

# Material Waste Management at Construction Site

Sumpa Dey

M.Tech, 2nd Sem, CEM, SRM University  
E-mail: [sumpadey13@gmail.com](mailto:sumpadey13@gmail.com)

---

**Abstract**—Waste minimization refers to strategies that are aiming to prevent waste through upstream interventions. The purpose of this paper is to identify the waste management influence factors in the project work activities.

Environmental sustainability has become one of the key drivers for continuous growth in the construction industry. Managing and monitoring the different waste streams on a construction site requires a detailed waste minimization strategy. This needs careful planning throughout the design, build and occupancy phases, to ensure its success, effectiveness and compliance with building regulations. This paper proposes methodology that assists project managers to assess the performance level of a project in terms of waste management practice. Once waste has been produced, the best method of managing it is through reuse either on the existing site, or a nearby site. The scope of this paper deals with the developing of tools to measure the performance of a project towards waste management. Small changes to building practices and extra attention to detail can add up to significant savings.

## 1. INTRODUCTION

Materials management is a function, which aims for integrated approach towards the management of materials in a concern. It covers a wide field and deals with material costs, material supply, utilization and its handling. It is concerned with the planning and programming of materials and equipment, market research for purchase, storage and inventory control, transportation of material, salvage, material handling and procurement of material such as capital goods, raw materials, components and semi finished items.

Material waste minimization is the process and policy of reducing the amount of waste of material produced by construction site. In construction projects, the term materials denote all purchased items utilized at the project site including construction material, supporting plant and machinery and their operational repair and maintenance materials and stores. Constructional materials cover all type of materials used in construction including electrical and mechanical fittings, devices and instruments that are incorporated during the construction of work. With the implementation of an effective construction waste minimization effort, a high percentage of all waste materials mentioned above can be diverted from the landfill and recycled into new products.

Now-a-days, material management concept has emerged and is becoming popular. Useful inert materials which do not

consist of active chemical content, such a sand, bricks, rocks, asphalt, rubble and concrete are deposited at public filling areas, as they are suitable for sea reclamation and land formation works. Some may be recycled for used in construction works. The non-inert waste which comprising plastics, bamboo, wood, paper and packaging material are often contaminated. Therefore they have to be disposed on solid waste landfills, because they are not suitable for reuse in reclamation works or recycling as construction materials.

## 2. OBJECTIVES

The objectives are as follows:

- i. Provide training for site foremen in waste minimisation techniques;
- ii. Implement waste minimisation practices on the construction sites;
- iii. Obtain data on the construction waste stream;
- iv. Confirm potential environmental and economic benefits of waste minimisation.
- v. Identify the sources, volumes, quality and timing of wastes arising from the construction activities;
- vi. Recommend measures for the disposal of inert materials and wastes.

## 3. CAUSES OF WASTE MATERIAL AT CONSTRUCTION SITE

### 3.1 In General

- a) Faulty planning and policies systems and procedures
- b) Lack of accountability
- c) Wrong specifications, standard, codes
- d) Wrong raw materials
- e) Lack of inventory control
- f) Lack of proper storage, layout of facilities, handling of materials
- g) Communication gaps
- h) Faulty work method
- i) Lack of supervision and control
- j) Less attention to waste segregation and collection
- k) Miscellaneous causes

### 3.2 Main Causes

The main causes of waste of materials are as follows:

#### 3.2.1 Cement

Waste of cement is complex due to the fact that this material is used as a component of mortar and casting place concrete in several different processes, such as brick- work, plastering, and floor screed. By contrast this is a relatively expensive material that has high levels of waste in construction industry. Its main sources of waste are as follows:

- In situ production of mortar: Waste of cement was observed in the production of mortar on site. Cement and other materials are usually loaded manually in the mixer using inadequate equipment. Another cause of waste in this stage is the lack of information available to labour for producing different mixes of mortar.
- Brickwork joints: Production of brickwork was also responsible for some waste of cement, due to the excessive consumption of mortar in joints.
- Handling and transportation of mortar: Waste of mortar was observed in most sites during the handling and transportation operations, although no quantification was possible. Such waste was mostly related to site layout problems, lack of properly maintained pathways, and use of inadequate equipment.

#### 3.2.2 Premixed concrete

The main causes of waste are lack of constructability of some structural elements, poor design of the concrete formwork system, imprecision of the measuring device, and flaws in the formwork assembling process. At a few sites, the excessive dimensions of concrete foundation piles and curtain walls also caused unexpected waste.

#### 3.2.3 Bricks and Blocks

Insufficient planning of the site layout, lack of properly maintained pathways, and the use of inadequate equipment were among the main causes of waste. Another source of waste was the need to cut blocks and bricks, due to the lack of modular coordination in design.



