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Evaluating Overall Importance of Waste Management in Construction Industry

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Abstract

India is a developing country where the growth rate is increasing and side by side waste material is also increased so there is a need of the management of waste material in India. Due to the increase in population, IT sector, new infrastructure projects and industrialization, the construction industry has shown very fast growth. Builders face the problem of financial difficulty due to the excessively material wastage in construction projects. The harmful effect of the waste material is on our general environment, philosophy of art, beauty and on our health. There are excessively wastage of material, inappropriate management of material and low awareness about reduction and proper utilization of waste material is very common in the local constructions sites in India. It is very economically expedient to recycling up to 80-85% of the total amounts of construction waste by the European countries. The Recycling technologies are used by them are very easy to apply and control the wastage of the material. There is a need to the management of the waste material because they play very harmful role in our country, in many cities waste material management is very big problem. There is no proper estimation of waste material in India because of the in disciplinary, less focused on this issue and absence of regulatory and strict administration. In this paper we are discussing about the method for the management and control of waste construction materials.

The main objective of this work is to know about the sources of waste generation in the construction industry, to study about construction and demolition waste management, how to reduce the wastage and process of reducing the wastage

etc. With the eduction of the wastage sources of the material is also increased, demand of increased population is also fulfilled and limited resources are also used.

Additional sources of waste generation as those already known, such as a lack of attention paid to the sizes of the used products, lack of influence of contractors, and lack of knowledge about construction during design activities. A significant part of waste generation is caused by the building and construction industry. Reduction of Construction waste is therefore a major topic of the two days government all over the world. Construction companies benefit from reduced waste generation by lower deposition costs and lower purchasing costs of virgin materials. An overview is being presented of the main policy areas government concerning sustainability. This paper gives more focus on the importance of reduce, recur and recycle means concept of 3R for the management of the waste material.

Keywords: Construction Waste, Management Techniques, Demolition and Waste Management

INTRODUCTION

Construction and demolition waste has been defined as „wastage which are arising from construction, renovation , explosion activities ,surplus and damaged products and material arising in the course of construction work and on site work. 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 Engineering, solid waste management officials. The agriculture is the largest industry in India. According to the eleventh five year plan, construction is the second largest industry after agriculture. India's most population skilled/semiskilled and significantly labor class unskilled is dependent upon the construction work.

Material is the major part of all types' constructions projects. The success and failure of every construction project is by and large depends on the material management. In country like India where on one hand side the growth of development and redevelopment project has Considerably increased and on the other hand the bad impacts of construction sector on the environment is also amplified. Today the environmental issues Such as flood levels due to the illegal explosion of waste into the rivers, resources are depletion from the earth and illegal explosion of hill slopes are evident in the metro cities. In India infrastructural facilities are increased due to the construction, refurnishing and explosion of buildings, bridges, runways, flyover, roads, factories, industries, hospitals and other similar formulations.

The waste material generally consist of powerless, inactive and non-biodegradable materials such as—

- Plaster
- Plastics

- Wood
- Brocken tiles
- Metals
- Excavated materials
- Asphalt concrete
- Concrete rubbles
- Steels, Masonry etc.
- Wastage of Chemicals

This type of waste material is most usually seen on the road sides, communistic dustbin, occupy the land space, and reduce the use of land and fertility of land. If we say a statement that in most of the world when we travelling a few kilometers by road we saw huge piles of such type of waste and which is very heavily and that wastage is from the industrial or constructions project wastage and the effect of that is traffic congestion. From that type of waste material there is increase in floods, earthquake, and ecology imbalance, effect on the wild life, low space for living, reduction in the land fertility and adverse effect on the environment and peoples. So there is a need of proper planning of waste management and recycling of waste material. In India being developing countries, there is immense need of awareness for waste management. Due to lack of awareness waste management project is not working well. From the last few decades, European countries make excessive growth on the waste management and utilize the construction waste and recycling that waste. Many developed countries like U.K, U.S.A., France, Denmark, Germany, Australia and Japan have used cost-effectively attainable technologies for recycling up to 80-85 percent of waste. However India is also doing various activities for achievement in that project but efforts are least.

