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Causes and Controlling measures of Waste Management in India

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1. Introduction

The concept of Total Waste Management occupies an important place in the study of Modern Political Systems, It is very much essential for developing countries to reach a maximum level in economic growth and development. The concept of Waste Management has become a major threat to sustainable development.

Waste is directly linked to human development, both technologically and socially. The compositions of different wastes have varied over time and location, with industrial development and innovation being directly linked to waste materials. Examples of this include plastics and nuclear technology. Some components of waste have economical value and can be recycled once correctly recovered.

There are many waste types defined by modern systems of waste management, notably including:

1. Municipal Waste includes household waste, commercial waste, and demolition waste
2. Hazardous Waste includes Industrial waste
3. Bio-medical Waste includes clinical waste
4. Special Hazardous waste includes radioactive waste, Explosives

United Nations Environment Programme (UNEP): According to the Basel Convention: "Substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of international law".[1]

United Nations Statistics Division (U.N.S.D.) defined "Wastes are materials that are not prime products (that is products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded".[2]

Waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics. Waste management is also carried out to recover resources from it. Waste management can involve solid, liquid, gaseous or radioactive substances, with different methods and fields of expertise for each.

Waste management practices differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. Management for non-hazardous waste residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator.

The major epidemics which are threatening the world, because of the pollution, environment, medical waste, solid waste, Industrial waste, Nuclear waste, plastic waste, hazardous waste and so on.

Biomedical waste has been classified into different categories so to enable proper segregation of waste generated in the hospital. The various categories are human anatomical waste, animal waste, microbiology & Biotechnology waste, Waste sharps, Discarded medicines & Cryonic drugs, Solid waste, Liquid waste. Incineration ash and chemical waste.

E-waste comprises of wastes generated from used electronic devices and house hold appliances which are not fit for their original intended use and are destined for recovery, recycling or disposal. Such wastes encompasses wide range of electrical and electronic devices such as computers, hand held cellular phones, personal stereos, including large household appliances such as refrigerators, air conditioners etc. E-wastes contain over 1000 different substances many of which are toxic and potentially hazardous to environment and human health, if these are not handled in an environmentally sound manner.

2. Indian Scenario

The electronic industry has emerged as the fastest growing segment of Indian industry both in terms of production and exports. The share of software services in electronics and IT sector has gone up from 38.7 per cent in 1998-99 to 61.8 per cent in 2003-04. A review of the industry statistics show that in 1990-91was 22%. The scenario changed by 1994-95, with hardware share falling to 38% and software's share rising to 41%. This shift in the IT industry began with liberalization, and the opening up of Indian markets together with which there was a change in India's import policies vis-à-vis hardware leading to substitution of domestically produced hardware by imports.

Sixty-five cities in India generate more than 60% of the total e-waste generated[3] in India. Ten states generate 70% of the total e-waste generated in India. Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab in the list of e-waste generating states in India. Among top ten cities generating e-waste, Mumbai ranks first followed by Delhi, Bangalore, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur. There are two small e-waste dismantling facilities are functioning in Chennai and Bangalore. There is no large scale organized e-waste recycling facility in India and the entire recycling exists in un-organized sector.

The assessment of e-waste recycling sector in India indicates that e-waste trade starts from formal dismantling sector and moves to informal recycling sector. E-waste movement from formal to informal sector is driven by trade and can be tracked by trade value chain. This e-waste trade value chain can be mapped based on material flow from formal sector to informal sector. This chain was identified considering bottom-up approach with three levels of e-waste generation hierarchy. The three levels of e-waste generation hierarchy[4]give rise to three types of stakeholders involved in e-waste trade as described below.

The entire e-waste treatment is being carried out in an unregulated environment, where there is no control on emissions. There are two e-waste dismantling facilities in formal sector in India. These facilities are M/s. Trishiraya Recycling facilities, Chennai and M/s. E-Parisara, Bangalore.

