

Construction and Demolition Waste Management in India

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Abstract – *The construction industry has gained very fast growth in recent decades due to the increase in the population, increase in the IT sector and increase in the industrialization and also introduction of new infrastructure projects resulted in the increase of construction industry drastically. Due to which the demand for construction materials is huge for the construction activities which results in the generation of huge amount of construction waste. Construction material wastage resulted in the huge financial setbacks to builders, contractors, regional authorities and also to the country. The production of waste due to the demolition of structures is more than the wastage which occurs during construction of structures, so there is need of management of Construction and Demolition (C&D) wastes, as distinct from Municipal Solid wastes, is a relatively new subject in India [1]. To begin with the issue there is no proper estimate regarding the quantity of waste occurs in India [1]. The primary reason is being in disciplinary and less focused in this issue. In this problem there is absence of regulatory framework and strict enforcement. Specific recommendations has made in this paper to overcome the loop holes in the issue. In this paper current global status of construction and demolition waste management is overviewed and also the sustainable waste management hierarchy is studied so to overcome the waste problem.*

Key Words: *Construction, Demolition and waste management.*

1. INTRODUCTION

Due to the increase in the economic growth after development and redevelopment projects in the country and subsequent increase in the urbanization in the cities has made construction sector to increase drastically, but also environmental impacts from construction and demolition (C & D) waste are increasingly becoming a major issue in urban solid waste management. Environmental issues such as increase in the flood levels due to the illegal dumping of construction and demolition

waste into the rivers, resource depletion, shortage of landfill and illegal dumping on hill slopes are evident in the metro cities [1].

For the purpose of management of C&D Wastes in India, Construction and demolition waste has been defined as ‘waste which arises from construction, renovation and demolition activities. Also included within the definition are 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,
- Concrete
- Tiles, brick, ceramics, asphalt concrete,
- Plaster,
- Glass,
- Metal and steel,
- Plastics,
- Wood, asphalt, and
- Concrete rubbles, etc.

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The primary method is adopted in waste handling is carried through by interviewing professionals like project managers, architects, civil engineers, contractors and government officials like city engineers, solid waste management officials.

Secondary information is gathered by compiled data from secondary source like various research papers, various international journals, various international reports on construction and demolition waste management. And also proceedings of waste management organizations and also some reports of surveys did by various agencies and institution. Some information is collected through waste management and national authorities websites in construction waste and demolition management.

2. OVERVIEW OF CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.

Asian countries

Asian institute of technology, Thailand had conducted a survey in various Asian countries and prepared a report regarding the construction and demolition waste management in May 2008. The study includes Asian countries like Bhutan, Japan, Hong-Kong SAR, China, Thailand and others including India[2]. The following pie chart shows the status of construction and demolition waste in Asian countries. Figure 1 shows the status of construction waste in Asian countries.

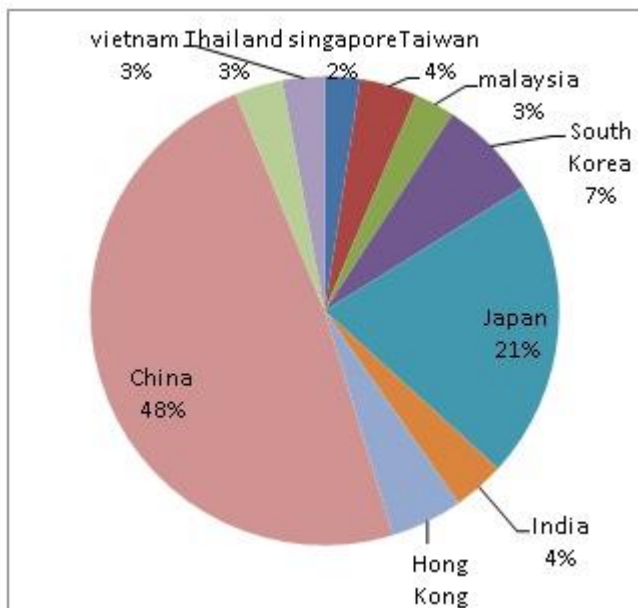


Fig- 1: Estimates of C&D Wastes in Some Asian countries (Asian Institute of Technology, 'Report on reduce, reuse and recycle (3R) practices in construction and demolition waste management in Asia', Thailand, May 2008, 81 p.)

