

# Role of Material Management In Apartment Building

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## ABSTRACT

In recent trends a wide range of building materials is available for the construction of Civil Engineering structures. The total cost of materials may be up to 50% or more of the total cost incurred in construction project reliant upon the type of project. 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. Effective construction materials management is a key to success for a construction project. Initially, the qualitative information regarding deviation in planned and actual materials was found in terms of S curve analysis using MSP tool. From the result of S curve analysis, the lagging time of the project could be found. To maintain sufficient stock of raw material in period of short supply, to protect inventory against deterioration and control investment in inventories and to keep it in an optimum level an inventory control technique, EOQ analysis was carried out in second phase of study to overcome the problems of stock out.

**Keywords:** Construction Materials, Cost control, Materials Management, Inventory control.

## I. INTRODUCTION

Materials management is a process for planning, executing and controlling field and office activities in construction. The goal of materials management is to insure that construction materials are available at their point of use when needed. A research was made to increase the profit through proper management of materials. For that, ninety four (94) copies of questionnaires were distributed out of which eighty six (86) were filled and used for the research. All eighty-six respondents approved that the delivery of poor quality raw materials is a hitch of materials management. Elijah E. Ogbadu (2009) came to the conclusion that, the inefficiencies, breakdown and shut down of the plant decrease the profitability. Establishing good relationship with suppliers of spare parts for minimizing losses arising from frequent breakdown improves profitability. The study was done to find voids created by the absence of proper materials management on construction sites. The research was carried out in Ahmedabad. Khyomesh V.Patel (2011) has done careful study right from first step till the end of the project i.e., from material indent to material usage. Since each step was managed, the voids could be identified. He concluded that, team co-ordination between the site and the organization, proper control, tracking and monitoring of the system,

awareness and accountability, efficient MIS integration will end in better results.

## II. LITERATURE REVIEW

A study on role of raw material management in production operations was done by **Olusakin S Akindipe (2014)**. The author was conscious about the inefficiency in raw material management and the alternate solutions to overcome the problem. He found the relationship between raw material and Inventory management to solve the crisis. From this he had concluded that, the inefficiency were due to illiterate and non experts involvement in management, mishandling of materials and inability to use proper inventory model in the site. He added that, all the above said reasons are mainly due to the managers involved in the management process.

An empirical case study of material management in Residential project was done by **Anup Wilfred et.al. (2015)**. This study was made to find out the problems occurring due to the improper material management. Due to these problems, there will be rise in cost of the project. So he had undergone ABC analysis and S curve analysis. ABC analysis give complete study of quantity of material utilized. S curve analysis was helpful in finding the deviations in project. Class A materials give

the profit rate. The deviation from scheduled project is found by S curve analysis and suitable measures were taken.

The paper reports on the premature stages of research which is developing a new ICT-based approach to managing materials on fast-track schemes by **Kasim et.al. (2005)**. Planning, procurement, handling, storing and control must be taken care to complete project on time with high efficiency were revealed from his research. Implementation of IT in materials management could ease the successful and proficient control of materials on site. He concluded that fast track construction was preferred to improve the merit of the production process.

Modelling of inventory management in construction operations which involves on-site fabrication of raw materials was made by **Do Young Jung et.al. (2007)**. The research was done to decide an optimal level of material inventories on considering vibrant variations of resources under uncertainty is very critical for the economical efficiency of construction projects. This paper developed a probabilistic optimal inventory management model on the process of on-site fabrication of raw materials such as iron-rebar process. From the research it was concluded that, the amount of inflow and outflow iron-bars at the temporary shop attained a stability by applying the pull system to the phase of raw material inventory management, moreover average inventory quantity were reduced, and by eliciting optimal time lags linking to the start of fabrication/assembly works, it was likely to reduce the holding time of assembled products, and inventory management costs could be reduced around a total of 25%.

**Sharif (2011)** made a study and explained that Inventory management basically aims at providing both internal and external customers with the required service levels in terms of quality, quantity and order fill rate, to ascertain present and future requirements for all types of inventory to avoid overstocking while avoiding bottleneck in production and to keep costs to a minimum.

### III. OUTLINE OF RESEARCH WORK

✓ Aim:

The aim of this research is to Scheme of Material Management for Construction Site and by applying the inventory control technique so as to analyze the effect of material management on constructions projects. Also gaining a stronger research design and achieving more valid and reliable findings.