OBJECTIVE OF THE STUDY

- To make people aware about the wastage of materials that may be used again.
- To know about the causes of wastage.
- To know about the various techniques through which the wastage can be reduced
- To know about the suitable wastage management hierarchy.
- To study about Landfill, Recycling, Reduce and Reuse.

PRESENT SCENARIO OF WASTE GENERATION IN INDIA

Growth of population has increased our urbanization as a result rising standard of living due to technological innovations have contributed to an increase both in the quantity and variety of solid wastes generated by industrial, agricultural activities, mining and domestic. Globally the estimated quantity of wastes generation was 12 billion tones in the year 2002 of which 11 billion tones were industrial wastes and 1.6 billion tones were municipal solid wastes (MSW). About 19 billion tons of solid wastes are expected to be generated annually by the year 2020. Annually, Asia alone generates 4.4 billion tons of solid wastes and MSW comprise 795 million tons of which about 48 (6%) MT are generated in India. MSW generation in India, is expected to reach 300 Million tones and land requirement for disposal of this waste would be 169.6 km2 as against which only 20.2 km2 were occupied in 1997 for management of 48 Million tones.

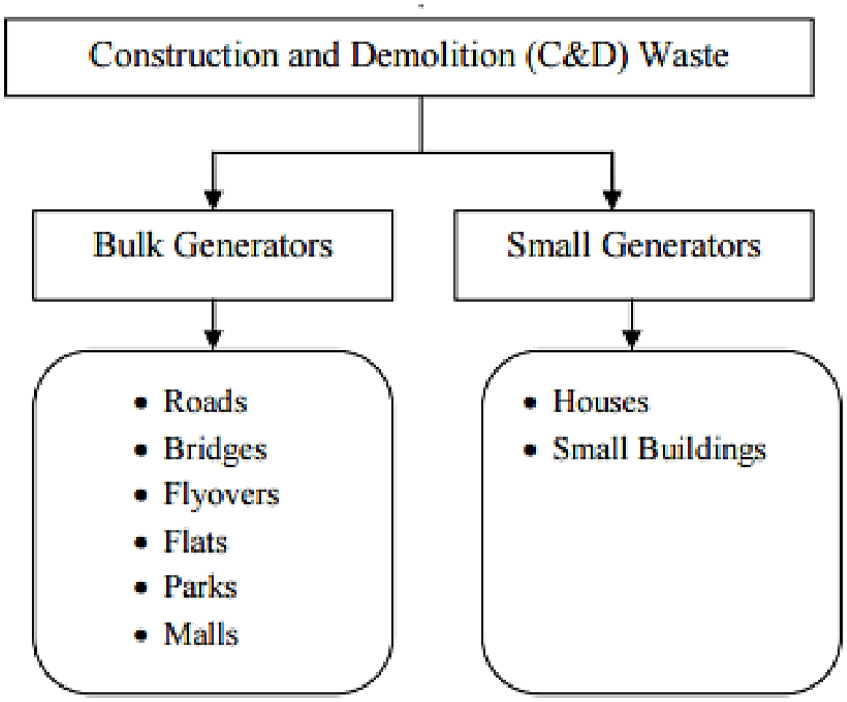
As it is studied that apart from municipal wastes, the organic wastes from agricultural sources alone contribute more than 350 million tons per year. However, it is reported that about 600 million tons of wastes have been generated in India from agricultural sources alone. The Quantity of wastes generated from agricultural sources are sugarcane baggage, paddy and wheat straw and husk, wastes of vegetables, food products, tea, oil production, wooden mill waste, coconut husk, jute fiber, groundnut shell, cotton stalk etc. In the industrial sector inorganic solid waste could are coal combustion residues, bauxite red mud, tailings from aluminum, iron, copper and zinc primary extraction processes. Generation of all these inorganic industrial wastes in India is estimated to be 290 million Tons per annum. In India, 4.5 million tons of hazardous wastes are being generated annually during different industrial process like electroplating, various metal extraction processes, galvanizing, refinery, petrochemical industries, pharmaceutical and pesticide industries.

