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Solid waste management: A comparative study of Indore and Jaipur metropolitan.

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Abstract- In today's era, rapid urbanization , industrialization , transportation ,increase in population coupled with materialistic philosophy of life and high standard of living, with incessant migration to urban areas have rather conspired to create a situation. In India, rapid urbanization and uncontrolled growth rate of population are main reasons for MSW to become an acute problem. Solid waste management is a worldwide phenomenon. It is a big challenge all over the world for human beings. Solid waste. management.is also one of the most ignored services in Indian cities. According to population size per capita waste generation rate and its growth during a decade are growing at a very fast rate. This study is based on a comparative analysis in which the Jaipur city of the Rajasthan state and the Indore city of Madhya Pradesh is selected. This comparison is based on the waste generation. Collection, transportation and management of the waste generated in the study area.Indore has consequetively achieved 1st position in swachhbharatsurvekshan 2020 in the past four years and Jaipur at its best has achieved the 28th position in all India swachhtasurvekshan. But has achieved a lot more as in the past years as it can be noticed that Jaipur has stood on the 44th positions. Jaipur is also facing problemsas there is a need to make improvement in the MSW practices in the city to improve the standards of sanitation and urban environment keeping pace with the rapid urbanization and

growing population. Indore city is doing it's best in managing the waste. There are many factors which are responsible for the proper management of waste in the study area.

Keywords- solid waste, Management, Analysis, Urbanization, Collection, Disposal.

Introduction- India is the second largest nation in the world, with a population of 1.366 billion,(approx. in 2019) accounting for nearly 18% of world's human population, but it does not have enough resources, adequate place, living standard and many other major problems . Its urban population grew at a rate of 31.8% during the last decade to 377 million, which is greater than the entire population of US, the third largest country in the world according to population.One of the major problem that India is facing today is Solid waste. Management of such major issues should be concerned at broader level. Solid waste management (SWM) is one such service where India has an enormous gap to fill. Proper municipal solid waste (MSW) disposal systems to address the burgeoning amount of waste are absent.

The term "waste" generally refers to "unwanted things or goods" for the person who discards it; a product or material that does not have value anymore for the first user(domestic ,commercial and many more) and is thus thrown away or not taken in use. But "unwanted" is subjective because the waste could have value to another person in a different circumstance or even in a different culture. Today, there are many large industries that operate primarily or exclusively using waste materials like paper and metals as their industrial feed stocks (Scheinberg, 2001). The objective of Solid Waste Management (SWM) is to reduce the quantity of waste to be disposed in landfill by suggesting suitable treatment options like 3R ,circular economy, biological treatment so that land requirement for the landfilling can also be reduced.

The problem of waste management is becoming more and more complex day by day. There has been a significant increase in MSW (municipal solid waste) generation in the last few decades due to rapid population growth ,urbanization, modernization in the country. The current practice of collecting, processing and disposing municipal solid wastes is also considered to be least efficient in most developing countries. The typical problems are - low collection coverage, irregular collection services, crude open dumping and burning without air and water pollution control, the breading of flies and pests, and the handling and control of informal waste picking or scavenging activities (Bartone, 1995). Remediation and recovery of misused resources will also be expected. Big cities collect about 70 - 90% of MSW generated, whereas smaller cities and towns collect less than 50% of waste generated. More than 91% of the MSW collected formally is landfilled on open lands and dumping zone. It is estimated that about 2% of the uncollected wastes are burnt openly on the streets. About 10% of the collected MSW is openly burnt or is caught in landfill fires. Many a times the gas that is released causes fire in the dumping zones.

All attempts to recover materials and energy from MSW have encountered initial failures. Ten aerobic composting (MBT) projects in 1970s, a WTE project in 1980s, a largescale bio-methanation project, and two RDF projects in 2003 have failed. Anaerobic digestion of MSW on a large scale does not work in India due to the absence of source separated organic waste stream. The largescale bio-methanation plant built in Lucknow to generate 6 MW of electricity, failed to run because of the segregation of the waste. India has a total of five RDF processing plants, located near Hyderabad, Vijayawada, Jaipur, Chandigarh and Rajkot.

