

Factors Affecting Material Management on Construction Site

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Abstract - This research work is on the analysis of factors affecting effective materials management in building construction projects. Having the right materials in the right place at the right time is important for effective execution of a building project. This study is carried out to fill the voids created by the improper material management on construction sites. Materials constitute over 70% of the project cost and may affect overall project cost if not managed properly. The study describes the case study of nine different small, large & medium firms in Maharashtra. By studying gathered data factors were found out affecting material management. It was recommended that organizations should incorporate materials management in the overall policy of the firms in order to eliminate some of these problems.

Key Words: Construction Materials, Management, Construction site, Project cost, Material Management.

Management.

1. INTRODUCTION

Construction projects depend upon having the right people with right skills and equipment that are able to deliver the project on time and on budget. Having the right materials, in the right place at the right time equally is important and having the cash flow and capital to procure the labour and materials is also important [1].

Materials management is the system for planning and controlling to ensure that the right quality and quantity of materials and equipment are specified in a timely manner (Donyari and Flanagan, 2009). Material management is a management system that integrates purchasing, shipping and material control from suppliers. Based on those definitions, generally materials management can be defined as a process of planning, executing, and controlling the right source of materials with the exact quality, at the right time and place suitable for minimum cost construction process. Selection of personnel for marketing, purchasing, inventory control, stores management and materials handling and their training and placement is also to be seen by the materials management department. This indicates that it is very essential to have a materials management department

in any organization to support the management in the production activities. It also helps in the marketing, sales promotion and control of all the types of materials for its quantity, quality and cost. Thus, the objective of this paper is to find out the factors affecting material management on construction site & suggest remedial measures on it. This study describes the general procedure followed by small, medium & large construction firms in Maharashtra, India and factors affecting the material management for all three sizes of construction firms. To overcome these factors some remedial measures were suggested.

1.1 Objectives of the study

- To gather the information about material management procedures of different firms.
- To study the different material management procedures (From collected data).
- To find out factors affecting material management for small, medium & large construction firms.
- To suggest remedial measures to overcome factors affecting material management on construction site.

1.2 Benefits of study

Following are the benefits of study:

- Improvements in labor productivity
- Improvements in project schedule
- Quality control
- Better field material control
- Better relations with suppliers
- Better handling of material
- Reduction in duplicated orders
- Material is on site when needed and in the quantities required
- Reducing the overall costs of material
- Reduction in technical problems
- Avoids seasonal problems arising with materials
- Reduces overall project cost
- Avoids delay in work, etc.

2. THEOROTICAL FRAMEWORK

According to Dr. Kevin Okorochoa, a good management system for materials management will lead to benefits for construction. Cash flow has become crucial for the survival of any business. If materials are purchased early, capital may be tied up and interest charges incurred on the excess inventory of material. Material may deteriorate during storage or be stolen; also delays and extra expense may be incurred if materials required for particular activities are not available [1].

N.B. Kasim states that it is clearly important to manage all materials from the design stage to the construction stage. Poor handling of construction materials affects the overall performance of construction projects in terms of time, budget (cost), quality and productivity. The wastage of materials should also be minimized during construction in order to avoid loss of profit for construction companies. There is a need to develop new approaches to materials management in fast-track construction projects in order to improve the efficacy of the production process [2].

Ashwini Patil explains that Construction material constitutes a major cost component in any construction project. The total cost of material may be 50% of total cost; so that it is important for contractor to consider that timely availability of material is potential cause of successful completion of project [3].

According to T. Phani Madhavi, in construction project operation, often there is a project cost variance in terms of the material, equipments, manpower, subcontractor, overhead cost, and general condition. Material is the main component in construction projects. Therefore, if the material management is not properly managed it will create a project cost variance. Project cost can be controlled by taking corrective actions towards the cost variance. It is often necessary to dedicate important resources like money, personnel, time, etc. to monitor and control the process [4]. A.A. Gulghane describes that Materials management processes require a transformation to improve the overall in handling of materials for more efficiency and effectiveness on the construction site. This is because poor handling of construction materials affects the overall performance of construction projects in terms of cost, time, quality, and productivity [5].

3. MATERIAL MANAGEMENT

Material management is defined as the process to provide right material at right place at right time in right quantity so as to minimize the cost of project. Material management is concerned with the planning, identification, procuring, storage, receiving and distribution of material. The responsibility of Material management department for the flow of material from the time the material is ordered, received, and stored until they are used is the basic responsibility of material management. The main goal of

material management is to ensure that the materials are available at their point of use when needed hence, efficient procurement of material represents a key role in the successful completion of the work. In order to make materials management on site effective for fast-track projects there needs to be an integrated material handling process from the design stage to the usage of materials. Three important phases that holds the key to a successful materials management are materials purchasing, materials usage, and storage .It is used to reduce the cost, which increases profitability and streamlines the production. Apart from management of material cost and its supply it helps in its proper utilization, transportation, storage, handling and distribution.

