A STUDY ON SOLID WASTE MANAGEMENT WITH A SPECIAL FOCUS ON THE POLICIES OF THE CENTRAL AND THE STATE GOVERNMENT (TELANGANA)

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ABSTRACT: *The carefree and negligent attitude of humans has led to a dangerous and threatening situation to life and the environment at large today. A major one of this has been the disregard towards solid waste generation and its treatment. Solid Waste generation is an essential by-product of human activity. Its negligence has resulted in the whole world facing a menacing challenge while also leading to the ignorance of the notion of sustainable development. The generation of million tons of solid waste per capita is growing almost at a double rate every five years, mainly due to rapid urbanization, changing lifestyles, swift population growth, a solid increase in industrialization, insufficient availability of resources, and a rise in earning capacity and living standards of the people. This hasty increase in the generation of solid waste and improper solid waste disposal and management has triggered a challenge to various economies of the world and human life at large. With this view, the following article tries to show a suitable flow of activities and pressurized source segregation in the best holistic manner which can lead to efficient and healthy solid waste management and might produce opportunities in multiple ways.*

Keywords: *Solid waste, improper disposal of solid waste, vital by-product, source segregation, holistic management, sustainable development.*

INTRODUCTION

Solid Waste generation is an essential by-product of human activitycaused by the daily routine of human life.The speedy urbanization, rapid population growth, and a solid increase in industrialization have directed a momentous increase in the generation of solid waste. During the earlier times, the same waste generated was relatively small and was primarily biodegradable making it a non-pest and not a source of causing diseases. However, in today's modern world with the present generation, factors like high living standards and technological advancement in every sector have led to the generation of waste in larger amounts which are not only hazardous to human health but also non-biodegradable, making it poisonous for the environment. The waste generated presently is causing more damage to the mother earth within its major elements, which arethe soil, water, air, and wildlife habitat. The per capita generation of million tons of solid waste is getting doubled every five years.

This hasty increase in the generation of solid waste has triggered and brought about the imminent challenge to human life i.e., the management of solid waste, making it a chaotic concern for various economies.The management of solid waste is a combined effort and responsibility of the Government of the country and its residing citizens. It should be prioritized by every country to reduce the continuous harming effect on the environment. This effort will be effective and

operational only with holistic participation and combined efforts of every citizen and member involved in its generation, collection, transportation, disposal, and treatment of solid waste. Each member of the community must participate and actively engage themselves in proper solid waste management by attributing their concern and willingness to reduce, reuse and recycle the generated solid waste.

REVIEW OF RESEARCH AND LITERATURE

Ashwani Kumar, Gaurav Dixit, and Dolonchapa Prabhakar (2016)-The research was done to provide a deeper outline of factors, matters that relate to Municipal Solid Waste Management (MSWM) in the Punjab region and to analyze the various key factors that play a dynamic role in improvingthe productivity of municipal waste management. The study recommended proper collection centers are required for waste collection and more focus must be on the disposal of waste by evolving a wide range of landfills and maintaining the existing landfilling methods. Further efforts of reducing municipal solid waste must be done throughtechnological solutions of disposal and collection and increase common public sensitivity through more education and awareness on municipal solid waste.

Brijesh Kumar Pandey, Savita Vyas, Mukesh Pandey, and Anurag Gaur (2016)-The study was conducted to show municipal solid waste as a budding source of renewable energy. In this process of proving the above thought, an effort has been made to provide a limited way of power generation that derives power from municipal solid waste. This study proposed the adoption of various techniqueswhich rest on many aspects such as geographical patterns, type of waste produced, demographical patterns of the site, and living standard of people. So, it is likewise not practicable to come up with a general capital investment of definite technology.

