

Construction Waste Minimization

Miss. Monika Mhaske¹, Mr. Pranay R. Khare²

¹ Student M.E., (C&M) Civil Department, ² Assistant Prof, Dept. Of Civil Engineering
Dr. D Y Patil SCOT, Lohgaon, Pune 412105,
monikamhaske1994@gmail.com , pranaykhare@dypic.in

ABSTRACT

Construction industry is second largest industry in India and has been developing more rapidly. But the development of Construction industry also lead to serious problem of construction waste generation. Heavy wastage is occurring in any type of construction work. It is unavoidable but with help of prevention techniques by finding causes of waste it can be avoided. Construction waste increases burden on land fill which are becoming scare. If the waste is not properly managed it causes water and soil pollution. So it's become essential for any construction company to reduce the construction waste to minimize environmental damages and enhance the construction process. This paper identifies use of 3R (Reduce, reuse, recycle) in construction waste minimization base on literature survey.

Keywords- Construction industry, Construction waste, Reduce, Reuse, Recycle,

I. INTRODUCTION

The construction industry is the second largest industry in India. The construction industry as a whole presents many employment opportunities in the fields of building, civil engineering, offshore structures. It makes significant contribution to the national economy and provides employment to large number of people [1]. The construction industry must be able to respond to the changes that the world is constantly facing. Construction making rapid growth day by day. Rapid growth in construction activities increases construction waste problems. It is one of the major issues that construction industry is facing now days. Construction waste leads a negative impact to the environment, costs, time, and productivity of the country. Construction waste also affects economic health of construction companies [2]. Construction waste increases the burden on landfill sites which are becoming increasingly scarce. If waste is not managed properly cause soil and water pollution. It's essential for construction companies to reduce waste in order to minimize environmental damages and conserve natural resources.

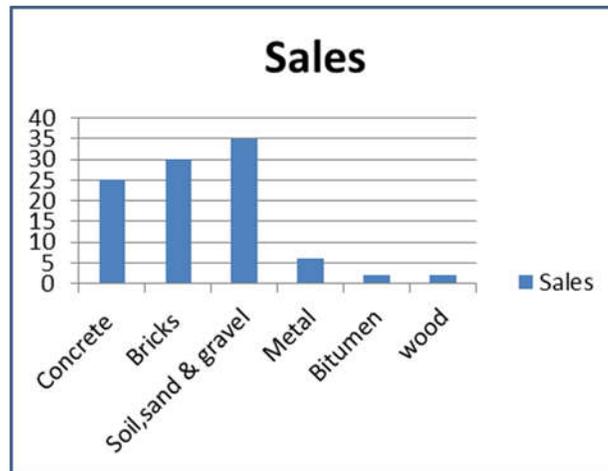
Minimize the construction waste is one of the important parameter in cost equation also as the advantages gain from waste minimization are more. Construction waste minimization help construction firm to reduce cost and increases profit. It also provides some financial benefits in terms of reduce less disposal cost; price of raw material and price of new material when considered reuse and recycle material. Waste minimization is nothing but reducing the amount of waste and its impact on environment. To reduce these negative impacts, it needs a complete understanding of the construction waste generation [3,4]. The excessive wastage of materials, improper management on site and low awareness of the need for waste reduction are common in all construction sites. There are many sources of generation of waste in construction as Design of structure, Handling of material and equipment, Worker's influences, Management of the sites, Procurement of Materials and external factors. Waste management plan, Building information modelling, 3R (Reduce, Reuse, Recycle) techniques can be used for effective management of construction waste.

II. DATA COLLECTION

2.1 Construction waste

Construction industry consumes huge amount of natural resources. In general, a very high level of waste is assumed to exist in construction. Construction waste is unwanted materials produced directly or indirectly by construction activity. The construction activity involves assembling materials and component.

Construction waste means any matter or thing which is generated as a result of construction work. It is mixture of surplus materials arising from site clearance, excavation, construction [5], renovation and demolition. This include building materials such as concrete, plaster, wood, metal, broken tiles, bricks, masonry insulation, nails, electrical wiring, as well as waste originating from site preparation such as degrading materials, tree stumps. These wastes are heavy, having high density, very often occupy considerable storage space.



