

## INNOVATIVE STRATEGIES FOR SUSTAINABLE CONSTRUCTION PRACTICE THROUGH REDUCTION AND RECYCLING OF CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

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**Abstract-** Construction industry is likely to be one of the most dynamic industrial sectors in the next fifteen years and is utterly crucial to the evolution of prosperous societies around the world. The key area of construction growth in emerging countries will be infrastructure: transport, energy, social infrastructure, schools, hospitals, government accommodation, water, defence infrastructure and natural resources. These projects are expected to increase by 130% in developing countries by 2020 but by only 20% in developed countries. Construction activities are believed to consume around half of all the resources humans extract from nature. The construction industry accounts for one sixth of global fresh water consumption, one quarter of global wood consumption, and one quarter of global waste generation. Man created most incredible, awe inspiring projects and landmark buildings from cradle to grave with his knowledge and innovative technologies. Though these functional wonders provide comfort and safety are well known for producing immense waste. Construction industry is the major contributor for creating more waste than any other industry in world. Construction professionals have a bevy of actions available to them that can help construction sites reduce waste and become more environmentally conscious. Managing construction waste is possible through controlling costs and minimal usage of resources and materials through strategic planning. It can be manageable through the application and adaptations of strategies while the project in pre-construction stage. Though it's difficult to manage the construction without waste; project owners, Architects, engineers and construction managers may follow some guidelines to help reduce and managing waste at pre-construction stage itself.

**Keywords:** C&D waste, resources, contributor, strategic planning, adaptation

### I. Introduction

A traditional list of immediate lists of basic needs is food (including water), Shelter and clothing. Since the prehistoric period human had shelter in one or the other form to protect himself from climatic conditions like rain and sun. Gradually this shelter run developed in scale and comfort which is in its developed stage now. The traditional construction materials such as concrete, bricks, hollow blocks, solid blocks, pavement blocks and tiles are being produced from the existing natural resources. This is damaging the environment due to continuous exploration and depletion of natural resources. The industries emitting various toxic substances such as high concentration of carbon monoxide, oxides of sulfur, oxides of nitrogen, and suspended particulate matters while manufacturing the products and construction materials. These are invariably emitted to the atmosphere during the manufacturing process. of construction materials. The emission of toxic matters causing air and water pollution which effecting the human health and ecological disturbances.

### II. Literature Survey

The annual Construction and Demolition waste is estimated as 530 million tonnes by Ministry of Environment and Forests. It is difficult and inevitable to manage construction without waste. The Demolition waste is the

waste debris generated from destruction of construction. The Construction and Demolition (C & D) waste is not only the debris, broken bricks, tiles and wood etc. It also may include such as plasterboard which are hazardous, once land filled as it is broken down in landfill conditions releasing hydrogen sulphide, a toxic gas.

Most of the C & D waste is due to

- Last minute client requirement
- Complex Design.
- Lack of communication between architects, contractors and engineers
- Lack of design information
- Unforeseen ground conditions
- Long project duration

Regardless of the above reasons the construction boom and rapid urbanization has given rise to massive constructions and massive waste generation. Construction activity and consequent waste generation is expected to rise more in coming years. Dumping the waste on road sides or landfill is a common practice followed all these years and all over the world. The C&D waste comprises of non-biodegradable materials and hazardous to the environment. Globalized awareness on environment and climatic threat

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due to C&D waste, it is necessary to implement scientific approaches and regulatory mechanism to manage the C&D waste.

### **III. Methodology of Current Research**

Building materials and components manufacturing process involves in consumption of raw materials and it is found that the consumption is almost three billion tons every year worldwide. That's 40□50% of the total material flow in the global economy. Construction activities are believed to consume around half of all the resources humans extract from nature. Other Resources, the construction industry accounts for one sixth of global fresh water consumption, one quarter of global wood consumption, and one quarter of global waste generation. Open Space and Natural Habitats: If current trends continue, expansion of the built environment will destroy or disturb natural habitats on over 70% of Earth's land surface by 2032, driven by population growth, economic growth, and urbanization. Buildings account for 30□40% of global energy use, and construction/demolition activities push this to over half of global energy use. Buildings account for 9Gt of global CO<sub>2</sub> emissions out of 44Gt total global emissions. The construction industry accounts for one sixth of global fresh water consumption, one quarter of global wood consumption, and one quarter of global waste generation.

