

# **WASTE MANAGEMENT**

## **ACKNOWLEDGEMENT**

*In the accomplishment of this project successfully, many people have best owned upon me their blessings and the heart pledged support, this time I am utilizing to thank all the people who have been concerned with this project.*

*Primarily I would thank god for being able to complete this project with success. Then I would like to thank my principal Mrs. Writuparna Chatterjee and economics teacher Ms. Madhuchhanda Biswas, whose valuable guidance has been the ones that helped me patch this project and make it full proof success. Her suggestions and her instructions have served as the major contributor towards the completion of the project.*

*Then I would like to thank my parents and friends who have helped me with their valuable suggestions and guidance has been very helpful in various phases of the completion of the project.*

*Last but not the least I would like to thank my classmates who have helped me a lot.*

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## CERTIFICATE

This is to certify that **TANMOY BACHAR**, a student of class **XII** commerce has successfully completed the research on the project **“Waste Management in India”** under the guidance of **Miss. MADHUCCHANDA BISWAS** during the session **2020- 2021** in partial fulfillment of economics practical examination conducted by CBSE, New Delhi.

Name of examiner

Signature of examiner

Name of economics teacher

**Madhuchhanda Biswas**

Signature of economics teacher

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## Introduction

With increasing population, the management of municipal solid waste (MSW) in the country has emerged as a severe problem not only because of the environmental and aesthetic concerns but also because of the sheer quantities generated every day.

The key issues impacting proper management of MSW include the following:

- Limited primary collection at the doorstep
- Reluctance in public to take ownership
- Unavailability of adequate funds
- Lack of access to proper technology
- Unscientific disposal of MSW at dump sites

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## Policy framework

The status of solid waste management is considered as a development indicator as it has direct links to issues like sanitation and public health. Thus, management of solid waste generated in country must be one of the priorities while forming policies at national level. However, the situation of solid waste and sanitation in India has always been questionable. The major reasons, particularly in urban areas, are economic growth, migration from cities, unplanned land use and most importantly the lack of proper legislations on solid waste management.

### National Urban Sanitation Policy :

The policy was prepared by the Ministry of Urban Development in 2008. The objective of the policy is 'to transform urban India into community driven, totally sanitized, healthy and livable cities and towns'. The policy stress upon awareness and behaviour change, open defecation free cities and integrating sanitation in all the other aspects of cities. (Ministry of Urban Development).

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### National Mission on Sustainable Habitat

Launched in 2010 under the National Action Plan for Climate change, the mission will be implemented in the Twelfth Five Year Plan. Apart from energy consumption in buildings and shift to public transport this mission focuses on technological intervention in the waste management and recycling. The mission will include major R and D programs in biochemical waste processing, recycling and especially in, waste to energy (Planning Commission 2012)

Teacher's Signature.....

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## Swachh Bharat Mission

The Swachh Bharat Mission was launched in 2014. The main objectives of the mission include elimination of open defecation, eradication of manual scavenging, modern and scientific municipal waste management, to effect behavioral change regarding healthy sanitation practices, capacity for ULB's and to create enabling conditions for private participation in capital investment and operation and maintenance. One of the overall objectives is to achieve scientific solid waste management in 4041 cities/town for 30.6 crore persons.

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## Municipal Solid Waste (Management and Handling) Rules 2000

The MSW rules were made effective in they year 2000.

All the municipal authorities in country were directed to manage solid waste in their respective jurisdiction according to the rules. The msw rules cover all the aspects of solid waste from collection to waste disposal. Some of the directions made are :

- Collection/ storage : A door to door collection must be done by the municipal authorities including in unauthorized areas like slums. The collected waste must include both bio-degradable and non-biodegradable wastes must be installed at convenient locations.

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## life cycle of product

The life cycle begins with design, then proceeds through manufacture, distribution and primary use and then follows through the waste hierarchy stages of reduce, reuse and recycle. Each stage in the life cycle offers opportunities for policy intervention, to redesign to ~~reduces~~ minimize waste potential, to extend its use.

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## Institutional Framework for Implementation.

The framework of solid management in India is broadly divided into three tiers, which are, central, state and urban local bodies (UBL)

The main function at the central level is to make laws and rules, frame policies, financial support and to prepare guidelines and manuals. The state is responsible for implementing the rules, laws and guidelines set by the center at the state level.

