

# GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

## A CRITICAL REVIEW OF WASTE MANAGEMENT

Dr. Umesh Kumar<sup>\*1</sup>, Jagriti Kumari<sup>2</sup>, Kusum Kumari<sup>2</sup>, Puja Kumari<sup>2</sup>, Mamta Kumari<sup>2</sup>,  
Anamika Kumari<sup>2</sup>, Swati Barnwal<sup>2</sup>

<sup>\*1</sup>Principal, Govt. Women's Polytechnic, Ranchi, Jharkhand, 834001

<sup>2</sup>Scholars of Govt. Women's Polytechnic, Ranchi, Jharkhand, 834001

---

### ABSTRACT

Waste is those unnecessary substances that have no use to us. Nothing is waste in this world they all contribute to us directly or indirectly. Waste to one person may or not be waste to other. Today the production of waste is extremely high and it is necessary to control and manage it. Waste from kitchens can be used as compost, left out food materials can be used by animals or in bio gas plant. The metals from the E-waste can also be used in electrolysis process, or in making jewellery. There are many more things which are not waste but people turned them as unusable. Many a times the reason behind this waste is that many people think that if I will use this. It will reduce my prestige and I will get less importance in the society. They think wasting food or having a Electronic device per month is a sign of richness. About 35% of people, waste things only just to show off their standard of living. And it is really very necessary to change their mindset so that production of waste can be minimized. It is based on a simple concept:-If we create less waste we consume fewer resources and we don't have to spend as much money to recycle or dispose of our old bicycle instead of buying a new one is perfect way to reduce waste. We have done many nasty things to our earth which cannot be cured totally but can be reduced with the help of proper waste management. Waste management is all those activities and action required to manage waste from its inception to its final disposal. It is really very necessary to make aware people about proper waste management so that we can live more happier and healthy life.

*Keywords—Waste, Household, Management, Chemicals, Disposal.*

---

## I. INTRODUCTION

The collection, transportation and disposal of garbage sewage and other waste products. Waste management is the process and resources for proper handling of waste material, from maintenance of waste transport truck and dumping facilities to compliance with health and environmental regulation.

Our waste management program was really good and we were the cleanest business in all of the country and that made us very proud.

Rapid development and industrial progress is generation of waste.

Therefore, efficient waste management is a matter of international concern and countries.

All the people set up their mind how to control the population, how to control the pollution. If we control these two things we get first step for waste management.

In India, the national environment pollution 2006 while suggesting majors for controlling various forms of environmental pollution.

The waste materials from the industries, homes or other source properly collected and treat. This forms recycling.

In India waste management is governed by various sub-ordinate legislations and the ministry of environment, forest and climate change, government of India in conjunction with State Pollution Control Boards of different states motivate for waste management.

Pollution is big problem in the world. This pollution is comes from the big as well as the small sources. We use generally those things which are not properly disposed. So that waste material creates various problems.

We all know our scientist research various typical medicine for controlling the various diseases and the do well. But we all also know if we control the pollution many peoples are protected.

For controlling this we control the burden on scientist.

## II. WASTE

Waste has been major environmental issues everywhere.

Waste are obtained from home, school and other public places, there are also those from hospitals, industries and other sources.

Waste is items we don't need and discarded. This waste is necessary to decompose because it is very harmful for human beings and the animals. Waste comes in infinite sizes some can be as small as an old tooth brush, or as large as the body of a big vehicle.

Every one creates waste, although some people are very conscious about environmental and create very little waste. Likewise, some countries do a very good job creating less waste.



*Figure 1 View of waste*

In Europe 1.8 billion tonnes of waste is created by people in each year.

All over the world, communities handle their waste from different, different ways. Some common methods of managing their waste include land fillings, recycling and composting.

Some country strongly tries to reduce the waste. Some communities has first work to minimize the waste.

### III. TYPES

Generally, waste could be liquid or solid waste. Both of them could be hazardous. Liquid and solid waste types can also be grouped into organic, re-usable and recyclable waste.