✓ Objectives:

Objectives which have covered in this project study are as follows:

- To Compare Planned Vs. Actual material consumption using MSP software then to find the problems in planning, purchasing, procurement & to suggest remedies regarding the material management.
- S Curve Analysis is used for comparison of planned and actual cost of construction material.
- Reasoning over S curve Analysis.
- Apply inventory control technique so as to minimize the total cost of inventory.

✓ Research Methodology:

The research approach, which is the combination of both the qualitative and quantitative methodologies were adopted in this research. This research has the advantage of gaining a stronger research design and achieving more valid and reliable findings. The experimental analysis consists of theories and practical consideration of the concepts. Therefore the work can be classified as site management, inventory controlling, purchasing procedure, cost and procurement and tracking. Basically this research is divided in two parts such as first one Qualitative analysis & second Quantitative analysis.

✓ Qualitative analysis:

This analysis is carried out using MSP software for analyzing planned and actual material consumption through S curve analysis. Reasoning over the deviations curve is the s shaped graph produced by the cumulative expenditure of certain parameters (man-hours cost) against time and it is the representation of project path. This analysis is carried for comparison of planned and actual cost for material.

✓ Quantitative Analysis:

This study mainly focuses on Inventory Control techniques which can be done by EOQ analysis. The

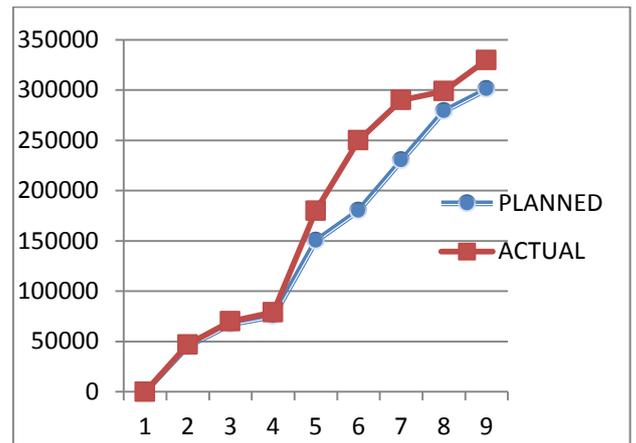
EOQ refers to the order size that will result in the lowest total of ordering and carrying costs for an item of inventory. If a firm place unnecessary orders it will incur unneeded order costs. If a firm places too few order, it must maintain large stocks of goods and will have excessive carrying cost.

#### IV. REPORT ON PRESENT INVESTIGATION

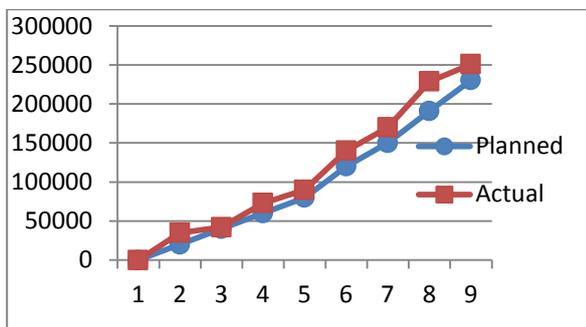
##### S curve Analysis

The analysis report shows the deviations in the actual and planned cost of the materials utilized in this project.

