

# A Study To Enlarge mass Production In Building Industry By Material Waste Management

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## ABSTRACT

*In the current environment, Building industry had pressed to find ways to gain a competitive advantage and improve slim profit margins. In Building industry Material, Manpower, Money, and Machine play a crucial persona. Research has shown that construction materials and equipment may constitute more than 70% of the total cost for a typical construction project. Material wastage in construction projects resulted into huge financial setbacks to builders and contractors. Material waste has been acknowledged as a major issue in the construction industry. So, Waste management is very important for a company's profitability. Significant volumes of waste result from activities such as inefficient design, inaccurate materials estimates and orders, design changes, poor logistics and storage, and a traditional low prioritisation of materials costs as compared to labour costs. Cost-benefit analyses indicate you can save up to 2% of the construction cost by achieving good practice wastage rates on the 5-10 most wasted components on each project. This is because if a company can manage its waste properly, reduction in waste can help the company to reduce its cost. Therefore the proper management of this single largest component can improve the productivity and cost efficiency of a project and help ensure its timely completion. This dissertation delineate the consequence of research studies carried out in Pune (Maharashtra) that investigated the loss of total productivity due to happening of material waste at building sites located in different locations of the Pune in Maharashtra. From this it is reasoned out that total productivity can be enhanced by efficient & strict control over supervisors and flow of construction materials. The main focus of this dissertation is to seek the most effective waste management methods that can help the companies to reduce their cost and thus increase their corporate profits or productivity.*

**Key Word-** *Building Industry, Construction Material, Waste Material, Material Management, Productivity, Waste Control*

## INTRODUCTION

The dissertation work is based on increase in total productivity by material waste management in construction. Through the dissertation work, effort is laid down to discover causes of wastage in construction of medium rise structures & how it can be minimized. As we know that Construction is one of the well-nigh significant parts of Indian economy, is often cited as an industry but it is more accurately depicted as the sector of economy. The monetary standard of living of the people is right away or circuitously associated to the growth of infrastructural facilities in an economy. Construction activities set the strong-arm basis for economic and social build up of the human being. It is not individual activity, but a group of activities intimately linked to each other by its size nevertheless, but by the work of its product.

In developing country like India, nowadays a construction activity meets a very crucial part in its growth. The activities are prominent and extremely diverse, both in terms of quantity and quality of resource usage. Cost is increasing with sub-optimal use of resources, unconventional management that affect the national economy. The state of construction industry in India is not a hugely advancing. The excess of cost over budget, time taken over than calculated and bad quality of construction site are turning bit by bit a prevail quite than exception.

In India, an intensive debate has been ongoing for a number of years concerning building and production costs. Statistics indicate that the costs for producing buildings have risen sharply in recent years. These statistics have been questioned; partly because more exclusive tenant-owned flats have been built than had previously been the case. The market situation is also important as, during periods of rapid economic growth, costs increase only to

decrease again during economic recessions. Lowering these costs is a high priority for both the building and construction sector.

Reducing costs has become more relevant due to the financial crisis in the autumn of 2008, which led to the current depression and to reduced construction of buildings. Reducing costs in the long-term, however, requires that any given product be produced using less resources.

Construction firms are trying to extract their determined resources more productively and profitably. As the foreign investment is rising in this sector, the Indian organization is also confronting challenges. The construction companies have to take on an effective scheme to tackle this problem. Productivity is a fundamental epitome of a nation's future living monetary standards and the competitiveness of an industry and an economy. In lots of countries, the degree of construction productivity has been witnessed to be falling back behind those of other sectors of the economy. In India, in the gone two decades, increases in construction productivity (measured in terms of profit) falling back behind all sectors. A plan should be enforced to ameliorate the industry's productivity performance. During the last few years, the Indian construction and real-estate companies have raised their ambition levels. Indian construction industry vision is to serve as an example not only for the construction industry, but for Indian industry as a whole. They intend to decrease their purchasing costs by 25% within the next few years. The construction industry has less share to the GDP owing to a lesser productivity. There are several factors that coming unitedly to constitute overall productivity of construction industry, and most of these components are being worked upon successfully to contribute to the productivity except that of Material waste management.