- **Liquid type:-**  
Waste can come in non-solid form. Some solid waste can also be converted into liquid waste form for disposal. Liquid waste from waste water, homes, liquid used for cleaning in industries and waste detergents.
- **Solid type:-**  
This include old car tires, old newspapers, broken furnitures and then food waste.
- **Hazardous type:-**  
It is harmful type waste which is dangerous for public health or the environment. Such waste could be inflammable, reactive, corrosive or toxic.  
Many countries tries to disposed of such hazardous waste.  
Examples include fire extinguishers, pesticides lamp and batteries.
- **Organic type:-**  
Generally comes from animal's sources or plants. They include food waste, fruits and vegetable peels.  
Many people turn this organic waste into compost and use them in their gardens.
- **Recyclable type:-**  
Recycling is the processing used materials into new useful products.  
Aluminum products, glass products, paper products, news papers etc can be recycled and all of this comes into this categories.
- **Controlled waste:-**  
Waste that is defined as household, industrial or commercial waste. The storage, handling, movement and disposal of controlled waste is strictly regulated with the environmental protection.  
Act 1990 introducing a chain of accountability for controlled waste and the concept of duty of care.
- **Household waste:-**  
Waste comes from a domestic property, residential home, educational establishment, hospitals or nursing homes with the exception of mineral or synthetic oil or grease.
- **Clinical waste:-**  
Any waste consisting wholly or partly of human or animal tissue, blood or other pharmaceutical products, swabs or other dressings or syringes, needles or other sharp instruments, being waste which unless rendered safe may prove hazardous to any person

coming into contact with it; and any waste arising from medical, nursing, dental veterinary, pharmaceutical or similar practices, investigation, treatment, care, teaching or research or the collection of blood for transfusion, being waste which may cause infection to any person coming into contact with it.

Clinical waste is further subdivided for management purpose into hazard risk group 1 to 4(Advisory committee on Dangerous Pathogens)and groups of A1-A3 and B, C, D and E (Health Services Advisory Committee)

- **Agricultural waste:-**  
Agricultural waste includes a range of waste streams that originate from agricultural and horticulture establishment for examples, agricultural plastics and packaging waste, empty pesticide containers, clinical waste, tyres, cold machinery and coil. Where manure slurry and effluent is used as fertilizer on the form where it originated, it is not considered to be waste. Certain waste derived from agricultural premises are subjected to strict control under the animal by-products regulations, and may be subjected to control under clinical waste special waste or radioactive waste legislation.
- **Radioactive waste:-**  
Radioactive waste is defined in the radioactive substances Act 1993 as any waste which:  
1:-Consists wholly or partly of substance which would otherwise be classified as a radioactive material or  
Any substances contaminated by a radioactive material or radioactive waste.

#### IV. WASTE PREVENTION

Preventing waste means reducing the amount of waste generated reducing the hazardous content of that waste and reducing its impact on the environment.

It is based on simple concept: If we create less waste we consume fewer resources and we don't have to spend as much money to recycle or dispose of our waste. For instant repairing of our old bicycle instead of buying new one is a perfect way to reduce waste.

It is also important that individual and business can often save a significant amount of money through waste prevention:



Figure 2 Pyramid of Waste positions

“Waste that never get created doesn't have management cost (handling, transporting, treating and disposing of waste).

The rule is simple: The best waste is that which is not produced!

Waste prevention includes strict avoidance of waste generation, qualitative, and quantitative reduction at source, and re-use of products. It does not include recycling of materials and separate waste collection.

#### V. MANAGING HOME WASTES

We all know in our home per day 1 to 2 bags waste materials is stored some people throw this, in dustbin or some people throw this on road side or free space like as plot.

We should manage our home waste so we done followings things:-

Use cloth bags instead of plastics:-

If we done this small measure greatly reduce the amount of waste. We all go market for purchasing many useful things or cloths also. We can bring our own reusable cloth bags instead of accepting plastic bags from the store. Sometimes we miss this cloth bag. This bag is also available in shop. So we could spring for those instead of accepting plastic or paper we can never have enough around the house.