2.1.1 Main constituents of construction waste

2.2 Sources of waste generation:

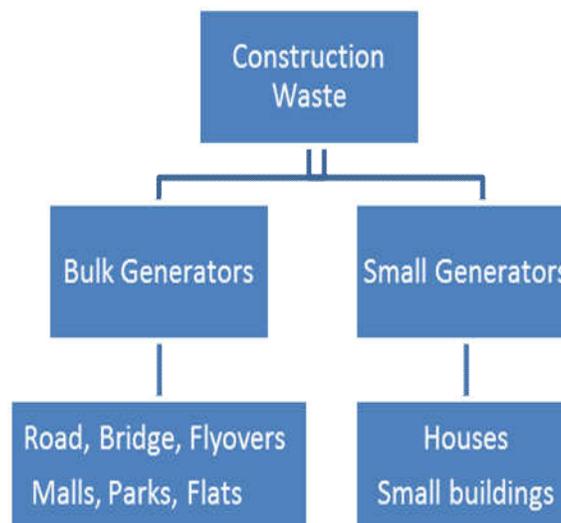
In past decade construction industry in India has shown its growth drastically upward due to the development and redevelopment projects in the India [6]. Generally there are two sources of waste generation of waste materials:

I .Bulk generators

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.

II. Retail generators or small generators.

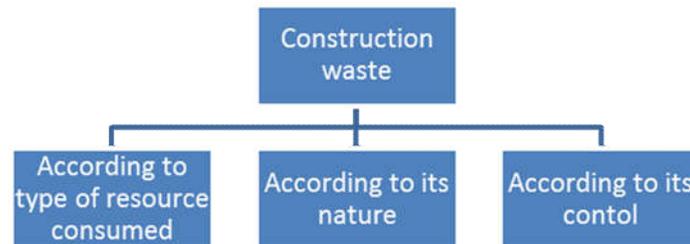
Small generators consist of housing, industrial, and commercial building construction, demolition of unauthorized structures etc. small commercial enterprise and individual house.



2.2.1 Sources of waste generation

2.3 Construction waste classification

Construction waste can be originated due to different causes. The following classifications consider all these forms of occurrence of construction waste.



2.3.1 Construction waste classification

2.3.1 Waste according to the type of resource consumed

According to the consumed resource, the waste can be classified in physical and financial waste.

- Physical waste of materials: additional amount of material required due to material waste;
- Physical waste of equipment: equipment hours increased
- Physical waste of man-hour: men hours increased due to the delay
- Financial waste in result of the physical waste

2.3.2 Waste according to its nature

There are two types of waste:

- Indirect waste, related to the financial waste and the use in excess of material, and
- Direct waste, related to the physical waste of material, more specifically, the debris.

2.3.3 Waste according to its control

Considering the possibility of controlling or reducing the index of waste detected, the waste is classified in two categories

- **Unavoidable.**

The unavoidable waste is the one for which investment is necessary for its reduction to obtain economy. Generally, this waste category represents an acceptable level of waste that its factors escape to the control of the builder, depending on the development of each company.

- **Avoidable**

The avoidable waste is consequence of a process of low quality, in which resources are used inadequately. The one for which investment is not required for its reduction up to acceptable level.

III. FINDINGS

3.1 Construction waste management

Construction waste management is important today. To achieve it the concept of 3R which refers to reduce, reuse and recycle can be used in construction waste management to achieve the economy in construction firm [7]. 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, and use, dismantling and disposal can be expressed as:

- Reduce: waste minimization
- Reuse
- Recycle

I. Reduce: Waste minimization

Construction waste leads to excess use of material, equipment, labour and capital than those estimated which affect the performance of project. Reduce the construction waste means minimizes the environmental impact of waste. It can be achieved by reducing the quantity of material use and reuse the existing material. To reduce the waste up to acceptable limit it is necessary to find out the main areas where waste occurs most and identify the ways to reduce this. With the help of proper waste minimization some environmental impacts such as depletion of natural resources, pollution and ecological imbalance can be reduced. Immediate actions towards waste minimization lead to save natural resources and land fill spaces. It also helps in decreasing global warming. Other benefits are there like improved productivity and enhance the work efficiency. Construction waste minimization also improved image of company.

