

# Analysis the Critical Factors Causing Wastages of Construction Materials in Building Construction

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**Abstract** - Construction industry has been swiftly developing around the world from last three decade especially in India the rate of developing of this industry is very high. There is a lot of capital investment, is invested in this sector as well as this industry become second largest industry after agriculture in India in perspective of capital investment as well as employment generation. This industry directly related with GDP of nation. The bigger construction projects have been launched in power, infrastructure, building sector in recent year. The 60 to 70% expenditure of the any construction project spend on construction materials. And it is found that huge quantity of wastage of material take place on site during the construction phase. Wastages of material has major problem in construction industry which must be recognize very efficiently. Effective control on wastages of material saves money, so that organizations profit margin will increase. More specifically, it has main impact on construction cost, construction productivity, time, & environment aspect. At such circumstance reduction of wastage of material during the construction phase contribute major role in economy of that construction project. Impact on environment is also serious issue because due to wastages of material the natural resources which are used for production of that construction material also wasted. The majority of this wastage of material can be avoided by competent & firm control over supervision of site, flow of construction material & strict labour supervision. This study identifies sources for wastages of construction material and critical factor causing wastages of material for those sources by using Delphi techniques and detailed questionnaires analysis & also states the necessary suggestion for reduction in wastages of construction material and also suggest checklist for reduction of wastages of construction materials.

**Keywords** - Construction Materials, Wastages, Critical factor

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## INTRODUCTION

In construction sector having huge competition among companies, due to this in less profit margin the works carried out by these companies .At such circumstances the wastages of construction materials plays very important role .By reducing wastages of materials profit margin can be increase .Due to wastages of material not only waste of wealth takes place but also the natural resource those which is spend on manufacturing of these materials also wastages this is serious issue for environment. For these factors effective control on wastages is required.

### Identification of Critical Factors

#### Introduction

The detailed questionnaires are circulated to experts those are associated with Construction sectors like

Site Engineers ,Project Managers, Labour Contractors, RCC Contractors, RCC Designers, Architects ,Estimators, Environmental Consultants etc to indentified the causes of Wastages of Construction Materials.

#### Study peoples characteristics

In general features of the study people were investigated. They include the field of work, classification of contractors, experience of respondents, number of employees, cost of executed projects during the last five years etc.

#### Field of work

Table Gives details that the building represents the highest field of work for respondents with 80 % (40 ) in buildings, 10 % (5 ) of work was in roads, 5 % (

2) in water and sewage and 5 % ( 3 ) of contractors work in Industrial Building.

Table 1.1: Field of company specialization

Company Work Field	% of Respondents
Building	80
Roads	10
Water and Waste Water	5
Industrial Building	5



Graph 1: Experience of respondents (years)

Analysis of Data and Remedies

Following scale taken for analysis of questionnaires on scale 1 to 5 ratings were given

1. Very highly affects
2. Highly affects
3. Moderately affects
4. Less affects
5. Very less affects

Respondents designation

Total 76 questionnaires were circulated out of that 50 questionnaires were considered for this study graph shows that 14 % (8) companies respondents were Project Manager, 26 % (13) were Senior Engineers, 6 % (3) were the Purchase Officers of organization and 14 % (7) were Structural Consultants, 6% (3) were labour contractors, 4 % (2) were Management ,6% (03) were architect , 6 % (2) were Storekeeper, 4% (2) were Transportation operator, 2% (2) were Equipment Operator and 10% (5) were RCC Contractor.

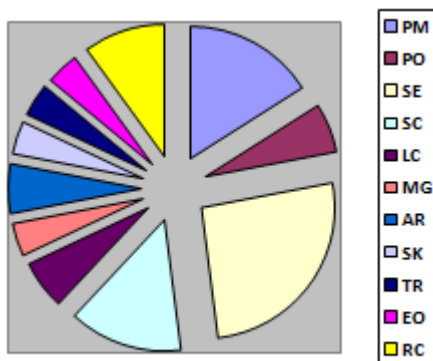


Figure 1: Respondents Designation

Experience of Respondents

Graph 1 gives details that 18.8 (19%) have experience from one to three years, 10.4 (10%) of respondents have experience from 3 to 5 years, the percentage 20.8 (21%) of the respondents firm have experience between 5 to 10 years at construction works and 50 % (24) of respondents who have experience more than 10 years.

Critical Factors Causing Wastage of Materials

Group 1

I. Design

**Critical Factor:** From respondent response it is found that in design source **Complicated Design** is critical factor. From this we have to also give attention towards dimensional coordination many respondent think that this is reason for wastages of materials

Measures:

- o Much complicated design causes the conflict in between various personnel at site that causes mistakes while implementing the design on site that causes wastages to avoid this design should as simpler as possible.
- o All specifications in design should be plotted clearly so that confusion while implementing will be lesser that will reduce the wastages.
- o Lack of attention paid to the dimensional coordination also causes of wastages so there should be coordination between all departments about dimensional parameter.

## II. Handling

**Critical Factor:** In this handling source it is found that **Storing Material Far Away From Working Place** critically considered by all respondents.

### Measures:

- Stacking and Storing of construction material play important role in material consumption in proper way
- Due to storage material location away from the working areas takes wastages of material because two or three times handling of material takes place due to which chance of damage to materials
- For transportation of material from store place to construction site ,many times equipment are required which is also difficult task to arrange in proper way .

## III. Worker

**Critical Factor:** This is most important source for this study and all respondents precisely given their views form that **Damage Caused By Workers** considered for maximum wastages of materials.