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## Challenges

The key challenges in achieving efficiency in waste management sector at the national level include non segregation of waste at the source, the ULBs lack funds and are inadequate to address the existing identified problems in waste management sector. at the level.

The institutional arrangement is not adequate and there is no community participation towards management of waste and sanitation.

The Indian government has realized that for national sustainable development active participation of all the stakeholders including environmental NGOs is necessary.

The development programs must take place at the grass root level for the sake of sustainability. Waste minimization circle (WMC) for ensuring maximum resource recovery from industrial waste is one such example (Planning Commission)

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## Solid Waste Management in India

Due to urbanization and industrialization in India, threats for environmental degradation has increased. Environmental degradation results in frequent floods, change in durations of summer and winter, melting of ice from glaciers etc. Also there is an increase in pollution due to deforestation and increase in industrial activities. Developing and under developing countries are facing crucial problems due to generation of solid waste and due to improper dumping of solid waste on a landfill area, it has been creating problems due to generation of solid waste and due to improper dumping of solid waste on a landfill area, it has been creating problems such as drinking unhygienic water, domestic and agricultural use and many more. Aquatic and lithospheric systems are also affected.

## Necessity of Solid Waste Management

1. Increases in breeding of insects
2. Increases water, air and ground pollution
3. Increases health issues
4. Leads to ozone layer depression
5. Leads to uncertain changes in the climatic conditions
6. Degrade the quality of soil
7. Increases deforestation
8. Affects aquatic life

## Solid Waste Treatment Methods

### Thermal Treatment

It is classified as incineration, pyrolysis and gasification and open burning. In incineration process, waste material are converted into fly ash and gases. In pyrolysis and gasification method, waste is exposed to high temperatures and low amounts of oxygen. In open burning, the waste is burnt in an open space which causes air pollution.

## Biological Waste Treatment

Biological waste treatment is classified as composting and anaerobic digestion. Composting is the process of decomposing solid organic waste by using natural or artificial methods in the presence of oxygen. vermicomposting is the nature process which decomposes the solid organic waste with the help of earthworms whereas in mechanical composting, mechanical compost plant is used to grind the organic. Various other techniques are vessel composting, windrow composting and static pile composting.

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## Integrated Solid Waste Management

The main one of focus of this system is 3R's ie reduce reuse, recycle. The 1st step of ISWM is collection and sorting of waste to reduce the further process. If the waste is not properly segregated and treated, the next step adopting for treating solid waste is composting generation. It is well planned process which also includes financial planning, transportation planning, construction planning and planning designing stages. It can help in improving the air and water quality.

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## Deployment of technology

Smart Waste management system is the major problem with waste management system in India is inefficiency in waste collection and transportation. A nationwide intervention is required in collection and transportation system.

The municipal corporation of Coimbatore is using an online waste truck monitoring system using radio frequency identification linked with waste transfer and processing units. The Bhopal Municipal Corporation saved upto 2000 - 3000 litres of diesel per day only by installing GPS devices in about 50 waste trucks.

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## Information Communication Technology.

Integrating the information technology with the existing waste management system can have a impact on the condition of the waste sector in India. Technologies like GPS, GIS, remote sensing, online web services and cloud computing can find some real time application in waste management. For example, trucks and bins can be installed with remote optical sensors which can constantly record the data of type and amount of waste collected at various locations and create database.

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## Ways Forward

Greening The waste is expected to generate substantial economic, environmental and social benefits. They include 1) natural resource and energy saving 2) creation of new business and jobs 3) compost production supporting organic agriculture 4) energy production from waste 5) reduced GHG emissions ; 6) contributions to equity and poverty eradication. Improved health, avoided health costs, avoided water contamination, and the consequent cost of alternative water supply are also streams of benefits .

## Waste reduction Strategies

Waste reduction strategies involve lesser generation of waste at source and using alternative material which generate waste of lesser hazard as compared to traditionally used ones.

It is necessary to decouple the waste generation process from the growth of economy and population. Various ways in which this can be achieved are:

- a) Alternative packaging - use of fabric or jute packaging instead of traditionally used polythene bags which are difficult to collect and recycle.
- b) Designing products like cell phone and other electronic goods for longer shelf life so that they enter the waste stream a little later
- c) Designing products for disassembly so that majority components can be recycled
- d) Developing re-manufacturable products to increase their life cycle.

