

Future of Civil Construction Towards Sustainable Development – A Review

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Abstract – Construction industry has gained fast growth in recent decades due to the increase in population, growth in various industrial sectors and very fast increase in the industries and also due to new infrastructural projects resulted in the increase of construction industry drastically. Due to all these conditions demand of construction materials is large for the construction activities which resulted in the generation of large amount of construction wastages. Construction material wastage hence results in huge financial losses to contractors, builders, government authorities and to the customer and, to the country. Waste production due to the old structure demolition is more, than the wastage that occurs during construction of any structures, hence there is need to manage the constructional waste & demolition waste, as municipal solid wastes, is new subject in India. There is no proper estimate regarding the quantity of waste generated in India. The basic reason being in disciplinary and less focused in this issue.

In this paper current status globally, construction and demolition waste management is overviewed and also the sustainable waste management hierarchy is studied so to overcome the waste disposal problem.

Keywords- Construction, infrastructural, solid wastes and Waste production.

INTRODUCTION

In India increase in the economic growth after development and redevelopment projects and subsequent increase in the urbanization in cities has made construction industry to increase drastically at faster rate, hence also environmental impacts from constructional and demolition infrastructural waste generated are also increasingly has become a major point of thought in urban solid waste management. Environmental impact such as increase in the flood water levels due to the dumping of construction and demolition waste illegally

into the rivers, depletion of resource, shortages of landfill and dumping illegally on hill are general in the metro cities which causes major accidents, if not properly dumped. For the purpose of managing of infrastructural Wastes in India, Construction and demolition waste has been defined as ‘waste which arises from construction, renovation and demolition activities. Surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities. The various streams of wastes to be considered will include:

- Excavated materials such as Concrete from footings, floor tiles, bricks from walls,
- Wall plaster, • waste glass from windows, • steel reinforcement, • plastics pipe, • wooden boards, concrete rubbles, etc.



Fig-1 Concrete Waste Generated After Demolished Structure

Increase in the economic growth after development and redevelopment projects in India and increase in the urban population in cities has made construction industry to increase at faster rate, but also impact on environment

from construction and demolition infrastructural waste are also increasing, hence become major factor to handle urban solid waste. Environmental impacts such as increase in the flood levels due to the illegal dumping of construction and demolition waste into the rivers, depletion at source, shortage of agriculture land due landfill and illegal dumping on hill slopes are becoming regular practice which causes health hazards to the population nearby in metro cities. The initial method is adopted in handling of waste is done by professionals like project managers, architects, civil engineers, contractors and government officials like engineers, officials related to solid waste management. Secondary, the information is gathered by compiled data from secondary source like various research papers, various international journals.

• Overview of Infrastructural Waste Generation.

A survey was conducted by Asian institute of technology, Thailand on various Asian countries and a report was prepared regarding the construction and demolition waste generated in May 2008. The study was done on Asian countries including Japan, Hong-Kong China, Thailand and others including India. The following chart (Fig-1) shows the figures of construction & demolition waste generation by Asian countries. As per the chart in Asia China is the major producer of construction & demolition waste, followed by Japan and South Korea. Waste generated should be properly treated or recycled so that it should not cause health hazards to future generations to come, also it should not affect environment.

Table-1 Infrastructural Waste in Asian Countries

Countries	Total construction and demolition waste produced per year
China	48%
Vietnam	3%
Thailand	3%
Singapore	2%
Tiawan	4%
Malaysia	3%
South Korea	7%
Japan	21%
India	4%
Hongkong	5%

