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Issues and Challenges in Construction Waste Management

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Abstract: Indian economy is growing on a fast pace and as a consequence there is considerable rise in construction activities. The Purpose of this paper is to highlight some of the issues and challenges related to effective waste management practices on construction site. Paper identifies the project life-cycle factors which help to increase awareness in construction professionals to control construction waste. Paper discuss about the environmental issues arising due to construction waste. Paper also discuss about the materials which are wasted in high amount and how they are reused or recycled. This paper is based upon interviews & surveys of the various case studies which gives us some of the major issues and challenges associated with the implementation of waste management practices in construction sector.
Keywords: Construction Waste, Construction waste management (CWM),Issues, Challenges, Waste minimization

I. INTRODUCTION

After China, India is the second largest populated nation with over 1.29 billion population contributing 17.6% of the total population worldwide. To provide housing facilities to the growing population, lots of construction activities are in progress.

The construction primarily depends on the natural environment for the source of raw resources like wood, sand, timber and aggregates and in construction work large amount of waste is being produced. Construction industry plays a key role in socio-economic development of any country. Nowadays construction industry is rapidly growing because of increase in standard of living, demands of infrastructure projects, changes in consumption habits, as well as natural increase in population. The issues surrounding the generation of construction wastes need to be identified in order to create awareness among the construction factors about the importance of construction waste management and the challenges in developing construction waste management. The main challenge in developing a construction waste management is managing organizations involved (e.g. contractors, project managers), which are not giving a high priority to proper waste management.

A. Need

With the global concern of conservation of energy and natural resources, there is urgent need of implementing construction waste management strategies through technological and design solutions. Work towards exploring newer applications and maximizing use of existing technologies for a sustainable construction waste management is need of a time. Construction of projects results in the massive amount of construction waste which effects the cost of construction, environment, material scarcity etc which results to management of construction waste. Construction waste is major challenge because of tremendous environmental effects as illegal dumping affects the bio-habitat of dump area and creates potential public health issues.

B. Objectives

1) To analyse the factors for the generation of construction waste during the project life cycle phase
2) To identify prominent global issues related to construction waste.
3) To analyse the challenges which should be taken into consider for construction waste management.

II. LITERATURE REIVIEW

A. Paper 1

1) Topic: A study of construction material waste management practices by construction firms in Nigeria
2) Author: A. A. Dania, J. O. Kehinde and K. Bala

Research studied the practice of construction material waste management by firms in Nigeria by the use of structured questionnaires to senior construction-professional personnel of construction firms.

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Also discussed about the factors influencing the practices of construction waste management
Benefits on construction waste management.
Awareness on CWM Issues. Factors which lack the practice of CWM. Causes of construction waste on construction site. The paper had the findings which was done through questionaries' with different people and was analysed in percentage and ranking.

B. Paper 2

1) Topic: Issues on Construction Waste: The Need for Sustainable Waste Management

2) Author: Sasitharan Nagapan, Ismail Abdul Rahman, Ade Asmi, Aftab Hameed Memon, Imran Latif (Published in 2012

The paper studied about the impacts of construction on sustainable construction and contributing causes which will help the practitioners to formulate ways in avoiding or reducing the waste. Also the sustainable approach in managing the construction waste is studied from this paper.

C. Paper 3

1) Topic: Challenges in Managing Construction and Demolition Waste

2) Author: Abioye Oyenuga(Published in 2015) At : researchgate.net publication

Paper describes about the waste management hierarchy. study on the extent of reuse and recycling of construction and demolition for 7 types of construction material9soil,concrete,metal,hardcore,wood,cardboard/paper and plaster board) through interview with the construction professionals.