T.V. Ramachandra, H.A. Bharath, Gouri Kulkarni, and Sun Sheng Hand (2017)The exploration was led in Greater Bangalore in 1967 households in direction to know the solid waste generation, composition, GHG emissions, and its treatment by the competent authorities. Various demographic factors were considered for the study and the relationship between the demographic and socioeconomic factors and waste generation was estimated. Finally, the study proposed the setting up of decentralized waste treatment centers and the enactment of purposeful elements in each stage of the solid waste management process.

Salma Sultan (2017)Theresearch was done to illustrate a synopsis of the prevailing municipal solid waste management practices from the universal to national and national to local level perceptions in locus to the Indian cities. Specific prominence has also been put on to assess the inclusive solid waste generation and management services practiced by the Indian municipalities. It concluded that despite various constructive initiatives taken by the Indian government the state of solid waste management is far-off from an acceptable level and there is an earnestness to discourse on the issue or downsides of solid waste management by including every single solid waste generator.

Prathibha Ganesan (2017) This study is based on a sample survey of 175 households located in the landfill sites connected with two Municipal Corporations, viz. Thrissur and Kochi, Kerala. It observed some issues accompanying the centralized waste management system and how urban local bodies tackled the struggle against centralized waste management. It clinched that strong substitute methods like decentralized waste management are preferred when the struggle is strong, and where the struggle is feeble there is a predisposition to maintain the centralized waste management system.

NEED AND IMPORTANCE OF THE STUDY

The global world today is developing at a rapid stage along with the degradation of the environmental and natural resources. This has led to ignorance of the notion of sustainable development and proper solid waste management. Economic and environmental sustainability will be a result of better management of solid waste and further cause no threat to human and animal life.

Waste generated during the early times was small in amount and relatively biodegradable and a non-source of causing diseases. However, the modern world today, with its digital generation grows up with high living standards and advancements in every sector, leading to the generation of waste in larger amounts making it most hazardous and non-biodegradable harming the mother earth's elements that are soil, water, air, and wildlife habitat.

Thus, to address the issue of environmental problems and threats to human life, it is necessary to take an initiative to manage solid waste in the best possible way to reduce the negative effect on earth and earth life. Lastly, proper solid waste management, reusing, recycling, and reducing the generated solid waste into some wealth will conserve our planet earth and give the legacy of the natural beauty to the future generation which is a duty and responsibility of the present generation.

OBJECTIVES OF THE STUDY

The objective of this study is:

1. To understand the solid waste management in India.
2. To present and analyze the solid waste management policies of the Central and State government

CONCEPT AND SOURCES OF SOLID WASTE

The term solid waste refers to unwanted and useless solid waste generated from human activities. In other words, solid waste is termed as any non-liquid waste, trash, leftover, or garbage generated from human activities. Solid waste is generated from various sources or numerous human activities. The following table shows the various components of solid waste based on the source of the generation of the waste.

Table- 1: Sources and Composition of waste

Source of Waste Generated	Places	Composition of Waste
Residential	Independent houses, Apartments, and Gated communities	Kitchen waste, plant waste, paper, and cardboard waste, clothes, metal, E-waste, plastics, pooja waste, hazardous waste, construction, and demolition waste.
Industrial	All types of industries-micros, small, medium, and large enterprises.	Hazardous waste, plastics, cardboards, metals, glass, textiles, E-waste, etc.
Commercial	Malls, restaurants, hypermarkets, grocery stores, hardware stores, hotels, etc.	Food waste, paper, plastics, metals, e-waste, cardboard, etc.
Institutions	Schools, colleges, training centers, government offices, and hospitals.	Paper, cardboard, processing waste, hazardous waste, plastics, etc.
Municipality	Parks, roads	Green and plant waste, construction, and demolition waste.

Source: Google

CONCEPT OF SOLID WASTE MANAGEMENT

The term solid waste management refers to the various activities and actions required to manage the generated solid waste from its source to the final disposal to reduce and eliminate the antagonistic effect on human life and the environment. The solid waste management practices are heterogeneous.

