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The Role of Stakeholders in Waste Collection Services in Municipal Limits of Kerala

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Abstract – Kerala the beautiful state located in the southern peninsular India is enriched with forty four rivers and plenty of hillocks. Its landscape and greenery makes it a visitors' paradise. In spite of a well educated, politically and socially motivated population its solid waste efforts are below the benchmark. From past studies it is seen that almost 80% of the municipal solid waste is neither collected nor processed showing the inefficiency of the solid waste management system of the State. The waste generators are classified into four groups for the purpose of this study namely Households, Shop Owners, Hotels/Restaurants and Institutions. Similarly stakeholders are classified into Residents' Associations, Self Help Groups, Non-Government Organisations, Community Based Organisations, Private Companies, Political Parties and Other Agencies. The study attempts to bring to light the role of stakeholders in waste collection services of the municipalities of Kerala. It reveals that institutions get higher benefits from majority of the stakeholder groups.

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INTRODUCTION

1. INTRODUCTION

Materials rejected by the first user and is not in liquid form is generally known as solid waste. World over solid waste is creating problems at alarmingly unmanageable levels. In a developing country like India which is the second largest in terms of population unmanaged solid waste is a potential threat to human and animal life. It creates problems to aquatic life also. The golden rule is to track waste at the point of generation and manage it after proper segregation. It should not be allowed to litter and the minimum should hit the land for landfilling. Kerala, the state located at the south-west corner of India is suffering in its waste management efforts because of its high density of population. It's population density is thrice the national average and even rural areas have urban features. Getting free space for processing or disposing waste is extremely difficult in the state. Municipalities of Kerala where population density is much higher than the rural are really finding it difficult to collect and process their waste. The per capita waste generation of Kerala is comparatively higher than the other states of India is also multiplies the waste issues. Irrational consumerism lead by excessive waste generation by the people of Kerala is another problem. Municipalities of Kerala do not have the expertise or resources to manage such huge volume of wastes. Hence the authorities so badly need the support of stakeholders in managing the waste generated in municipal limits. The stakeholders identified for this study are Residents' Associations, Self Help Groups, Non-Government Organisations, Community Based Organisations, Private Companies, Political Parties and Other Agencies. The waste generators in municipal limits are identified as Households, Shop Owners, Hotels/Restaurants and Institutions.

2. STATEMENT OF THE PROBLEM

The prominent waste generators in municipal limits are classified as Households, Shop Owners, Hotels/Restaurants and Institutions for the purpose of this study. Kerala's municipal limits are stinking because of big heaps of waste thrown away by the so called educated residents of the state. The low commitment of people ends up with a very low environmental sanitation level polluting air, water and environment. A handful of health inspectors are responsible for managing the entire volume of waste generated in each municipality. They neither possess the expertise nor provided with the resources to manage such a volume of waste. Hence the state is trying to manage waste seeking support from various groups called stakeholders. The major stakeholder groups identified for the study are Residents' Associations, Self Help Groups, Non-Government Organisations, Community Based Organisations, Private Companies, Political Parties and Other Agencies. The study concentrates on the involvement of stakeholders on the waste collection practices of the municipality only and not on the processing or disposal. Hence the problem is stated as **"THE ROLE OF STAKEHOLDERS IN WASTE COLLECTION SERVICES IN MUNICIPAL LIMITS OF KERALA".**

3. OBJECTIVES OF THE PAPER

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

1. To identify which stakeholder is most involved in waste collection services to support the municipal authorities

2. To identify the level of support obtained by the waste generators such as Households, Hotels/Restaurants, Shop Owners and Institutions in waste collection services provided by the stakeholders.

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. Primary data are collected through survey method where Multi-Stage Stratified Random Sampling is used. Kerala is classified into three regions South, Central and North and out of the total sixty municipalities in Kerala nine are selected for primary data collection. That includes three each from South, Central and North Region. As the second stage from each municipality Households, Shops, Hotels/Restaurants and Institutions are selected in proportion to their total number. A structured questionnaire is administered among them to collect data about the involvement of different stakeholder groups in waste collection services. The sample size comes out to be 656 split in the ratio of 240:180:173:63 among Households, Shop Owners, Hotels/Restaurants and Institutions 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

Municipalities being local bodies are responsible for managing solid waste generated within its limits. Managing waste does not mean waste collection, transportation, treatment and its disposal physically. Municipalities has to play the role of a facilitator to provide the facilities for waste generators to treat and dispose in a healthy and environmentally friendly manner. But practically because of lack of infrastructure, resources and professionalism they find it hard to reach the objective of decentralized waste management. Waste management may be centralized or decentralized. Centralised system is the old system where waste collected from the source of generation by the authorities and treated or disposed. Here there is a chance of littering of waste while transporting and waste heaps will become usual sights in municipal limits. In decentralized system waste is segregated, treated and disposed at the source of its generation. The advantage is waste is not exposed to public which will reduce health issues. The role of stakeholder groups is identified by an opinion survey among waste generation groups. The stakeholder groups are Residents' Associations, Self Help Groups, Non-Government Organisations, Community Based Organisations, Private Companies, Political Parties and Other Agencies. For this purpose primary data is gathered by administering a well structured questionnaire to four groups of stakeholders namely, Households, Shop Owners, Hotels/Restaurants and Institutions. The respondents are selected by Multi-Stage Stratified Random Sampling in the ratio 240:180:173:63. The ratio is fixed in proportion to the number of units to the total 656 sample size.

