

An Analytic Comparison between Different Countries Solid Waste Management

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ABSTRACT: Solid wastage management is process related with the controls of the storage, generation, collection, transfer or transport, disposal and processing of the solids waste things in manner that the best address ranges of conservation, public well-being, aesthetic, economic, engineering, as well as different environmental considerations. This paper analysis in different countries of solid waste and solid waste management. The paper analyzed many data such as types of waste composition in United States values in percentage in United States and in India. the total waste generated in tones per day in different cities) also analyzed in this paper which gives details about the which city is produce more solid waste and the various techniques which is use for solid waste disposal in united kingdom, united kingdom and Germany. The waste of solid is increasing in world and it is further increasing at greater rates and in orders to solve the worldwide problem world need wastes management systems of future which'll more well-organized in the any aspects including energy efficiencies, volumes of the waste treatments as well as an increase usage of the robotic technology in its place of people whose suffers from the disease cause by emitted pollutant.

KEYWORDS: Disposal, Management, Solid Waste, Solid Techniques, Waste.

INTRODUCTION

Waste managements are essential strategic prerequisite for cleaner resources and cleaner cities. Reduced electricity and water use, as well as a detrimental effect on the atmosphere, necessitate cutting-edge technologies Waste management refers to the processes and acts that must be undertaken to handle waste from their inception to their ultimate disposal [1]. MSW (Municipals Solid Wastes) reduction could be aided by policies focused on the market functions, while existing MSW industries and businesses contribute to recycling as well as energy generation. Although city manager intervention concerns could both technological and social, efficiency enhancement as a result of the system optimization may also meet the cleaner target. The activity which involves in solid wastes management have group into 6 functional element:

- Collection
- Recovery and Processing.
- Disposal.
- Transport and transfer.
- On site handle, processing and storage.
- Wastage generation.

The inter relationship between useful element is shown below in the Figure 1[1].

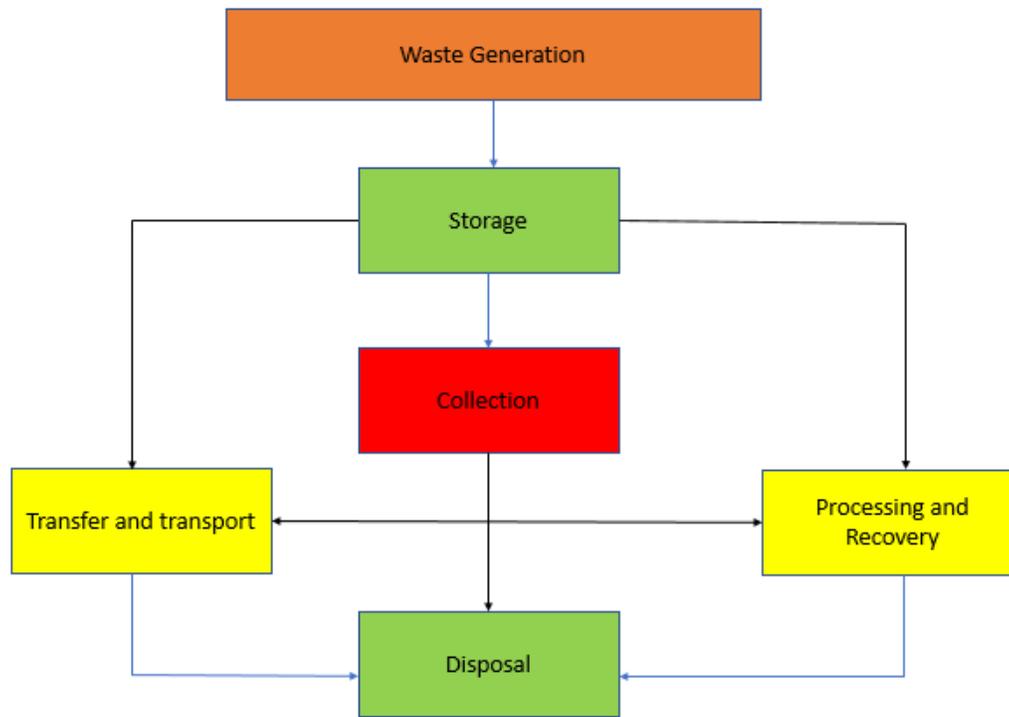


Figure 1: Inter relationship of the functional element including Solid Wastes Management Systems.

