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A STUDY ON SOLID WASTE MANAGEMENT SYSTEM OF INDIA

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Abstract

Solid waste management is a critical issue in India due to its rapidly growing population and urbanization. India generates a colossal amount of solid waste each day, resulting from various sources such as residential, commercial, industrial, and healthcare activities. The composition of this waste ranges from organic matter, paper, plastics, glass, metals, and hazardous materials, making its proper management crucial for public health and environmental sustainability. This paper presents an overview of the solid waste management system in India, highlighting the challenges faced and the strategies implemented to address this pressing concern.

Keywords: Solid waste, Waste disposal, Recycling, Landfill, Incineration

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Introduction

The World Book Dictionary defines waste as "useless or worthless material". Such materials/items that people no longer use and discard are called as waste. These items range from household rubbish, sewage, sludge, municipal waste, waste from manufacturing activity, nuclear waste, agricultural waste, etc. These waste materials if not treated and handled properly can create a number of problems associated with soil, air and water. With growing population and material consumption rates, Indian cities need adequate waste management practices to prevent waste from becoming a health hazard. Rapid increase in the use of plastics, paper and electronics has made the solid wastes a significant portion of waste generated from households. Composting is considered to be the best option to deal with the waste generated. Composting helps reduce the waste transported to and disposed of in landfills. During the course of the research, the author learned that several developing countries established large-scale composting plants that eventually failed for various reasons. The main flaw that led to the unsuccessful establishment of the plants was the lack of application of simple scientific methods to select the material to be composted. Landfills have also been widely unsuccessful in countries like India because the landfill sites have a very limited time frame of usage. The population of the developing countries is another factor that detrimentally impacts the function of landfill sites. As the population keeps increasing, the garbage quantity also increases, which, in turn, exhausts the landfill sites. Landfills are also becoming increasingly expensive because of the rising costs of construction and operation.

Research Methodology

The entire range of discussion in this study is based on secondary source of data. The different books, journals, news articles, websites, Government publications and information available on various post research and other reports.

Indian Scenario

Being second most populous country in the world, India continuously keeps on adding waste material within its geographical boundaries. India has about 16% of the world population and 2.5% of world's land area. In an already densely populated country with even more densely packed urban centers, land for proper waste treatment, disposal and overfall management is scarce. Recent and sustained economic growth increasing living standards of the people, increased manufacturing and production activities has led to increased to rapid rise in the waste generation rated. India produces around 42 Million tons of solid waste annually. There is wide difference in the waste generation rates in rural and urban areas. Even within the urban areas, the composition includes more paper and inert material and less of organic and compostable material as the city population and size increases. The per capita generation rate increases and the overall calorific value of the waste drops with increase in the size of the city.

Solid waste Management Practices in India

Solid waste management includes many steps like collection of the waste, its transport, processing, recycling or disposal and monitoring of the waste material and relevant processes activities. The system implemented for solid waste management mostly depends on quantity and complexity of the waste materials. There are three main types of waste management methods widely used across the world - Landfill, Incineration and Recycling. Various municipal corporations and waste management companies are involved in these activities.

- Landfill: A landfill, also known as a dump site for the disposal of waste materials by burial under the waste management procedures. It is most common methods of organized waste disposal. Landfill for the waste material is associated with many severe problems such as land and groundwater contamination, engagement of land which would have been otherwise useful for the agriculture/other infrastructural activity, release of methane which is potent greenhouse gas.

- Incineration: It involves the combustion of organic substances contained in waste materials which further converts the waste into ash, flue gas, and heat. Flue gases involve various pollution gases like oxides of sulphur, oxides of nitrogen, etc. Some of these gases causes green house effects resulted in climate change and global warming.

- Recycling: It includes collection, processing and utilization of waste material. Conversion of waste materials into new products/potentially useful materials reduces the consumption of fresh raw materials (virgin materials). It subsequently results in natural resource conservation. Varieties of environmental legislation are available in India to treat and manage waste materials. Environmental protection acts encourage and reward organizations/companies for managing and recycling their waste to maintain the clean and hygienic environment.

Sources And Quantities Of MSW

The quantity of municipal solid waste generated depends on factors such as food habits, standard of living of people, seasonal variations and the number of commercial activities being taking place. Since solid waste is an environmental health hazard, its effective management by local authorities is a posing problem. The municipal corporations are continuously seeking new management strategies to deal with this huge quantity of solid waste. To design an appropriate collection and disposal system of municipal solid waste it is necessary to have complete data on quantity generation and variation of the solid waste produced. With increasing urbanization and changing lifestyle, Indian cities produces eight times more solid waste as was produced in 1947. Presently, around 90 million tons of solid waste is generated as by product from industrial, municipal, agricultural, commercial and other processes. The amount of municipal solid waste generated is estimated to increase at a rate of 1 to 1.33 % annually in India. Recent studies show that 45 MT year of solid waste is generated from the urban centers of India which are inefficiently collected, inadequately transported and disposed off in an unscientific manner. The projected increase of solid waste is expected to rise to 125 MT/ year by 2025.