3.1 Basic Components of Material Management

There are four basic components of material management:

- Value analysis
- Purchasing
- Material Handling
- Store Keeping
- Recycling/Disposal

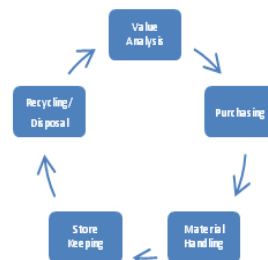


Figure 1: Components of Material Management

3.2 Objectives & Importance of Material Management

- Efficient use of the working capital
- Lowering inventory investment
- Increase in inventory turnover
- Responding to the market changes related to any product
- Ensuring the cooperation of all departments
- Providing best services to the king of market i.e. customers.

3.3 Advantages of Material Management

- Systematic operations
- Reduction in cost of material handling
- Reduction in overall cost of the project
- Increase in productivity of the labors
- Time management
- Quality control
- Better relations with suppliers
- Better relations with customers

- Reduces seasonal problems arising with materials

4. DATA COLLECTION & ANALYSIS

The methodology adopted for data collection in this study was questionnaire survey. For this study total of nine firms (3 small, 3 medium, 3 large) were selected randomly in the Maharashtra region of India.

The questionnaire used for the data collection is given in the annexure at the end.

The data gathered from the questionnaire survey was arranged and studied properly. According to gathered data it was found that there were few flaws in the material management systems of all three sizes of construction firms which affect the material management.

4.1 General Procedure for Material Management of Large firms:



Figure 2: General Procedure for Material Management of Large firms

4.2 General Procedure for Material Management of Medium firms:



Figure 3: General Procedure for Material Management of Medium firms

4.3 General Procedure for Material Management of Small firms:

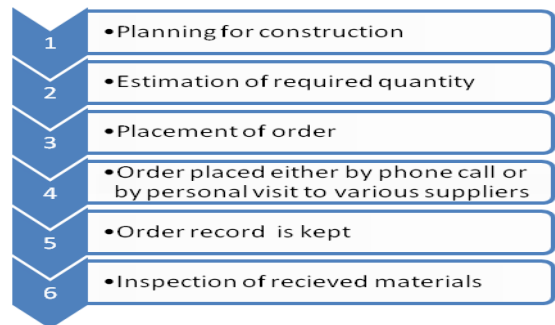


Figure 2: General Procedure for Material Management of Small firms

4.4 Factors affecting material management for:

Large firms:

- Delay due to rejection of materials from quality control team
- Transportation problems
- Seasonal problems

Medium firms:

- Delay due to rejection of materials from quality control team
- Transportation problems
- Seasonal problems
- Labor strikes
- Improper handling of materials

Small firms:

- Delay due to rejection of materials from quality control team
- Transportation problems
- Seasonal problems
- Labor strikes
- Communication problems
- Hike in material prices
- Lack of material management
- Improper material handling

5. OBSERVATIONS & DISCUSSION

Studying above cases it was observed that only large firms use typical protocol & software for material management, hence they faced minimum problems.

On the other hand medium & small firms lack behind in material management as they don't use any software or they aren't aware of material management techniques.

It was observed that there is no any material management department in small & medium construction firms.

It was seen that though the large construction firms are using material management techniques, software, etc. still they are facing problems in the material management process.

Lack of material management ultimately results in delay in work, project cost overruns, decrease in labor productivity and wastage of materials.

6. CONCLUSION & RECOMMENDATIONS

Studying above cases it was concluded that the large firms are good & capable enough in applying material management techniques on construction sites.