Objectives of the study –

1. To study the present status-practises of waste generated in the study area.
2. To study the comparison in the management of the waste generated.

Research methodology - The study is based on the secondary data. The secondary data have been collected from the website of census of India, local municipal bodies, newspaper, magazines, etc. It is an Empirical approach to analyze the waste management in the study area. The secondary data is collected from Indore municipal corporation, Indore development authority, Jaipur municipal corporation, Jaipur development authority, waste treatment plants ,NGO'S and other private organizations which are contributing for the waste management.

Discussion- Like many metropolitan cities of India, Jaipur and Indore both are undergoing rapid development. In Jaipur, the population was 30.7 lakhs according to the 2011 census,and is now estimated to be over 39.9 lakhs (approx in 2020) the tenth most populous city in the country. In Indore, the population was 19.9 lakh according to the 2011 census and is now estimated to be over 30.lakhs (approx. in 2020). Solid waste management is an important part of urban and environmental management, like other infrastructural services has come under great stress, consider low priority areas, solid waste management was never taken up since reply nor by public nor by concerned agency or authorities and in present time the solid waste had impact on our heath, environment and well-being.Jaipur is also facing these problems as there is a need to make improvement in the MSW practices in the city to improve the standards of sanitation and urban environment keeping pace with the rapid urbanization and growing population.

CURRENT STATUS OF MSWM OF JAIPUR All the functional elements of Solid Waste Management System i.e. collection & storage, Transportation, processing and final disposal of solid waste of Jaipur city were analyzed and it was found that waste is not segregated majorly at many sources into degradable and non-degradable waste. Waste is collected door to door within the main city, but the outer skirts of the city are still suffering from the source collection. AlsoCommunity bins and street sweeping is used for primary collection of waste. It was found that the waste treatment and processing is the most neglected part in the system. Most of the waste is directly dumped, without any treatment, to the unscientific open dumpsites namely

Mathuradaspura and Sewapura and Langriyawas which pollutes soil and ground water quality and also poses risk to health of human and environment.

The waste generation in Jaipur city is around 1200 MTPD and the collection efficiency is about 80% (JMC), which is projected to rise the waste by 3643 MTPD by 2021 .Pink City that vouches for becoming a smart city lacks proper management of waste, even though the door to door collection of waste is successfully launched in the study area. However, city at present treats about 900 metric tones waste and converts it into compost and the remaining into RDF. There is one treatment plant, which is with private sector partnership (Grasim Industries) a new refuse derived fuel paletization unit has been set up in Lengriyawasarea(landfill site) with 500 MTPD capacity. The per capita solid waste generation per day is around 450 gm, which with a family size of almost five, results in 1.75 kg/day. Commercial and industrial waste is collected on daily basis.

Due to poor collection of MSW and several operational problems, this plant is not able to run its full capacity. Most of the waste is disposed in three uncontrolled open landfills sites at the outskirts of the city. In absence of proper sanitary landfill sites, these landfills are a major source of groundwater contamination and air pollution. The national urban sanitation policy has mentioned Jaipur as the worst sanitized city in India Jaipur is one of the best planned cities in the world, but it is also a sour truth that the city is one of the worst managed cities in the world. The worst affected urban service in the city is the solid waste management. Jaipur is one of the top city in terms of per capita waste generation in India.-Some of these wastes have been proved to be extremely toxic and infectious. One of the worst about Jaipur's waste management is its open dump phenomenon. The uncontrolled and unscientific dumping of such wastes has brought about a rising number of incidents of hazards to human health. The city also generates lots of commercial waste which includes hazardous waste also. The management is not following strict rules and regulations for segregation and disposal of these wastes. More serious risk to human health is envisaged due to contamination of surface and ground water. The problem of municipal solid waste management (MSWM) is also prevailing throughout the urban environment of Jaipur and need to improve at the large scale.

Also ,it is noted that there is a rate of 10-20% absenteeism at theworkplace30 At times, rather than coming to work, workers will just send someone else in their place. There are about 100 days off a year (including Sundays) when the formal sector workers do not collect garbage and it just sits on the streets. As the corporation is working in a public private partnership the duties are not done on time and thus it is a major concern in the study area. The C/N ratio ranges from 20 to 30.