Fig. 1: Waste blocks

#### 3.2.4 Sand, lime, and premixed mortar

The main causes of cement waste can also explain most of the problems related to sand, lime, and premixed lime and sand mortar. Sand and mortar are usually delivered in trucks, and so there may be additional losses related to the lack of control in the delivery operation and the necessary handling it demands.

#### 3.2.5 Steel reinforcement

The main cause of wastage is resulted from cutting. Damages during storage and rusting also form a major part of wastage. Pre-bending in the factory could reduce cutting waste.



Fig. 2: Waste steel material

#### 3.2.6 Formwork

Another major material used is timber board. The main causes of wastage are the natural deterioration resulted from usage and cutting waste. Both are difficult to avoid.

## 4. METHODOLOGY OF MATERIAL WASTE MANAGEMENT

To provide a successful construction material waste reduction, there are some steps that should be taken into consideration and determine the best and most cost-effective approach.

### 4.1 Design to Prevent Waste

Paying attention to waste potential in the building's design stage can lead to less waste on the site. Some issues to consider in the design phase of a building are:

- Optimize building dimensions to correspond to standard lumber dimensions.
- Modify framing details to optimize lumber use and reduce waste and costs when ordering.
- Develop framing layouts to avoid waste and costs when ordering lumber.
- Minimize the number of blueprints and reproductions necessary during the design and construction.

#### 4.2 Plans for Waste Prevention

- Estimate the types and quantities of waste that the project will generate and determine a schedule when the wastes will be developed.
- Work with all suppliers to reduce waste on a project by asking to buy back unused product.
- Ascertain if storage and handling practices prevent loss from weather and other means and make revisions as needed.

#### 4.3 Prevent Waste On-Site

- Store lumber on level blocking and under cover to minimize warping, twisting and waste.
- Set aside, in a marked and designated container, clean sawdust for use in compost piles or around planting areas. Avoid sawdust that might contain painted or treated wood. This should be bagged separately and sent to appropriate facilities.
- Set aside, in a marked and designated area, large drywall scraps for use as filler pieces in small hidden areas.

### 5. BENEFITS OF MATERIAL MANAGEMENT

Minimizing waste often provides economic benefits such as using inputs more efficiently to reduce purchases of raw materials. Some benefits include:

- Increase of production, but lessen the waste generation;
- Saving money by reducing waste treatment & disposal cost, raw material purchases and other operational costs including storage;
- Optimize use of resources (like water);
- Promotes good public image on environmental protection.

According to DETR Andrew et al. (2004) “25% of waste produced on construction sites could be minimized relatively easily, which could increase profits by up to 2%”. Very often construction projects are competitively priced, allowing for very little profit margins. With the introduction of environmentally friendly approaches to minimize and divert waste from land fill it will mean that these extra profits will be very noticeable in the contractor’s balance sheet.

Begum et al. (2006) found that net financial gains of reusing and recycling construction site waste were 2.5% of the project

budget. By maximizing resource efficiency through reduce, reuse and recycle it will reduce operational costs and improve environmental performance of companies.

### 6. CONCLUSION

Managing and monitoring the different waste streams on a construction site requires a detailed waste minimization strategy. This needs careful planning throughout the design, build and occupancy phases, to ensure its success, effectiveness and compliance with building regulations. There are three basic strategies for dealing with waste: reduce, reuse and recycle. Waste prevention is the ideal, and this can be addressed first by identifying possible waste streams early on in the build process, and then designing for their minimization. Using standard sizes for building components (windows, doors etc.) can prevent future waste, as can design for deconstruction, using recyclable components.

Better communication between building professionals to ensure exact calculations of required materials are made can mean that this waste is prevented. Just-in-time delivery strategies can further reduce waste created by improper storage and weather damage.

Once waste has been produced, the best method of managing it is through reuse either on the existing site, or a nearby site. Many materials can be usefully reclaimed, and even sold to offset the costs of a building project. Recycling materials is the final option for managing waste.

The waste of building materials is occasionally far higher than the nominal Fig. ures assumed by the companies in their cost estimates. Most causes of waste are related to flaws in the management system, and have very little to do with the lack of qualification and motivation of workers. The lack of knowledge was an important cause of waste. Most building firms did not know the amount of waste they had.

### REFERENCES

- [1] [http://www.neo.ne.gov/home\\_const/factsheets/const\\_waste\\_min.htm](http://www.neo.ne.gov/home_const/factsheets/const_waste_min.htm)
- [2] <http://www.sustainablebuild.co.uk/reducingmanagingwaste.html>
- [3] <http://www.level.org.nz/material-use/minimising-waste/implementing-waste-management/>
- [4] S.C. Sharma, Khanna Publishers, “Construction engineering and management”