Solid wastes are defined as useless or unwanted solids material generate from the human activity in the residential, commercial or industrial areas[2]. Waste may be categorized base on the material like papers, plastics, metals, organic wastes, and glasses. Categorization may also be based on radio actives, hazard potentials, infectious, flammable non-toxic or the toxic wastes.

Categories also relate to source of waste whether domestic, industrial, institutional commercial, and demolitions. They’ve several solid waste disposals existing in world because of high use of solid material by human. The Table 1 shows the types of waste composition (Food Scraps, Yard Trimmings, Paper, Plastic, Metals, Textiles, Rubber, and Leather, glass wood and others) value in percentage in United States of America in year 2001.

Table 1: Types of Waste Composition in United States Values in Percentage in Year 2001.

Types of Waste Composition in United states	Value in Percentage
Food Scraps	11.8
Yard Trimmings	12
Paper	35.3
Plastic	11.2
Metals	8.1
Textiles, Rubber, and Leather	7.2
Glass	5.2
Wood	5.9
Others	3.4

The Figure 2 shows the pie chart of different type of waste disposal value in percentage in the United States. From the pie chart it is clearly shows that the minimum value of waste disposal is 4 percent as compared to the other type of solid waste and the maximum value of waste disposal is 35.3 percent which is disposal of paper as shown in pie chart.

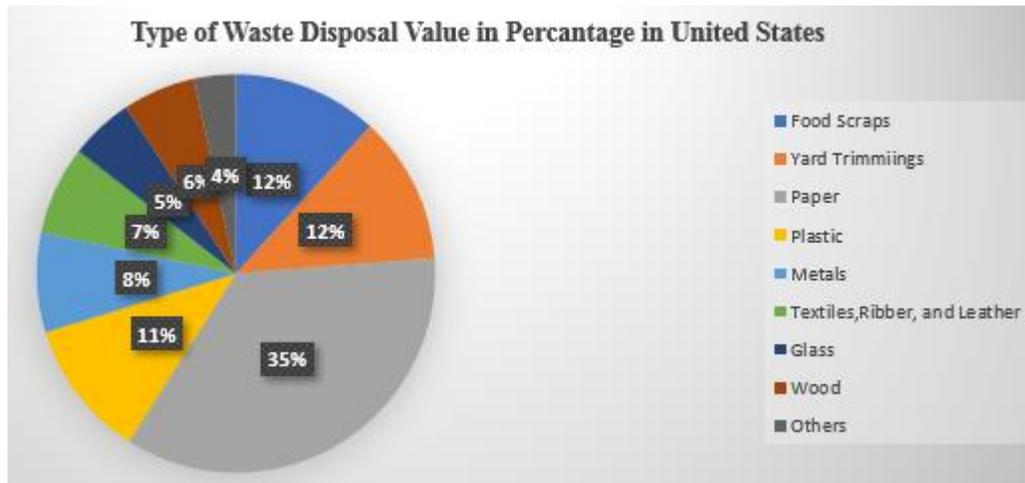


Figure 2: Pie Chart of Types of Waste Composition in United States Values in Percentage.

Garbage arising from human activities, that is throw unwanted and useless is referred as solid waste[3]. The waste of different materials is inside the India also increasing day by day because of more usage and wastage of impossible materials. The Table 2 shows the types of waste composition (like Inert, Paper, Plastic, Metals, and Textiles) value in percentage in India in year 2003.

Table 2: Types of Waste Composition Value Percentage in India in 2003.