## Waste Inventory

In absence of dynamic waste inventory, long term planning for waste management becomes difficult.

Each municipality should maintain complete for its waste management activities, particularly generation of waste (daily data), characteristic of waste, processing facilities actually installed and operated and their performance and final disposal in a sanitary landfill (monthly data).

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## Material recovery and recycling

India reportedly salvages and recycles around 70% of the MSW, though most of it is collected and recycled by informal sector using rudimentary technologies. It is reported that in developing countries around 15-20 million people are engaged in waste recycling activities in India.

The goals of greening the waste sector cannot be achieved without increased investment. Minimising waste generation requires changes to product design and production processes upstream.

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## Composting

Biological decomposition of organic waste is known as composting. In India, majority of the waste produced is organic which makes composting a viable technique to handle waste. The technologies used for composting are as follows:

Window composting : In this type of composting, the organic waste is stacked into windows.

Aerated static pile composting : The waste is placed over piles which are directly above a system of pipes connected to blower.

In-vessel composting : The composting is done inside a closed lead drum.

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## Public private partnership

In India, typically government has been responsible for provision for public utility projects like roads, sanitization, health, water supply and so on. However it was observed that the available funds for development purposes were not adequate.

Thus Public Private

Partnership was introduced as a financing solution to developmental activities.

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## Research Methodology

It is a specific procedure or technique used to identify process and analyze information about a topic. In research paper methodology section allows the reader to critically evaluate a study's overall validity and reliability.

Research methodology explain the methods by which a researcher may proceed with his or research. It involves the learning of the various techniques that can be used in the conduction of tests, experiment, surveys and critical studies.

But the research methods are the methods by which one conducts research on a subject or a topic. Research methodology is systematic way to solve problem.

It is a scientific method of how research has to be carried out.

Essentially, the procedure by which the researchers go about their work of describing, explaining and predicting phenomena are called research methodology.

## Steps of Research method

Problem identification



Objective and scope of the study



Literature review



Problem formulation



Deciding the methodology



Sample selection and preparation of tools of data collection



Collecting Data



Data analysis and interpretation



Writing report

## H.. Research Objectives of Waste management

- To study the characteristics of solid waste management
- To establish an understanding of the perception among locals about solid waste management
- To investigate the environment impacts of solid waste management practices in Urban areas.
- To assess how improved waste management practices can contribute to sustainable development process.

## Research methodology of my project

My research methodology requires gathering of relevant data from the specified documents and compiling databases in order to analyse the data and arrive at a more complete understanding.

- Data Collection
- Sources of primary Data : Survey
- Sources of Secondary Data : Study reports from internet articles in newspaper, magazine and internet.
- Data collection Tools :
  - i) Questionnaire survey (structured)
  - ii) internet
  - iii) newspaper

Area of Study : Kolkata

Time Period : One month

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- Limitations Found out During Data Collection**
- All individuals did not respond honestly.
  - Responses were incomplete.
  - The research was affected by time constraint.
  - Many participants did not voluntarily take part in the survey.
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### Survey Questionnaire:

This interview is made to you to undertake a research for the partial fulfilment of the award of MPhil degree in Environmental Economics. I would like to know about the environmental issues faced at the HH level in Kohat including the existing water supply situation, the sanitation and about the Solid waste management in the town. Your response will help policy makers to formulate an informed policy about improved water supply service. The interview will take a few minutes and the answers will be completely confidential and strictly for academic purpose. Thus, please answer the questions honestly and as truthfully as you can.

#### A. Household Details

1. Name of the respondent: .....
2. Are you the head of the household? Yes/No
3. Name of the head of the house hold: .....
4. Total members of the Household .....; Male.....; Female..... Children (6-14).....  
Kids (1- 5 years).....; Infants (<1 year).....
5. Education of the HH head..... : Highest education among the members of the HH.....  
0. Illiterate; 1. Primary; 2. Middle; 3. Matric; 4. FA/FSc; 5. BA/BSc/BCS; 6. MA/MSc; 7. Above
6. Total number of HH who are employed.....
7. Employment status of Head of Household Head
 

