

A Study on Integrated Waste Management

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Abstract - Waste as a management issue has been evident for over four millennia. Disposal of waste to the biosphere has given way to thinking about, and trying to implement, an integrated waste management approach. The United Nations Environmental Programme (UNEP) defined integrated waste management as a framework of reference for designing and implementing new waste management systems and for analyzing and optimizing existing systems.

Key Words: Waste , Management , Technological Solutions , Sustainability ,Environment ,Hazard.

1.INTRODUCTION

There are couple of things sure in life – one is death, second is change and the other is waste.” No one can stop these things to take place in our lives. Be that as it may, with better management we can prepare ourselves up. Here we will discuss about waste and waste management. Every one of us has a right to clean air, water and food. This right can be fulfilled by maintaining a clear and healthy environment. Now for the first question, what is waste?

Any material which is not needed by the owner, producer or processor is waste. Generally, waste is defined as at the end of the product life cycle and is disposed of in landfills. Most businesses define waste as “anything that does not create value”. In a typical man’s eye anything that is unwanted or not useful is garbage or waste. However scientifically speaking there is no waste as such in the world. Almost all the components of solid waste have some potential if it is converted or treated in a scientific manner. Hence we can define solid waste as “Organic or inorganic waste materials produced out of household or commercial activities, that have lost their value in the eyes of the first owner but which may be of great value to somebody else.” (Robinson, W.D.1986).

Generation of waste is inevitable in every habitation howsoever big or small. Since the dawn of civilization humanity has gradually deviated from nature & today there has been a drastic change in the lifestyle of human society. Direct reflection of this change is found in the nature & quantity of garbage that a community generates. We can dispose the waste or reuse the waste and can earn money through proper management. Indian cities which are fast contending with worldwide economies in their drive for fast economic development have so far failed to effectively manage the huge quantity of waste generated.

The quantum of waste generated in Indian towns and cities is increasing day by day on account of its increasing populace and increased GDP.

Thus, waste management is undergoing drastic change to offer more alternatives that are more sustainable. We look at these options in the expectation of offering the waste management industry a more financially feasible and socially satisfactory solution to our current waste management dilemma. This study outlines various advances in the area of waste management. It focuses on current practices related to waste management initiatives taken by India.

1.1 Priorities of Integrated Waste Management

Despite the fact that it may sound simple to implement integrated waste management by utilizing a variety of waste strategies, it is actually more complex. An outlined arrangement for implementing integrated waste management includes three priorities.

The **first priority** involves the primary avoidance of pollution and waste by expecting ventures to eliminate or reduce the amount of harmful chemicals used in production, reduce packing materials for products and make products that last longer and are easier to recycle, reuse and repair. This first priority targets large industry and endeavours to reduce the overall waste produced at the source.



Fig -1: First priority focusing on industries

The **second priority** targets small businesses and individuals and focuses on secondary prevention of pollution and waste. This step involves educating and encouraging individuals to buy reusable products, repair broken items, recycle, reuse products and compost.

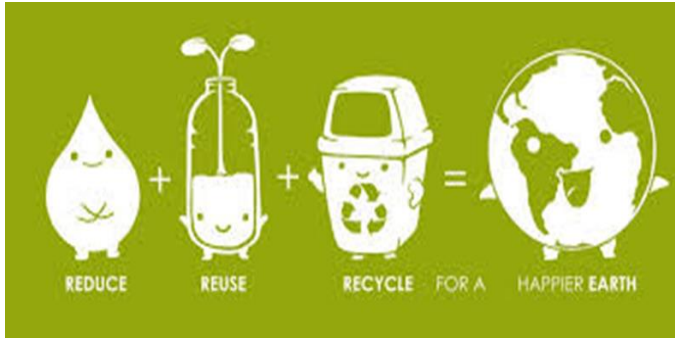


Fig -2: Second priority focusing on individuals

The third priority is altogether different from the initial two and focuses solely on waste management, including treating waste to reduce toxicity, burying or incinerating waste and releasing some waste into the environment for dispersal or dilution.

As you can now be able tell from the priorities of the integrated waste management system, for the system to work efficiently, more effort and consideration need to be paid to waste reduction. Shockingly, although the priorities were designed by scientists and backed by data, most countries, still tend to focus more on waste management.