#### **A. Construction and Demolition waste management strategies**

Finding the type or the category of waste generated and disposed of to a lawful place.

1) What kind of waste generated –

- excavated material such as rock and soil
- waste asphalt, bricks, concrete, plasterboard, timber and vegetation
- asbestos and contaminated soil.

2) The process of C&D waste management

- Storage and segregation
- Collection and transportation
- Recycling and reuse

3) Reducing construction Site Waste.

- Control at Design stage
- Quantity surveying and procuring material with minimum percentage of waste (expected).
- Proper packaging of materials
- Safe Transportation

- Possibility of package materials with recyclable materials.

The following are all common materials found on construction sites that can be recycled:

- Metal (Both ferrous and non-ferrous)
- Cardboard
- Paper
- Plastics
- Wood (Be careful that it is not painted or stained!)
- Concrete
- Gravel and other aggregates
- Drywall
- Asphalt roofing
- Window glass
- Carpeting

Any other material that is not listed above also have the possibility of recycling. The Advancement of science and technology made it possible to recycle any kind of material and produce or reshape for reuse of the waste very efficiently. That is Waste to energy and waste to use.

### **IV. Technical & Cost-Effective Measures to Manage and Minimize C&D Waste**

#### **A. Standardization of Materials**

This can be controlled at design stage if building dimensions designed to correspond with standard material sizes available in market. This will reduce material wasted and wood accounts for nearly a third of all construction waste. Room sizes in modules of available floor tiles will minimize waste efficiently.

#### **B. Minimizing waste at material procurement level**

While procuring construction materials, place your order optimally fit your needs; Excess materials delivered to the project site requires storage, maintenance.

#### **C. Package material**

Better always opt for package with recyclable material or suggest for reusable or returnable material.

#### **D. Purchases on returnable basis**

Minimizing the waste with minimum purchase of material and buyback any unused material. So that the left over unused material may not be dumped at landfill.

#### **E. Storage of material in safe condition**

Damaged material is waste and cannot be used in construction. Store the material in safe condition and away from susceptibility of damage.

## V. Employment of Trained and Technical Staff on Construction Project

As Human being everybody shall have the consciousness to environment and natural resources. Employing trained and technical persons as supervisors and contractors benefits the construction project and helps in minimizing C&D waste with spontaneous decisions whenever necessary.

Energy efficient buildings require more perfection in construction. These buildings Construction practice differs with conventional buildings. Ex. Cold storages etc requires more thermal insulation and any leakage loads on consumption and effects the energy bills.

Precautions may be taken for soil erosion and ground cover while curing the construction projects.

## VI. Results

Paper has been constructed on the basis of Dissertation study and the research has not been completed. Depending on the case studies and interpretation of data, the above following parameters have been prioritized for further analysis.

The study needs to be extended with the above parameters on a local site and there by analysing the utmost and ultimate possible methods for minimizing and recycling C&D waste.

## VII. Conclusion

All states (including municipalities) in India and not only India, other countries on worldwide have been facing the problem of construction and demolition waste and dumping the waste on the road sides illegally. There by effecting the landcover and narrowing down the roads and traffic congestion. This will be possible only when the estimation of projects with approximate consumption of materials and expected waste before initiation of project. The 3Rs reduce, reuse, recycle system and segregation of waste and transporting to lawful places is safe to environment. Specific measures have to be developed to quantify the net environmental impacts of different waste management options such as recycling, conventional landfilling and incineration. Sustainable and optimum recycling strategy have to be developed considering the environmental and economic impacts, simultaneously.

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