7. ANALYSIS AND INTERPRETATION

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

Table 1.1 Category of Stakeholders

Category	N
Households	240
Shop Owners	180
Hotels/Restaurants	173
Institutions	63
Total	656

The above table explains the constitution of waste generators selected for study. Out of the total 656 respondents 240 belong to Households, 180 Shop Owners, 173 Hotels/Restaurants and the remaining 63 Institutions. A pilot study is conducted to identify the above four groups who are contributing the majority of waste generated in the municipal limits of Kerala. In the table given below WC indicates Waste Collection.

Table 1.2 Descriptive Statistics

	Category	Mean	Std. Deviation	N
WC Residents' Associations	Household	1.3875	1.24920	240
	Shop Owner	1.0000	.00000	180
	Hotel/Restaurant	1.0000	.00000	173
	Institution	**1.5238**	1.47951	63
	Total	1.1921	.90613	656
WC Self Help Groups	Household	2.1125	1.83180	240
	Shop Owner	1.7444	.96371	180
	Hotel/Restaurant	2.2717	1.84931	173
	Institution	**2.4286**	1.86404	63
	Total	2.0838	1.66068	656
WC Non Govt. Organizations	Household	**1.1542**	.60436	240
	Shop Owner	1.1389	.82397	180
	Hotel/Restaurant	1.0694	.36701	173
	Institution	1.1429	.64401	63
	Total	1.1265	.62822	656
WC Community Based Organizations	Household	1.1708	.65964	240
	Shop Owner	1.0000	.00000	180
	Hotel/Restaurant	1.0000	.00000	173
	Institution	**1.4127**	1.44395	63
	Total	1.1021	.61054	656
WC Private Companies	Household	1.1833	.73733	240
	Shop Owner	1.0000	.00000	180
	Hotel/Restaurant	1.0000	.00000	173
	Institution	**1.1905**	.85868	63
	Total	1.0854	.52600	656
WC Political Parties	Household	1.1500	.59496	240
	Shop Owner	1.0000	.00000	180
	Hotel/Restaurant	1.0000	.00000	173
	Institution	**1.2857**	1.28802	63
	Total	1.0823	.54360	656
WC Other Agencies	Household	1.0458	.39077	240
	Shop Owner	1.3556	1.12176	180
	Hotel/Restaurant	**3.3121**	2.60940	173
	Institution	1.0000	.00000	63
	Total	1.7241	1.76352	656

Source: Primary Data

Waste Collection Services of Residents' Association is mostly reaching the Institutions than any other type of waste generators as their Mean Score is the highest ***(1.5238)***. Considering the Waste Collection Services of Self Help Groups also the highest Mean Score of ***2.4286*** is with Institutions meaning the accrual of maximum benefits to this group. With respect to Waste Collection Services of Non-Government Organisations the service reach is greater for Household group with the highest Mean Score of ***1.1542***. It indicates that the Households are the main beneficiaries of the Waste Collection Services of Non-Government Organisations.

Waste Collection Services of Community Based Organisations, Private Companies and Political Parties are reaping maximum benefits for Institutions than any other group as the Average Scores are higher ***(1.4127, 1.1905 and 1.2857)***. Considering the services of Other Agencies, Hotels/Restaurants are getting highest benefits as the Mean Score is ***3.3121*** the highest among all.

Now it is the time to test whether these variations are significant for which the following hypotheses are formulated;

H_0: There is no difference in the mean scores of waste collection services of various stakeholder groups among categories of waste generators in Municipalities of Kerala.

H_1: There is difference in the mean scores of waste collection services of various stakeholder groups among categories of waste generators in Municipalities of Kerala.

Table 1.3 Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.876	651.879[b]	7.000	646.000	.000
	Wilks' Lambda	.124	651.879[b]	7.000	646.000	.000
	Hotelling's Trace	7.064	651.879[b]	7.000	646.000	.000
	Roy's Largest Root	7.064	651.879[b]	7.000	646.000	.000
Category	Pillai's Trace	.409	14.619	21.000	1944.000	***.000****
	Wilks' Lambda	.616	16.243	21.000	1855.513	***.000****
	Hotelling's Trace	.583	17.902	21.000	1934.000	***.000****
	Roy's Largest Root	.506	46.828[b]	7.000	648.000	***.000****