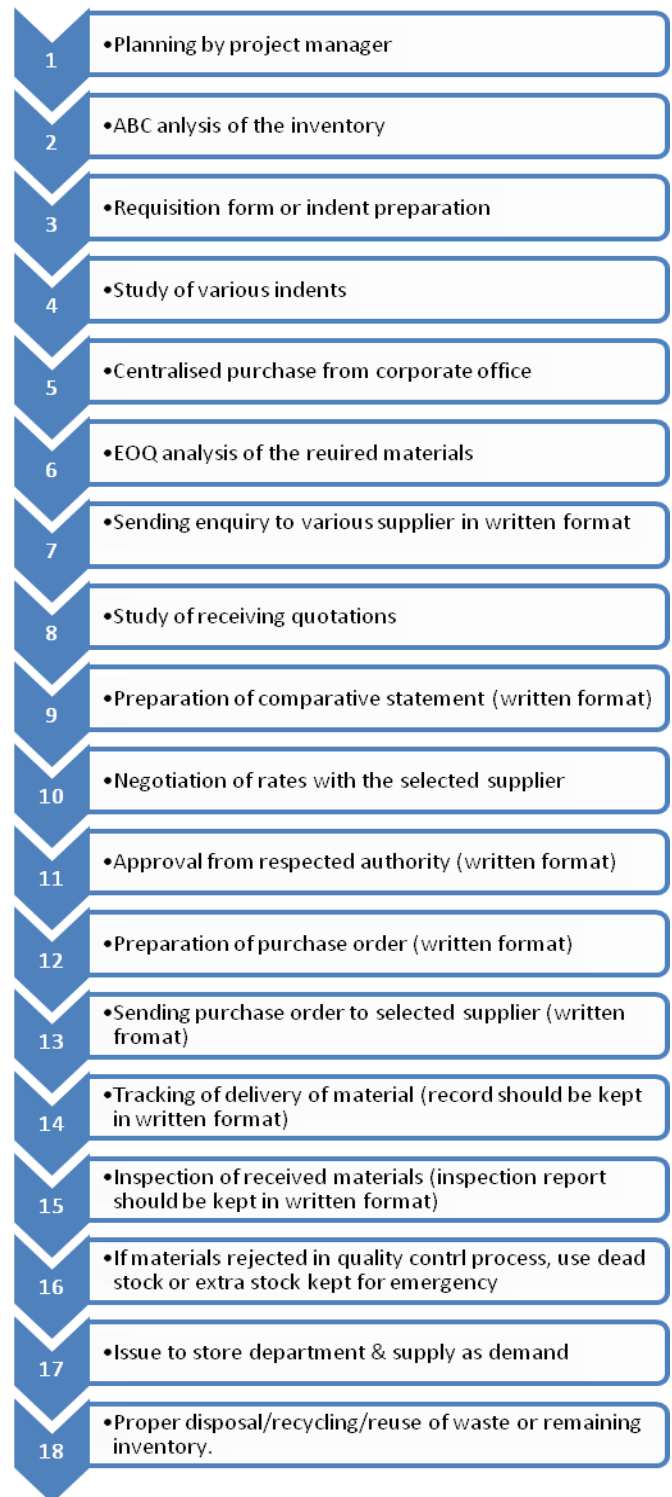
Medium firms have some technical as well as some seasonal problems as they don't use any software.

Small firms lack behind in material management as compared to medium & large firms due to lack of knowledge about material management.

The following recommendations were given considering all sizes of construction firms:

- Top management should pay more attention towards material management.
- Use of software like MSP, PRIMAVERA, ERP, SAP, etc. should be done to avoid manual errors in material management.
- To avoid delay due to rejection of materials by quality control department or seasonal problems, the construction firms should store extra materials like steel, cement, etc. for emergency purpose.
- To avoid communication problems, it is recommended that all the indents, requests, notes; records should be kept in the written format.
- To reduce the wastage due to improper material handling, material handling equipments like conveyor belts, trolleys, cranes, etc. should be used.
- ABC analysis should be done for value analysis of the inventory.
- Before placing any order every construction firm should apply EOQ technique to reduce project cost overrun.

It is recommended to follow the procedure given below to implement the material management effectively:



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ANNEXURE

| Sr. No. | Title |
|---------|---|
| 1 | Name of the organization/firm |
| 2 | Do you know the concept of material management? |
| 3 | Do you know techniques/ methods of material management? |
| 4 | Material management implemented or not? |
| | If yes, How? |
| | If no, Why? |
| 5 | What is your planning procedure for material management |
| 6 | Explain detailed procedure for procurement of materials |
| 7 | Explain details of storage facilities for materials purchased |
| 8 | Utilization of materials (How much achieved)? |
| 9 | Describe billing procedure in the firm |
| 10 | Details of stored material management: |
| | Receiving from supplier |
| | Issuing to the contractors |
| 11 | Security facilities for the stored materials? |
| 12 | Storage facilities & problems faced in it |
| 13 | Procedure for recycling of waste materials |
| 14 | Problems faced regularly in material management? |
| 15 | Seasonal problems? |
| 16 | Remedial measures taken to overcome these problems? |
| 17 | Problems faced during present/past procedures? |
| 18 | Any software used for material management? |
| 19 | How much budget is sanctioned for material management? |