SOURCES OF WASTE GENERATION IN THE CONSTRUCTION INDUSTRY

The project activities are to be planned at every stage by every personnel, who are involved, to minimize the overall waste generation. Construction industry is largest economic expenditure in India. According to eleventh five year plan, it is the second largest economic activity after agriculture. The impact caused to the environment by Indian construction industry is also large. Construction industry consumes high volume

of raw materials and products. It generates high employment opportunity. Based on an analysis of the forward and backward linkages of construction, the effect in the construction on economy is estimated to be significant .The boom in the economic growth in the country is attributed to the developments in the construction industry. Investment in construction accounts for nearly 11 per cent of India's Gross Domestic Product (GDP). Our construction sector is likely to continue to record a higher growth rate in the years to come due to the Governments recent initiative to allow cent per cent foreign direct investment in real estate development related projects.

Based on the studies done by Technology, Information, Forecasting and Assessment Council –TIFAC (2000) the total construction works in the country for the five years during 2006-2011 has estimated to be for $847 billion. From the cost analysis of various modes of expenses in Indian construction industry, it has been seen that the component of material cost comprises nearly 40 to 60 per cent of the project cost. The material waste generation in construction industry is huge in monetary terms



GLOBAL SNAPSHOT OF CONSTRUCTION &DEMOLITION WASTE MANAGEMENT

Asian institute of technology of Thailand had conducted a survey in various Asian countries; Bhutan, Japan, Hong-Kong, China, Thailand and India prepared a report regarding the construction and explosion waste management in May 2008.

The following chart shows the status of construction and demolition waste in Asian countries.

Fig- 3: 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)

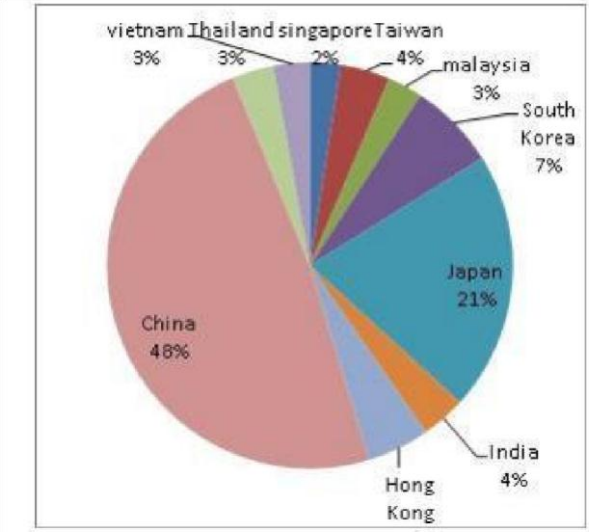


Fig 3

From the report of 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 tons of MSW are 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.