Conservation of wastes in to energy

The reuse and recycling of solid wastes can also serve as a means of conservation of energy. In the light of this, let us see, what are the principles guiding the management of solid wastes. Recognizing that our resources are finite and continued pollution will be difficult to rectify in coming times, the management of solid wastes has become important.

Before disposal, a waste should be considered for the following possibilities:

- **Reduction in Raw Materials and solid Waste**
  Solid wastes are generated at the start of the process beginning with the mining of raw material. Thereafter, solid wastes are generated at every step in the process of conversion of goods into products. The products are then used by the consumer whence again wastes are generated. Clearly if a reduction in the usage of raw materials is to occur the quantity of waste must be curtailed. This can be achieved by

(a) Reducing the amount of materials used in the manufacture of a product

(b) Increasing the life of the product

(c) Reducing the amount of materials used for packing the consumer goods.

- **Reuse of Waste Materials**
  Reuse of waste materials now occurs most commonly in those situations where a product has utility in more than one application. For example, the paper bags used to bring home groceries are used to store household wastes prior to placing them in containers used for storage for collection. Soup and vegetable containers are used to store cooking medium, like ghee or oil. Newspapers are used to start fires in fireplaces; they are also tightly rolled and used as logs for burning. While all the above reuses are important, their impact on generation of solid wastes is minimal. A much larger impact would occur if this habit is encouraged on a large-scale, in urban and town communities.

- **Material Recovery & Recycling**

A number of materials present in municipal and industrial waste are suitable for recovery and recycling about 10-15 percent of solid waste are recoverable. Most suitable candidates are the wastes generated by paper, cardboard, glass, ferrous metals, metals (mostly aluminum) and rubber. On the contrary, plastics, leather, textile and food wastes are unsuitable candidates for materials recovery. This is why it is advisable to save on the number of polyethylene packets, when purchasing consumer goods. Fly ash, which is a dust like by-product of the thermal power plants, is produced in huge quantities. Over 22mt of fly ash from thermal power sector was available for utilization in 1985-86. It appears that the fly ash can be compressed into bricks as such or in combination with cement etc., that can be used for building houses.

- **Energy Recovery**
  Alter segregation of wastes in the above-mentioned categories, the remainder is considered for the recovery of heat by burning (incineration). Because about 70 percent of the components that comprise solid waste are organic, the potential for recovery of heat energy is high. The energy content in the waste matter is converted to a form that can be used more easily. The remainder (ash) is also more compact and weighs less, occupying a smaller volume.

Benefits

Waste is not something that should be discarded or disposed of with no regard for future use. It can be a valuable resource if addressed correctly, through policy and practice. With rational and consistent waste management practices there is an opportunity to reap a range of benefits. Those benefits include:

- **Economic** - Improving economic efficiency through the means of resource use, treatment and disposal and creating markets for recycles can lead to efficient practices in the production and consumption of products and materials resulting in valuable materials being recovered for reuse and the potential for new jobs and new business opportunities.
- **Social** - By reducing adverse impacts on health by proper waste management practices, the resulting consequences are more appealing settlements. Better social advantages can lead to new sources of employment and potentially lifting communities out of poverty especially in some of the developing poorer countries and cities.
- **Environmental -** Reducing or eliminating adverse impacts on the environmental through reducing, reusing and recycling, and minimizing resource extraction can provide improved air and water quality and help in the reduction of greenhouse emissions.
- **Inter-generational Equity** - Following effective waste management practices can provide subsequent generations a more robust economy, a fairer and more inclusive society and a cleaner environment.

Challenges in developing countries

Waste management in cities with developing economies and economies in transition experience exhausted waste collection services, inadequately managed and uncontrolled dumpsites and the problems are worsening. Problems with

governance also complicate the situation. Waste management, in these countries and cities, is an ongoing challenge and many struggles due to weak institutions, chronic under-resourcing and rapid urbanization. All of these challenges along with the lack of understanding of different factors that contribute to the hierarchy of waste management affect the Treatment of waste.

Conclusion

Waste is a crisis of our own doing, (the result of a collision between rising living standards and insufficiently regulated capitalism). It is becoming more and more difficult to just run faster, catch up and solve the problem. There are just too many of us, producing too much waste. Long-term, viable solutions require action at every level - personal, corporate and government. It must start with acceptance of responsibility for waste, whether we are consumers or manufacturers. Once this happens the next step is anticipation. The eventual fate of every product must be anticipated at the outset, costed, and this cost built into the production process and/or the life of the product. Finally it requires a co-ordinate series of legislative measures, research funding and public education, and the development of public-private partnerships that can bring additional technical and financial resources and innovative solutions to the 21st century challenges.

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