

# EVALUATION OF MATERIAL WASTE MANAGEMENT IN SMALL SCALE CONSTRUCTION PROJECTS

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**ABSTRACT**— The objective of this paper is to study the material waste management in small scale construction sites. The questionnaire is designed based on the attributes for material waste. The survey was conducted in and around Tamilnadu. The responses from project managers and contractor of major, minor and small projects were collected. The received responses were analyzed using SPSS. Based on the study, suggestions for waste reduction in construction sites are made.

**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.

### 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 minimizing the materials.
- To formulate a simulation model for material wastes.

## 2. NEEDS FOR CONSTRUCTION WASTE MANAGEMENT

• Need for salvage, recycle and reuse of materials have proven to have economic benefits for the construction industry.



Fig 1. Need for construction waste management

- To reduce the material wastage
- Proper disposal of waste material
- Ranging from low risk waste through to hazards waste.

## 3. SOURCES AND CAUSES OF WASTE

### 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.

### Design waste

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

- Designer’s inexperience in method and sequence of construction.
- Lack of attendance paid to standard size available in the market.
- Designer’s unfamiliarity with alternative products, complexity and errors.
- Incomplete contract documents, selection of low quality products.

**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.

**Procurement waste**

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

**4. Methodology**

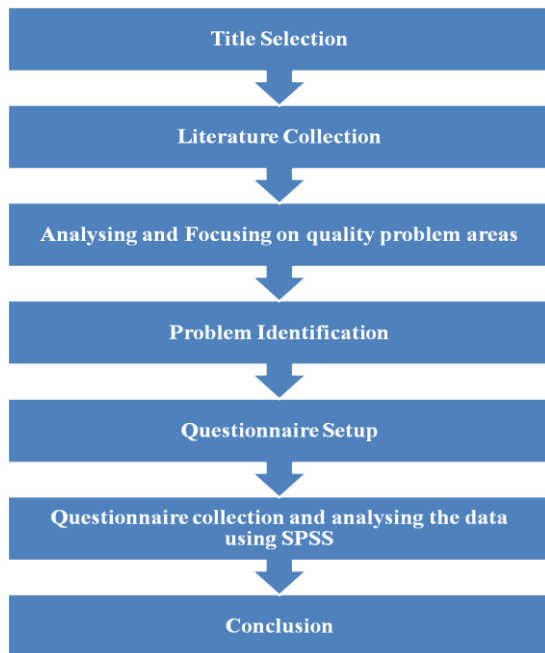


Fig 2. Methodology

**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 analyzed 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.

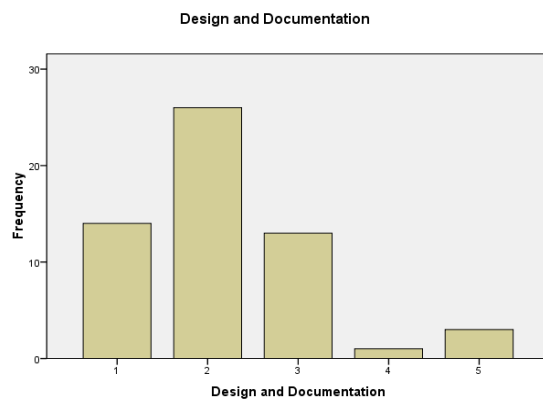
**FREQUENCY TABLE**

**Design and Documentation**

Valid	Frequen	Percen	Valid	Cumulative
d	cy	t	Percent	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	

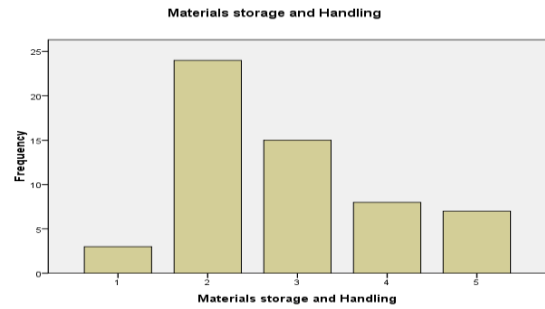
**INFERENCE**

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.



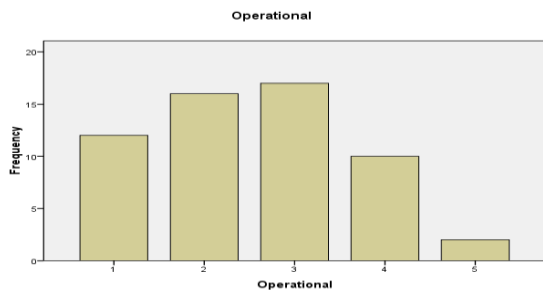
**Operational**

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.



**Materials storage and Handling**

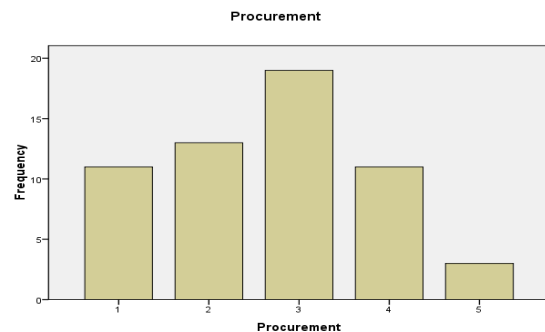
Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	3	5.3	5.3	5.3
2	24	42.1	42.1	47.4
3	15	26.3	26.3	73.7
4	8	14.0	14.0	87.7
5	7	12.3	12.3	100.0
Total	57	100.0	100.0	

**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.



**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.

**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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