | | | |
| 21-Dec | 8.41 | 1.514 | 0.39 | 0.39 | 0.94 | 0.937 | 0.9 | 3.3 | 0.675 | 2.103 | 2.944 | 12.6 | 3.5 | 3.364 | 42.06 |
| *22-Dec | 4.77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.278 | 1.79 | 7.67 | 0 | 0 | 15.51 |
| 23-Dec | 7.81 | 1.561 | 0.311 | 0.31 | 0.75 | 0.745 | 0.7 | 2.1 | 0.505 | 1.335 | 1.869 | 8.01 | 10 | 2.968 | 41.163 |
| 24-Dec | 7.82 | 1.564 | 0.311 | 0.31 | 0.75 | 0.745 | 0.7 | 5 | 0.507 | 1.338 | 1.873 | 8.03 | 7.2 | 2.972 | 44.065 |
| 25-Dec | 7.92 | 1.583 | 0.318 | 0.317 | 0.75 | 0.747 | 0.3 | 3.4 | 0.537 | 1.369 | 1.916 | 8.21 | 9.5 | 2.707 | 42.974 |
| 26-Dec | 8.13 | 1.626 | 0.323 | 0.322 | 0.78 | 0.775 | 0.8 | 2.4 | 0.52 | 1.391 | 1.947 | 8.35 | 10.3 | 3.091 | 43.061 |
| 27-Dec | 7.99 | 1.598 | 0.319 | 0.317 | 0.77 | 0.763 | 0.8 | 2.2 | 0.514 | 1.363 | 1.908 | 8.18 | 10.2 | 3.037 | 42.202 |
| Average | 7.6 | 1.349 | 0.282 | 0.281 | 0.7 | 0.67 | 0.6 | 2.6 | 0.465 | 1.45 | 2.04 | 8.7 | 7.24 | 2.5913 | 38.719 |

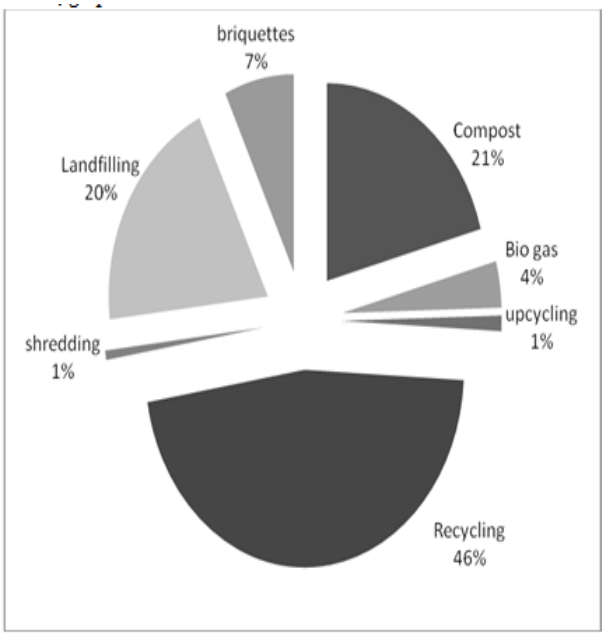


**Fig. 1 Uses of Waste**

The Pammal Municipality is a green location with cost of coconut trees the coconut leaves collected from the ward areas are utilized in making the Briquettes. The coconut leaves collected from ward areas are utilized in making briquettes, which are used for tea shops and ironing shops instead of coal. As they have high calorific value and keep burning for long time and non-polluting fuel, clean fuel. The coconut leaves are first dried by just keeping in open area. The dried leaves are then charred in the kiln by using dried leaves itself as a fuel. After charring of leaves they are powdered. Then the powdered material is sieved properly in order to remove unwanted bigger size particles which are of any use. And in comparison of the material it is very small quantity. It is then mixed with a binder, rice water, or some starchy material it is mixed to form thick paste. Then that thick paste is fed into the machine to get the cylindrical form briquette. This process continues till it gives the properly binded cylindrical piece as shown in Fig. 2 and Fig. 3.