III. CASE STUDY FINDINGS

A. Factors For The Generation Of Construction Waste During The Project Life Cycle Stages

DESIGN STAGE

- Frequent design changes
- Design errors
  - Lack of design information
- Poor coordination of parties during design stage
  - Last minute client requirements
- Complicated design
- Inexperience designer

HANDLING STAGE

- Wrong material storage
- Poor material handling
- Poor quality of materials
- Equipment failure
- Delay during delivery
- Loose supply of materials
- Inefficient methods of unloading

SITE CONDITION STAGE

- Leftover materials on site
- Waste resulting from packaging
- Poor site condition
- Difficulties accessing construction site
- Unforeseen ground conditions

MANAGEMENT STAGE

- Rework
- Poor site management
- Communication problems
- Non availability of equipment
- Lack of knowledge about construction
- Poor supervision
- Resources problems
- Poor planning
- Poor controlling

WORKERS STAGE

- Workers' mistakes during construction
- Insufficient training for workers
- Lack of experience
- Shortage of skilled workers
- Too much overtime for workers
- Lack of awareness among workers
- Inappropriate use of materials
- Poor workmanship

PROCUREMENT STAGE

- Wrong material delivery
  - Supplier errors
- Frequent variation orders
- Mistakes in quantity surveys
- Error in shipping
- Item not in compliance with specification
- Ordering errors
- Waiting for replacement

1) Some of the practices such as waste quantification, waste segregation, implementation of 3Rs (Reduce ,recycle and reuse).
2) Government should strictly monitor the construction sites so that the rules will be followed by everyone.
3) Issues associated with implementations of waste minimisations were due to:
a) Illegal dumping at open sites to avoid the extra charges to pay.
b) Inefficiencies such as unsegregated waste collection.

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c) Amount of Waste generated
d) Environmental Impact :Illegal dumping also affects the bio-habitat of dump area and creates potential public health issues.
e) Public complaints on noise generation: Construction & demolition activities often generate noise / vibration which lead to complaints from the public despite the limited time frame over which it takes place.
f) Health issues regarding the collection and transportation of waste in open trucks also health problems caused due to excessive exposure to undesirable noise levels include: i.e Sleep problems, insomnia & fatigue.
i) Fall in speech communication, disturbance and diminished concentration thus adversely affecting job performance efficiency.
g) Dust as environmental pollutant: Dusts from various construction activities & from the companies who have their own RMC plant release wide range of particle sizes and material types and can cause health problems ranging from eye irritation, nose, mouth and respiratory system.
4) Challenges associated with the implementations of waste minimisations were due to:
a) Lack of ownership of waste due to the presence of multiple contractors on the construction site.
b) Awareness and education among the construction workforce.
c) Regulations

The fig 1.1 from the survey shows, the total percentage of material wastage from the total material used for the project(where gypsum is maximum producer of waste)

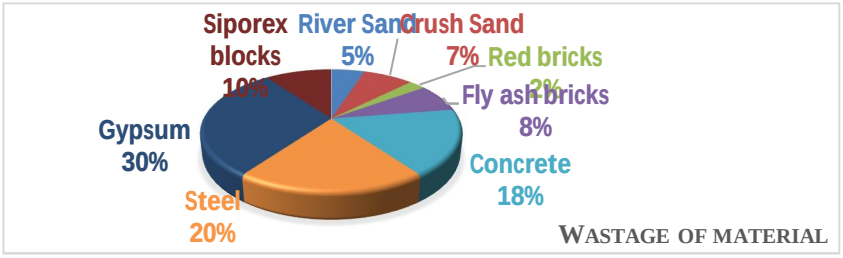

Fig 1.1

In the survey material gypsum was considered material which is least recycled but it can be recycled and reused. Some of the material waste can be reused onsite or recycled & then used for various purpose which are given below:

B. Gypsum

The gypsum waste can be turned into recycled gypsum by processing the gypsum waste through mechanical process in grinding and sieving in specialised equipment.
The recycled gypsum is used to enhance the crop growth and improve agriculture soil.
Recycled gypsum can also improve acidic, sodic or erosion-prone soil conditions.
Recycled gypsum is also be used in plastics, adhesives, sealants and specialty cements.

C. Steel

The small pieces of steel is used in making of pins, gutter grating, reinforcement rings etc. Some of them give the Steel to scrap. Steel is also melted and then reused for making the new valuable materials.