1 Unemployed	2. Street Vendor/Small Informal Business
3 Government Employee	4. Own Business
5 Private Employee	6. Other

#### 8. Average Monthly Household Income

1. Less than RS. 10,000
2. RS. 10,001-20,000
3. RS. 20,001-50,000
4. RS. 50,001-100,000
5. Greater than RS. 100,000

#### 9. Do the members of the HH (>12 years) watch T.V.

1. Every day
2. Once a week
3. Once a month
4. Almost never

#### 10. Do you think that media has raised your awareness about water, sanitation and solid waste management?

Yes 1

No 0

(if yes cont. to Q.11)

#### 11. What type of mass media component was more effective in generating your awareness?

1. Radio
2. Television
3. Newspaper
4. Social media

**12. Which purification method do you use?** \_\_\_\_\_

**13. If "No", what is the reason?**

1. The water is clean

3. do not know whether there is  
purification method or not

4. Other: \_\_\_\_\_

2. The water is not clean but it is  
expensive and time consuming  
Though the water is not good it  
is  
harmless

**14. Have any children in your household below the age of 12 had any of these conditions in the last six months?**

1. Diarrhea  
4. Cholera  
(Haiza)

2. Malaria  
5. Feces with  
Blood/Mucus

3. Typhoid  
6. Hepatitis A  
7. Other: \_\_\_\_\_

**15. What is the average medical expense of your household?** \_\_\_\_\_

### Environmental Awareness

**16. This year, did you or any member of the family participate in any community cleanup activities or other voluntary cleanups?**

1. Yes      0. No

**17. In your opinion is waste management an environmental problem?**

1 Yes      0 No

**18. Do you know how your service provider disposes your collected waste?**

1 Yes      0 No

**19. Are you concerned about the disposal methods of the service provider?**

1 Yes      0 No

**20. Do you consider that environmental degradation has negative effect on your family?**

1 Yes      0 No

**21. Do you think that leaving a better environment to future generations is something?**

0. Very important      1. Not important at all

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### Data Analysis and Interpretation

#### A. Employment status of head of household

- Out of 30 respondents 21 responds government job
- Out of 30 respondents 8 responds private job
- Out of 30 respondents 1 responds business

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Interpretation : most of the people are employed at government organization

#### B. Average monthly income of household

- Out of 30 respondents 20 responds Rs 20000 - 50000
- Out of 30 respondents 5 responds Rs 10000 - 20000
- Out of 30 respondents 3 responds Rs 10000 and less
- Out of 30 respondents 2 responds Rs 100000 and above

Interpretation : most of the people earns between 20000 - 50000

How your service provider discuss ..

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### Role of media in awareness

23 out of 30 respondents said yes  
7 out of 30 respondents said no

Interpretation : most of the people are aware and think media plays important role in increasing awareness.

### Method of Purification

24 out of 30 respondents use a water purifier  
6 out of 30 respondents use nothing to purify water

Interpretation : Most of the peoples use water purifier.

### T.V watch Time

27 out of 30 respondents said everyday  
3 out of 30 respondents said once a week

Interpretation : Most of the people watch T.V everyday

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How your service provider disposes your collected waste

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### Diseases in last 6 months

21 out of 30 respondents said malaria  
 9 out of 30 respondents said common fever

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interpretation : most of the people had malaria

### Participation in voluntary clean ups

17 out of 30 respondents had participated in voluntary clean  
 13 out of 30 respondents didn't participate in clean ups

interpretation : most respondent participated in voluntary clean

### Is waste management an entire problem related to environment

25 out of 30 respondents said yes  
 5 out of 30 respondents said no

interpretation : Majority of respondent said yes

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How your service provider disposes your collected waste

26 out of 30 respondents said yes  
 4 out of 30 respondents said no

Interpretation : most people know about disposal of waste

erred

Are you concerned regarding waste disposal method

23 out of 30 respondents said they are concerned  
 7 out of 30 respondents said they are not concerned

Interpretation : Majority of people are concerned about nature

Do you consider environmental degradation has negative effect on your family ?

27 out of 30 respondents said yes  
 3 out of 30 respondents said no

Interpretation : Majority of people are concerned and think environmental degradation has negative effect on your family.

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21. Do you think that leaving a better environment to future generations is something?

19 out of 30 respondents said important  
11 out of 30 respondents said not important at all.

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### Summary of Findings :

1. It is found that most of the people were concerned about waste management
2. Most of the people the waste management is directly involved with environmental degradation.
3. Water supplied at the house of most people has to be filtered using different artificial water purifiers
4. People consider it is important to leave a better ↑ generations environment for of future.