### Measures:

- Workers plays very important role while considering the material wastage on any construction site.
- Worker should be trained properly to avoid the wastage.
- Awareness of worker is important factor.
- Strict supervision on workers also reduces wastages of materials.
- Skilled labour should used where important and costly materials consumption.

## IV. Management

**Critical Factor:** From management source maximum respondent gives preference to **Poor Supervision** as critical factor.

### Measures:

- Supervision should be done properly while implementing design on site so that wastage will be less.
- Supervision reduces the mistakes by workers.

- Experience people can do the supervision of work
- There should be responsibility clearly define among employee so that seriousness among workers regarding work can be increased

## V. Site Conditions

**Critical Factor:** Location and access of site plays important role. In these study respondents gives majorly attention towards **Poor Site Condition**.

### Measures:

- Site should be well maintained so that all movement of man and materil should be free .
- There should be well prepared site layout ,to avoid confusion
- Proper light arrangement should be done on site

## VI. Procurement

**Critical Factor:** Procurement is the main part of any organisation .In this analysis the **Frequent Variation Orders** considering main reason from this source for wastages of materials.

### Measures:

- There should be strict about ordering the materials.
- Proper calculation of requirement of material and Perfect identification of material done to avoid further change in orders.
- Quantity survey is very important factor while considering the wastage of materials.
- To avoid wastage proper calculation of required quantity of material with proper specifications should be done.
- Mistakes in quantity survey causes extra material or deficiency of material on site that may causes wastage due to deterioration and stock out condition respectively.

## VII. Machinery

**Critical factor:** In this analysis most of respondents think that **Availability of Machinery** plays important for transportation of materials.

**Measures:**

- Initially requirement of machinery should identified and then that machinery should available in time for transportation of material
- There should emergency equipment also identified in failure of any equipment that machine can use
- Trained operator should be selected to operator the machinery
- Proper machinery selection should be done to implement each activity on site.

**VII. External Factors**

**Critical Factor:** In the external sources most of the respondents think that **Theft as well as accident** also main cause of loss of resources.

**Measures:**

- To reduce the theft on site security arrangement like CCTV, Watchman should done.
- Regularly stock checking to be done.
- To reduce accidents training of work should give t all workers
- Necessary safety arrangement should be done on site.

**Group 2: Material Management**

**Critical Factor:** Aim of the waste management that **the Completion of Project successfully and to Achieve Economy.**

**Importance:** For achieving the good economy in construction project reduction of wastages of materials is very imporantant. Due to this saving of materials we can complete the projects successfully.

**II. Benefits of Implementation of Material Management**

**Critical Factor:** Most of research agrees that effective materials critically **Helps to Reduce Wastage of Materials** in construction projects.

**Significance:** Due to effective material management we can monitor the use of materials as well as flow of materials maintain .Due to this factor the wastages of materials can be reduce and saving of resource can be possible

**III. Importance of Implementation of Material Management to Reduce Problems**

**MENTIONED IN QUESTIONNAIRE**

**Critical Factor:** Most of resources said that **Delivery of Materials with Wrong Specification** were major problem for implementation of material management.

**Importance:** Delivery of materials with wrong specification creates confusion among employees about use of those materials which causes wastages of materials to avoid this proper planning is required and proper placement of orders with required specification required.

**Need of Revised Checklist :** There is no checklist available to control the wastages of construction of materials this study develop the new Check List for Wastages Control Plan.The new checklist as follows

SOURCES	DESCRIPTION	YES	NO	REMARK
DESIGN	1. Design is Verified			
	2. Design with all specification and Details			
	3. Design error			
	4. Proper circulation of design is done			
	5. Supports Check			
TRANSPORTATION & HANDLING	6. Use of proper tools for loading & unloading of material			
	7. Instruction to Workers			
	8. Supervisor available while loading & unloading of material			
	9. Equipment Check			

STORAGE	10. Checking the area required for material storage is enough			
	11. Proper stacking is provided			
	12. Proper shelf's are provided			
	13. Proper grouping of material in store			
	14. Proper security for material			
	15. Storage of material far away from work place			
	16. Record of Materials			

WORKERS	17. Training to Worker about work			
	18. Poor attitude of worker			
	19. Experience Enough for Work			
	20. PPE for Workers			
	21. Number of workers are sufficient for work			
EXTERNAL FACTORS	22. Suitable weather condition			
	23. First Aid			
	24. Proper security against theft			

**CONCLUSION**

The many factors that cause increase to material waste on site practice are manufacturing defects, materials damage on site and improper cutting of

materials. The many factors that cause increase to material waste on materials handling are duplication of transporting material on site, insufficient instructions about handling materials on site and improper handling of materials on site. The many factors that cause increase to material waste on material transportation are improper materials and storing materials in far away stores. The many factors that cause increase to material waste on site management are lack of material and time waste management plan, poor qualification of the contractor's technical staff assigned to the project and shortage of technical professionals in the contractor's organization. The many factors that cause increase to material waste on site supervision are slow response from the consultant team to contractor inquiries and Poor coordination and communication among the consultant, the owner and the contractor. There are many factors that affecting on the increasing of labor productivity like workers discipline, the stability of the work, good management of the workers, incentive payments and relation between workers. There are many factors that affecting on the reducing of labor productivity such as the workers are not satisfied, misunderstanding between workers, unqualified training for workers, absenteeism from the work site and sycological pressure on workers. There are many factors which related to equipment and impact on the cost of the project like availability of construction equipment in the market, the quality of construction equipment and unqualified training for workers.

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