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

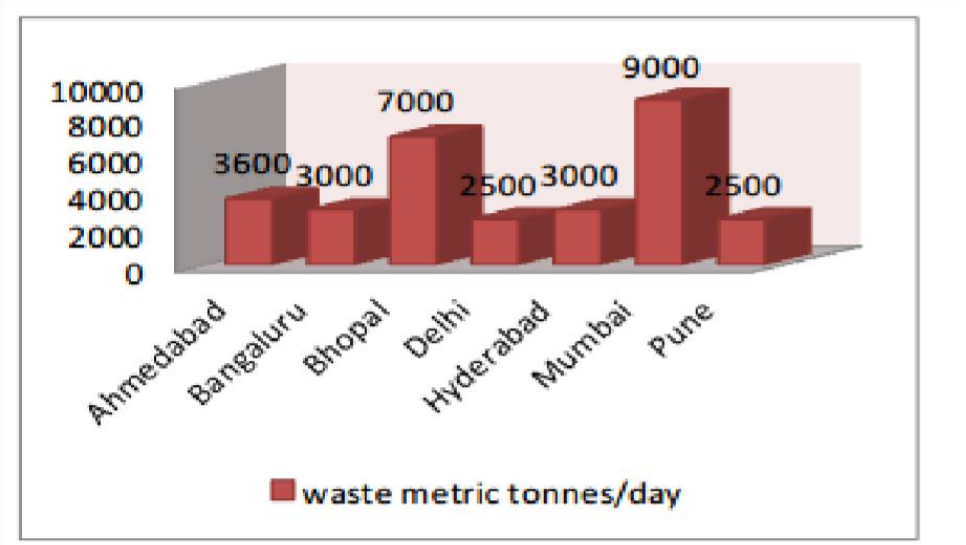
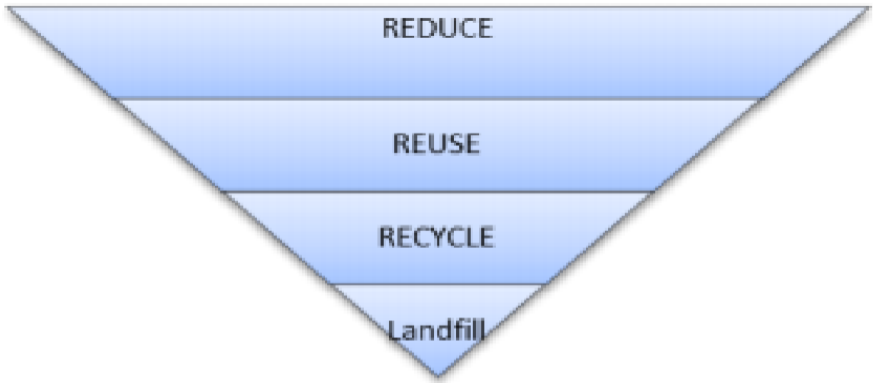


Chart -1: Waste Generated in Indian Cities Source (nexusnovus.com)

CONSTRUCTION WASTE MANAGEMENT HIERARCHY

There is some hierarchical order for the waste management that is reduces, reuse and recycle and that is mainly related with the production and consumption today. This hierarchal order is such as that of making of new product. That method can be applied on the entire life cycle of the product that is start from the extraction of raw material, manufacture, construction and disposal.



REDUCE - First of all wastage should be find out when starting the designing process because in that process wastage can be minimized which is generated in that stage is possible. Wastage can be reduced through reduction can be achieved by design with standard sizes for all building materials, design spaces to be flexible and adaptable to

changing uses and design for deconstruction.

REUSE -This involves identification of waste that can be salvaged for reuse on the current project or another project or that can be donated. A comparison of the value of the materials "as it is" for salvage and to their value as materials for recycling may be considered prior to reuse in many cases. Some of these materials may be valuable to reuse on-site; others may be sold to be used building material in another site or donated to a charitable organization

RECYCLE - After adopting all the options to prevent waste, salvage and reuse materials, the next step is to recycle as much of the remaining debris as possible. Recycling saves money by minimizing disposal costs

LANDFILL - A landfill is an engineered pit, in which layers of solid waste are filled, compacted and covered for final disposal. It is lined at the bottom to prevent groundwater pollution. Engineered landfills consist of a lined bottom; a leachate collection and treatment system; groundwater monitoring; gas extraction (the gas is flared or used for energy production) and a cap system. The capacity is planned and the site is chosen based on an environmental risk assessment study (UNEP 2002). There are also landfills specially designed to encourage anaerobic biodegradation of the organic fraction of the waste for biogas production by monitoring the oxygen conditions and moisture content. Landfills need expert design as well as skilled operators and a proper management to guarantee their functionality.