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At the beginning the it is said that there is no adequate or satisfactory data for accessing to this issue. This is because there is no separate regulatory frame work for handling the construction and demolition waste management in India, as it is considered in the municipal solid waste management. Due to which it is getting difficult to access the information or to handle the

construction and demolition waste management. As report prepared by the MoEF (Ministry of Environment and Forest) in 2008 estimated that 0.53 million tonnes/day of waste is generated in the country. On that basis the 210 million tonnes of MSW is produced annually, table 1 shows the estimate prepared by central government of India. But as per the world bank report says Asian countries produces around about 1000kg per capita per year, it means the figure which stated by the MoEF is very less than the world bank report figure. This show in India is underestimating the construction and demolition waste handling. The figure 2 with graphical representation shows construction and demolition waste production per day in Indian cities.

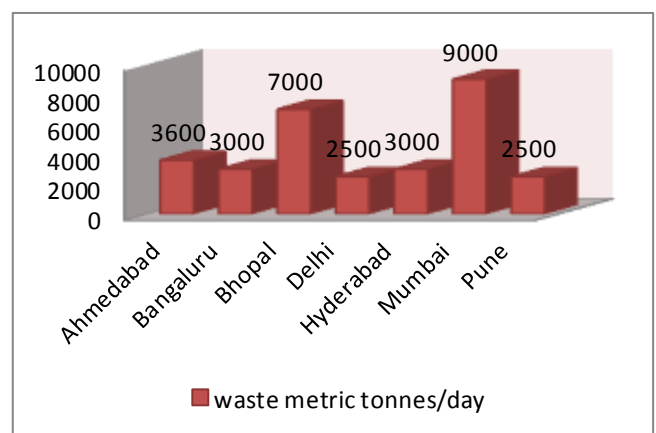


Chart -1: Waste Generated in Indian Cities Source (nexusnovus.com)

Table-1: Estimate Prepared by Central Govt.

year	Authority	Estimate in Million Tonnes
2000	Ministry of Urban Development(2000)	10—12
2001	TIFAC (2000)	12—15
2010	Ministry of Environment and Forest	10—12
2014	Ministry of Urban Development(2014)	no estimate exist

Table-2: Quantity of Waste Production by Developed Countries

Country	Amount Of Waste Per Year In MT	Year
Germany	223	2005
Australia	19	2008-09
China	200	2005
Japan	85	2000
	77	2012
South Korea	61.7	2013

3. COMPOSITION OF CONSTRUCTION WASTE GENERATED IN INDIA

The composition construction waste depend on the type of structure. For example if the structure is flyover or bridge structures the composition will be usually concrete and steel. On the other hand the if the residential structures are built or demolished the composition will be in verity, it consists of concrete, steel, wood, tiles, paints, plastics etc

Table-3: Composition of Construction and Demolition Waste.

Components of C & D waste	TIFAC (%)	MCD Survey (%)	Survey IL & FS (%)
soil/sand, Gravel	36.0	43.0	31.5
Bitumen	2.0	-	-
Metals	5.0	-	0.4
Concrete	23.0	35.0	-
Wood	2.0	2.0	1.5
Others	1.0	1.0	7.6

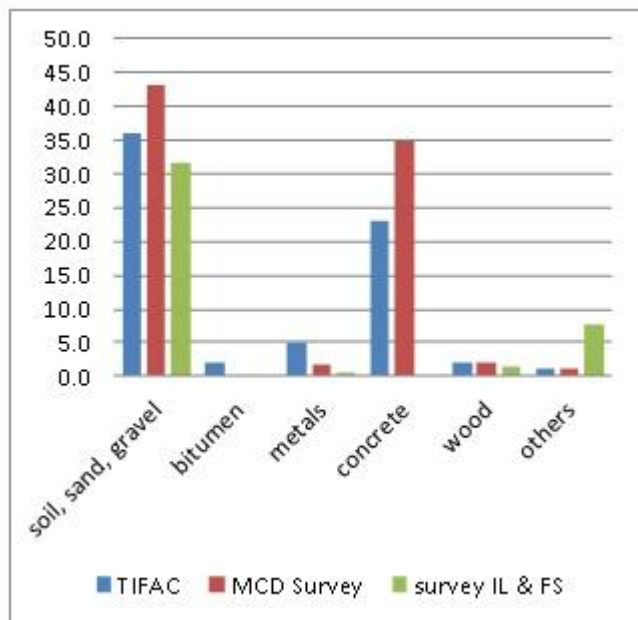


Chart -2: Typical Composition of Indian Construction Waste

3.1 SOURCES OF WASTE GENERATION IN THE CONSTRUCTION INDUSTRY

In past decade construction industry in India has shown its growth drastically upward due to the development and redevelopment projects in the India. The pace of construction and demolition waste is increasing.