II. Reuse:

Reuse techniques is defined as re-employment of materials to be reuse in the same application or to be used in lower grade applications. Once the wastes generated cannot be reduced or unavoidable, reuse techniques is a desirable option. A variety of reusable and unused materials could be found in construction activity such as lumber of different sizes, piping, plywood, and asphalt shingles and so on. The re-use of products or materials that would otherwise become waste can provide a range of social, economic and environmental benefits. Many building materials may be reusable during renovation projects where a new building is built following the demolition. Reuse waste material

- Steel – Use the small steel bar in miscellaneous parts
- Mortar – Waste mortar can reuse again for next day for lower grade work with some modification
- Tiles – Broken tiles can use in pathways
- Blocks - To use as curbs to stop water runoff
- Water – During Curing use gunny bags to reduce consumption of water
- Bricks –Can be used in plinth filling.

III. Recycle:

Recycling is the reprocessing of a reclaimed material and converting it into a new material or use. Reuse and recycling opportunities for construction and demolition wastes depend on the markets for the individual materials comprising the wastes and the ability to process the commingled waste or separate the individual materials. The benefits from waste recycling are not solely environmental, but economic and aesthetic as well. Recyclable materials have differing market values depending on the presence of local recycling facilities, reprocessing costs, and the availability of virgin materials on the market. In general, it is economically feasible for construction sites to recycle those waste materials. Recently, increased awareness of the environment, concern over guaranteeing sustainable development, and aware of the need to organize waste management have all contributed to enhancing the image of recycling as an important instrument to attain these environmental objectives. The recycling of waste materials has many benefits, which will indirectly protect the natural environment.

Advantages of Recycling:

Recycle technique is defined as utilizing wastes as raw materials in other applications. It takes less energy to process recycle materials than it does to use virgin materials.

The advantages of a construction and demolition recycling program include:

- Avoid trash collection and disposal fees
- Save resources and money through deconstruction
- Improve organization's public image
- Make new products from old materials
- Improve the market for recycled content product

IV. FUTURE WORK

Future work will carry out on the basis of survey on construction waste minimization and reuse for number of construction firm. In order to find out the causes of waste generation from various activities of construction the questionnaires will be form.

V. CONCLUSION

One of the most frequently found problems in the construction projects is inadequate planning of the construction waste. Even after some extent of wastage rate allowable in each project, this limit extended beyond the allowable limit, which ultimately effect on project profit or Return on Investment. Waste in the construction industry is important not only from the respective of efficiency, but also concern has been growing in recent years about the adverse effect of the waste of building materials on the environment. Concept of 3R in Construction waste management and minimization is the aspect which is going to help the country and construction company to develop in a sustainable manner. Applying the 3R theories will reduce issues related to environment, social and also gives economic benefits for the firm.

It can be conclude from the study that concept of construction waste and its sources of generation and its classification is helpful for identification of major causes of construction waste. Once it is identified, it can be avoided or minimized by using 3R concept resulting in major financial benefits for the firm.

REFERENCES

- [1] Mohd Firdaus Bin Mustaffa Kamal (2009) "Reduce, Reuse, Recycle And Recovery Technique In Sustainable Construction Waste Management"
- [2] Mohd Nizam Bin Yusoff (2010) "Waste Minimization By Recycling Of Construction Waste"
- [3] Pene Burns, Sinclair Knight Merz "Waste Minimization In The Construction Industry"
- [4] Cristiano R. Castelo Branco(2007) "An Effective Way to Reduce Residential Construction Waste : A Case Study In Texas, December
- [5] Sasitharan Nagapan, Ismail Abdul Rahman, Ade Asmi "Factors Contributing to Physical and Non-Physical Waste.
- [6] J.H. Findorff (2004) "Construction Waste Reduction and Recycling Demonstration Project" Wisconsin Department of Natural Resources March 1, 2004
- [7] Colin Jeffrey (2011) "Construction and demolition waste recycling"