1.2 Basic Principles of Waste Management

- **4R's:** Refuse, Reduce, Reuse & Recycle
 - Refuse: Do not buy anything which we do not really need.
 - Reduce - Reduce the amount of garbage generated. Alter our lifestyle so that minimum garbage is generated.
 - Reuse - Reuse everything to its maximum after properly cleaning it. Make secondary use of different articles.
 - Recycle – Keep things which can be recycled to be given to rag pickers or waste pickers (Kabadiwallahs). Convert the recyclable Garbage into manures or other useful products.
- Segregation at source: Store organic or biodegradable and inorganic or Non-biodegradable solid waste in different bins. Recycle of all the Components with minimum labour and cost.
- Different treatments for different types of solid wastes: One must apply the techniques which are suitable to the given type of garbage. For example the technique suitable for general market waste may not be suitable for Slaughter house waste.
- Treatment at nearest possible point: The solid waste should be treated in as decentralized manner as possible. The garbage generated should be treated preferably at the site of generation i.e. every house.

Based on the above principles, an ideal Solid Waste Management for a village could be as under.

2. COMPOSITION AND CLASSIFICATION OF WASTE

There may be distinctive types of waste such as Domestic waste, Factory waste, Waste from oil factory, E-waste, Construction waste, Agricultural waste, Food processing waste, Bio-medical waste, Nuclear waste, Slaughter house waste etc.

We can characterize waste as follows:

- special waste
- liquid waste
- hazardous waste
- general solid waste (putrescible)
- general solid waste (non-putrescible).

To figure out which of the above classifications applies to your waste, the following steps must be followed in the order below. Once a waste's characterization has been set up under a particular step, do not go to the next step the waste will be taken to have that classification and must be managed accordingly.

2.1 Step 1: Is The Waste Special Waste ?

'Special waste' is a class of waste that has a special kind of regulatory requirements. The potential environmental impacts of special waste need to be managed to minimize the risk of harm to the environment and human wellbeing.

Special waste means any of the following:

- clinical and related waste
- asbestos waste
- waste tyres

Generators of special waste do not need to make any further assessment of their waste if it falls within the definitions of special wastes below.

The main exemption to this is where special waste is mixed with restricted solid or hazardous waste. In these conditions, the waste must be classified as special waste and restricted solid or hazardous waste (as applicable), and managed as both of those classifications.

The meanings of the terms clinical and related waste, asbestos waste, and waste tyres are detailed below.

- **Clinical waste** means any waste resulting from medical, nursing, dental, pharmaceutical, skin penetration or other related clinical activity, being waste that has the possibility to cause injury, infection or offence, and includes waste containing any of the following:

- human tissue (other than hair, teeth and nails)
- bulk body fluids or blood
- visibly blood-stained body fluids, materials or equipment
- laboratory specimens or cultures
- animal tissue, carcasses or other waste from animals used for medical research

- becomes free-flowing at or below 60 degrees Celsius or when it is transported
- is generally not capable of being picked up by a spade or shovel

If the waste meets the criteria outlined above, it is classified as liquid waste, and no further assessment for classification is required.

Clinical and related waste means:

- ❖ cytotoxic waste
- ❖ pharmaceutical, drug or medicine waste
- ❖ sharps waste.
- ❖ **Cytotoxic waste** means any substance contaminated with any residues or preparations that contain materials that are toxic to cells principally through their action on cell reproduction.
- ❖ **Pharmaceutical, drug or medicine waste** means waste that has been generated by activities carried out for business or other commercial purposes and that consists of pharmaceutical or other chemical substances.
- ❖ **Sharps waste** means any waste collected from designated sharps waste containers used in the course of business, commercial or community service activities, being waste resulting from the use of sharps for any of the following purposes:
 - human health care by health professionals and other health care providers
 - medical research or work on cadavers
 - veterinary care or veterinary research
 - skin penetration or the injection of drugs or other substances for medical or non-medical reasons

- **Asbestos waste** means any waste that contains asbestos are the fibrous form of mineral silicates that belong to the serpentine or amphibole groups of rock-forming minerals, including actinolite, amosite (brown asbestos), anthophyllite, chrysotile (white asbestos), crocidolite (blue asbestos) and tremolite.
- **Waste tyres** means used, rejected or unwanted tyres, including casings, seconds, shredded tyres or tyre pieces.

2.2 Step 2: Is The Waste Liquid Waste?

If you have established that the waste is not special waste, decide whether it is 'liquid waste'.

Liquid waste means any waste (other than special waste) that:

- has an angle of repose of less than 5 degrees above horizontal

2.3 Step 3: Is The Waste Pre-Classified Waste?

If the waste is neither special nor liquid waste, establish whether the waste has been pre-classified.

Some commonly generated waste types have been pre-classified as hazardous waste, general solid waste (putrescible) or general solid waste (non-putrescible).

Once a waste's classification has been established under a particular pre-classification below, do not go to the next classification; the waste has that classification and must be managed accordingly.

