Material Management

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Topics Covered
Material Management

- Introduction
- Types of construction material and component.
- Material classification
- Material management: Planning and control of construction materials and components
- Poor material management
- Materials Procurement and Delivery

Introduction

In construction, materials account for about 35-40% of the cost of the project. It is a very considerable portion of the total cost of the project.

What happen to the project cost, particularly the profit margin of the contractor if there is a savings of say 5% in the cost of materials?

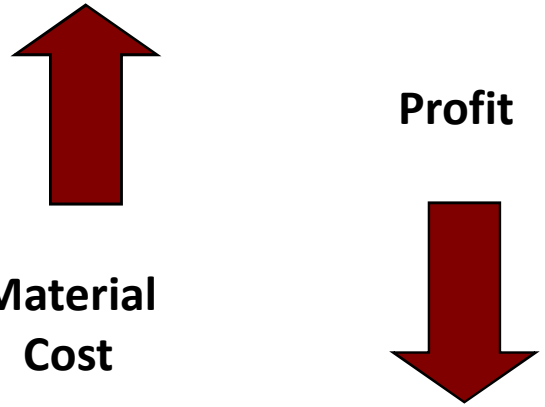
What happen if there is a wastage of materials, say 5%?

Material cost and contractor's profit

Material cost + Labour cost + Plant cost + Overhead = Project Cost

Profit = Contract Price - Project Cost

Material cost and contractor's profit



What is Construction Material?

Any material, good, fitting, component and accessory used in the construction of building project.

They include:

- Building materials and goods
- Electrical fittings
- Mechanical fittings & accessories
- Manufactured elements & components

The study of construction materials covers also the associated plant and machinery and storage.

Examples of Materials Used in Construction

- Cement
- Sand
- Aggregates
- Steel reinforcement
- Bricks
- Timber group A, B, C, D
- Lime
- Glass
- Aluminium sections
- Plasterboard
- Mineral fibre board
- Timber roof trusses
- Roofing tiles
- Timber wall paneling
- Pre-cast concrete slabs
- Floor tiles
- Door and door frame
- Windows and frames
- Sanitary fittings
- Electrical fittings and accessories
- Built-in fitments

Material classification

In general construction materials may be grouped or classified into any of the following categories:

1) **Bulky** - one time purchase, repetitive use and minor materials

2) **Vital** - essential and desirable materials

3) **Indigenous and imported** materials

4) **Price range** - High price, medium price and low price materials

5) **Value** - High usage value, medium usage value and low usage value

Material classification

There are many factors to be considered while classifying the materials

- the usage rates
- transport requirements
- procurement time
- project duration
- inventory cost
- ease of identification
- construction sequence
- price
- procurement sources
- storage methods and location
- shelf life of the materials
- supply reliability and regularity

The primary purpose of classifying the materials is:

- to control the quality
- to control the cost and
- to ensure timely supply and delivery of the materials

Material Management

Material management is a process.

It is how…

1. ..building is designed and how materials are estimated.
2. ..materials are acquired and even how the packaging is specified
3. ..the delivery schedule is designed
4. ..contractors plan material use and how they manage previously used materials and cuts

Material Management

As in other aspects of project management, material management requires an integrated and very coordinated approach.

- Planning
- Purchasing
- Control – inventory control (detailed list of materials in hand)
- Store keeping and ware housing
- Handling and transportation
- Codification and standardization
- Disposal of surplus and waste

Material Management

As in other cases, material planning is the key function of material management. It is very closely linked with project planning and control.

Planning includes:

- **Material procurement – purchase and acquisition; what, how much, when, where and how to buy**
- **Stocking (keeping materials) – to provide the work with materials of the right quality, in the right quantity, at the right place, from the right source and at the right time**
- **Securing credit facility and supply warranty**

Material planning process includes:

- Identifying the materials and goods for use in the project
- Estimating or computing the actual quantities needed
- Defining the specification
- Forecasting (estimating) the project materials
- Determining and locating the suppliers
- Getting samples of the approved materials for approval
- Designing material inventory
- Developing procurement plans – when to buy, from where and how much
- Monitoring flow of materials, delivery and consumptions

PRE-CONSTRUCTION PEOPLE INVOLVED IN MATERIALS MANAGEMENT	
Team Member	**Role in Materials Management**
Architect	Designs for best use of standard sizes, for multiple applications and for their recyclability
Engineer	Ensures appropriate structural component dimensions, quality and spacing, multiple applications and recyclability
Estimator / QS	Uses latest material takeoff technologies and exercises accuracy in estimates. Update and review actual waste factors regularly
Purchaser	Plan purchases and deliveries to reduce surplus and to balance materials maintenance during on-site storage vs. transportation energy consumption

People involved before materials arrive on site -
play roles in effective materials management

PRE-CONSTRUCTION PEOPLE INVOLVED IN MATERIALS MANAGEMENT	
Team Member	**Role in Materials Management**
Manufacturers & Suppliers	**?**

CONSTRUCTION PEOPLE INVOLVED IN MATERIALS MANAGEMENT	
Team Member	**Role in Materials Management**
Site construction manager	Applies the material management plan to the site and oversees its implementation. Takes into consideration physical space available and ensure subcontractors are familiar with and committed to the plan
Site materials manager	Keeps track of new materials, cuts and used materials, organised and stored them for availability by the various trades throughout the project
Subcontract management	Communicates with site management and Material Manager regarding the types of materials they may be able to use for various purposes, even if temporarily
Trade workers	Use material properly, store new materials properly, handle and cut them carefully for maximum use and minimum waste. Consider using cuts before new pieces.

People directly involved in the use of materials

- know the actual site and working conditions

Poor material management…

- If material purchased early…
  1. Capital may be tied up (+ interest charges incurred)
  2. Material may deteriorate during storage or be stolen (+incur cost for hired safety officer)

- If material purchased late…
  1. Delay and extra expenses if materials required for particular activities are not available

     (i.e more expensive suppliers or shippers may be employed to save time)

Poor material management…

Solution?

- ..Ensuring a timely flow of material
- J.I.T (Just In Time)
- Use of Automated Materials system
- RFID (Radio-Frequency Identification)

Poor material management…

- Use of Computer Aided Planning /Automated Materials system.

In these system, the master production schedule, inventory records and product components list are merged to determine..

What items must be ordered, and how much of each item should be ordered in each time period.

Poor material management…

- Use of RFID

  to track materials and locating assets.

- Use of RFID in construction industry

Material Procurement and Delivery

- The materials for delivery to and from a construction site may be classified as:

    1. Bulk materials
    2. Standard off-the-shelf materials
    3. Fabricated members or units

- The equipment needed to handle and haul (process of delivery) these classes of materials will be different

Material Procurement and Delivery

Bulk materials

- Refer to materials in their natural or semi-processed state
- E.g. Earthwork to be excavated, wet concrete mix

Material Procurement and Delivery

Standard off-the-shelf materials

- The delivery process is relatively simple. Materials can easily be stockpiled.
- E.g. Standard piping and valves

Material Procurement and Delivery

Fabricated members or units

- Materials are pre-processed in a factory/shop to simplify the field installation procedures
- E.g. Steel beam and columns for building

Summary

- Important element in project planning and control, and also during the initial planning and scheduling stages (i.e. major M&E items)

- Represent a major expense in construction; so by minimising procurement or purchase cost, presents important opportunities for reducing costs.

Point to remember…

The profit of company in the long term may well depend directly on the efficient utilisation of its resources

Reading list

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