International Journal of Research in Economics and Social Sciences(IJRESS)
Available online at: http://euroasiapub.org
Vol. 11 Issue 07, July- 2021
ISSN: 2249-7382 | Impact Factor: 8.018|
(An open access scholarly, peer-reviewed, interdisciplinary, monthly, and fully refereed journal.)

Solid Wastes: Sources and Management in Urban Arena of India

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Abstract:

One of the oldest problems of civilization is the management of solid wastes. The possibility of disposing them off, ceases to dominate, with the increases in population as well as the growing urbanization and industrialization. Increases in population, make it impossible for the natural system of waste disposal to dilute, disperse and decompose wastes to create a non-threatening level of these in the biosphere. the organic and inorganic waste materials, produced by household, commercial, institutional and industrial activities have caused immense problem in urban arena. The vast field of solid waste management, needs research attention and thus a review about it might help the research community.

KEY WORDS: Urbanization, Urban degradation, Solid Waste, E -waste, Management Practices

INTRODUCTION

Solid wastes can be defined as "any refuse or waste material, including semi-solid sludge, produced from domestic, commercial or industrial premises or processes including mining and agricultural operations and water treatment plants etc.". (Patrick,1980)

Urban areas bear more prominent traces of the above-mentioned crisis, due to the increasing population and the consequent pressure on the natural resources. In the early days, the major constituents of solid wastes were domestic refuse and agricultural residues, which were biodegradable in nature, and could be easily disposed of on vast stretches of open land.

Capitalism and urbanization have led to rising consumerism and this has changed habits and lifestyles diversifying the overall wastes produced in their turn leading to health hazards.

The quantum and type of solid waste generated in any urban centre are mainly from households, fruit and vegetable markets, slaughter houses, commercial areas including

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hotels, restaurants and office complexes; community places like hotels, clubs, function halls and cinema halls, health care centers, clinics, hospitals, nursing homes, street-sweepings, construction and demolition debris and e-waste. Further, the quantity and type of waste generated is directly proportional to the size and character of the urban centre concerned.

The wastes produced vary, from city to city, depending on: population, degree of industrialization, food habits, standard of living, economic condition and degree of commercial activity in the specific urban centers. Presently India's per capita waste generation is higher for larger cities and as compared to that of, smaller cities. In India, the per capita waste generation varies between O.lkg. to 0.6 kg. per day, with on an average of 0.33 kg per day. (Khullar,2001)

In its whole gamut, solid waste can be broadly categorized into municipal waste, bio-medical waste, nuclear waste, agricultural waste, industrial (toxic) waste, etc. However, the scope of the present research is limited only to municipal or urban waste. The solid waste which is generated within municipal boundaries, are specified by local ordinances and originate from various human activities. These are identified as Municipal Solid wastes. Industrial Wastes includes the discarded solid material of manufacturing process and industrial operations covering a vast range of substances such as packaging materials, food wastes, discarded metals, plastics, textiles, fuel- burning residues and so on. Cottage and small-scale industries tend to dump their waste into the general municipal refuse. Larger industries either arrange for private disposal of their waste or they are charged a fee for special municipal services.

DIFFERENT TYPES OF SOLID WASTE

In developing countries, markets are a major source of commercial waste and much of it is organic matter. Other sources include offices, wholesale and retail stores, restaurants, hotels, warehouses and other commercial establishments. Large offices or hotels arrange for their waste disposal, but, most of the commercial waste is handled by the municipal authorities. Institutional Refuse includes waste collected from hospitals and schools, universities, government establishments, research institutes, barracks of police and other allied defence units. Sometimes large hospitals handle their own waste privately. But, more often, wastes generating from hospitals are considered to be hazardous to public health and to the