D. Concrete

The concrete waste is used for backfilling.
The smaller pieces of concrete are used as gravel for new construction projects.
If the waste concrete if properly segregated then can be given to recycling, where it is crushed and then used as the dry aggregate. Also used for new road construction.
From the survey it proved that most of the materials are reused on site itself. As the construction waste material of river sand is used for tile flooring, Pieces of red bricks are used for landscaping, waterproofing, Siporex or fly ash bricks are used in Backfilling portions like top- bottom chajja, sunk's, Centring : Ply sheets, Metal plates are reused for shuttering work or at the end given to scrap. Also according to the survey some of the remaining waste materials are send to the other ongoing sites where required and the process of recycling is carried out in order to control & minimize the waste.

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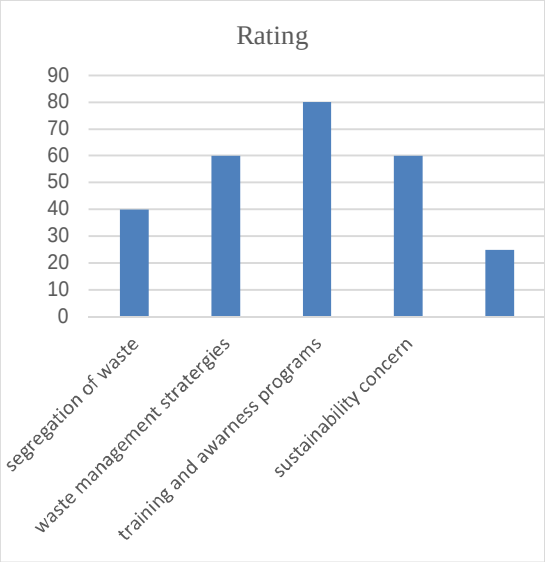

Fig 1.2

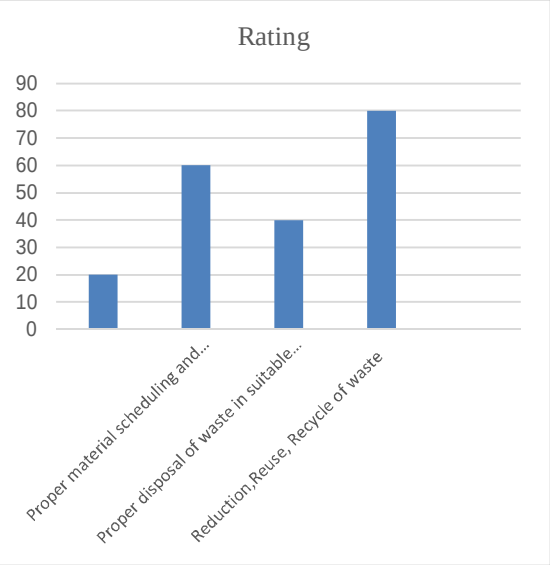

Fig 1.3

E. Challenges For The Practice Of Construction Waste Management

From the survey fig 1.2 shows the rate of percentage i.e how the waste management is carried out by the companies. Only 40% of the companies carry out the segregation of waste, as more time is needed to carry out the segregation process and also to avoid extra work & pay to the labours. Training and awareness programme is nowadays followed by the companies but still it needs to be done by every company. Only 25% of the companies were applying the waste management policy. These were the points which should be considered with strict monitoring by the government to avoid the generation of construction waste.

The fig 1.3 shows the ratio were company were lacking in the management of construction issue such as supervising workers, proper material scheduling and handling, proper disposal of waste in suitable areas and reduction,reuse,recycle which should be taken into consideration for improving the better construction waste management.

The below table shows the survey of questioner asked for the generation of construction waste:

	Agree (%)	Disagree (%)
Lack of awareness	60	40
Weakness in legislation	26	74
Insignificant cost of handling waste	50	50
Landfill	75	35

The table shows that the 40% of the people were agreed that they are not aware about the recycling process and the rules of the government. Weakness in legislation were 74% of the people disagree because they work according to the norms.75% of the people said that percentage of landfill is decreased as the waste is used on site for backfilling etc.

IV. CONCLUSION

The environmental issues which have been studied will help the management to take into consideration before starting up the project. Education on waste management through tool-box workshops, sessions, conferences should be held for practicing persons to create awareness about the waste management. The materials like gypsum are also recycled & used in various other purpose. The study of significant factors contributing to waste will help in planning the activities of project. Once the issues and challenges are known it can be helpful for the upliftment for better future planning

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V. RECOMMENDATION

A. All recyclable material should be clearly segregated and stored inappropriate in containers or stockpiled.

B. Onsite portable crushers for concrete crushing should be used which reduces the construction cost & also reduces the pollution generated while transporting the waste.

