The Effectiveness of Solid Waste Collection Services in Municipalities of Kerala

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Abstract – Solid materials in the waste flow pattern rejected by the original user are solid wastes. If not processed, treated and disposed its impact on human health and environment are devastating. In municipalities of Kerala how waste is collected and treated and what is the range of their waste collection services is the subject matter of this study. The study tries to throw some light into the three major aspects, segregation, participation and use of modern methods which determine the quality of waste collection services. It reveals that out of the nine municipalities selected Palakkad is leading in segregation, Koyilandi in participation and Kottayam in use of modern methods.

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1.   INTRODUCTION

Materials useless for the original user and in a solid form are called solid wastes. Solid waste issues are growing as a social menace world over. Its unprecedented impact on health, environment and ecology are extremely vulnerable to the living species on land and under water. Developed countries are managing solid waste more effectively but in developing and under developed countries most of the solid waste generated are not collected or treated properly. In India solid waste is a burgeoning issue. The state Kerala lying in the south west corner of India is not up to the mark in its solid waste management efforts. The Municipalities of Kerala being the authorities responsible for managing solid waste is its territorial limits are found to be suffocating for funds and equipments to meet their tasks. The study concentrates on evaluating the waste collection services of Kerala municipalities to test their level of reach and effectiveness. Waste collection is the most crucial area of solid waste management as of any delay in collecting waste which cannot be processed by the waste generators will prove to be fatal.

2.   STATEMENT OF THE PROBLEM

Solid waste management is the responsibility of the municipalities in its geographical limits. Management does not mean waste collection, treatment and disposal by municipalities themselves. It really means campaigning for awareness, providing the facilities and supporting the waste generators to treat or dispose their waste in their own premises. But the residents of municipal limits find it difficult to process and dispose waste in a healthy manner because of lack of awareness, commitment and free space. Naturally the responsibility of waste collection and treatment is falling upon the shoulders of the municipalities. In this

context it is attempted to study the waste collection services' effectiveness in municipalities of the state by analyzing its reach and level of segregation. The success of waste management is determined by the promptness of waste collection and the level of source segregation. Hence the problem is stated as **"THE EFFECTIVENESS OF SOLID WASTE COLLECTION SERVICES IN MUNICIPALITIES OF KERALA"**

3.   OBJECTIVES OF THE PAPER

Generally the study looks into the effectiveness of waste collection services in municipal limits of Kerala. The specific objectives of the study are;

1.   To identify which municipality out of the selected sample is most effective in waste segregation efforts.

2.   To trace out which municipality is leading in participation in waste collection efforts.

3.   To know which municipality is using modern methods of waste collection effectively.

4.   METHODOLOGY AND SAMPLING DESIGN

The study uses both primary and secondary data for gathering information. Various publications of Government Departments, other Agencies and Municipal Authorities are the sources of secondary data. By Simple Random Sampling method nine municipalities in Kerala are selected from sixty for conducting the study. The selected municipalities are Thiruvalla, Varkala, Pathanamthitta, Kottayam, Cherthala, Kothamanglam, Palakkad, Koilandy and

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Kalpetta. The respondents are selected from the category of households as more than fifty percent of municipal solid wastes are the contributed by them. A structured questionnaire is administered among them to collect data about the effectiveness waste collection services. The sample size is 240 split in the ratio of 30:26:26:32:24:24:31:24:23 respectively.

5. TOOLS USED FOR DATA ANALYSIS

The basic tools used for analysis of primary data are Arithmetic Mean and Standard Deviation. For testing of hypothesis Standard Error and MANOVA (Multivariate Analysis of Variance) are used.

6. WASTE COLLECTION SERVICES BY MUNICIPALITIES

Managing solid wastes in the municipal limits are the primary responsibility of municipalities. There is a separate wing of experts for supervising municipal solid waste management in each municipality. Managing waste does not mean the physical collection, transportation, treatment and disposal of wastes. But it means campaigning, aiding and supporting waste generators for effective waste management. Hence municipalities being local bodies are the facilitators of waste management and are expected to do it in a healthy and environmentally friendly manner. Lack of infrastructure, resources, expertise and professionalism makes the task of waste management by municipalities very bleak. Decentralised waste management is the modern and healthy method of waste management to be followed by local authorities. It ensures minimum exposure of waste to public and possibility of littering is very limited. In such a way the possibility of potential health threats can be minimized. But in municipal limits of Kerala municipalities are forced to collect and treat waste because of lack of commitment of residents. So they are expected to provide all waste collection services to the inhabitants.

