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A Comparative Study among Stakeholders Regarding Negative Impact of Municipal Solid Waste Management in Kerala

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Abstract – Kerala is known for its high social and human development indices world over. Its high literacy rate, low death and birth rate are setting models for other states of India and are at par with advanced countries. The resident's household sanitation level is very high but the state's low environmental sanitation level poses a serious question on the level of social commitment the people possess. The high population density of urban areas make humans and animals highly risk prone for diseases due to the high scale of uncollected and unprocessed waste. Past studies show that almost 80% of the municipal solid waste is neither collected nor processed or disposed. It shows the inefficiency of the solid waste management system of the State. The present study classifies the waste generators into four key groups namely Households, Shop Owners, Hotels/Restaurants and Institutions. The negative impact of improper municipal solid waste management is the subject matter of the present study. The major issues are categorized into four types namely; Environmental Impact, Air Pollution, Water Pollution and Noise Pollution. It is found that in Environmental Impact Hotels/Restaurants are most affected group, while in Air Pollution, Institutions and in Water Pollution and Noise Pollution, Households are the most affected.

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1. INTRODUCTION

Any form of material useless for the original of first user is called waste. If they are not essentially in liquid form they are categorised as solid waste. All forms of human activities generate waste in one form or the other. Piling up of waste due to convenience practices and consumerism of humans is seriously hampering the balance of the ecology. Unless the humans become cautious about the judicious use of invaluable resources gifted by '***Mother Earth'*** life in this planet will become difficult within a period of another fifty years. Legally it is the responsibility of the local bodies to manage the solid wastes generated within their limits. Hence managing municipal solid waste is the responsibility of the municipalities. Managing waste does not mean collection, transportation, treatment and disposal of waste. It really means arranging the facilities and encouraging the waste generators to treat or dispose waste generated by them in an environmentally friendly, ecologically safe and healthy manner. But people irrationally cast upon the responsibility of waste collection, transportation, treatment and disposal on the shoulders of the municipality which is totally a wrong notion. It is true in a state like Kerala the population density is three times the national average and especially with regard to municipalities where the population density is much higher, the inhabitants so badly need the help of the authorities to dispose of their waste in a healthy manner. But, unfortunately it is seen from past experience that the municipalities of Kerala except a handful are successful in managing their waste properly. Inhabitants are dumping waste in roadside and water bodies making the surroundings unhealthy. Birds, flies, mosquitoes and scavenging animals roaming around make the situation further worsened.

Generally, the waste generators in municipal limits are classified into four categories such as Households, Shop Owners, Hotels/Restaurants and Institutions. They all are stakeholders too. In constitution, quantity and quality their waste generation level changes vastly. Hence the study is attempted to bring out the negative impact of improper municipal solid waste management.

2. STATEMENT OF THE PROBLEM

Solid waste is already turned up as a social menace in a state like Kerala where irrational consumerism mixed with NIMBY Syndrome of inhabitants added fuel to fire. Untreated waste remaining in waste bins and public places are responsible for a lot of health issues like Hepatitis, Malaria, Dengue and Chikungunya. Scavenging animals, birds and mosquitoes act as agents for spreading such diseases. Moreover it pollutes air, water and environment in multiple ways. People of Kerala are

known for their household sanitation level but their environmental sanitation level is surprisingly low. Waste generators within municipal limits can be commonly categorized as Households, Shop Owners, Hotels/Restaurants and Institutions for the purpose of this study. They are the prominent stakeholders in municipal solid waste management. Municipalities of Kerala are struggling to manage solid waste generated within its limits effectively because of lack of expertise and professionalism. Unmanaged waste contaminates drinking water and air consumed by humans and animals. Hence the study is intended to make a comparison among the opinion of these four stakeholders regarding the negative impact of improper solid waste management and the problem is stated as **"A COMPARATIVE STUDY AMONG STAKEHOLDERS REGARDING THE NEGATIVE IMPACT OF MUNICIPAL SOLID WASTE MANAGEMENT IN KERALA".**

3. OBJECTIVES OF THE PAPER

Generally the study is meant to make a comparison of the stakeholders in terms of negative impact of solid waste. The study specifically meant;

1. To make a stakeholders' comparison of the environmental impact of municipal solid waste management in Kerala.

2. To make a stakeholders' comparison of the levels of air, water and noise pollution of the municipalities in the State.

4. METHODOLOGY AND SAMPLING DESIGN

In this study both primary and secondary data are used. Secondary data is gathered from various published sources of Government Departments, other Agencies and Municipal Authorities. For collecting primary data, the study uses Multi-Stage Stratified Random Sampling Method. Out of the total sixty municipalities in Kerala nine are selected for primary data collection three each from South, Central and North Region. As the next 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 negative impact and pollution due to improper solid waste management. 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 tools used for analysis of primary data and hypothesis testing consist of Arithmetic Mean, Standard Deviation, Standard Error and MANOVA (Multivariate Analysis of Variance).

6. NEGATIVE IMPACT OF SOLID WASTE MANAGEMENT

For a critical evaluation of the negative impact of municipal solid waste in the State four key factors namely, Environmental Impact, Air Pollution, Water Pollution and Noise Pollution are identified and used in the study. 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.

Analysis and Interpretation

The study uses Multivariate Analysis of Variance (MANOVA) as the major tool of analysis and it is conducted by using SPSS Software.