ADVANTAGES

- Effective disposal method if managed well
- Sanitary disposal method if managed effectively

- Energy production and fast degradation if designed as a bioreactor landfill

DISADVANTAGES

- Fills up quickly if waste is not reduced and reusable waste is not collected separately and recycled
- A reasonably large area is required
- Risk of groundwater contamination if not sealed correctly or the liner system is damaged
- High costs for high-tech landfills
- If not managed well, there is a risk of the landfill degenerating into an open dump
- Once the landfill site is shut down O&M and monitoring must continue for the following 50 to 100 years

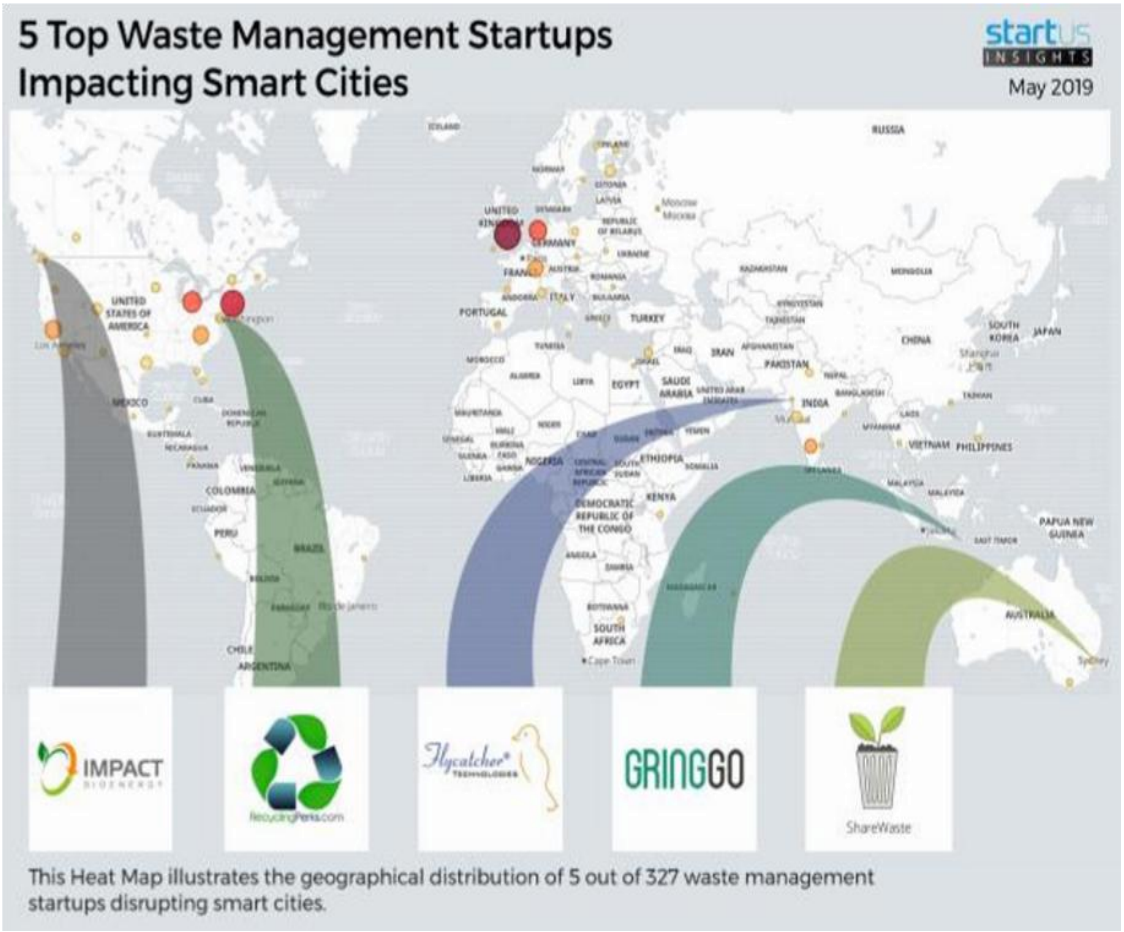
WASTE MANAGEMENT STARTUPS IN INDIA

Waste Management is the generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes. There are various types of solid waste including, municipal, agricultural, and special like hazardous and household etc. The term usually relates to materials produced by human activity, and the process is generally undertaken to reduce their effect on health, the environment, or aesthetics.

The initiative was first done by Waste Management Inc. in 1971. It is mainly based in North America. The major services include the Waste, recyclables, yard debris, and hazardous materials collection, hauling, treatment and disposal, Dumpster rental, Portable toilet rental, and security services. The company is headquartered in the First City Tower in Houston, Texas. The company includes 367 collection operations, 355 transfer stations, 273 active landfill disposal sites, 16 waste-to-energy plants, 134 recycling plants, 111 beneficial use landfill gas projects, and six independent power production plants. Today, not only abroad, but, even India has several start-ups for waste management.

Here, presenting some of them:

Eco-wise: Headquartered at Noida, India. Eco wise waste management provides comprehensive waste management services to a variety of establishments including residential, commercial and industrial entities. They ensure that, the waste collected by them are treated and disposed in accordance with MSW Rules 2000. Eco wise is an ISO 9001, 14001 and 18001 Certifications. It is currently collecting waste from Center Stage Mall, Noida, Hadrian, ATS, etc.



LITRATURE RIWIEW

S.M. Elgizawy et al. (2016) tried to provide an integrated solution for developing countries that combines efforts in slum development and zero waste management to get a higher impact on the local area and the national level. By providing job opportunities to the slum dwellers, enhancing the waste management mechanism and reducing the wastes sent to landfills hence moving towards the realization of the zero waste concepts and at the same time fostering the feeling of identity of the slum dwellers and solving the landownership problem. And concluded that Slum development through zero waste concepts is a comprehensive solution to the current slum development problem and waste accumulation problem and should be encouraged by the government.