Don't use bottled drinks unless you have to:-

Bottled water and other bottled drinks are major sources of waste in many places. In some places bottled water is safe to drink than tap water, but if that's not the case in your area, consider using tap water, instead of bottled water. We can always filter the water if we don't like the way it tastes. This is more economical and much better for the environmental. If we do choose to buy drinks by the bottle, choose large containers, rather than small ones. For example we get a 5 gallon container of water instead of buying an 18 pack of small bottles. The main help from the government to reduce this type of waste is that install a filter in every place where it is possible or where drinking water is necessary.

Reduce our paper waste:-

Many bills like as shopping malls or general stores are giving to the costumer. This increases the waste of paper. If we like using computers, there are very few reasons you still need to have a lot of paper waste in our house. So it is very necessary to reduce the amount of paper. Many information sent in e-mail instead of printing bill on paper.

Day by day technology developed very fast and every person have self phone. So our news paper which is delivered per day billions of peoples house for getting information is reduce to minimum. And all this information provide online. This reduces the use of paper.

Making our households cleaners and detergents:-

Many of the containers used for cleaners and detergents are recyclable.

Here are few great recipes to try:- Make our own laundry detergent, Make our own glass cleaner ,Make our own bathroom cleaner, Make our own kitchen cleaner.

Save our food scraps and yard cutting from the trash:- Food scraps and yard cuttings don't need to be thrown out. This food scraps used to nourish our gardens or donated to someone else who will be able to use it.

By using bio-gas:- We all know flue is very important for making food. We should install own bio-gas plant this is not very hard. Waste material from the house is stored in deep dug in that area where sun light is properly reach and gas created from that waste is used for many purpose.

## VI. NEWS PAPER WASTE MANAGEMENT

In our daily life for knowing different news we purchased news paper.

Some people use this old news paper in different, different work. And some throw this in dustbin or other places away from population. If we don't throw away this old news paper and try some of these ideas to recycle or re-use them:-

- Cheap insulation:- Stuff rolled us newspaper under doors and in windows to keep warm in an emergency.
- Wrap around ice cream containers to carry to parties to keep it cool.
- Layers of newspaper are great insulation for cooling or heating.
- Use as table cloth padding.
- Use as light reflector when taking photographs.
- Use to decorate crafts.
- Use as glass cleaner.
- Make paper hats.
- Use as fire starter.
- Use as shape keeper.
- Use as dress patterns.

## VII. INDUSTRIAL WASTE MANAGEMENT

Industrial waste is producing approximately 50 million metric tons of solid waste each year. This amount is lower than that produced by many other sources industrial waste has a higher environmental impact than many other types of waste.

Thus, a smart industrial waste management solution is vital to ensure our company manages its waste in a way that is efficient, cost effective, and environmentally sound. Developing an efficient industrial waste management

plan will give facility stays safe and clean, improving our employees working environment and boosting our facility's over all waste management plan.

Accept the best way to collect waste as it is produced.

- If we produced waste that must be stored for treatment. Due to this harmful impact is minimized. This is the duty of employees to know where and how to dispose of these materials.
- Properly drainage of waste storage tank and treatment is done. This is the way for waste management.
- The ideal schedule for waste storage and removed will depend upon the amount and type of waste we produce.

### VIII. INDUSTRIAL WASTE SOURCE REDUCTION PRINCIPLES

The amount of industrial waste is reduced is produced by our facility. Reducing the amount of waste we produce lowers both the financial and environmental cost of continued manufacturing and industrial activities. Upgrading our technology and updating our production techniques can drastically reduce the amount of waste. In addition to reducing waste these changes can also save we money in terms of time and energy to improve over overall benefits. Maintaining our facilities and employer are properly trained will also, reduce the amount of waste produced in terms of mistakes and faulty machinery. Recycling is a simple way to reduce the amount of waste.

### IX. E WASTE

Electronic waste is one of the fastest-growing population problem worldwide given the presence if a verity of toxic substances which can contaminate the environment and threaten human health. Thus proper management is necessary while disposing or recycling e-waste.