CURRENT STATUS OF MSWM OF INDORE- Indore is ranked as 1st in M.P. and 2nd Mysore in India for cleanliness in the city.In the year 2001 the population of Indore city was

10,86,673and the waste generated in the area was 600 metric ton per day, in year 2011 the population of Indore city was 19,94,398 and waste generated was about 885 metric ton per dayand in the year 2018 the expected population of Indore city is 34 lakhs approximately and waste generated in the city is 1100 metric ton per day which is segregated as dry waste-500 metric ton per day, wet waste -600 metric ton per day. with the rapid increase in population the waste is also generating at a higher rate which can be hazardous to the environment if not managed sustainably. With increasing population the health issues are also increasing and so there are many communicable diseases which are spreaded in the area. For the treatment of this diseases the medical facilities are increasing and thus the biomedical waste generated is also a big hazard to society. To dispose this waste safely there are many organizations working which collect the waste from hospitals, laboratories, clinics, and other places. In India about 550 tons per day medical waste is generated and in the western part of Madhya Pradeshthe medical waste generated is 5200 kg per day, from which 2400kg waste is only from the Indore city. Improper management of the solid waste and biomedical waste can lead to environmental issues, serious health issues. Rubbish waste can cause air and water pollution.

Wet waste- The method used to decompose wet waste is the Windrop composting method, which is 35days process in which the dumbed waste is let opened for 7 days, then the turning process is done inwhich the waste is turned to supply it organic materials - water,oxygen and the other micro-organismswhich breaks the material in fine particles. The material is further moved to filteration process in whichthe compost is obtained and the remaining material is moved to the landfill sites . The compost is used inthe gardens as a manure. Thus the wet waste generated in the city is fully decomposable. To motivate the organizations for decomposing the waste at the source level IMC has rebate the institution on tax about 5-6%.

Dry waste- The waste after compression is dumbed on the material recovery centre .On the site the rag-pickers collect the plastic and other reusable material such as metals, bottles, cans etcwhich is send to theindustries for its recycling. The remaining valueless inorganic non-recyclable waste is reffered to as residuals.

Also a Bio methanation plant is installed at the choithramvegetable market Indore. The installed capacity of the plant is 20 tons per day of fruits & vegetables waste which generates nearly 2400m^3 of Bio-CNG per day. This gas is used as an fuel by public buses, auto-rickshaws, hotels, restaurants and many more. Which shows the best example from waste to money.

Kavitkhediplant- it is an important eco-friendly initiative. The facility is pegged to be the first such power generation unit in the country. The Hydro Power Screw Generator established by Jash Engineering Ltd was inaugurated at 78 MLD sewerage treatment plant at Kabitkhedi, The plant has installed power generation capacity of around 18.5 KW to 22 KW, Kabitkhedi area holds significance for Riverside Corridor project, as nearly 180 million litre of sewage falls into

Khan river everyday and out of which, only half is being treated. Sewage treatment plant of IMC at Kabitkhedi has capacity to treat only 78 million litres per day. Also there are many other factors which are responsible for the waste treatment:-

- Use of plastic is banned.
- Messages for swacchta on walls everywhere in the city
- Bio-methanation plant
- Door to door collection
- segregated waste at source
- Bio-metric system for manpower
- Sewage water treatment plant
- The 3R concept
- Initiative for zero waste

Conclusion--: Urbanization, Industrialization, High standard living etc are the factors which are a direction towards developed economy. Education, Employment, Health facilities are the reason for which the people shift from one place to another. Growth of population in urban areas are major concerns due to which many other problems arises. The waste is generated more in quantity which is due to modernization, urbanization causing big problem to the society which developing countries are facing now a days. We have observed the collection, disposal, transportation pattern of both the places and there are so many differences which can be noticed in the waste management. Jaipur is trying to work better for the management of the cities still there are many factors on which emphasis should be made. We have studied and analyzed the key factors which are responsible for sustainable waste management in the Indore city. The 3R concept, abolition of plastic,circular economy, waste to energy,segregation of waste at source, community bins etc are the major factors which are makes Indore a role model for other cities to manage their waste.

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