C. Tool-box workshops, sessions & conferences should be conducted for workers, site managers, project managers.

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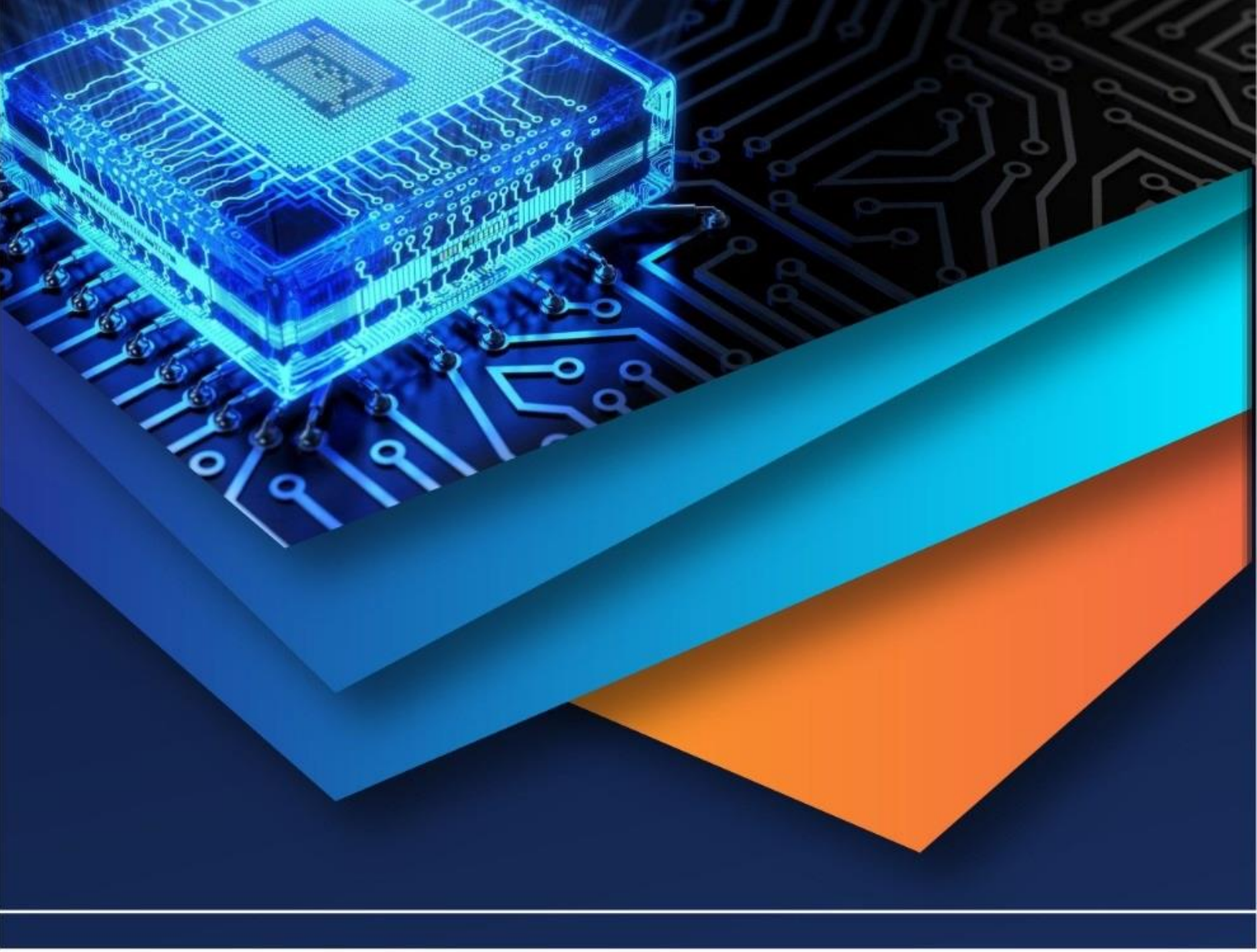

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