

# EVALUATION OF MATERIAL WASTE MANAGEMENT IN LARGE SCALE CONSTRUCTION PROJECTS

Raja Sekar.A <sup>[1]</sup>  
Department of Civil  
Engineering  
PSR Engineering College,  
Sivakasi

Tamil Nadu, India

Sanjay Kumar.C <sup>[2]</sup>  
Department of Civil  
Engineering.  
PSR Engineering College,  
Sivakasi

Tamil Nadu, India

Kishor Kumar.G <sup>[3]</sup>  
Assistant Professor  
Department of Civil  
Engineering.  
PSR Engineering College,  
Sivakasi  
Tamil Nadu, India

## ABSTRACT

*In recent trends a wide range of building materials is available for the construction of civil engineering structures. The total cost of materials may be up to 60% or more of the total cost incurred in construction project dependent upon the type of project. Effective construction materials management is a key to success for a construction project. Construction waste is another serious problem in construction industry. A large and various types of construction waste with different characteristics are created at all the stages of construction. Construction industries have a larger part in contributing environmental problems. The economic and environmental benefits must be gained from construction waste minimization. This paper presents a review on systematically investigation of the management of construction materials and construction waste, material management techniques, control of construction waste and existing situation of construction management and construction waste in the industry.*

**KEYWORDS**— RECYCLE AND REUSE OF MATERIALS, MATERIAL WASTE MANAGEMENT, CONSTRUCTION WASTE.

## 1. INTRODUCTION

The increasing amounts of construction waste cause rapid depletion of landfill space available and bring about an increasing demand for natural aggregates, thereby inflicting ecological and environmental damages on the earth. Thus, how to reduce the generation of construction waste and how to ease the impact of wastes generated on the ecosystem are recognized as critical social issues on the global scale. This research is focused on modelling waste-handling processes in construction, with particular emphasis on

mapping and simulation of on-site waste sorting processes

## 2. OBJECTIVES OF WASTE MANAGEMENT

The main objective of material waste management is to reduce the material waste in on-site and off-site.

- To reduce the generation of construction wastes.
- To minimize the cost incurred for material wastage.
- To create an economical project by effective minimization of the construction waste materials.
- Proper disposal of waste material
- To create an economical project by minimizing the materials.

## Management of Waste from Construction Industry in India

In general, in India, contractor executes construction project on a labour contract basis or on turnkey basis. Small housing projects are executed by owners and are predominantly executed on labour contract basis and strict supervision is required to control waste generation during construction process. In this construction process waste generation ranges between 5 to 7%.

## Constituents of Waste that Arise from Construction Industry in India

Constituent	Quantity generated in Million Tonnes
Soil, Sand and Gravel	4.20 to 5.14
Bricks and Masonry	3.60 to 4.40
Concrete	2.40 to 3.67
Metals	0.60 to 0.73
Wood	0.25 to 0.30
Others	0.10 to 0.15
Soil, Sand and Gravel	4.20 to 5.14

### 3. SOURCES AND CAUSES OF CONSTRUCTION WASTE

#### Procurement waste

- Ordering errors.
- Lack of possibilities to order small quantities.
- Purchased products that do not comply with specification.

#### Operational waste

Errors by trade persons or laborers, accidents due to negligence, damage to work done caused by subsequent trades, use of incorrect material

- Required quantity uncleared due to improper planning
- Equipment malfunctioning.
- Inclement weather.

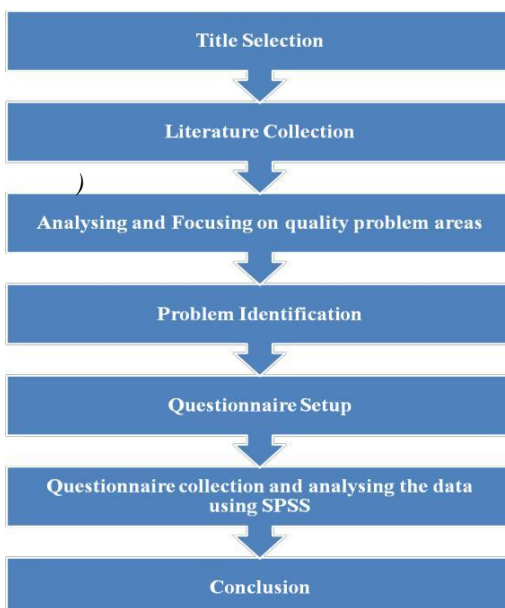
#### Material handling waste

- Damages during transportation & inappropriate storage.
- Materials supplied in loose form.
- Use of material which are closed to working place.
- Unfriendly attitude of project team and laborers, theft.

#### Design waste

- Lack of attention paid to dimensional co-ordination,
- Changes made to the design while construction is in progress.

### 4. Methodology



### Design of questionnaire

A questionnaire was designed to understand more about the material management in the construction industry. Data was collected from the responsible persons from the site such as project manager, project engineer or site engineer. Questionnaire mainly focused on the following areas

- Company details.
- Documentation details.
- Details of material usage
- Details of material storage
- Methods for wastage reduction

### 5. Results and discussion

Collected data were analysed using statistical tools analysis method, SPSS (Statistical package for the social sciences) is a statistical analysis and data management software package. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distribution and trends, descriptive statistics, and conduct complex statistical analyses.

Some of the analysis results of the questionnaire were shown below.