Generally there are two sources of waste generation of waste materials namely, bulk generators and retail generators or small generators. The classification of sources is given the figure the infrastructure and real estate sector are the bulk generators of waste. Construction and repairs of roads, bridges, flyovers etc. are classified under the infrastructure development sector. Real estate sector consists of housing, industrial, and commercial building construction, demolition of unauthorized structures etc. small commercial enterprise and individual house building teams are considered as the retail or small generators [3].

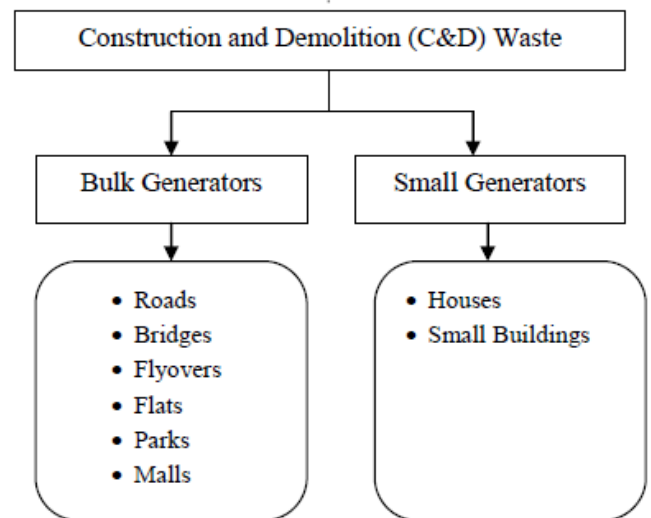


Fig-1: Sources of Generation of Construction and Demolition Waste

4. CONSTRUCTION WASTE MANAGEMENT HIERARCHY

The concept of 3R which refers to reduce, reuse and recycle particularly in the context of production and consumption is well known today. It is something like using recyclable materials is more than actual practice, reusing of raw materials if possible and reducing use of resources and energy.

These can be applied to the entire life cycles of products and services – starting from design and extraction of raw materials to transports, manufacture, use, dismantling and disposal can be expressed as:

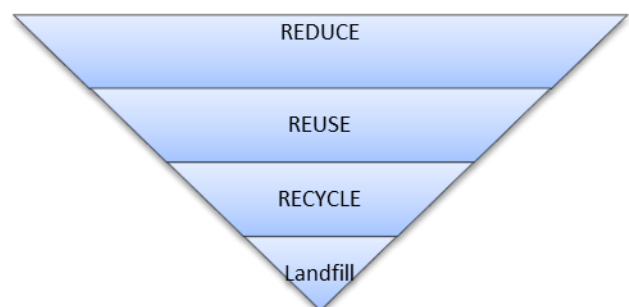


Fig-2: Sustainable Waste Management Hierarchy

5. REGULATORY FRAMEWORK

It is recommended that appropriate rules be framed covering the following (Dr A. K. Mullick);

- **The relevant regulations and by-laws** for civil construction would have to be changed so that the recycled C&D material can be used legitimately.
- **For new constructions, permission from municipalities** should include a clear waste management strategy, including use of recyclable building materials. The emphasis will be on reduction of wastes and deconstruction instead of demolition.
- **Use of recycled materials meeting requirements for new constructions**, subject to prices being competitive.
- **Permission for demolition will be required from municipalities**, with a provision that owner of the property being demolished takes full responsibility of collection, recycling and disposal of demolition wastes and the related expenses. Detailed plans for safe demolition will be required.
- **Local authorities should issue detailed deconstruction plans and detailed recycling specifications.**
- **Local authorities should be responsible for arranging the collection, recycling and disposal infrastructure of C&D waste**, either on their own, or through other agencies. In such cases, the costs will be borne by the owners.
- **There should be charges for disposal in landfills**, which should be sufficiently high to encourage processing and recycling of C&D wastes.

6. CONCLUSIONS

- There is huge challenge to manage C & D waste in near future. Data should be generated on C & D waste generation and its characteristics.
- Separation of C & D waste should be promoted at source and an institutional mechanism for waste collection should be established involving informal sector who can be trained to separate the waste into categories and also do some amount of use, reuse and reprocessing like making tiles from crushed construction debris.
- Charges should be levied on C & D waste generators.
- Environmentally friendly technologies should be adopted for waste utilization of C & D waste.
- Standards for C & D should be formulated for waste utilization.
- There shall be easy access to the information regarding C & D generation, legislative and regulatory framework and procedures to all stakeholders and common public.

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