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Domestic Waste Variation in Different Economical Section: A Review

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Abstract: ***Solid waste generation and characterization are the very important parameters which affects the environment as well as human health. Municipal solid waste (MSW) characterization depends on social structure and income levels in the area. This study aims to determine the variations in waste constituent within MSW by income levels following the analysis conducted on the characterization & quantity of solid wastes produced in the WARDHA city in MAHARASHTRA, INDIA which is the research area of this study.***
Keywords: ***MSW- Income Level, WARDHA City, Maharashtra, India***

I. INTRODUCTION

A. Background Study

Waste management represents a great challenge for local authorities, which have the responsibility to provide the well-mannered collection system and proper treatment of municipal waste. Amounts of waste and characteristics of MSW differ not only from country to country, but also from area to area and neighborhood to neighborhood, even within the same city. These differences depend on socio-economic structure, lifestyle, income level, consumption, and usage habits of people. An efficient system for MSW management requires a good knowledge of the characterization of solid wastes to be carried out & disposed. Physical features of solid wastes are significant parameters for the selection and functioning of collection and transportation equipment, studies related to recoverable matter, as well as selection and design of proper disposal methods.

The top Cities of India are facing two primary challenges-First with disconnecting MSW generation & second with the insufficient collection storage, transportation and final disposal of solid waste by the local municipal bodies. Experiences from the cities of the developed countries suggest that MSW generation is intimately connected with various socio-economic factors like household income, occupation of the city dwellers where hardly any municipality has a role (Khan, Kumar & Samadder 2016). The management of MSW has been a serious environmental issue in many urban areas of developing countries. Improper dumping & burning of waste without pollution control measure is common in many developing nations such as India. Hence, a better solution required for resolving their waste related problems.



Figure 1. Improper Storage of Waste

Waste structure defines all parameters that are effective in decision-making processes about solid waste management. Composition and the amount of solid wastes differ by the source of generation, season, lifestyles of people, social parameters, economic status, habits of the people, and some regulations related to waste and the recoverability of waste. In another characterization study, research was conducted based, on three different income levels (low, middle, high) and suggestions were made regarding waste management.

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B. Collected Data

As per a recent World Bank Report, Global waste generation in a year 2016 was about 2.01 billion tons, which is expected to be increased by 70% from 2016 to 3.4 billion tons by 2050. India is a rapidly growing country, with a 32% growth in urbanization in the past decade. The total MSW generated in 2016 in India was about 52 million tons, which amounts to 0.14 million tons per day (TPD). This number is rapidly increasing with the country's increasing population. Out of this massive waste, only 68% of this waste is collected, and only 19.4% (increase 7% in 3 Year) of the collected MSW is treated. In India, out of the total waste collected only 12.45% waste is scientifically treated, and the rest is disposed-off in open dumps. (CPCB Report, 2013). Open dumping in India caused soil contamination with the transfer of metals to plants and earthworms, leading to severe risk to the environment and human health (Mehta, Shastri and Joseph 2018; Singh at el., 2018).

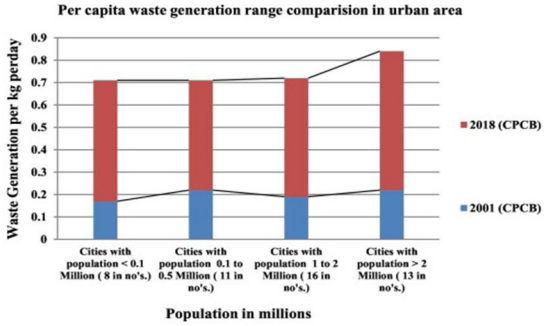


Figure 2. Waste Generation Rates with Population in Urban Area

Waste generation by wards under “Swachh Bharat Mission” (SBM), as of January 2020 in Maharashtra, in 7322 wards found total waste generation is 22,080 MT/D. Due to this deficiency of waste collection and treatment, generated waste is either openly dump in ground or burned in most of these cities. This poor waste management leads to various health risk and environmental issues in urban areas. So, to reduce the amount of solid waste going to the landfills and its associated impacts, proper MSW management and treatment system is critical for India and other developing nations.

The essence of SWM Rules 2016, was to convert the generators of domestic waste to their segregators as well. The municipalities must, therefore, courageous enough to make the household to segregate & store the generated MSW into three categories i.e. Biodegradable (Wet Waste), Non-Biodegradable (Dry Waste) & Domestic hazardous waste in differently colored bins or sacks.



Figure 3. Separation of Waste in Colored Bins

II. LITERATURE REVIEW

In the related literature, studies on characterization of municipal solid waste are common. Additionally, there are also studies frequently conducted towards the economic utilization of wastes and income effect on generation of wastes.