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environment. Street Refuse includes wastes that are collected from streets, walkways, alleys, parks, and vacant plots such as paper, cardboard, dirt, leaves and other vegetable matter. It may also include household refuse, drain-cleanings, animal manure and human fecal matter. In some of the universities like Jawaharlal Nehru University, New Delhi, they are managing their own separate solid waste collection and disposal systems through the initiative of some NGOs. Construction and Demolition Debris include the waste material generated by construction, refurbishment, repair and demolition of houses, commercial buildings and other structures. It mainly consists of earth, stones, concrete; bricks, timber product, roofing materials, plumbing materials, heating systems, electric wires and parts of the general municipal waste stream often are dumped into the streets by builders. Household Waste comprises of solid wastes that originate from household units and consists largely of organic (decomposable) kitchen wastes, generated from household activities such as cooking, cleaning, repairs, hobbies and redecoration and contain empty containers, packaging, clothing, books, writing materials and old furnishings. Ash produced from traditional cooking in poor neighborhoods, use of bucket-latrines all contribute to the growing solid waste. In wealthier habitats, discarded furniture, appliances, and gardening waste also form the list.

ELECTRONIC WASTE (E-WASTE): A NEW-AGE BURDEN

Industrial Revolution followed by the advances in information technology during the last century has radically changed people's lifestyles. Though this development has helped the human race, but its mismanagement has led to new problems of contamination and pollution. Technological excellence achieved in the past century has posed a new challenge in the management of solid waste, due to 'electronic waste' or 'e-waste' through electronic equipment like personal computers (PCs), VCRs, stereos, copiers, cell phones fax machines etc.

The problem of urban waste is more intensified in densely populated areas. India's urban population is the world's second largest, after that of China and its urban population is growing much faster than rural population. Between 1961-91 while the total population of India increased three and a half times, the urban population went up nearly nine times from 25 million to 217 million. The decadal growth in urban areas during 1991-2001 is 31.2 per

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cent compared to 17.9 per cent in rural areas. The development of large cities has been an important aid to Indian urbanization. Sixty-five per cent of 3700 urban centers is concentrated in metropolitan cities. Out of the total urban population, 21 per cent is concentrated in just six cities: Delhi, Mumbai, Kolkata, Chennai, Hyderabad, and Bangalore. According to M.S. Gore (1975) many villagers, while moving out of their villages in search of employment, do not necessarily go to the nearest town, rather, they go to the biggest town or city. The rural-urban migration has led to an overwhelming growth of urban centers which has threatened the very development of urban centers. The municipal authorities lag behind in their efforts and initiatives to keep up with growing demands Due to this, as much as 30 per cent of municipal waste is left uncollected in urban centers. The labour market finds itself increasingly pressurized by the consistent inflow of migrants into urban centers. While industrialization has created jobs, the increase in employment opportunities has failed to strike a balance with the additions to the labour force and even the informal sector is often unable to engage substantial sections of the population in gainful employment. Basic services and employment opportunities then emerge as the most prominent and immediate needs of most urban centers today.

SOLID WASTE MANAGEMENT PRACTICES

Existing Practices in Solid Waste Collection

The task of providing solid waste management service often lies with the local government. A harmonious and compatible mode of operation between the stages of storage, collection, transport and disposal is essential to maintain smoothness of functioning.

Solid Waste Storage: Developing countries should ensure that storage facilities be as far as possible, animal-proof, insect-proof, and weather-proof, washable and big enough to meet the requirements of normal use.

Collection: Some common methods of waste collection practiced in developing countries may be classified under four headings:

1. Communal Collection: Waste from households is discharged at specified collection centers from which collection vehicles collect them at a stipulated time interval.

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2. Block Collection: This system is widely practiced in Burma and Mexico. Collection vehicles travelling down a pre-determined route, at prescribed intervals, blow a horn at specified areas, upon hearing which, householders empty their refuse containers in this car.

3. Kerbside Collection: This system requires a very regular and well-organised collection service, so that householders know when to leave out their wastes. Here, the collection crew collects bins, bags and other containers of refuse which are deposited at the kerbside at fixed intervals, usually on two specific days in the week, when collection takes place. Where collection is irregular, it is common to see the containers placed permanently outside, with increased incidence of the scattering of wastes by scavenging animals.