7. ANALYSIS AND INTERPRETATION

The analysis tools used in the study are descriptive statistics like mean score, standard deviation and standard error. For testing of hypothesis it is using Multivariate Analysis of Variance (MANOVA) with the help of SPSS Software.

Table 1.1 List of Municipalities

		Municipality	N
	1.00	Thiruvalla	30
	2.00	Varkala	26
	3.00	Pathanamthitta	26
	4.00	Kottayam	32
Name of the Municipality	5.00	Cherthala	24
	6.00	Kothamanglam	24
	7.00	Palakkad	31
	8.00	Koilandy	24
	9.00	Kalpetta	23
	Total		240

Source: Primary Data

Table 1.1 shows the split up of respondents in the nine municipalities from where data is collected. Thiruvalla, Varkala, Pathanamthitta, Kottayam, Cherthala, Kothamanglam, Palakkad, Koilandy and Kalpetta are the sample municipalities selected for the study. The sample size is 240 split in the ratio of 30:26:26:32:24:24:31:24:23 respectively.

Table 1.2 Descriptive Statistics of Waste Collection Efforts

	Name of the Municipality	Mean	Std. Deviation	N
	Thiruvalla	19.6000	5.34725	30
	Varkala	17.3846	6.00051	26
	Pathanamthitta	18.4615	5.34588	26
	Kottayam	17.5313	3.72424	32
Segregation	Cherthala	10.0000	.00000	24
	Kothamanglam	21.2083	8.30390	24
	Palakkad	**22.9032**	9.93430	31
	Koilandy	17.5417	10.48800	24
	Kalpetta	20.9130	6.29511	23
	Total	18.5083	7.54013	240
	Thiruvalla	55.8000	6.41335	30
	Varkala	54.6154	9.77375	26
	Pathanamthitta	64.0769	5.90541	26
	Kottayam	45.5000	10.45112	32
Participation in Waste Collection Efforts	Cherthala	57.0833	3.45048	24
	Kothamanglam	61.1667	10.58985	24
	Palakkad	54.2581	13.42626	31
	Koilandy	**64.6667**	9.88924	24
	Kalpetta	57.2174	8.10699	23
	Total	56.6833	10.73802	240
	Thiruvalla	28.0000	3.34252	30
	Varkala	30.3462	1.44062	26
	Pathanamthitta	21.5385	3.47828	26
	Kottayam	**30.8125**	2.36149	32
Use of Modern Methods	Cherthala	26.6250	1.83712	24
	Kothamanglam	27.2500	5.67412	24
	Palakkad	28.6774	5.53406	31
	Koilandy	26.0417	4.10174	24
	Kalpetta	26.3913	4.89656	23
	Total	27.4542	4.63636	240

Source: Primary Data

From Table 1.2 it is observed that out of the nine municipalities Palakkad follows the best Segregation practices in waste collection services as its Mean Score is **22.9032,** the highest among all. Considering Participation in Waste Collection Efforts Koyilandi is the best performer as its Mean Score is **64.6667**, the highest among all. In the opinion of the respondents in terms of Use of Modern Methods Kottayam municipality is leading with an Average Score of **30.8125** meaning it is supported with the best equipments in sufficient quantity for waste collection services.

It is normal to test whether the variations in the Mean Scores are significant or not. MANOVA is used for testing the significant difference by formulating the following hypotheses;

H_0: *There is no difference in the mean scores of segregation, participation in waste collection efforts and use of modern methods among Municipalities of Kerala.*

H_1: *There is difference in the mean scores of segregation, participation in waste collection efforts and use of modern methods among Municipalities of Kerala.*

Table1.3 Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.988	6505.371[b]	3.000	229.000	*.000**
	Wilks' Lambda	.012	6505.371[b]	3.000	229.000	*.000**
	Hotelling's Trace	85.223	6505.371[b]	3.000	229.000	*.000**
	Roy's Largest Root	85.223	6505.371[b]	3.000	229.000	*.000**
Municipality	Pillai's Trace	.757	9.752	24.000	693.000	*.000**
	Wilks' Lambda	.383	10.880	24.000	664.771	*.000**
	Hotelling's Trace	1.266	12.012	24.000	683.000	*.000**
	Roy's Largest Root	.933	26.939[c]	8.000	231.000	*.000**