Types of Waste Composition in India	Value in Percentage
Compostable	40
Inert	41
Paper	7
Plastic	3
Glass	2
Metals	3
Textile	3

The Figure 3 shows the pie chart of type of waste disposal value in percentage in the India. From the pie chart it is clearly shows that the minimum value of waste disposal is 2 percent which is by glass solid waste and the maximum value of waste disposal is 41 percent which is disposal of paper as shown in pie chart. This shows the maximum value of disposal in both United States and India is by paper solid waste but in United States the value of paper disposal is 35 percent but in India the value of paper disposal is 41 percent.

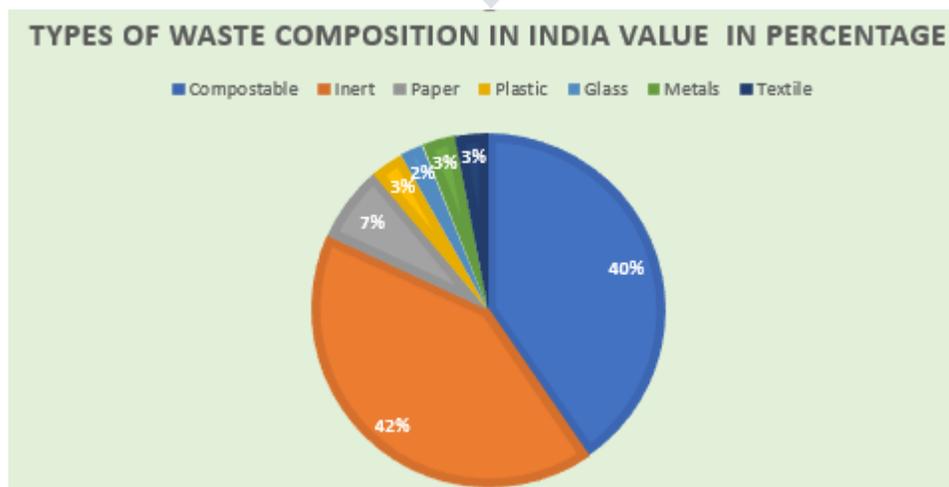


Figure 3: Pie Chart of Types of Waste Composition Value in Percentage in India in Year 2003.

Rapid growth in urbanization and per capital income in the India significantly led to the increase in public solid unwanted generation in country. There are many cities in India which produce large amount of solid waste. The Table 3 shows the Total Waste generated in tones per day in different cities (Ahmedabad, Hyderabad, Bangalore, Chennai, Kolkata, Delhi and Mumbai).

Table 3: The Whole Waste Generate in Tons in One Day in Different Cities of India.

City	Whole Waste generate in Tons in One Day
Hyderabad	4250
Ahmedabad	2350
Chennai	4550
Bangalore	3750
Delhi	5850
Mumbai	6550
Kolkata	3675

As shown in Figure 4 The bar graph shows the entire waste produced in the tons per day is maximum in Mumbai which is 6550 tons per day and the entire waste produced in the tons per day is minimum in Ahmedabad which is 2350 tons per day.



Figure 4: Bar Graph of complete Waste Generate in Tons of the One Day in Different Cities of India.

There are lots of wastage which is present inside the earth for their management Although United State represents 4 percent of global population, it accounts for twelve percent of the worldwide public solid unwanted generation. There are lots of techniques which is use for disposal of solid waste. The Table 4 shows the various techniques (Recycling, Landfill, Incineration and composting) which is use for the solid unwanted disposal in United States.

Table 4: Various Techniques Values in Which is Use for Solid Unwanted Disposal in the United State.

Solid Waste Disposal Techniques	Value in Percentage
Recycling	25
Landfill	54
Incineration	13
Composting	8

The Figure 5 shows the pie chart of solid waste techniques and this pie chart shows the maximum landfill technique is use for the solid waste disposal which is 54 in percentage and minimum composting is use for the solid waste disposal which is 8 percent in United States in the year 2003.



Figure 5: Pie Chart of Various Techniques Values in percentage which is Use for the Solid Unwanted Disposal in the United State.