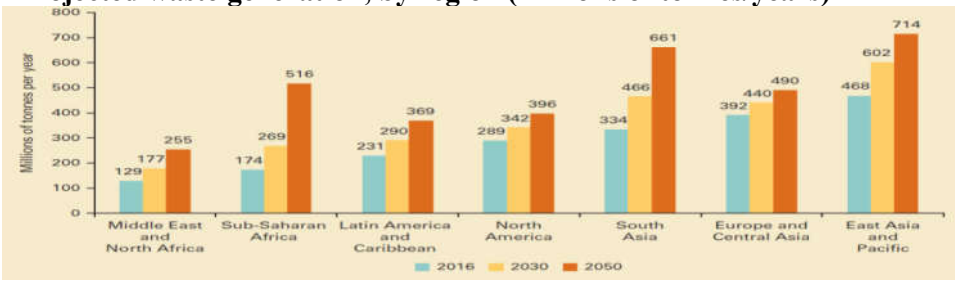
The practices differ from one country to another country, one sector to another sector, one region to another region, etc., as they may take different approaches which will be the best possible way in dealing with solid waste to condense and eradicate the destruction and threat to human life and environment.

The most common method used by various countries in solid waste management is as follows:

SOLID WASTE MANAGEMENT AT THE GLOBAL LEVEL

The world generates 2.01 billion tonnes of municipal solid waste annually, with at least 33 percent of that being extremely conventionally not managed in an environmentally safe manner. Worldwide, waste generated per person per day averages 0.74 kilograms but varies widely, from 0.11 to 4.54 kilograms. However, they only account for 16 percent of the world's population; high-income countries generate about 34 percent, or 683 million tonnes, of the world's waste. In the forthcoming future, global waste is expected to rise to 3.40 billion tonnes by 2050, more than double population growth over the same period. East Asia and the Pacific region are generating most of the world's waste, at 23 percent, and the Middle East and North Africa region is producing the least in absolute terms, at 6 percent. However, by 2050, in the fastest-growing regions like sub-Saharan Africa, South Asia, the Middle East, and North Africa, waste generation capacity is expected to be more than triple, double, and double respectively.

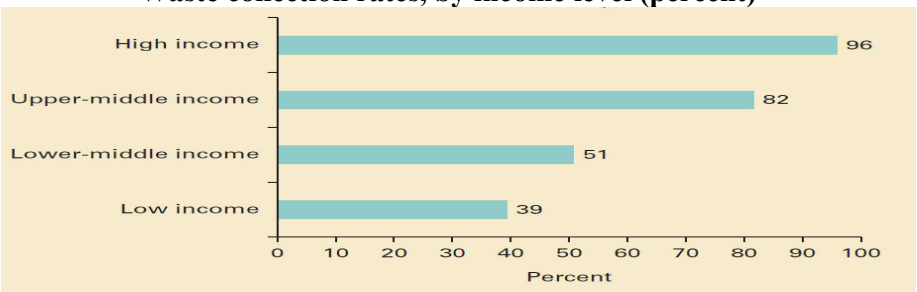
Projected waste generation, by region (millions of tonnes/years)



Source: What a Waste 2.0, World Bank Group.

Waste collection is a serious step in managing waste. Across regions, sub-Saharan Africa collects about 44 percent of waste while Europe and Central Asia, and North America collect at least 90 percent of waste.