Table 1.4 Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Segregation	2765.747[a]	8	345.718	7.379	.000*
	Participation in Waste Collection Efforts	7762.785[a]	8	970.348	11.324	.000*
	Use of Modern Methods	1634.939[a]	8	204.367	13.478	.000*
Intercept	Segregation	80073.892	1	80073.892	1709.172	.000*
	Participation in Waste Collection Efforts	773110.177	1	773110.177	9021.829	.000*
	Use of Modern Methods	176365.741	1	176365.741	11631.641	.000*
Municipality	Segregation	2765.747	8	345.718	7.379	.000*
	Participation in Waste Collection Efforts	7762.785	8	970.348	11.324	.000*
	Use of Modern Methods	1634.939	8	204.367	13.478	.000*
Municipality	Segregation	2765.747	8	345.718	7.379	.000*
	Participation in Waste Collection Efforts	7762.785	8	970.348	11.324	.000*
	Use of Modern Methods	1634.939	8	204.367	13.478	.000*
Error	Segregation	10822.237	231	46.850		
	Participation in Waste Collection Efforts	19795.149	231	85.693		
	Use of Modern Methods	3502.557	231	15.163		
Total	Segregation	95802.000	240			
	Participation in Waste Collection Efforts	798678.000	240			
	Use of Modern Methods	186033.000	240			
Corrected Total	Segregation	13587.983	239			
	Participation in Waste Collection Efforts	27557.933	239			
	Use of Modern Methods	5137.496	239			

Source: Primary data
*Significant at 5% Level of Significance

Pillai's Trace the most reliable test used for testing significance in MANOVA says all variations are significant as a bundle at 5% Level *(p<0.05 as per last column of Table 1.3)*. More over at individual level also the variations are found to be significant at 5% Level *(P<0.05 as per last column of Table 1.4)*. Hence in all cases the null hypotheses are rejected at 5% Level of Significance. There is sufficient variation among waste collection practices such as Segregation, Participation in Waste Collection Efforts and Use of Modern Methods among municipalities in Kerala.

8. FINDINGS OF THE STUDY

1. Out of the nine municipalities Palakkad follows the best Segregation practices in waste collection services.

2. Koyilandi is most effective in coordinating all agencies in Participation in Waste Collection Efforts.

3. In terms of Use of Modern Methods Kottayam municipality is leading. It is supported with the best equipments in sufficient quantity for waste collection services.

9. SUGGESTIONS

From the above findings of the study the following suggestions are being evolved:

1. Measures to be taken by the Govt. to improve the technology used for waste collection services as most of the municipalities are using the old and out of date methods.

2. The waste management of municipalities are supervised by a small group of health inspectors in each municipality. They are not properly trained and not provided with sufficient equipments.

3. Urgent steps should be taken to increase the staff strength of solid waste management team.

4. Municipalities are running short of financial resources to manage solid wastes. They should be provided with adequate funds for effective waste management.

5. Decentralized waste treatment system must be implemented and municipalities should be relieved of the responsibility of waste collection. Waste generators should be taught to treat and dispose their waste in their own premises.

10. CONCLUSION

The most crucial activity in solid waste management is waste collection and transportation. A little carelessness will attract long-lasting implications on the ecology and environment. So waste should be collected and transported without littering and without exposing to public places. Wastes ending up in water bodies and public places are inviting a lot of health issues. Burning waste emits lot of toxic gases leading to greenhouse effect. Decomposed waste releases methane to atmosphere which is also a greenhouse gas. Waste treatment techniques like biomethanation and composting at the point of origin will reduce those impacts. These treatment techniques will provide electricity, cooking gas and high quality manure for household use. As more than fifty percent of municipal solid waste is contributed by households they have to work for these treatment techniques so that waste will not be exposed and the health problems can also be reduced. Let us work for a cleaner environment as it is our responsibility to hand over the fast depleting natural resources to the coming generations. Seven billion dreams and a single planet; consume with care.

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