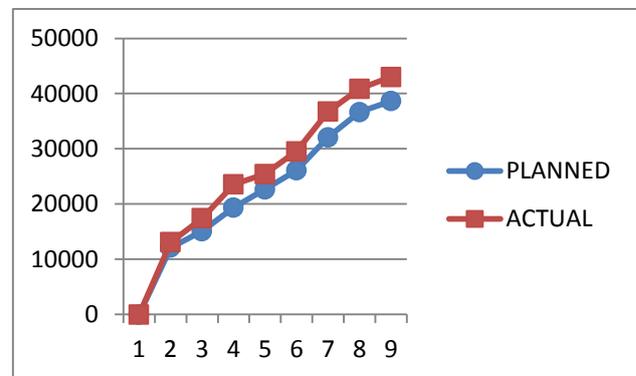
##### ➤ R-Sand



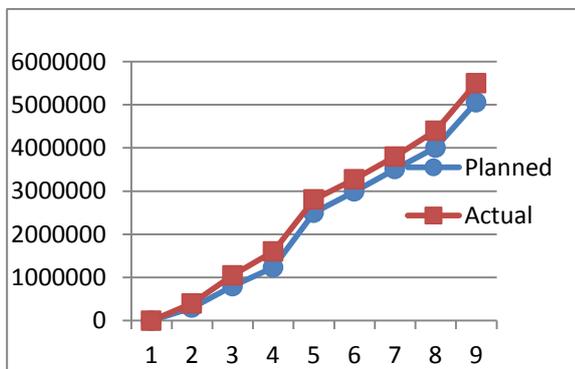
##### ➤ Brick



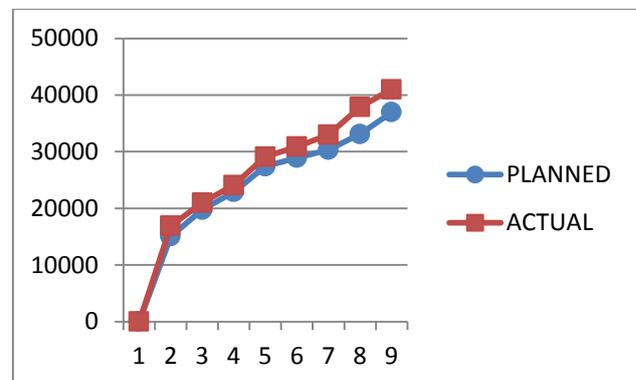
##### ➤ 20 mm aggregate



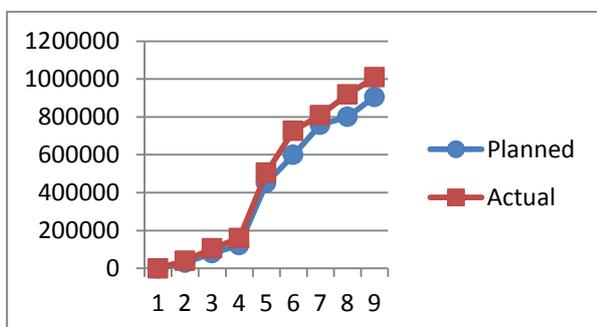
##### ➤ Cement



##### ➤ 40 mm aggregate



##### ➤ Steel



Above graphs shows the comparison of cumulative cost of planned actual material. This cost is less at initial stage. This S curve Analysis recognize that there is increase in material cost while actual execution. Though this is small project but material management aspect never differs whether it is small or big.

## V. EOQ ANALYSIS

In this study EOQ analysis is performed on Cement, Reinforcement Steel, Bricks, Sand & Aggregate. While performing EOQ analysis Ordering Cost & Inventory Carrying Cost is assumed for each material with practical execution procedure of construction. Inventory carrying cost incurred for maintaining the inventory. This includes Cost of Storage, Insurance taxes, Deterioration & obsolescence this calculates in %. Inventory Carrying Cost is 26% Economic Order Quantity is calculated by following formula,

$$Q = \frac{\sqrt{2 \cdot C_o \cdot S}}{\sqrt{C_u \cdot I}}$$

where,  $Q$  = Economic Order Quantity  $C_o$  = Ordering Cost

$S$  = Total Consumption  $C_u$  = Cost of item

$I$  = Inventory carrying cost

Inventory cost includes cost of storage, insurance taxes, Deterioration and obsolescence. Hence, Inventory Carrying Cost = 26% for all the materials.

$$N = \sqrt{\frac{C_u \cdot S}{2C_o}} \quad t = \frac{1}{N}$$

where,  $N$  = number of orders per year

where,  $t$  = time between orders

**Table :** EOQ Analysis

Name of material	Annual requirement	EOQ	Total cost of inventory using EOQ in lakhs
Brick	66400 CUM	27125	18.8
Cement	10020	9203	37.1
Steel	241.8 MT	1891	41.33
R-sand	1379.8 CUM	1492	7.70
20 mm aggregate	168 CUM	623	12.6

40 mm aggregate	168 CUM	619	12.5
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The table shows the EOQ value. By this quantity purchasing at frequent intervals the cost could be control. It also avoids the stock out.

## VI. RESULTS AND DISCUSSIONS

It is concluded that major causes of variations are as following:

- Due to deviation in Items it will effect on material procurement and finally affects the total project budget.
- After EOQ analysis for cement it is concluded that economic order quantity & frequency of ordering which has overcome the problems of Stock out successfully over the actual Site stock records.
- For materials such as sand and aggregate on site material are ordered as per requirement because of space availability they could not maintain stock as per EOQ.
- The Total cost of inventory after adoption of EOQ analysis is less than without adopting EOQ.

## VII. CONCLUSION

Construction material constitutes a major cost component in any construction project. The total cost of material may be 52% of total cost, so that it is important factor to consider that timely availability of material is potential cause of successful completion of project.

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