4. Door-to-Door Collection: Very common in developed countries, this method is not in much practice in developing countries. The collection crew enters each premise, takes out the container and set it back after emptying the waste into collection vehicles.

These four methods represent the basic methods of collection, and are the most effective methods for different communities in urban areas.

EXISTING PRACTICES IN SOLID WASTE DISPOSAL

The mere collection of the waste material doesn't solve the problem of waste management. They need to be transferred to a specific place for the disposal. However, no single method of solid waste disposal is equally suitable in all circumstances. The choice of a particular method is governed by local factors such as cost and availability of land and labour.

Some of the important methods of solid waste disposal are:

1. Ocean Dumping.
2. Land Filling.
3. Incineration.
4. Composting.
5. Energy Recovery.

1. Ocean Dumping: In this method, the authorities pack the waste in containers etc., and travel in the sea for a long distance and dump the waste, deep into the sea. However, ocean

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dumping is costly and eco unfriendly. Ocean dumping of untreated or partially treated solid wastes as practised by the developed countries has caused dwindling and disappearance of some of the marine species because of pollution.

2. Land Filling: Among the various waste disposal methods, most common is dumping at land fill sites located around the city where an estimated 90 per cent of the collected solid waste is disposed. Significantly, most landfill sites in India are uncontrolled dumps and not sanitary landfills. Domestic, commercial and even hospital and industrial waste are dumped together. No daily cover is applied (a layer of earth or construction debris) to the waste. Disposal of waste in this manner then leads to a range of problems-groundwater pollution through the leachate and other problems associated with flies, rats, rodents and odours are common. Apart from its limitations, the landfill method is the most easily adopted and the least expensive of the various disposal methods.

3. Incineration: Refuse can be disposed off hygienically by burning or incineration. It is the method of choice where suitable land is not available. Hospital waste which is particularly dangerous is best disposed of by incineration. This method is practiced in several developed countries, particularly in large cities due to lack of suitable land. This method is not popular in India, because, Indian waste contains a fair proportion of soil and non-combustible substances. Further, this method is very expensive also.

4. Composting: It is a resource recovery mechanism where the manure so produced (from solid waste) can be used as a soil conditioner. It is a method of disposing of solid waste on land without creating nuisance or hazard to public health and environment, by utilising the principles of engineering to confine the waste to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day's operation or at such more frequent intervals as may be necessary.

Energy Recovery: Biogas can also recovered through an anaerobic decomposition of the organic component of waste deposited in landfills, as well as power generation from incineration of domestic and trade waste. However, given the high organic content and high content of dust earth in Indian waste, burning of waste has been possible only with the use of extra fuel, making the entire process of incineration too expensive. Therefore, the solid waste management services suffer from many constraints, like inappropriate technology to

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inadequate and disinterested staff as well as an absence of efficient management and planning. There are also attitudinal factors which inhibit genuine interest in waste management and accord this service little prestige. All these factors combinely result in large quantities of uncollected waste, health risks to workers, waste pickers and the larger population and sub optional use of the resources that the garbage constitutes. 33 It is a method of composting waste that does not require oxygen (but in 'aerobic composting' oxygen is required). This composting method pro

URBANISATION AND SOLID WASTE

Urbanization has been understood to be a major cause of solid waste generation Economic changes resultant from urbanization, encourage immigration to the major cities, thus increasing the pressure of population in large cities and deterioration of infrastructural services and amenities. The poor people's access to basic services like water, sanitation, education and health services decline as a result. (SivaramaKrishnan ,1993)

According to Sandhya Venkateswaran (1994), urbanization and lack of responsibility on the part of the municipal authorities disturbs the overall process of solid waste management in urban localities. Disposal problems become difficult with increase of population density as there is a greater production of waste per unit area; therefore, the history of solid waste is largely connected with the histories of largest cities.

The history of solid waste, in general, has not been written. Till recently, there is no tradition of scholarly research into solid waste management. This review has thus aimed to fill this dearth of research in the crucial area of solid waste management- a pertinent problem in large urban industrialized localities like India.

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