### Objective

To Study the wastage of major building materials of medium rise structures and its effect on project cost. Provide an accessible guide to productivity measurement for those involved in constructing and interpreting productivity measures, in particular statistical offices, other relevant government agencies and productivity researchers. Improve international harmonization; although there is no strong prescriptive element in the manual, it contains indications about desirable properties of productivity measures. Hence, when countries have a choice in constructing new measures or developing a system of indicators, the manual may provide guidance. Identify desirable characteristics of productivity measures by reference to a coherent framework that links economic theory and index number theory. Desirable properties have to be assessed against the reality of data availability or cost of producing statistics. Broad trends can often be discerned with tools that do not live up to full theoretical standards as long as they are interpreted with the necessary caution. However, the user has to be aware of simplifications that occur in the practice of labour productivity measurement.

### LITERATURE REVIEW

University of California, Berkeley, CA; USA method for waste control in the building industry; Carlos Torres Formoso, Eduardo Luís Isatto, and Ercilia Hitomi Hirota, 26 - 28 July 1999.

The paper presents the preliminary results of an ongoing research project which aims to develop a method for controlling waste on building sites. The main focus of the method is to establish waste control procedures as part of site management on a routine basis, using a pull learning approach and emphasising the principle of process transparency by using qualitative and quantitative data collection techniques. The study also intends to make some contributions for the consolidation of the Lean Construction theory, through the application of some of its principles in practice. A classification for waste in the construction industry is proposed, based on previous studies concerning waste measurement. Based on that classification, a protocol for data collection was developed and applied in case studies carried out in three different Brazilian building companies. One of the main conclusions of the paper is concerned with the need to integrate waste control into the production planning and control process.

Journal of construction engineering and management; material waste in building industry main causes and prevention; Carlos T. Formoso, Lucio Soibelman M. Asce, Claudia de Cesare, and Eduardo I. Isatto; 316 - 325 July & August 2002.

Material waste has been recognized as a major problem in the construction industry that has important implications both for the efficiency industry and for the environmental impact of construction projects. Moreover, waste measurement plays an important role in the management of production systems since it is an effective way to assess their performance, allowing areas of potential improvement to be pointed out. This paper describes the main results of two research studies carried out in Brazil that investigated the occurrence of material waste at 74 building sites located in different regions of that country. Some typical figures for the waste of some key construction materials are provided, and the main causes of waste in the sector are discussed. The results indicate that the waste of materials in the Brazilian building industry is fairly high and that a large variability in waste incidence is found across different projects. Most of this waste can be avoided by implementing inexpensive preventive measures, mostly related to managerial improvements.

National conference on recent trends in engineering & technology, A study on basic material waste in building industry: Main causes and prevention; Mahesh D. Meghani, Chetna M. Vyas, J. J. Bhavsar, Rakesh J. Hingu; 13-14 May 2011

This research work is based on material waste management in building construction. Through the dissertation work, attempt is made to find reasons of wastage in construction industry and how it can be minimized. In Construction, 4-M (Material, Manpower, Money, Machine) play crucial role. Material waste has been recognized as a major problem in the construction industry. This paper describes the main results of research studies carried out in Anand (Gujarat) India that investigated the occurrence of material waste at building sites located in different location of the Anand in India .Most of this waste can be avoided by strict supervision and control of material. The main causes of waste and necessary suggestion for reduce waste are discussed on this paper.

### Scope

1. Limited to R.C.C. frame structures of residential building projects.
2. For major material for R.C.C. (Cement, Sand, Aggregates and Steel).

### Methodology

The study applied the following methodology to achieve the stated objectives; a review of the literature on construction productivity, its determinant factors and the methods for its estimation; comparison of construction productivity for India with those of industrialized countries, analysis of existing methods for measuring industry-level productivity in India, analysis of data on construction projects in India to established benchmarks; and development, testing and fine-tuning of a suitable model.

Data accumulation through site visit from versatile Civil Construction Projects.

Examined data to find out wastage proportion & its effect on the cost of the project.

Find the causes of wastage on site by experience and discussion with Site Engineer/Builder/Consultant.

#### Line of Action

- Collected data from different construction projects
- Find the wastage of material
- Analysed data to find out wastage proportion.
- Find the % of wastage with the help of wastage material
- Worked out the Gross % of wastage with the help of total wastage in terms of rupees and estimated cost of major materials.
- Find the productivity from gross % of wastage.
- Study the effect of wastage on project cost.