These days computer has becomes most common and widely used schools, residences, office to manufacturing industries. E-toxic component in computers could be summarized as circuit boards containing heavy metals like lead and cadmium ; batteries containing cadmium ; cathode ray tubes with lead oxide and barium ; used on printed circuit boards ; cables and plastic casing poly vinyl chloride (PVC) coated copper cables and plastic computer casing that release highly toxic dioxins & furans when burnt to recover valuable metals; mercury switches; mercury in flat screen ; poly chlorinated biphenyls present in older capacitors ; transformers ; etc . Basel Action Network (BAN0 estimates that the 500 million computers in the world contains 2.87 billion kg of plastics, 716.7 million kg of lead and 286,700 kg of mercury. The average 14 inch monitor uses a tube that contains an estimated 2.5 to 4 kg of lead. The lead can seep into the ground water from landfills thereby contaminating it. If the tube is crushed and burned, it emits toxic fumes into the air.

### X. MANAGEMENT OF E-WASTE



It is estimated that 75% of electronic items are stored due to uncertainty of how to manage it. These, warehouses etc. And normally mixed with household wastes, which are finally disposed off at landfills. This necessitates implementable management measures.

In industries management of e- waste should be being at the point of generation .This can be done by waste minimizing techniques and by sustainable product design.

- Environmental management  
Proper control over the materials used in the manufacturing process is an important way to reduce waste generation. By reducing both the quantity of hazardous material used in the process and the amount of access raw material in stock, the quantity of waste generated can be reduced. This can be done in two ways i.e. establishing material purchases review and control procedures and inventory tracking system

- Developing review procedures for all materials purchased is the first step in establishing an inventory management program. Procedures should require that all materials be approved prior to purchase in the approval process all productions materials are evaluated to examine if they contain hazardous constituents and whether alternative non-hazardous materials are available
- Other inventory management procedure for waste reduction is to ensure that only the needed quantity of a material is ordered. This will require the establishment of a strict inventory tracking system purchases procedures must be implemented which ensure that materials are ordered only on an as needed basis period of time is ordered.

## XI. RECOVERY AND REUSE

This technique could eliminate waste disposal costs, reduce raw material cost and provided incoming from a salable waste can be recovered on site, or at an off-site recovery facility, or through inter industry exchange. A number of physical and chemical techniques are available to reclaim a waste material such as reverse osmosis, electrolysis, condensation, electrolytic recovery, filtration, etc. For example, a printed circuit board manufacturer can be used electrolytic recovery to reclaim metal from copper and tin-lead plating bath However recycling of hazardous products has little environmental benefit if it simply moves the hazardous into secondary products that eventually have to dispose of. Unless the goal is to redesign the product to use non-hazardous material, such recycling is a false solution.

Waste disposal

Waste management is the handling of discarded material. Recycling and Compositing , which transform waste into useful product, are forms of waste management. The management of waste also include disposal such as land filling .

Waste can be anything ,including , food leaves , newspaper , bottles construction debris , chemical form a factory ,candy wrapper , disposal diapers , radioactive materials . People have always produced waste, but as industry and technology have evolutes and the human population has grown , waste management has become increasingly complex .

A primary objective of waste management today is to protect the public and the environment from potentially harmful effect of waste. Some waste materials are normally safe ,but can becomes hazardous if not managed properly . For example 1gal 9(3.75l) of used motor oil can potentially contaminate 1 million gal (3,790,000l) of drinking water.

Every individual, business, or organization must make designs and take some responsibility regarding the management of his or her waste. On a large scale, government agencies at the local, state ,and federal levels enact and enforce regulations governing waste management . these agencies also educate the public about proper waste management . in addition , local government agencies may provide disposal or recycling services or they may hire or authorize private companies to perform these have function .

Thought-out history , these have been four basic method of managing waste -dumping it ,burning it , finding another use for it (reuse and recycling ) and not creating the waste in the first place (waste presentation ).How those four methods are utilized depends on the waste being managed municipal solid waste is different from industrial ,agricultural or mining waste . Hazardous waste is a category that should be handled separately, although it sometimes is generated with the other types.