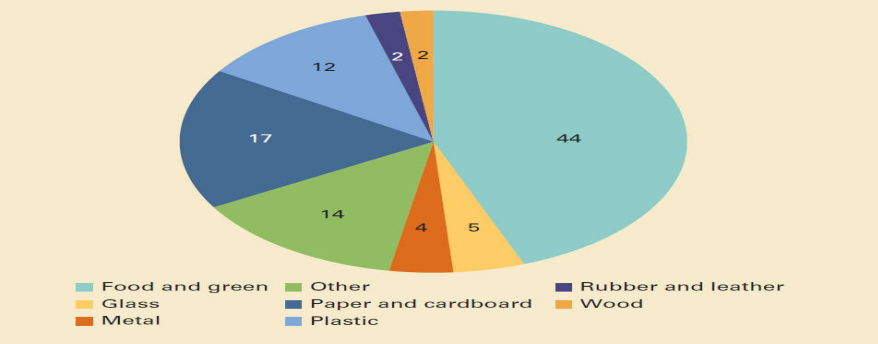
Waste collection rates, by income level (percent)



Source: What a Waste 2.0, World Bank Group.

Waste composition across the globe differs based on the living standards, food habits, and income levels among the people. The higher the income and living standards of the people the more generation of non-biodegradable waste and vice-versa.

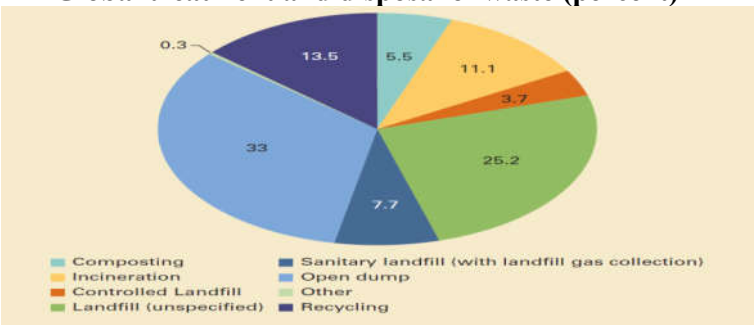
Global waste composition (percent)



Source: What a Waste 2.0, World Bank Group.

It is a misapprehension that technology is the solution to the problem of unmanaged and increasing waste. Globally, most waste is currently disposed of in some form of a landfill. Some 37 percent of waste is disposed of in some form of a landfill, 8 percent of which is disposed of in sanitary landfills with landfill gas collection systems. Open dumping accounts for about 31 percent of waste, 19 percent is recovered through recycling and composting, and 11 percent is incinerated for final disposal. Three regions openly dump more than half of their waste—the Middle East and North Africa, sub-Saharan Africa, and South Asia.

Global treatment and disposal of waste (percent)



Source: What a Waste 2.0, World Bank Group.

Based on the size of waste generated, its composition, and how it is managed, it is projected that 1.6 billion tonnes of carbon dioxide (Co_2) equivalent greenhouse gas discharges were generated from solid waste treatment and disposal in 2016, or 5 percent of global emissions. This is determined primarily by disposing of waste in open dumps and landfills without landfill gas collection systems. Food waste accounts for nearly 50% of emissions. Solid waste-related emissions are anticipated to increase to 2.38 billion tonnes of Co_2-equivalent per year by 2050 if no improvements are made in the sector.

Financing solid waste management systems is a substantial challenge, even more so for ongoing operational costs than for capital investments, and operational costs need to be taken into account. Waste management is labor-intensive and costs of transportation alone are in the range of $20–$50 per tonne. User fee models may be fixed or variable based on the type of user being billed. Typically, local governments cover about 50 percent of investment costs for waste systems, and the remainder comes mainly from national government subsidies and the private sector.

A STEP TOWARDS A CLEAN AND GREEN ENVIRONMENT

a) Policies and Initiatives Taken By the Indian Government

Currently as per the information on municipal areas the country generates 1, 33,760 metric tonnes per day of municipal solid waste (MSW), of which only 91,152 TPD waste is collected and 25,884 TPD treated. The Ministry of Environment, Forest, and climate change has notified the Municipal Solid Wastes (Management and Handling) Rules, 2000 for the management of municipal solid waste. The prominence is on the management of the waste through a sustainable business model which includes segregation of municipal solid waste at source, door-to-door collection by involving waste collectors, and processing of segregated waste into useful products such as methane, compost, etc. The municipal authorities have been made responsible for setting up, operationalization, and coordinating the waste management system and for ensuring safe collection, storage, segregation, transportation, processing, and disposal of plastic waste. The Ministry regularly provides financial assistance to create awareness of the various provisions of these Rules.