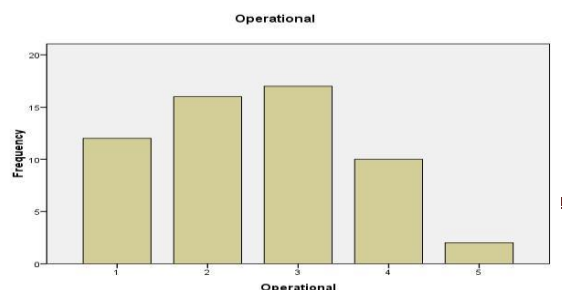
#### FREQUENCY TABLE

##### Operational

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	12	21.1	21.1	21.1
2	16	28.1	28.1	49.1
3	17	29.8	29.8	78.9
4	10	17.5	17.5	96.5
5	2	3.5	3.5	100.0
Total	57	100.0	100.0	

#### INFERENCE

The inference made from response of construction employees and owners 21.1% are Very low Severity rating of material waste management projects are due to "Organization Chart", 28.1 % of the respondent says Low, 29.8 % of the respondent says medium, 17.5% of the respondent says High, 3.5 % of the respondent says Very High.

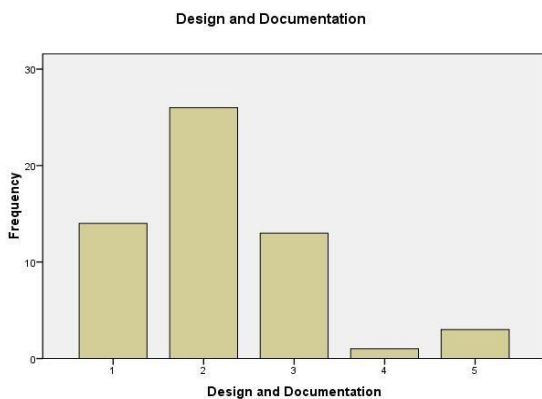


Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	14	24.6	24.6	24.6
2	26	45.6	45.6	70.2
3	13	22.8	22.8	93.0
4	1	1.8	1.8	94.7
5	3	5.3	5.3	100.0
Total	57	100.0	100.0	

### Design and Documentation

#### INFERENCE

The inference made from response of construction employees and owners 24.6% are Very low Severity rating of material waste management projects are due to "Organization Chart", 45.6 % of the respondent says Low, 22.8 % of the respondent says medium, 1.8 % of the respondent says high, 5.3% of the respondent says very high.

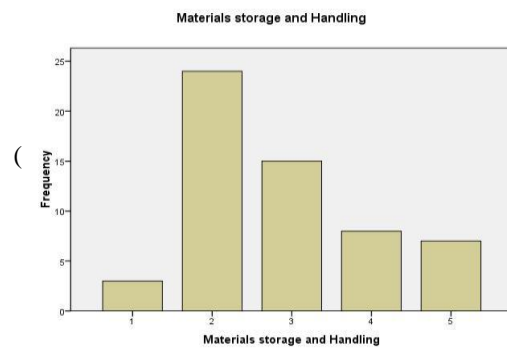


### Materials storage and Handling

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	3	5.3	5.3	5.3
2	24	42.1	42.1	47.4
3	15	26.3	26.3	73.7
4	8	14.0	14.0	87.7
5	7	12.3	12.3	100.0
Total	57	100.0	100.0	

#### INFERENCE

The inference made from response of construction employees and owners 5.3% are Very low Severity rating of material waste management projects are due to "Organization Chart", 42.1 % of the respondent says Low, 26.6 % of the respondent says medium, 14.0% of the respondent says High, 12.3 % of the respondent says Very High.

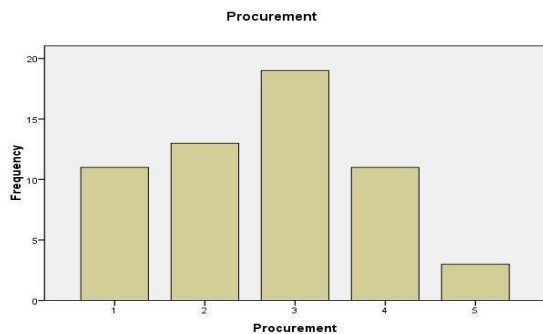


### Procurement

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	11	19.3	19.3	19.3
2	13	22.8	22.8	42.1
3	19	33.3	33.3	75.4
4	11	19.3	19.3	94.7
5	3	5.3	5.3	100.0
Total	57	100.0	100.0	

#### INFERENCE

The inference made from response of construction employees and owners 19.3% are Very low Severity rating of material waste management projects are due to "Organization Chart", 22.8 % of the respondent says Low, 33.3 % of the respondent says medium, 19.3 % of the respondent says High, 5.3 % of the respondent says Very High.



## Conclusion

This study clearly indicates that, most of the materials in construction sites get wasted because of the erroneous waste management policy and failure in records maintenance. Contractor's poor involvement and lack of knowledge in the material management intensifies the problem further. The maximum amount of sand, brick and steel gets wasted all because of its storage condition. Whatever the project cost is high, the storage for sand, brick and steel is open at the site and due to impossible storage, these materials gets more wasted. This increase in waste not only increase the total cost of the project but also the span of the project also gets delayed. Hence it is suggested to provide a proper storage for all these materials at the site and the handling should be done in a proper manner. More careful is needed while placing and transporting the materials. If we reduce these types of waste; the project can be completed in an economical and effective manner.

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