Table 1.4 MANOVA-Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	WC Residents' association	29.122[a]	3	9.707	12.442	.000
	WC Self Help Groups	34.522[b]	3	11.507	4.234	.006
	WC Non Govt. Organization	.793[c]	3	.264	.669	.571
	WC Community Based Organizations	10.891[d]	3	3.630	10.147	.000
	WC Private Companies	5.572[e]	3	1.857	6.894	.000
	WC Political Parties	6.098[f]	3	2.033	7.070	.000
	WC Other Agencies	604.175[g]	3	201.392	91.638	.000
Intercept	WC Residents' association	768.781	1	768.781	985.391	.000
	WC Self Help Groups	2333.838	1	2333.838	858.791	.000
	WC Non Govt. Organization	646.921	1	646.921	1636.722	.000
	WC Community Based Organizations	669.590	1	669.590	1871.567	.000
	WC Private Companies	609.716	1	609.716	2263.254	.000
	WC Political Parties	627.098	1	627.098	2181.127	.000
	WC Other Agencies	1436.514	1	1436.514	653.651	.000
Category	WC Residents' association	29.122	3	9.707	12.442	***.000****
	WC Self Help Groups	34.522	3	11.507	4.234	***.006****
	WC Non Govt. Organization	.793	3	.264	.669	.571
	WC Community Based Organizations	10.891	3	3.630	10.147	***.000****
	WC Private Companies	5.572	3	1.857	6.894	***.000****
	WC Political Parties	6.098	3	2.033	7.070	***.000****
	WC Other Agencies	604.175	3	201.392	91.638	***.000****
Error	WC Residents' association	508.677	652	.780		
	WC Self Help Groups	1771.867	652	2.718		
	WC Non Govt Organization	257.706	652	.395		
	WC Community Based Organizations	233.266	652	.358		
	WC Private Companies	175.648	652	.269		
	WC Political Parties	187.457	652	.288		
	WC Other Agencies	1432.885	652	2.198		
Total	WC Residents' association	1470.000	656			
	WC Self Help Groups	4655.000	656			
	WC Non Govt Organization	1091.000	656			
	WC Community Based Organizations	1041.000	656			
	WC Private Companies	954.000	656			
	WC Political Parties	962.000	656			
	WC Other Agencies	1987.000	656			
Corrected Total	WC Residents' association	537.799	655			
	WC Self Help Groups	1806.389	655			
	WC Non Govt Organization	258.498	655			
	WC Community Based Organizations	244.157	655			
	WC Private Companies	181.220	655			
	WC Political Parties	193.555	655			
	WC Other Agencies	2037.059	655			

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

Even though individually Waste Collection of Non Govt. Organisations are not found significant at 5% Level as per Table 1,4 where the p value is 0.571 definitely much higher than 0.05. Apart from that all other p values corresponding to stakeholder groups are significant as they are only 0.000. But 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)***. It is seen from Table 1.3 given above. Hence in all cases the null hypotheses are rejected at 5% Level of Significance. There is sufficient variation among waste collection practices of stakeholder groups as per the opinion of the waste generating groups.

8. FINDINGS OF THE STUDY

1. Institutions are getting maximum Waste Collection Services from Residents' Associations as their Mean Score is the highest ***(1.5238)***.

2. Considering the Waste Collection Services of Self Help Groups also the highest Mean Score of ***2.4286*** is with Institutions meaning the accrual of maximum benefits to this group.

3. With respect to Waste Collection Services of Non-Government Organisations the service reach is greater for Household group with the highest Mean Score of ***1.1542***. It indicates that the Households are the main beneficiaries of the Waste Collection Services of Non-Government Organisations.

4. Waste Collection Services of Community Based Organisations, Private Companies and Political Parties are reaping maximum benefits for Institutions than any other group as the Average Scores are higher ***(1.4127, 1.1905 and 1.2857)***.

5. Considering the services of Other Agencies, Hotels/Restaurants are getting highest benefits as the Mean Score is ***3.3121*** the highest among all.

9. SUGGESTIONS

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

1. A waste management culture must be inculcated among the inhabitants where they should be taught to segregate, treat and dispose waste in a sustainable manner. It can be done through mas campaigning and educating

2. As part of the curriculum waste management should be included in school education. From the early childhood they should be taught to manage the waste generated by them in a healthy manner so that they will become responsible citizens of future.

3. Waste management has to be identified as a high priority area by the Government of Kerala which is not given special attention till this time.

4. Municipalities should be professionalized to become specialists in waste collection services so that each gram of waste generated should be managed effectively without environmental harm.

5. Dropping the traditional centralized waste collection and treatment municipalities should practice decentralized waste management system to protect health and environment.

6. Sustainable Solid Waste Management system should be implemented to manage waste positively.

10. CONCLUSION

Waste collection is the most critical activity of waste management process as it needs utmost care in handling and transporting waste without exposing to public. Once it is exposed it will have potentially very dangerous impact on human health and ecology. Methane escaping from decomposed waste is a greenhouse gas and pollutes air. Similarly littering of waste and dumping of waste irresponsibly in public places will lead to roaming of scavenging animals and birds ending up in polluting the water bodies. Decentralised treatment of waste tapping the source of its generation is a healthy solution for the growing waste problems of Kerala. Sticking on to the traditional centralized collection and treatment will definitely makes the system more unhealthy and totally against the principles of sustainability. By upholding the rules of sustainability the municipalities of Kerala can work for an environmentally friendly waste management system if they are sufficiently equipped with training and resources and moving in the line of professionalism.

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