Saheed O. et al. (2016) suggested that site construction waste management practices could be important for reduce waste generation. Like strict construction waste management, project drawings, no design changes during construction process. And concluded poor knowledge, poor design documentation and lack of awareness towards waste minimization would increase construction waste generation. Site supervisors should be with the knowledge of waste minimization which could reduce of waste generation on sites.

R. Shreena Shankari et al. (2017) highlighted the importance of waste management in construction, amount of waste generated in construction project, methods of minimizing waste and best methods involved in construction industries for minimize waste. Identified the factors that can contribute to materials that are minimum wasted. which is a need to concentrate even on materials that are least wasted as any small improvement in reduction of waste generated adds to the advantage in improving the overall efficiency of the project and enhance the construction industries performance with cost saving benefits. And suggested waste management plan which only minimizes the material waste but also improves the profitability and decreases the cost overrun.

CONCLUSIONS

In nut shell, we can say that there is no satisfactory mechanism for control the issue of waste management. The only reason behind that there is no separate regulatory frame work for handling that project in India. In India this project is mixed with the other projects so there is no special focus on that project because in India the waste management is considered only the part of Municipal Corporation. In near future wastage of industries are very huge so there is need to take care for that from the present. There should be need of hiring the professional and trained people regarding that project for C&D Separation. Some informal institutions should also be included so that the wastage can be separated according to their recue; reuse and recycling process is possible. Charges should be collected on construction and explosions waste generators. Those technologies which are environment friendly should be adopted for waste utilization. There should be fixation of standards that can be used for how much % waste can be utilized. Information regarding C & D generation, legislative regarding the waste management, regulatory framework and procedures should be known by all the public

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