It has been observed that the waste processing and disposal facilities in the majority of states are not working effectively. It is observed that after 2 years of notification of the Solid Waste Management Rules, 2016; State policy and strategy for implementation of the Solid Waste Management Rules, 2016, have not been formulated by most States/UTs. There is a lack of coordination between UDDS, ULBs & State Pollution Control Boards, and other concerned agencies, who are involved in the Implementation of SWM Rules, 2016. It has been observed that most of the dumpsites are unscientific and operating without following SWM, Rules. The mixed MSW is dumped on dumpsites causing environmental & health hazards and often leading to open fires. Besides, as per SWM Rules, 2016 Landfill sites should preferably be used for depositing inert waste and rejects. To develop clean and safe cities, the government of India brought some initiatives under the Swachh Bharat Mission such as Liveability Index, Seven-star Rating, and Swachh Survekshan. These three initiatives mainly focused on solid waste management and urban sanitation to improve the living standards of the people and make India a clean and safe place to live in.

Municipal Solid Waste Management: The status of the Solid Waste Management in the 16 States based on the information provided by the SPCBs & PCCs, is given below:

- Solid Waste Generation: 54417.385 TPD (tonnes per day)
- Solid Waste Collection: 45082.15TPD
- Treated l: 15386.81 TPD
- Land filled: 22904.70 TPD
- Total Landfill Sites operational: 21.

b) Policies and Initiatives Taken By the Telangana Government

As the State of Telangana moves toward its economic future, the number of various types of solid waste, one of the most important by-products of urbanization & industrialization, is growing even faster than the rate we are anticipating. The generation of solid wastes is directly linked to economic development. As per the information provided by the office of the Commissioner & Director, Municipal Administration, Telangana State there are 73 Urban Local Bodies (ULBs) existing in Telangana State and among them, 12 Nos. are Class-I Municipalities. The total quantity of waste generated by Urban Local Bodies (ULBs) of Telangana has increased from 5455 MT/day in 2008 to 7871 MT/day in 2017. Whereas the quantity of waste processed has increased from 2481 MT/day in 2014 to 4895 MT/day in 2017.

Table -2: The process of solid waste management in Telangana

S. N0.	Parameters	Compliance Criteria
1	Collection of municipal solid wastes	House to House collection of MSW has been started in all the local bodies in the State. As per the information furnished by the Commissioner & Director of Municipal Administration 98% of households are covered under the door-to-door collection.

2	Segregation of municipal solid wastes	About 15% of households in the State are covered under source segregation.
4	Transportation of municipal solid wastes	In Hyderabad, most of the MSW is transported in covered vehicles. In other municipalities, the waste is transported in trucks covered with nets to avoid scattering.
5	Processing of nunicipal solid wastes	• Compost plant established 20 municipalities The details of waste to energy plants set up in those states to produce energy a) 19.8 MW Capacity at Jawahar Nagar — Earth work for the plant has started. It is expected to complete by March 2019. b) 11 MW Capacity Chennaravulapally, Bibi Nagar— undergoing pre-commissioning activities. c) 12 MW Capacity Permission for granting an extension of time to the agency (M/s. SVGPPL) for entering into PPA. with TSSPDCL is under examination of GHMC/ d) The Government of Telangana has also enteredMOU with the Government of Japan through Clean/ Authority of Tokyo (CAT23) for the establishment of an Advance incineration plant at Warangal and surrounding areas of GHMC and the studies are under process.
6	Disposal of municipal solid wastes	The Greater Hyderabad Municipal Corporation (GHMC) hasconstructed the sanitary landfill facility and operating the same. The rest of the ULBs are dumping the MSW in the existing dump sites.