1) Pham Thi Thuy Trang, In his paper “The Effects of Socio-economic Factors on Household Solid Waste Generation and Composition: A Case Study in Thu Dau Mot, Vietnam” Estimated the household solid waste (HSW) generation and composition in Thu Dau Mot city. The study also determined the socio-economic factors influencing the waste generation of the households in the city by using Ordinary Least Square (OLS) regression method. The Research finding indicate that income has a negative significant effect on household waste generation of the household. Higher income people are generating less waste than the lower income people. This study suggests new insights concerning the role of socio-economic characteristics in affecting the generation of household waste in the city.

2) Huseyin Kurtulus Ozcan & Senem Yazici Guvenc in his paper "Municipal Solid Waste Characterization according to Different Income Levels: A Case Study" to determine the variation in waste components within MSW mass by income level and seasonal conditions following the analysis conducted on the characterization of solid waste produced. Considering the differences in waste component based on income level, it was found that organic waste rates & income level were inversely proportional and also results found that Low income level groups generates the Highest organic waste as compare to High level income groups.
3) Ali Kamran, Muhammad Nawaz Chaudhry and Syeda Adila Batool in "Effects of socio-economic status and seasonal variation on municipal solid waste composition: a baseline study for future planning and development" to characterize & to quantify the MSW generated from three different income groups of Shalimar Town, Lahore (Pakistan) during four different seasons of the year & among the three different socio-economic level. It is concluding that low income group produces the minimum of waste in each of the four season as compare to the high income group. Food waste had the largest value in all the income groups. The results also show that there is positive correlation between the economic status & MSW generation. This study shall be helpful in minimizing the human health risks associated with waste management.
4) Abhishek Dutta & Wanida Jinsart in "Waste generation and management status in the fast-expanding Indian cities" says that the standard of living increments were associated with an increase in MSW generation per capita.
5) As per capita, MSW generation in India was on the rise with the rising economic power of the people (Gupta & Arora 2016).
6) Chavan and Zambare have also observed that the essential inadequacies of SWM in India are in treatment methods and techniques. In his paper, "Sustainable Solid Waste Management in India," Annepu7 explores ways to reduce the quantity of solid waste generation. In Mumbai alone, the open burning of solid wastes and landfill fires emit nearly 20,000 tones per year of air pollutants on land. Amongst other ways to reuse waste, such as by creating fly-ash bricks, Annepu recommends the integration of informal recycling into the formal system by training and employing waste-pickers for the door-to-door collection of waste, and allowing them to sell out the recyclables they collect.
7) Satpal Singh & Shyamala Mani In their paper, "Sustainable Municipal Solid Waste Management in India: A Policy Agenda," suggest that the policy agenda for sustainable SWM needs to drive developmental change amongst citizens, elected representatives and decision-makers to minimize waste and maximize reuse and recycling. There is also the study of the SWM system in urban India, it finds the failure of ULBs (Urban Local Bodies) in providing proper SWM service and the general lack of awareness to be the main reasons for poor waste management in India. Thus, the rationale for encouraging private-sector participation (PSP - PlayStation Portable) is to gain efficiency, expertise and technology, not finance. If the private sector provides higher standards of waste management service at the same cost, or equivalent service at a lower cost.
8) Yay analyzed the management of solid wastes in the province of Sakarya. To this end, a ton of solid waste samples were collected during the period of one year and suitable waste management suggestions were made.
9) Banar and Ozkan characterized solid wastes in the province of Eski¸sehir based on different income groups. In their study, they divided the province into three income groups i.e. low, middle, and high income groups and determined the proportions of solid waste components based on these income levels.
10) Gómezetal, determined the seasonal changes in the characteristics of solid wastes. They investigated the city in three different socio-economic categories level in their characterization study.

III. OBJECTIVE

The objective of this study is to quantify and to identify the MSW generated from three different income groups of WARDHA City, (Maharashtra) India, among three different socio-economic levels (income groups).

Solid waste samples were collected to represent three different lifestyles (high, medium, and low income levels), and Quantity & characterization was made on these samples. For planning and execution of a sustainable integrated municipal solid waste management, quality and quantity of MSW should be known. The study shall be helpful in reducing the human health risks associated with solid waste management. An efficient system for MSW management requires a good knowledge and social awareness of the characterization of solid wastes to be disposed. Physical features of solid wastes are significant parameters for the selection and functioning of collection and transportation equipment, studies related to recoverable matter, as well as selection and design of proper disposal methods.