The Table 5 shows the various techniques (Recycling, Landfill, Incineration and composting) which is use for the solid unwanted disposals in the United Kingdom in year 2003.

Table 5: Various Techniques which is Use for the Solid Unwanted Disposals in the United Kingdom in Year 2003.

Solid Waste Disposal Techniques	Value in Percentage
Recycling	14
Landfill	71
Incineration	10
Composting	5

The Figure 6 shows the pie chart of solid waste techniques and this pie chart shows the maximum landfill technique is use for the solid waste disposal which is 71 in percentage and minimum composting is use for the solid waste disposal in United Kingdom in the year 2003.

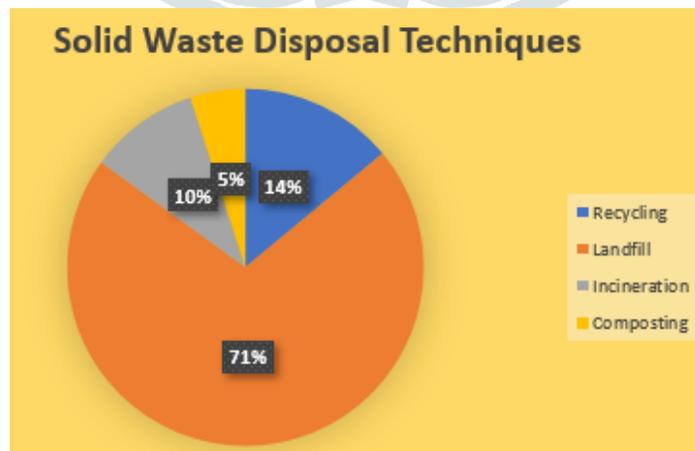


Figure 6: Pie Chart of Various Techniques Values in percentage which is Use for the Solid Unused Disposal in the United Kingdom.

The Germany uses only three techniques for solid waste management. The Table 6 shows the various techniques (Recycling, Incineration and composting) which is use for solid waste disposal in Germany in year 2003.

Table 6: Various Techniques which is Use for Solid Waste Disposal in Germany in Year 2003.

Solid Waste Disposal Techniques	Value in Percentage
Recycling	67
Landfill	7
Incineration	26

The Figure 7 shows the pie chart of solid waste techniques in Germany and this pie chart shows the maximum recycling technique is use for the solid waste disposal which is 67 in percentage and minimum composting is use for the solid waste disposal is landfill which is just 7 percent in Germany the year 2003.



Figure 7: The Pie Chart of Solid Waste Techniques in Germany in Year 2003.

LITERATURE REVIEW

The difference contribution by giving different researches by researcher are given below: Andreas Bartl studies the new European waste strategy does not primarily seek to handle waste sources, but instead prioritizes the whole supply chain of a commodity. Waste prevention and re-use are given first priority, and they take place before a product or material reaches its end-of-life period. Recycling is just in 3rd place, although recovery and waste are the least appealing choices. Recycling may help to reduce primary resources use, but it only addresses the symptoms rather than the causes. In principle, recycling systems require energy to have waste streams. In addition, there are insurmountable obstacles, and practice is far to 100 percent recyclable. Waste preventions and re use have a radically different ideology when they address the root causes. It goes without saying that reducing waste reduces the amount of electricity, time, and money used to produce it. Even if the European regulation is progressing in the right directions, there has been no discernible reduction in waste generation to date. Inappropriately, waste production is a good economic growth driver. Essentially, waste production is a multibillion-dollar industry, and many stakeholders are uninterested in reducing waste. To decouple economic growth from waste production, more sophisticated incentives are expected[4].

Saleh Faraj Magram studies in certain part of world, waste disposal is now seen as an essential aspect of solids wastage management. There are several options available, ranging from small-scales decentralized plants to large-scale organized plants. This paper examines the various waste reuse systems that exist around the world. This research paper was based on peer reviewed journal paper, conference paper, and material collected from the internet. The expense data that was available was also given As a result, their paper as a whole contributes to the technical and economic facets of waste recycling awareness. Aside from the

technological aspects, concerns such as societal acceptance, economics as well as hygienic risks, and so on should be considered in order to overcome the barriers to waste recycling adoption[5].