**Fig.2 Stages of Briquettes**

**Fig.3 Briquettes fresh to dry**

The Proximate analysis of with the Briquette is given in Table.3 and that of different Indian coals are given in Table.4

**Table.3 Proximate Analysis of Briquette Vs Coal**

| Quantity | Coal |
|---|---|
| Ash | 8% |
| Moisture | (4 ± 2.8)% |
| Volatile matter | (81± 0.31)% |
| Fixed Carbon | (14.95±3.5)% |
| Calorific Value | 5254 Kcal/kg |

**Table.4 Proximate Analysis of different Indian Coals samples**

| Sample No. | Proximate Analysis | | | | HGI | Gross Calorific Value (kcal) | Net Calorific Value (kcal) |
|---|---|---|---|---|---|---|---|
| | M (%) | VM (%) | A (%) | FC (%) | | | |
| 1 | 4.5 | 25.04 | 34.56 | 24.6 | 68.54 | 3896 | 3596 |
| 2 | 6.65 | 28.25 | 26.92 | 34.92 | 59.22 | 4558 | 4258 |
| 3 | 5.24 | 25.01 | 33 | 37.1 | 65.203 | 4796 | 4496 |
| 4 | 5.09 | 26.06 | 43.18 | 25.32 | 62.50 | 4469 | 4169 |
| 5 | 6.64 | 33.82 | 25.67 | 38.23 | 58.62 | 4623 | 4323 |
| 6 | 5.39 | 28.86 | 34.85 | 30.9 | 76.09 | 3871 | 3571 |
| 7 | 8.24 | 33.96 | 8.84 | 53.16 | 61.23 | 4821 | 4521 |
| 8 | 13.15 | 24.95 | 33.57 | 28.38 | 48.69 | 4345 | 4045 |
| 9 | 11.18 | 25.07 | 39.85 | 24.58 | 65.93 | 4268 | 3968 |
| 10 | 4.45 | 27.87 | 39.19 | 31.51 | 60.37 | 5003 | 4703 |
| 11 | 6 | 26.74 | 28.1 | 39.16 | 57.49 | 4963 | 4663 |
| 12 | 5 | 29.01 | 37.6 | 28.7 | 70.32 | 3962 | 3662 |
| 13 | 2.4 | 23.27 | 52 | 22.6 | 57.28 | 3645 | 3345 |
| 14 | 4.45 | 25.01 | 44.02 | 26.68 | 76.68 | 3692 | 3392 |
| 15 | 8.39 | 31.4 | 33.42 | 27.81 | 52.33 | 4538 | 4238 |

## III. RESULTS AND DISCUSSION:

On analyzing the data given in Table.1, 2 and Fig.1. It is observed that variety of waste are collected and there is lot of scope for reduction of land filling if segregation at source is strictly insisted and may further be ensured by making it legal with penalties on deviation.

Secondly is the recyclables from individual houses are diverted to recycling units through green ambassadors rather than to vendor then shredding an up cycling has a huge potential.

On analyzing Table.3 and 4 it is observed that the briquettes made from waste coconut leaves are better than the higher grade of Indian coal. Ash content in coal is very high as compared to the briquette. More the ash content less is the calorific value. Volatile matter is very high in briquette as compared to coal. As more the volatile material high is the calorific value. Calorific value is very high in comparison to any another Indian coal.

On analyzing the process, we can say that 40% of material lefts after heating of leaves in the kiln. And 50% material left after crushing and sieving. So with that left over material we can prepare briquettes. With 1 kg 20 pieces can be prepared of 4 cm size. And daily collection of coconut leaves is approximately 2.5 MT – calls for a huge potential of making briquettes. Only requirement is the touch of professionalism and proper monitoring of the process parameters.

## IV. CONCLUSION

Dumping is a major issue considering the effective waste generated from a locality per day. The segregation is best way to manage waste. The segregation waste management has a lot of potential and scope for entrepreneurship. The smart segregator gives an edge over as there is no manpower involved throughout the working process. The automation of the process scraps the dumping pits and is an easy process for recycling.

Generally, places involving various recreational activities or the places where public activity is evident; Smart bins are effective. Replacement of dust bins with segregator will not only involve added waste management facility but also with cost effective add-ons.

Industrial usage is very much possible and moreover to that there is a need of it. The prototype developed does not put its focus on industries but there is always a want that will drive the development of the segregator optimizing to its usage purpose.

Smart Segregators take you into a different space for waste management processes. Being feature packed it also gives you an advantage over disposal of waste. The foremost job the segregator proposes is that it is eco-friendly in nature. Nominal power usage gives

an edge over the competitors. The segregator is very much handy as compared to its counterparts.

When it comes to value for money products the team believes that the smart bin segregator is capable enough for effective functioning and to take on the market scenario.

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