Table 1.1 Category of Stakeholders

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

From Table 1.1 it is seen that out of the total 656 respondents 240 belong to Households, 180 Shop Owners, 173 Hotels/Restaurants and the remaining 63 Institutions. Each of these categories are identified after a very critical pilot study as the most prominent groups of waste generators in the municipal limits of Kerala.

Table1.2 Descriptive Statistics

	Category	Mean	Std. Deviation	N
Environmental Impact	Households	47.7917	7.20808	240
	Shop Owners	43.2500	6.23907	180
	Hotels/Restaurants	**49.9769**	3.39451	173
	Institutions	49.8730	5.67533	63
	Total	47.3216	6.54184	656
Air Pollution	Households	21.2000	5.10902	240
	Shop Owners	22.7611	1.40774	180
	Hotels/Restaurants	19.8382	2.51677	173
	Institutions	**22.8095**	2.32002	63
	Total	21.4238	3.68744	656
Water Pollution	Households	**28.3458**	6.24208	240
	Shop Owners	21.3778	6.10628	180
	Hotels/Restaurants	25.3237	2.69568	173
	Institutions	26.2857	4.21376	63
	Total	25.4390	5.97470	656
Noise Pollution	Households	**5.8125**	4.31818	240
	Shop Owners	3.0667	.92513	180
	Hotels/Restaurants	2.1098	.34870	173
	Institutions	2.7619	1.91526	63
	Total	3.7896	3.14751	656

Source: Primary Data

From Table 1.2 it is observed that the Mean Score for Environmental Impact is highest for Hotels/Restaurants which come out to be **49.9769**. Hence it is concluded that as a negative impact,

among the four groups Hotels/Restaurants are suffering mostly from Environmental Impact. Considering Air Pollution the Mean Score of institutions is **22.8095** which is the highest among the stakeholder groups. It represents that Air Pollution as a problem is affecting mostly the Institutions. Households lead in Average Scores of Water Pollution and Noise Pollution with **28.345** and **5.8125** respectively indicating the most affected stakeholder group in this respect.

Now it is the time to test whether these variations are differing significantly for which the study uses F-Test of ANOVA. The following hypotheses are formulated;

H_0: There is no difference in the mean scores of Environmental Impact, Air Pollution, Water Pollution and Noise Pollution among categories of stakeholders in Municipalities of Kerala.

H_1: There is difference in the mean scores of Environmental Impact, Air Pollution, Water Pollution and Noise Pollution among categories of stakeholders in Municipalities of Kerala.

Table 1.3 Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.985	11021.122[b]	4.000	649.000	.000
	Wilks' Lambda	.015	11021.122[b]	4.000	649.000	.000
	Hotelling's Trace	67.927	11021.122[b]	4.000	649.000	.000
	Roy's Largest Root	67.927	11021.122[b]	4.000	649.000	.000
Category	Pillai's Trace	.666	46.451	12.000	1953.000	.000*
	Wilks' Lambda	.447	50.898	12.000	1717.384	.000*
	Hotelling's Trace	.990	53.448	12.000	1943.000	.000*
	Roy's Largest Root	.622	101.226[c]	4.000	651.000	.000*

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 at 5% Level ***(p<0.05)***. So there is significant difference in all four key factors identified as critical issues in municipal limits namely Environmental Impact, Air Pollution, Water Pollution and Noise Pollution. In this context we are rejecting the null hypothesis.

9. FINDINGS OF THE STUDY

1. Considering the four key negative impacts identified in the case of Environmental Impact, among the four groups Hotels/Restaurants lead with an Average Score of **49.9769** indicating that stakeholder group is most affected by the issue**.**

2. Considering Air Pollution the Mean Score of Institutions is **22.8095** which is the highest among the four groups meaning the issue is most affected the Institutions.

3. With regard to Water Pollution, Households lead in Average Scores marking **28.345** which indicate the issue is most intensive among Households.

4. In the case of Noise Pollution also Households lead with a Mean Score of **5.8125** indicating them as the most affected stakeholder group in this regard.

10. SUGGESTIONS

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

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

2. The municipalities should take urgent steps to manage waste in a healthy and environmentally friendly manner so that it should not reach water bodies and ground water sources which in turn is responsible for waterborne and airborne diseases..

3. The residents of Kerala are still in the clutches of NIMBY (Not In My Backyard) Syndrome hence, widespread campaigning should be undertaken by authorities to make inhabitants smart waste managers.

4. Decentralized waste segregation and management should be implemented in a war footing in municipal limits so that waste should be tackled at source of generation. The fundamental principle is not to reach the waste outside the place of generation.

5. Integrated Solid Waste Management (ISWM) system-a well organized system with a holistic design from the very initiation to conclusion of channeling waste without littering or damaging the health or environment-should be practiced for a clean and healthy life in municipal limits.

11. CONCLUSION

Kerala, a high profile state with regard to its democratic and socialistic style of development in the pattern of a welfare based economy is gasping to solve the burgeoning solid waste issues. Being a paradise on the earth its scenic beauty and landscapes are attracting travelers from far distant places. Its growing consumerism, lack of social and environmental commitment leading the state to a stage of man made solid waste disaster. Waste dumping drives to water clogging, contamination of

drinking water sources and ends up with the presence of coliform bacteria in each and every drop of drinking water. Its water reservoirs are polluted with the presence of dangerous bacteria and the air supposed to breath is extremely contaminated. Its high population density adds fuel to fire. Its municipal limits are unhygienic and untidy. The authorities lack professionalism and expertise to handle these high-profile waste issues. As a solution sustainable solid waste management can be carefully planned and implemented to overcome the ever mounting waste puzzle.

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