▪ Hazardous waste

The following waste types (other than special waste or liquid waste) have been pre-classified as 'hazardous waste':

- coal tar or coal tar pitch waste (being the tarry residue from the heating, processing or burning of coal or coke) comprising of more than 1% (by weight) of coal tar or coal tar pitch waste
- lead-acid or nickel-cadmium batteries (being waste generated or separately collected by activities carried out for business, commercial or community services purposes)
- lead paint waste arising otherwise than from residential premises or educational or child care institutions
- any mixture of the wastes referred to above.

▪ General solid waste (putrescible)

The following wastes (other than special waste, liquid waste, hazardous waste or restricted solid waste) have been pre-classified as 'general solid waste (putrescible)':

- household waste that contains putrescible organics
- waste from litter bins collected by or on behalf of local councils
- disposable nappies, incontinence pads or sanitary napkins
- food waste ,animal waste
- grit or screenings from sewage treatment systems that have been dewatered so that the grit or screenings do not contain free liquids
- any mixture of the wastes referred to above.

In assessing whether waste has been pre-classified as general solid waste (putrescible), the following definitions apply:

- **Animal waste** includes dead animals and animal parts and any mixture of dead animals and animal parts.
- **Food waste** means waste from the manufacture, preparation, sale or consumption of food but does not include grease-trap waste.
- **Manure** includes any mixture of manure and biodegradable animal bedding, such as straw.

▪ **General solid waste (non-putrescible)**

The following wastes (other than special waste, liquid waste, hazardous waste, restricted solid waste or general solid waste (putrescible)) are pre-classified as 'general solid waste (non-putrescible)':

- glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal
- paper or cardboard
- household waste from municipal clean-up that does not contain food waste
- waste collected by, or on behalf of, local councils from street sweepings
- garden waste
- wood waste
- waste contaminated with lead (including lead paint waste) from residential premises or educational or child care institutions
- containers, previously containing dangerous goods, from which residues have been removed by washing or vacuuming
- drained oil filters (mechanically crushed), rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids
- virgin excavated natural material
- building and demolition waste

In assessing whether waste has been pre-classified as general solid waste (non-putrescible), the following definitions apply:

➤ **Building and demolition waste** means unsegregated material (other than material containing asbestos waste or liquid waste) that results from:

- the demolition, erection, construction, refurbishment or alteration of buildings other than
 - chemical works
 - mineral processing works
 - container reconditioning works
 - waste treatment facilities
- the construction, replacement, repair or alteration of infrastructure development such as roads, tunnels, sewage, water, electricity, telecommunications and airports

and includes materials such as:

- bricks, concrete, paper, plastics, glass and metal

- timber, including unsegregated timber, that may contain timber treated with chemicals but does not include excavated soil (for example, soil excavated to level off a site prior to construction or to enable foundations to be laid or infrastructure to be constructed).
- **Garden waste** means waste that consists of branches, grass, leaves, plants, loppings, tree trunks, tree stumps and similar materials, and includes any mixture of those materials.
- **Virgin excavated natural material** means natural material (such as clay, gravel, sand, soil or rock fines):
 - that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities
 - that does not contain sulfidic ores or soils, or any other waste.
- **Wood waste** means sawdust, timber offcuts, wooden crates, wooden packaging, wooden pallets, wood shavings and similar materials, and includes any mixture of those materials, but does not include wood treated with chemicals.

3. CONCLUSIONS

There are regular practices to dispose waste from ordinary people. But disposal of waste is becoming a serious and vexing issue for any human habitation all over the world. Disposing solid waste out of sight does not solve the problem but indirectly increases the same manifold and at a certain point it goes beyond the control of everybody. The consequences of this practice such as health hazards, pollution of soil, water, air & food, unpleasant surroundings, loss of precious resources that could be obtained from the solid waste, etc. are well known. That's why it is essential to focus on proper management of waste all over the world. Waste management has become a subject of concern globally and nationally. The more advanced the human settlements, the more complex the waste management. There is a continuous search for sound solutions for this problem but it is progressively understood that solutions based on technological innovations without human intervention cannot sustain for long and it in turn results in complicating the matters further. Management of solid waste which generally involves proper segregation and scientific recycling of all the components is in fact the ideal way of dealing with solid waste. Solid waste management (SWM) is a commonly used name and defined as the application of techniques to ensure an orderly execution of the various functions of collection, transport, processing, treatment and disposal of solid waste (Robinson, 1986). It has developed from its early beginnings of mere dumping to a sophisticated range of options including re-use, recycling, incineration with energy recovery, advanced landfill design and engineering and a range of alternative technologies. It aims at an overall waste management system which is the best environmentally, economically sustainable for a particular

region and socially acceptable. This not only avoids the above referred consequences but it gives economic or monetary returns in some or the other forms.

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