

## **A REVIEW ON THE 3R CONCEPTS: A SUSTAINABLE APPROACH FOR CONSTRUCTION INDUSTRY**

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*Abstract: Construction and demolition waste is defined as the solid waste generated by the construction, remodelling, renovation, repair, alteration or demolition of residential, commercial buildings and big infrastructure. Sustainable development is a development that meets the needs of the present without compromising the ability of future generation to meet their own needs. Sustainable construction refers to the adoption of building design construction methods and materials that are environmentally friendly. It also means using materials and resources that have sustainable supplies and are readily available from many sources. Through the sustainable construction, we will do our part to optimize the use of natural resources via recycling and reuse of materials. This will also reduce our dependence on raw building materials. By adopting this technique construction industry will not only manage the waste but also achieve the economy.*

*Keywords: Reuse, Recover, and Recycle, Sustainable construction, C&D waste.*

### **INTRODUCTION**

Construction industry has notable effect on the environment in terms of variance ecology, change in the life style of human being, exhaustion of the natural resources, depletion of energy and waste generations. In this study, main concept is based on the recycling, reusing, and recovering the construction waste into useful products. Proper site waste management exhibit that it is economically feasible to do significant cost savings from the whole process. According to the US EPA (2002), waste management makes good economic and business sense and at the same time it can improve production efficiency, profits, good neighbour image, employee participation, product quality and environmental performance. Although Begum & Siwar, (2006) suggests that practices that induce waste reduction from the beginning through proper planning, designing etc. should be encouraged. This study has developed concepts for the reutilization of construction materials, including waste debris, by means of recycling into other components that are useful in construction. The key challenge is to choose materials that can reduce burdens to the environment. The construction industry must recognize that developers, designers, builders and suppliers have a responsibility to develop system, products and methods that are environmentally friendly. Divert construction, demolition and land-clearing debris from landfill and incineration disposal. Redirect recyclable recovered resources back to the manufacturing process.

**Redirect reusable materials to appropriate sites. To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.**

## CONCEPTS OF 3R

Construction and demolition (C and D) debris produced when new structures are built and when existing structures are renovated or demolished. There are various options to treat the waste some of them are landfill, incineration. From last two decades, landfill was considered as the cheapest and convenient method of C&D waste disposal. But landfilling is considered to be undesirable due to environmental and ecosystem hazards. Hence more valuable lands may have to be employed in the future, which increase the cost for C&D waste disposal. But this treating is not work because it does not have sustainable approach, it promotes the environmental degradation. There are certain approaches which help the sustainable approach such as Reuse, Recycle and Recover the construction and demolished waste.

**Reuse:** A reused material is that material which neither passes through the chemical transformation for its internal structure nor changes its physical state. While it maintains its initial properties, it does not need to serve the same function as it did in its previous life cycle. For example a steel section is dismantling from one structure than it can be reused directly in other steel construction.

**Recycle:** A recycled material is that material which passes once through the chemical transformation, and changes its physical state. But it maintains the initial properties but it does not serve the same function as it did in the previous life cycle. For example recycling of the metal.

**Recover:** A recover material is that material which is directly gain from the damaged object. For instance, crushed ceramic brick and concrete blocks used as aggregate for new concrete structures are good examples of recover materials. By using this technique the dependency on the raw material of natural resources had been reduce and also proved effective in managing the waste.

Checklist of the products which can be obtain from the demolished waste are as follow:

1. Timber
2. Bricks
3. Gypsum board
4. Tiles
5. Plastic
6. Metals
7. Concrete debris
8. Steel
9. Glass
10. Asphalt shingles

Since the reusing of C&D waste is always more advantageous, it is essential that to identify and segregate more and more reusable materials in debris. This is possible, if sufficient precautions are taken while a building is demolished. There should be an effective deconstruction plan instead of just converting the standing structure into debris within minutes. Useful products like doors and windows, bricks, reinforcement, from RCC

components, structural steel can be taken out with little extra efforts and put into reuse without much processing. Once the reusable items are taken out, the leftover waste is now available for recycling. Recycling of this waste into useful products to extend the service to environment is a challenge. Worldwide in Japan, Korea, Norway, Singapore etc., recycling of such wastes is taking place and we must understand the potential of different waste products for their effective and useful recycling.

### MATERIAL SHOULD NOT BE REUSED OR RECYCLED

A certain portion of the materials from construction and demolition projects are toxic or classified as hazardous waste. Materials generated in new construction that may require special handling include latex paint, chemical solvents and adhesives. The materials should be managed according to local regulations. Lead paint can be planed, removed, and recycled at a lead smelter or disposed of appropriately, while the remaining wood can also be reused or recycled. The age of structures involved in demolition projects ranges considerably. Many older buildings may contain materials that are no longer allowed in new construction, such as asbestos and lead-based paint. Asbestos abatement is required prior to demolition. Asbestos must be handled appropriately and disposed in a landfill that accepts asbestos-containing material (ACM). Contact your landfill to find out if they accept ACM.