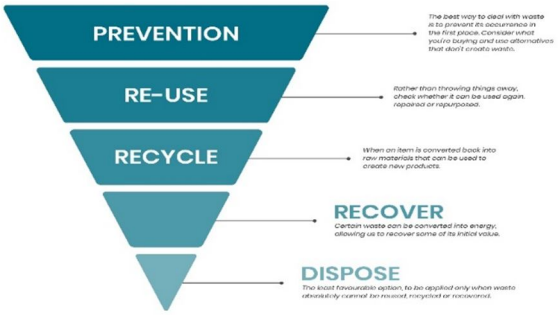


Figure 4. Domestic Waste Hierarchy

IV. FURTHER RESEARCH DIRECTION

Introduced a new approach to quantify and qualify the municipal solid waste by using a Google form sheet filling by respective household persons in the area where to be surveyed. For an effective and efficient municipal solid waste management, this survey should be carried out monthly as well as annual basis with no extra cost required for carried out this survey. These approaches reduce the time and save a lot of money required for evaluating the quantity of generation waste. This sheet includes a very simple questions to understand each and every person filled with its own knowledge & correct manner. The paper indicates that population of Indian cities are growing economically but in an unsustainable way. In this paper, we have also indicated that the city municipalities must practice the concept of "generators as segregators" principle to control and plan the MSW management process efficiently

V. DISCUSSION

The city would definitely face with so many problems in terms of pollution and health if the local waste management system authority cannot cope with the volumes of solid wastes being generated. To partially control the situation, it is necessary to have precise data about the quantity of waste generated and types of household solid waste (HSW) being generated in the city as waste, as well as the factors which are responsible for household waste generation. When the influential factors can be identified, it could be helpful for the environmental planners in their decision-making for managing waste and environmental pollution for WARDHA city. The city municipalities are helplessly witnessing untreated waste lying for months & years at dumpsite. The reported case of contaminated waste dumping site rising concern towards imminent health hazards for the city dwellers. To counter this major issue of the waste related to health hazards, the municipalities in the city first required to launch "Generators as Segregators" program for efficient & effective handling of generated solid waste followed by pay-as-you-throw system to let down waste generation without any delay. This paper considered economic feasibility & public support as the key factors for the implementation of SWM schemes, along with technological advancement & ecological impact. In the given results obtained in this study it was shown that solid waste, and especially the packaging waste in the structure of solid waste, may be reclaimed for the economy by efficient and effective waste management planning. Considering the methods implemented in the study area, increasing separate collection activities in the region will not only increase the amount of the collected packaging waste and the profit margins of licensed firms, but also decrease the total Sustainability amount of waste sent for disposal. Therefore, while providing better opportunities to used solid waste material as a secondary raw material, this caused total waste disposal costs will decrease. Determining the characterization of waste is the most important parameter of integrated waste management system. This type of study should be conducted more often to observe the improvement of MSW management systems and minimize the total amount of generated MSW.

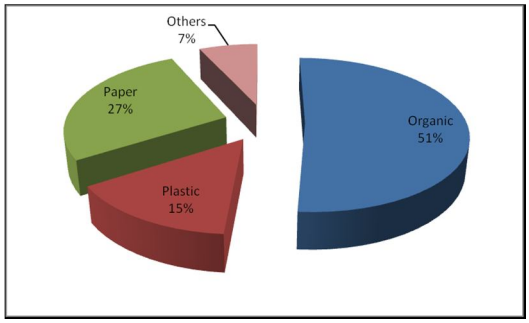


Figure 5. Average Composition of Domestic Waste

Therefore, household with a higher economic status more frequently dine out more often than cooking at home, while households with a lower income and economic status depend mainly on cooking at home for their meals. In addition, the city is characterized by industrial activities; most sustainable income households have members working in shift, so they frequently have lunch and dinner at working places. That explains why higher income household generate less waste compare to lower income families. Education has positive but insignificant effect on domestic waste generation.



Figure 6. Kitchen Waste (Food Waste)

VI. CONCLUSION

From the previous study, determine the differences in component in the solid waste composition in a region based on income level & seasonal conditions. In another research finding indicate that income has a negative significant effect on household waste generation of the household. Households who are more concerned & aware about the environment would have generated less waste. Household with a higher economic standard more frequently dine out more often than cooking at the home, while households with a lower income level and lower economic standard depend mainly on cooking at home for their meals. This cause relate to the main problems and conclude that higher income people are generating less waste than lower income people. The study used a retrocession model to determine the dominant factors that might influence the HSW generation of the households and its composition in the area. In other study conclude that low income group produces the minimum of waste in each of the four season. The result also show that there is positive correlation between the economic status & MSW generation, because MSW generation has radically increased with the increased in economic growth, population as well as with the upsurge in living standard in the semi-developing countries.