SOURCE: TSPCB (Telangana State Pollution Control Board)

Initiatives taken by the Government of Telangana to improve efficiency in solid waste management are:

- **Swachh Auto Tippers:** 2000 Swachh Auto Tippers were launched across Hyderabad city for increasing the efficiency of the House-to-House Collection of Wet & Dry Garbage. The introduction of these autos has seen an increase of 1200MT extra garbage being collected daily. The autos have aided the removal of 1116 open garbage points across the city contributing to a cleaner Hyderabad.
- **Dry resource Centres:** Dry waste collected by Swachh autos has a huge potential as recyclable waste. GHMC has 24 transfer stations wherein segregated waste is brought by Swachh auto tippers, dry resource centres can be facilitated at all these locations. We are partner with **ITC and Godrej** who are spending the 24 DR Centres and are also involved in the intensive segregating program for dry resources and sanitation program.
- **Organic composters:** Wet waste can convert to organic manure for use in our parks and roadside greenery. Two-thirds of the waste generated is wet waste. GHMC has installed about 3 small composting units in its parks so far. GHMC introduced 7 organic composter centres in many hotels and companies, current partners are Google and Ramsey.

ROLE OF WASTE GENERATORS TOWARD HOLISTIC SOLID WASTE MANAGEMENT

Solid waste management must be the priority concern of every country to reduce the adverse effect on the environment and to protect the mother earth for future generations. Solid waste management will be effective and operational only when there is holistic participation of every member or citizen involved in the generation, collection, transportation, disposal, and treatment of solid waste. Holistic

participation here implies that every person must actively engage themselves in proper solid waste management by attributing their concern and willingness to reduce, reuse and recycle the generated solid waste. Any person may use these recycled wastes as a joint product or by-product to increase the worth of the waste product. Therefore, to understand and analyze the role of waste generators on holistic solid waste a management primary research was conducted to find out their opinion on the same.

SCOPE AND PERIOD OF THE STUDY

The study explores, exclusively the legal and institutional framework of solid waste management of the Central and Telangana governments. It concentrates on the composition of solid waste. It includes the study of current practices of solid waste management among households.The time factor is limited to 3 months (data collected during) and is confined to one locality in Hyderabad, Telangana.

RESEARCH METHODOLOGY

This study is based on secondary data. The secondary data was gathered from various authenticated sources such as websites, newspapers, E- NEWS applications, etc.

RESEARCH FINDINGS

Following are the major finding that emerged from this study:

1. This study disclosed that at the moment, several countries across the globe and exclusively developed and developing countries have awakened and recognized the novel and threatening issue of solid waste management as a serious problem to be tackled and are scheduling out proper solid waste management to endorse and achieve sustainable development. The study also revealed that the current practices of solid waste management have a few drawbacks like lack of sophisticated technology, financial and other resources, and cooperation between the general public and authorities.
2. Like various economies of the world the Indian government too recognized the issue of solid waste management and its threat in the last decade and took various initiatives to improve the efficiency of solid waste management but didn't reach the efficient target due to lack of coordination between various levels of authorities. Under the policy of the Indian government, the state government of Telangana published a solid waste management policy in October 2018 for the effective implementation of "Solid Waste Management Rules," 2016, and outspreading necessary support to urban local bodies due to the high density of population in urban cities. By taking various initiatives in solid waste management the Telangana state is still in the drive to reach 100% effective solid waste management.

SUGGESTIONS

It is recommended that the government should devise policies to implement and encourage the varied measures. Integration of the Annapurna scheme with the SWM RULE through a barter system of food for plastic by installing a coupon system formatted with the use of AI in the form of weight weighing machine. Other local authorities and waste generators must also pressurize on segregation of domestic waste at the source to facilitate effective and efficient treatment and disposal of waste. Thus, source segregation will facilitate the collection of waste on different days via different collectors-based segregation.

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