The first humans did not worry much about waste management. they simply left their garbage where it dropped . However as permanent communities developed. People began to dispose of their waste in designated dumping area .the use of such Open dumps for garbage is still common in many part of the world. Open dumps have major disadvantage , however especially in heavily populated area . Toxic chemicals can filter down through a dump and contaminant ground water .The liquid that filterd through a dump or landfill is called leachate . Dumps may also generate methane, a flammable and explosive gas produced when organic wastes decomposed under anaerobic (oxygen- poor ) conditions.

## XII. WASTE TREATMENT & DISPOSAL

Waste management is simply means collection , transport ,processing or disposal ,managing of waste material to minimize its hazardous impact on human and environment .

There are several methods for managing all the various type of waste.

Some of these methods is also harmful for environment .The common methods of managing waste;



- **Burning method of waste management :**  
This method is generally used those places where limited landfill space. Burning chamber is very small for domestic use, but they are larger for municipal use. This method is great treating waste, coming from industries, hospitals but they produce too much carbon dioxide. So modern burning process is accepted to reduce the toxic gases. This method is effective but expensive.
- **Landfills of waste disposal :**  
Generally this process is done where large space is available from ground the waste and this place is away from the living places where all the waste from a town is disposed. Proper landfill is also necessary. This is away from the water level in the land. This method is effective but difficult. In many towns, storing is not done that is treatment of waste material is not done and all the waste is mixed up and deposited. This includes a problem that plastics and glass take thousands of years to decompose. Proper waste management is not cheap.
- **Waste recycling :**  
Recycling is the processing of used materials into new, useful products. This is done to reduce the use of raw materials that would have been used. This process is a great way of controlling air, water and land pollution. Waste items that are usually recycled include:
  - **Plastic waste :**  
This item includes plastic bags, water bottles, rubber bags and plastic wrappers.
  - **Glass waste :**  
All glass products.
  - **Aluminum waste**  
Fruit cans, and all other cans can be recycled.  
When these are controlled, they are sent to the recycling unit, where all the waste from each type are combined, crushed, melted and processed into new materials.

### XIII. IMPORTANCE OF WASTE RECYCLING

- Recycling helps protect the environment.
- Recycling creates jobs.
- Recycling saves energy.

### XIV. WASTE RECYCLING

Recycling is processing used materials (waste) into new useful products. This is done to reduce the use of raw materials that would have been used. Recycling also uses less energy and is a great way of controlling air, water and land pollution. Effective recycling starts with household (or the place where the waste was created). IN MANY SERIOUS COUNTRIES, The authorities help households with bin bags with cables on them. Households then sort out the waste themselves and place them in the right bags for collection. This makes the work less difficult.

Waste items that are usually recycled include:-

**Paper Waste:-** Paper waste items include books, news-papers, magazines, cardboard boxes and Envelopes.

**Plastic Waste:-** Items include plastic bags, water bottles, rubber bags and plastic wrappers.

**Glass Waste:-**All glass products like broken bottles, beer and urine bottles can be recycled.

**Aluminum Waste:-**Cans from soda drink, tomato, fruit cans and all other cans can be recycled. "Recycling just 1 ton of aluminum cans conserves more than 207 million Btu, the equivalent of 36 barrels of oil, or 1,665 gallons of gasoline.

When these are collected , they are sent to the recycling unit , where all the waste from each type are combined , crushed , melted and processed into new materials.

## XV. BENEFITS OF WASTE RECYCLING

Recycling is beneficial in many ways including:-

- Recycling helps protect the environment:-  
This is because the recyclable waste materials would have been burned or ended up in the landfill. Pollution of the air, land, water and soil is reduced.
- Recycling conserves natural resources:-  
Recycling more waste means that we do not depend too much on raw (natural) resources, which are already massively depleted.

Recycling Saves Energy:- It takes more energy to produce items with raw materials than from recycling used materials. This means we are more energy efficient and the prices of products can come down.

Recycling Creates Job:- People are employed to collect, sort and work in recycling companies. Others also get jobs with businesses that work with these recycling units. There can be a ripple of jobs in the municipality.