Sunil Kumar et.al studies that India face significant environmental issues as a result of waste production and insufficient waste management, transportation, treatments, and the disposal. India's current waste management schemes are unable to cope with increased amounts of waste created by expanding urban populations, posing a threat to the atmosphere and the community well-being. The obstacles as well as difficulties are substantial, but so are reward. Their review is based on an international meeting hosted by Councils of the Industrial and Scientific Researches National Environment Engineering as well as Royal Societies and Research Institutes on the Sustainable solids wastage management for cities: prospects in the South Asians Association Regionals Cooperation's (SAARCs) countries.' Moving away from relying on waste dump that have little environmental protections and into waste management schemes that keep useful energy within economy is a top priority. A crucial role is played by waste separation at the source and the usage of specialist waste disposal plants to remove recyclable material[6].

V. Bharti et. al studies that the wastage that is discarded can be reused in a variety of ways. Their paper is about the processes and techniques of solid wastes management in India. Solid wastes management encompasses a wide range of waste categories, from commercial, agriculture, transportation, urban, and so on. While all wastes are hazardous, urban solid waste (now referred to as Solid Wastes) is the kind of waste that can be adequately handled without polluting the environment or harming other organisms. The subject of their paper is on urban solid waste. Various strategies for managing solid waste have been identified, ranging from organic composting for energy production[7].

DISCUSSION

The management of solid waste is very important in day to day life because by the management of the solid waste it can be easily reduce. This paper discussed about the solid waste management and analysis in different countries. The various data analyzed in this paper for example types of Waste Composition in United States Values in Percentage in United states and in India this helps to predict which solid waste is contaminant the environment more and more The Whole Waste Generate in Tons in One Day in Different Cities of India (Ahmedabad, Hyderabad, Bangalore ,Chennai ,Kolkata, Delhi and Mumbai) also analyzed in this paper which gives details about the which city is produce more solid waste and the various techniques which is use for solid waste disposal in United Kingdom, United Kingdom and Germany in Year 200,this analysis help to predict which techniques is grown in future. The interrelationship of functional elements which is use in Solid Waste Management System.

CONCLUSION

After analysis of different data author found that the maximum value of disposal in both United States and India is by paper solid waste but in United States the value of paper disposal is 35 percent and in India the value of paper disposal is 41 percent. Also, after comparing the value of different country, the maximum landfill technique is use for the disposal of the solids waste in United States and United Kingdom but in Germany the recycling technique is used for managing the solids waste. The waste of solid is accumulative in world and it is further increasing at greater rates and in orders to solve the worldwide problem world need wastes management systems of future which'll more well-organized in the any aspects including energy efficiencies, volumes of the waste treatments as well as an increase usage of the robotic technology in its place of people whose suffers from the disease cause by emitted pollutant. In future the plastic or any material which is not remove from environment should be avoided and use other material rather than usage of plastic.

REFERENCES

- [1] D. H. E. Elshourbagy, "Introduction." .
- [2] "Solid Waste," *India Water Portal*. .
- [3] "Waste Management in the United States - Statistics & Facts," *statista*. .

- [4] A. Bartl, "Moving from recycling to waste prevention : a review of barriers and enables," 2014, doi: 10.1177/0734242X14541986.
- [5] S. F. Magram, "Worldwide solid waste recycling strategies: A review," *Indian J. Sci. Technol.*, 2011, doi: 10.17485/ijst/2011/v4i6/30093.
- [6] S. Kumar *et al.*, "Challenges and opportunities associated with waste management in India," *R. Soc. Open Sci.*, vol. 4, no. 3, 2017, doi: 10.1098/rsos.160764.
- [7] V. Bharti and J. Singh, "a Review: on Solid Waste Management Techniques in Smart Cities," *Int. J. Adv. Eng. Res. Dev.*, vol. 4, no. 09, 2017, doi: 10.21090/ijaerd.22901.