#### Necessary Formula

Productivity = 1- Gross % of wastage

$$\% \text{ of Wastage} = \frac{\text{Wastage}}{\text{Estimated Consumption}} \times 100$$

$$\text{Gross \% of Wastage} = \frac{\text{Total Wastage}}{\text{Estimated Cost of major Material (Rs.)}} \times 100$$

## Data collection

PROJECT NO.	TOTAL COST RS (CRS.)	RCC AREA	SQFT RATE	NAME OF PROJECT	DATA PROVIDED BY	NO OF FLOOR
		TOTAL BUA SQFT	TOTAL			
1	3.34	35230	1180	Manthan Dudulgaon,Pune	Mr. Tejas Sancheti (P.E.)	G+5
2	7.82	60230	1300	Pearl Talekar Park, Alandi, Pune	Mr. Pratik Talekar (P.E.)	G+8
3	10.53	84260	1250	Star City, Vahile Nagar, Dehu Road, Pune	Mr. Taty Waghmare (P.E.)	G+11
4	13.65	105000	1300	Tanish Orchid Charoli, Bhudruk Pune	Mr. Sachin Magare (P.E.)	B+P+12

### Wastage of Cement

The wastage in the consumption of cement is given in table

Project No.	Total Cost Rs. (Cr.)	TOTAL BUA SQFT	Standard Consumption Bags	Actual Consumption Bags	Wastage Bags	% of Wastage
1	3.34	35230	4700	4830	130	2.76
2	7.82	60230	9330	9570	240	2.57
3	10.53	84260	20400	21000	600	2.94
4	13.65	105000	29767	31336	1569	5.27

### Wastage of Sand

The Wastage in the Consumption of Sand is shown in table

Project No.	Total Cost Rs. (Cr.)	TOTAL BUA SQFT	Standard Consumption CFT	Actual Consumption CFT	Wastage CFT	% of Wastage
1	3.34	35230	17000	17600	600	3.52
2	7.82	60230	47050	50730	3680	7.82
3	10.53	84260	59680	62810	3130	5.24
4	13.65	105000	62780	66330	3550	5.65

**Wastage of Coarse Aggregate**

The Wastage for Coarse aggregate is reported in table

Project No.	Total Cost Rs. (Cr.)	TOTAL BUA SQFT	Standard Consumption CFT	Actual Consumption CFT	Wastage CFT	% of wastage
1	3.34	35230	34000	35200	1200	3.52
2	7.82	60230	55930	58112	2182	3.90
3	10.53	84260	65530	66490	960	1.46
4	13.65	105000	74625	77228	2603	3.48

**Wastage of Steel**

The Wastage levels of steel are given in table

Project No.	Total Cost Rs. (Cr.)	TOTAL BUA SQFT	Estimated Consumption KG	Actual Consumption KG	Wastage KG	% of Wastage
1	3.34	35230	165000	172000	7000	4.24
2	7.82	60230	215000	220000	5000	2.32
3	10.53	84260	269632	272123	2491	0.92
4	13.65	105000	245000	251000	6000	2.44

### CASE STUDY

In my case study all 4 projects studied is located in PUNE MAHARASHTRA. All these projects were done by five Builders. The size of projects varies from, the RCC area 950 to 3750 Cubic meter and project cost 2.9 to 49.99 crores rupees. All projects have a different features and also all project are framed structure. The basic details of projects are given in tabular form.

My dissertation involves study of five R.C.C. frame structure of residential type medium rise buildings projects and same approach can also become utilize in complex or industrial project.

This study deals with basic contents (like classification of waste, definition and methodological issue etc.), various material management functions like reduction of waste, material storage, site location, quality control, site security, inventory control etc.

Data on estimated and actual consumption of major materials, namely: Cement, Reinforcement steel, sand and Coarse Aggregate are collected. For each projects negative variance or wastage worked out. From this wastage, gross % of wastage calculated which effected on productivity of project.

The analysis of data of various sites indicate that consumption of material or extent of wastage dependent on the various factors like primarily site and space, project management, construction methodology, manpower planning, material and equipment management etc.



**Steel waste**

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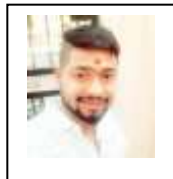
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