## XVI. UPCYCLING

Before we throw anything away, really think about it. For example, if we have finished burning a candle that comes in a big jar, don't waste it. Instead , drain out the leftover wax and use it as storage. This is called "upcycling".

Upcycling is "the process of converting waste materials or useless products into new materials or products into new materials or products of better quality or environmental value".

## GREEN ENGINEERING

"Green engineering is based on the idea of designing ,selling and using processes and products that are technically and economically viable while , at the same time , minimizing pollution ,as well as health and environmental risks. This is expressed in twelve principles that were formulated nearly a quarter of a century ago. Its most recent development, a pilot plant for the anaerobic digestion of organic waste is going to be used for research in the field of bio gas production using waste water ,sludge and organic waste from landfills and purification plants.

The system is based on the biological processing that certain bacteria perform in conditions that lack oxygen ,which convert organic waste material into a mixture of combustible gases {carbon monoxide, hydrogen and methane}.these gases can be accumulated and later used in the production of heat and electrical energy. "This prototype will serve to optimize the processes that make use of waste material to produce energy and will be a useful instrument for solving the problem of managing potentially toxic wastes in urban, agricultural and livestock areas."

The main reactor of this pilot plant consists of a stirred tank reactor in which the temperature and PH are controlled .the way it works is relatively simple: organic systems are continuously introduced and, as the biogas is produced by the metabolism of the microorganisms ,the waste that is obtained is extracted through the lower part of the tank .

"the ultimate goal is to develop the technology and optimize the processes that lead to energy production on an industrial scale ,using organic waste ".

The 12 principles of green engineering, a code of best practices for design:

1. Designers need to strive to ensure that all materials an energy inputs and outputs are as inherently non-hazardous as possible.
2. It is better to prevent waste than to treat or clean up waste after waste after it is formed.
3. Separation and purification operations should be designed to minimize energy consumption and material use.
4. Products, processes and systems should be designed to maximize mass, energy ,space ,and time efficiency.
5. Products, processes, and systems should be "output pulled" rather than "input pushed" through the use of energy and materials.
6. Embedded entropy and complexity must be viewed as an investment when making design choices on recycle, reuse, or beneficial disposition.
7. Targeted durability, not immortality, should be a design goal.
8. Design for unnecessary capacity or capability, for example: { "one size fits all"} solutions should be considered a design flaw.

9. Material diversity in multi component products should be minimized to promote disassembly and value retention.
10. Design of products, processes, and systems must include integration and interconnectivity with available energy and materials flows.
11. Products, processes, and systems should be designed for performance in a commercial "after life".
12. Material and energy inputs should be renewable rather than depleting.

## **XVII. CONCLUSION**

The management of waste is not a static process. Every institution will need to establish a process to ensure that its waste management practices continue to comply with legislation, evolve alongside the institution and keep pace with best practices. This process is known as a waste management system. We are aware that many pressures, including legislation, mean that we will have to change the way we approach waste management. For decades we have been tossing things in the bin and forgetting about them, out of sight, out of mind, in our 'throw away' society. It took little effort to dispose of rubbish times are changing and now we have to learn new habits. By adopting suitable good practice from elsewhere and ultimately reducing the amount of waste sent for final disposal. This may include awarding waste management contracts carefully and the implementation of new or improved recycling schemes. To move management of the current waste stream up the waste management hierarchy, care must be taken to produce less and to re-use and recycle more, so that only a small amount of general waste should be left for final disposal. The greatest impetus for waste prevention should likely come from the public. More and more citizens should come to understand that pesticides, excessive packaging, and the use of disposable rather than durable items have important environmental costs. Through the growth of the information society, knowledge about these and other environmental issues will increase. This should result in a continuing evolution towards more efficient and environmentally sensitive waste management. If we want to make sure that we are getting rid of all our waste in the right way we need to be good at waste management.

## **REFERENCES**

1. *Internet based sites.*
2. *UNEP reports available on net.*
3. *E Waste Book from TERI*
4. *Waste Management from Toxiclink reports from net.*
5. *Lecture notes on waste and management.*
6. *E Waste and other Papers of Dr Umesh Kumar on net.*