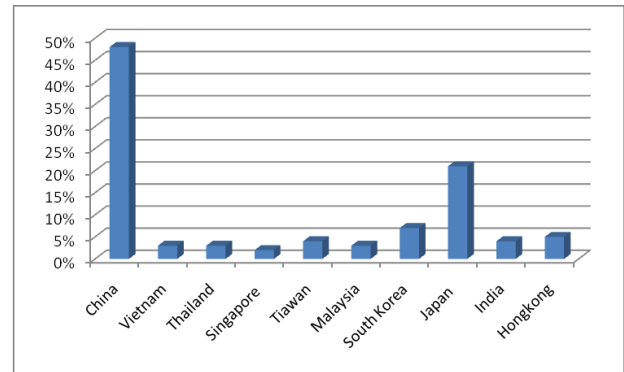


Fig-2 Infrastructural Waste In Asian Countries

As per report prepared by the Environment department in 2008 it is estimated that 0.53 million tonnes/day of waste is generated in the country. On that basis 210 million tonnes of MSW is produced annually. But as per the world bank report says Asian countries produces around about 1000 kg per capita per year. The chart (fig.2) shows the graphical representation of construction and demolition waste production per day in different Indian cities. Mumbai is the largest among all cities producing infrastructural waste as it is highly populated followed by Bhopal and other cities.

Table.2 Infrastructural Waste Generated By Various Cities In India

Indian Cities	Municipal Solid Waste Generated In Metric Tonnes / Day
Ahmadabad	3600
Bangluru	3000
Bhopal	7000
Delhi	2500
Pune	2500
Mumbai	9000
Hyderabad	3000

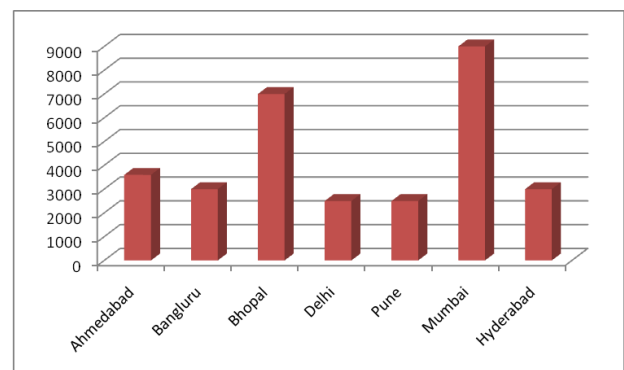


Fig.2 Infrastructural Waste Generated By Various Cities In India

• Waste Generated Infrastructural Demolition

Construction waste composition generated depends on the type of structure. If the structure is bridge or flyover the major composition will be of usually concrete and steel. If the structure is residential the composition will be in variety, it will consists of concrete, steel, tiles, wood, plastics, paints etc.

Generally there are two major sources of waste material generation namely, bulk generators and retail generators or small generators. The infrastructure and real estate sector are the bulk generators of these wastes. Construction and repairs of bridges, flyovers, roads etc. are classified under the infrastructure development industry. Real estate industry consists of construction of housing, commercial building & industrial, demolition of unauthorized structures etc. Where as individual house building, small commercial enterprises are considered as the retail or small generators .

Infrastructural Waste-

Bulk Generators- Roads , Bridges , Flyovers , Flats .
Parks . Malls

Small Generators – House , Small Buildings

• Infrastructural Waste Managing Lifecycle

The 3R concept which is reduce, reuse and recycle particularly in relation to production and consumption, is very well known today as we are concerned about protecting environment. It is like using recyclable materials more than actual in practice, hence reusing of raw materials if possible after proper treatment to waste materials so that it becomes suitable for use to human beings and hence reducing the use of energy and natural resources. This concept can be applied to the entire life cycles of products and services – starting from design and raw material extraction to lifting, transporting, manufacturing, using, dismantling and finally disposal, hence it can be expressed as under:



Fig 3 Sustainable Green Concrete Process

CONCLUSION

There is huge challenge of managing infrastructural waste during construction and demolition, in near future. Separating of infrastructural waste waste should be promoted at the source and suitable mechanism of waste collection should be established properly involving suitable machineries skilled manpower who can be trained to separate different waste into different categories and also can train people to do some amount of reuse and proper reprocessing like making tiles from crushed construction debris, also using demolished concrete which is in large quantity, if can be used for construction for different purposes, where natural material can be replaced by waste materials. Charges should be done on infrastructural waste generators. New environmental friendly technologies should be adopted for waste utilization of infrastructural waste reuse. Standards that are followed for production of new materials should be designed such that infrastructural waste can be formulated for waste utilization. Common public should get easy access to new information regarding infrastructural waste generation & treatment, legislative and regulatory structure and different procedures to be implemented. People should also come to know about financial benefits and environmental benefits for the sustainable development.

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