### KNOWLEDGE BASE OF 3R

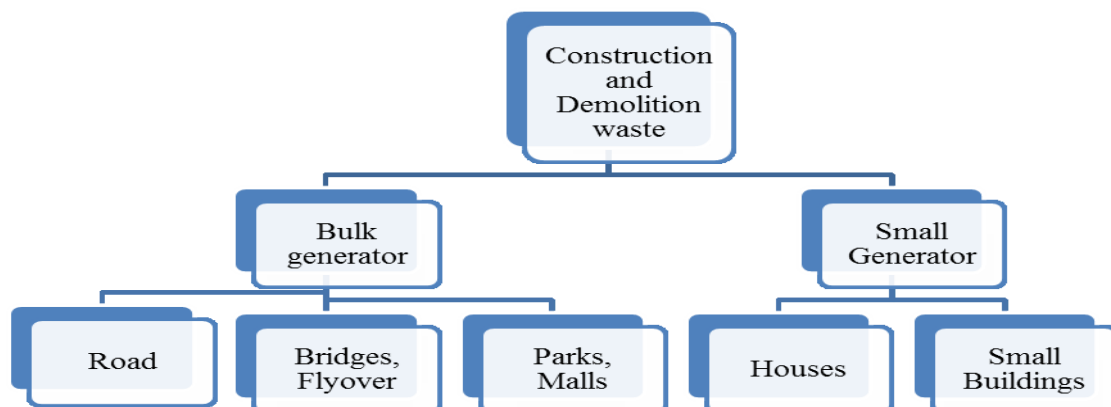
#### Construction Waste:

Construction waste consists of unwanted material produced directly or incidentally by the construction or industries. This includes building materials such as insulation, nails, electrical wiring, and rebar, as well as waste originating from site preparation such as dredging materials, tree stumps, and rubble. Construction waste may contain lead, asbestos, or other hazardous substances. Mainly leftovers from new construction materials (e.g. cut-offs, damaged materials), packaging waste, used materials during construction and all other wastes typical for activities on a construction site.

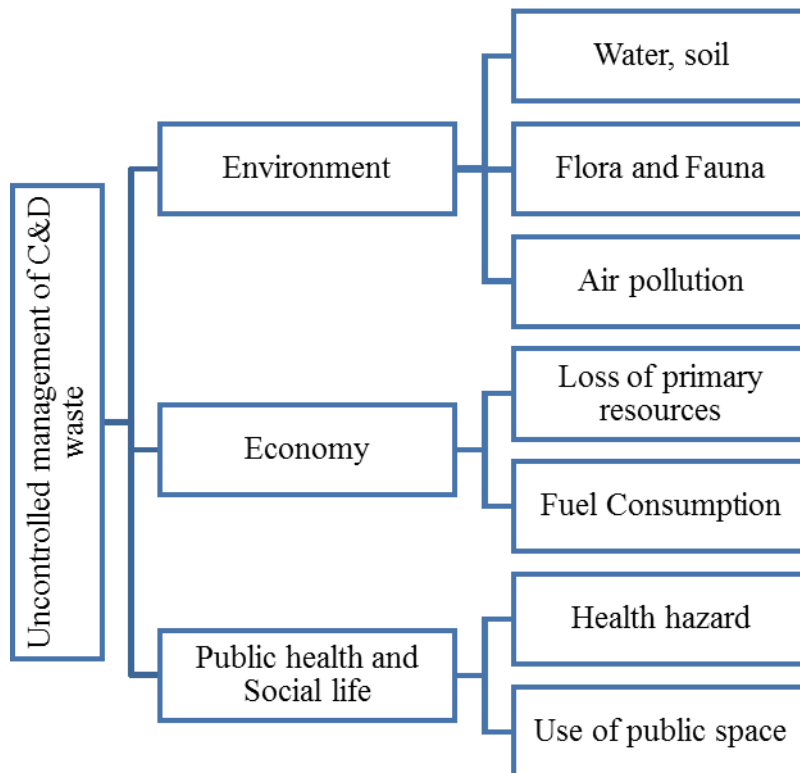
#### Demolition Waste:

Demolition waste is waste debris from destruction of a building. The debris varies from insulation, electrical wiring, rebar, wood, concrete, and bricks. It also may contain lead, asbestos or different hazardous materials. DW is much larger in volume than CW.

#### Sources of C&D Waste:



**Negative Impacts of C&D waste:**



**Managing the C&D waste:**

There are certain approaches through which C&D waste can be manage. But it is not still aware in Indian construction industry, one of the best approach to manage waste are as follow:

- I. Reduce
- II. Reuse
- III. Recycle
- IV. Recover

First step is to reduce the waste, it can be achieve in planning session, while reuse, recycle and recover is done after the waste had been generated. Reuse and recover doesn't go under the any chemical transformation or any transformation while recycling of any material goes under the transformation and produce new object

**SUMMARY**

It is essential to treat the C&D waste in order to reduce the dependency on the virgin material, India is one of the country which is using least C&D waste in there new construction project it about 10% of its whole waste. There is certain barrier which is ahead in the front of the path of the sustainable construction. By adopting this 3R technique, the waste management problem of construction industry will solved, Also there will saving of the

valuable land whose price are at peak in the market. It is necessary to develop the 3R technique in Indian construction industry to manage the waste and also achieve economy.

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