Municipal solid waste:

Municipal solid waste (MSW) mainly consists of:

a) **Food wastes,** commonly called garbage, are prone to decompose. They originate from food products of animal and vegetable origin, arising out of preparation, processing, handling, catering, and eating.

b) **Rubbish** is combustible and non-combustible rejected materials other than those mentioned above. The combustible portion (trash) consists of paper, cardboard, textile, plastics, rubber, etc. The non-combustible portion consists of glass, ceramics, metals, etc.

c) **Ashes and cinders** originate mainly from coal, firewood, and burnt residues of other combustible materials.

d) **Construction and demolition wastes** include wide varieties of materials, mostly non-combustible in nature. Civil works of construction, remodeling, repair works and demolition of building structures and others that include broken pieces of bricks, stones, plasters, dirt, sand, wooden articles, metal pieces, electrical parts, etc.

e) **Water treatment plant wastes** are obtained from the water treatment plants in solid or semisolid form, such as resins, organic waste, inorganic waste, etc.

f) **Special wastes** are uncommon materials accumulated from unpredictable and infrequent sources, i.e., abandoned vehicles, dead animals, limbs, blood, etc. from hospitals; and that found street sweepings.

3. Controlling Measures of Waste Management

1. **Vermitechnology** Waste biomass from domestic, agriculture, urban and industrial sources is the main cause of organic pollution in developing countries which can be used for vermitechnology. It has the following advantages:

   i. Vermitechnology is a natural and eco-friendly process
   ii. Vermitechnology facility can be designed and operated to minimize environmental impacts by controlling odors and bio aerosols
   iii. It can replace high-cost inorganic fertilizers in developing countries
   iv. It can improve soil quality by supplying humus forming organic materials. It can supply essential nutrients (apart from nitrogen, phosphorus and potassium that were drawn from soil through vegetation)
   v. By a reduction of the leaching of nutrients and helping in the slow process
   vi. Many community organic wastes generated from agricultural and forest activities, food processing industry, household activity and natural vegetation can be recycled into a vermitechnology. Thus, a single composting facility can handle a wide variety of organic resources. It can abatement of pollution through organic agriculture
   vii. It can increase in the water retention capacity by increasing the humus content.

2. **Anaerobic digestion** Using the process microbial degradation of organic waste promotes fermentation of gases and soluble salts and finally to utilize the organic matter as the fertilizer.
3. **Incineration** This process was practiced for the long time to reduce solid waste and lower transporting costs to disposal site and accommodating the wastes for a greater number of people. The two main disadvantages of the process are (i) Capital, equipments and operating costs are very high (ii) Possibility of high pollution in air.
4. **Pyrolysis** Solid wastes generated from municipal, domestic or industries are either disposed in land fill or incineration processes but these are being restriction due to air pollution or the availability of lands. Pyrolysis is a form of incineration that chemically decomposes organic materials by heat in the absence of oxygen.

4. The Andhra Pradesh Pollution Control Board (APPCB)

The A.P. Pollution Control Board (APPCB) is a statutory authority entrusted to implement environmental laws and rules within the jurisdiction of the State of Andhra Pradesh, India. The Board ensures proper implementation of the statues, judicial and legislative pronouncements related to

environmental protection within the State. The APPCB was constituted in the year 1976 after the enactment of the first major environmental legislation of the country, the Water (Prevention and Control of Water Pollution) Act, 1974. Initially set up to implement the provisions of the Water (Prevention and Control of Pollution) Act, 1974, the Board was subsequently given the responsibility of implementing a series of other environmental Acts and Rules, either directly or indirectly as stated hereunder:

1. Water Act
2. Air Act
3. Water Cess Act
4. Environment Protection Act
5. Hazardous Waste (Management and Handling) Rules
6. Bio Medical Waste (Management and Handling) Rules
7. Municipal Solid Waste (Management and Handling) Rules
8. Plastic Manufacture, Sale and Usage Rules
9. Batteries (Management and Handling) Rules
10. Manufacture, Import and Storage of Hazardous Chemical
11. Rules.

The specific functions of different sections located at the Head Office of the Board are illustrated below:

(a) Planning Section
(b) Consent for Establishment (CFE) Section
(C) Consent for Operation (CFO) Section
(d) Solid Waste Management Section
(e) Public grievance Section (Task Force)
(f) Cleaner Production Section (CPC)
(g) Computer Section
(h) Legal Section
(i) Cess Administration Section
(j) Geographical Information System (GIS) Section
(k) Administration Section
(l) Finance & Accounts Section
(m) Building Section
(n) Library
(o) Laboratory
(p) Environmental Awareness Wing
(q) Functions & Activities

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