Another results as, in the findings obtained from the solid waste characterization analysis, the following rates of different types of waste were found: organic waste: 57.69%; package waste: 26.53%; other burnable wastes (fabric, diaper, shoes, slippers, pillow, carpet, rug, bag): 8.01%; park and garden waste: 2.93%; electrical and electronic equipment waste: 1.23%; and hazardous waste: 0.19%. Considering the differences in solid waste components based on income level, it was found that generation of organic waste rates and income level were inversely proportional. The highest organic waste rate was found in the region having the lowest income level. The recyclable MSW rate was calculated as 26.53%. Comparing the rate of package wastes to the mean value of the rates for Istanbul (34.27%), it was found that there was a difference of 8%.

VII. ACKNOWLEDGMENTS

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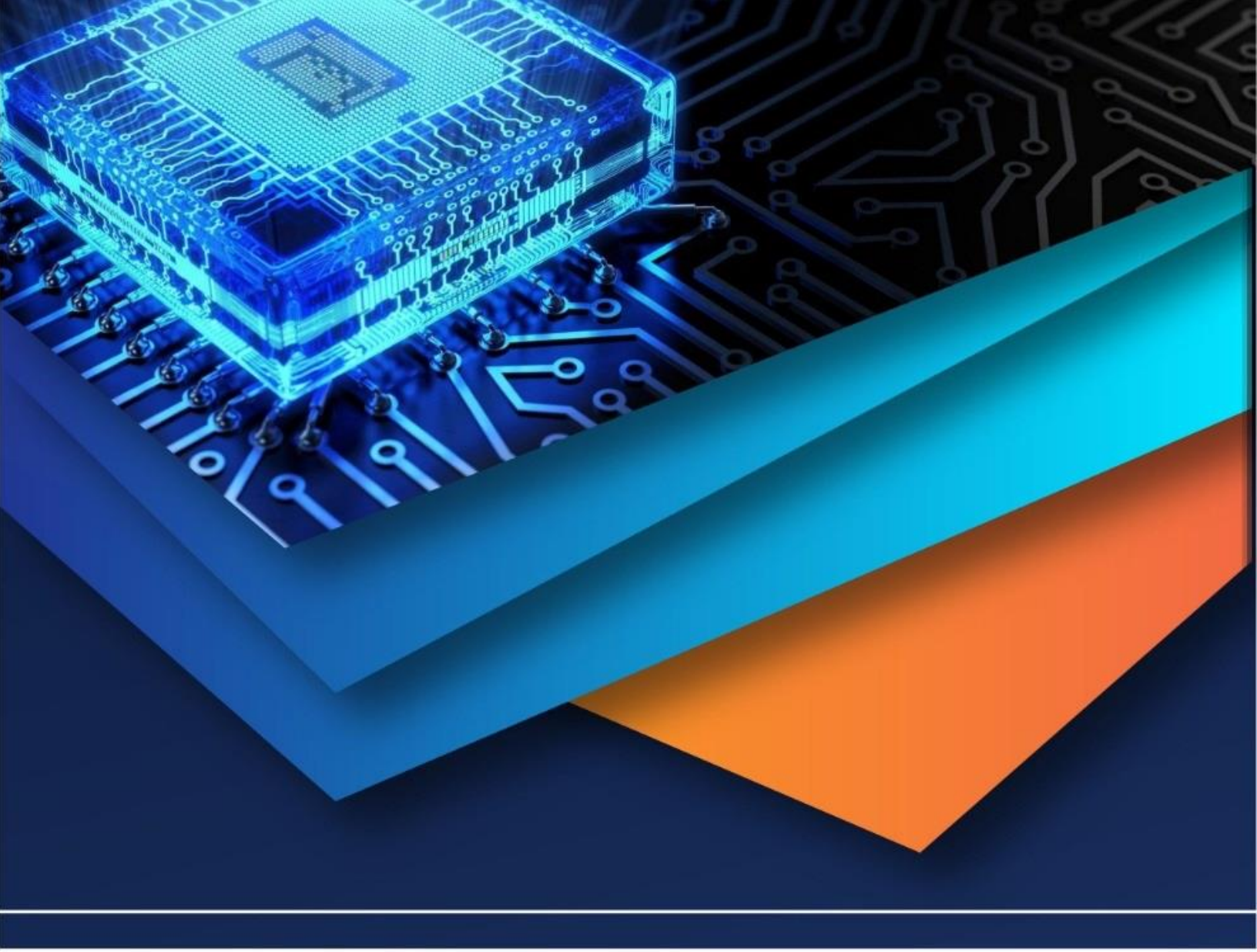
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