



EFFECT OF MATERIAL MANAGEMENT ON COST IN CONSTRUCTION

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Abstract : The research has shown that Construction material costs account for a significant amount of the overall project cost; material management is crucial to project management. The material management portion of the project cost accounts for roughly 60–70%. To execute a plan effectively, quality supplies must be available when needed. To fulfil the goal and prerequisite for project delivery, supply chains must be planned and carried out. Inventory and on-site material management problems are among the most prevalent problems people in the construction sector encounter. S-curve analysis is performed to measure the fluctuation between estimated material cost and market material cost. The result shows that the actual cost is higher than the planned cost.

Keywords—Material Management, Construction material estimated & planned cost.

I. INTRODUCTION

Successful completion of a project requires all resources to be effectively managed. Construction projects are one of the greatest common activities we meet in our lives, yet it is also known as one of the most difficult civilization endeavors. The fast-developing economy of our country has resulted in the rapid growth of construction projects. Construction materials play a vital role in construction projects as they contribute a major portion of total project costs. Construction projects depend on skilled personnel and equipment that can deliver projects on time.

The practice of providing the right material in the right quantity at the right time to reduce project costs is known as material management. The process of planning of materials, procurement of materials, inventory control, storage of materials, handling, and transportation, and standardizing the materials comes under material management. It is undeniable that material management techniques can lower overall expenses and boost operational efficiency. A building project may incur inevitable losses due to inefficient material management. The process of organizing, coordinating, and regulating the movement of materials inside an organization is known as material management. Poor material management causes delays, overspending, wasteful construction, and low productivity in building projects. Material planning and inventory control are the two most important aspects of material management. For the project to operate smoothly and be completed successfully, material management requires extra care.

II. LITERATURE REVIEW

- Chaitresh S. Umrani** et al. findings of a study to assess the material management system in the construction industry have been described. The present study was conducted through an analysis of multiple research papers pertaining to material management in the construction sector. The study's conclusion emphasized how several computer- and software-based techniques might enhance material management.
- Vikram Kulkarni** et al. sought to determine the material management issues that nine different firms—three small, three medium, and three large—were facing. The writers used questionnaires and surveys to gather data. Following data analysis, researchers have provided recommendations for construction enterprises of all sizes.
- Aparna Shruthi** et al. indicated Major material management factors that affect the building sector. Data was gathered by sending questionnaires to respondents who were involved in the day-to-day operations of construction companies. Data analysis was carried out using the frequency index approach. This study paper provides a comprehensive explanation of all the elements influencing material management in the building sector.
- Rajasekar K's** study was to examine material management in building construction projects. Field survey questionnaires and quantitative surveys are the main instruments used to gather data. The data was analysed using the relative index of inequality (RII) approach. According to research, companies that use appropriate material management systems have witnessed a 35% boost in total efficiency.

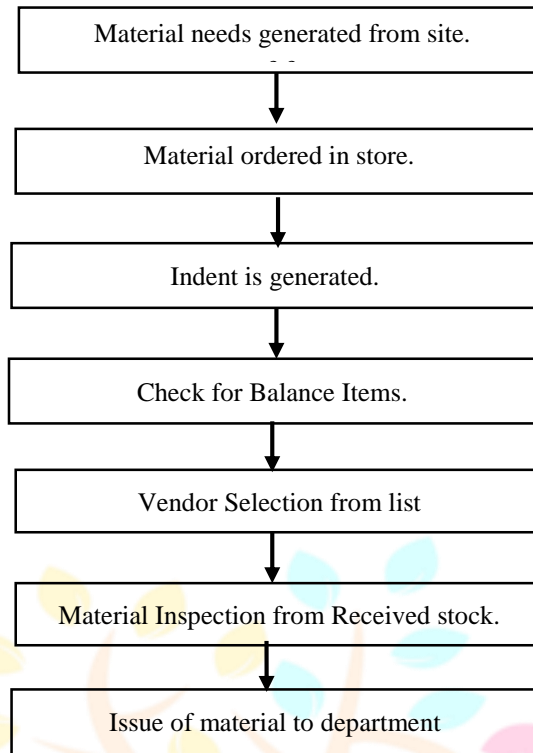


Fig.1 Process of Material Management

III. MATERIAL MANAGEMENT

Throughout a capital project's life cycle, materials management is an integrated process made up of the people, organizations, technology, and procedures needed to accurately identify, quantify, acquire, expedite, inspect, transport, receive, store, and preserve the materials, equipment, and related information. The aim is to guarantee that the right kind and number of supplies and machinery are acquired efficiently, affordably, and on hand when required. Establishing a thorough materials management program leads to lower project costs, increased quality and productivity, safer working conditions, and more predictable project outcomes.

Basic Components of Material Management

- Planning and acquisition of material
- Scheduling and transportation
- Quality Control
- Storage and inventory management
- Waste management

IV. METHODOLOGY

- **Case study** - - An ongoing project of residential project with Ground floor + 4 floor was taken for the case study for the research work. The residential project has a built-up area of 1800 square feet per floor.
- **S curve analysis**- An S-Curve's definition is a mathematical graph that represents all the data for a project. This information plotted on the graph is typically the project cost or the number of hours worked compared against time. The curve explains the comparison of actual time and expenditure components vs the estimated costs and actual time allotted for specific resources. In this research we use S-curve to analyze the comparison of planned material cost and actual materials cost. The analysis is carried out for some of the most important construction material such as cement & steel.

The similarity between the planned and actual cost of cement & steel is shown in table 1 & 2 resp. It is very clear from the graphs that the actual materials cost is higher than the planned materials cost. The Cost Performance Index is less than 1 for all the 3 materials and states that there is a cost teeming in the project. Though this is a small apartment project, the management aspect is the same for small and big projects.

Sr. No	Floor	Planned cost (INR)	Actual cost (INR)	Cost variance (INR)	CPI
1	First	719280	779801	60521	0.922
2	Second	719280	779170	59890	0.923
3	Third	719280	780,10	61230	0.922
4	Fourth	79280	780260	60980	0.922

Table 1 – Cost Performance for cement

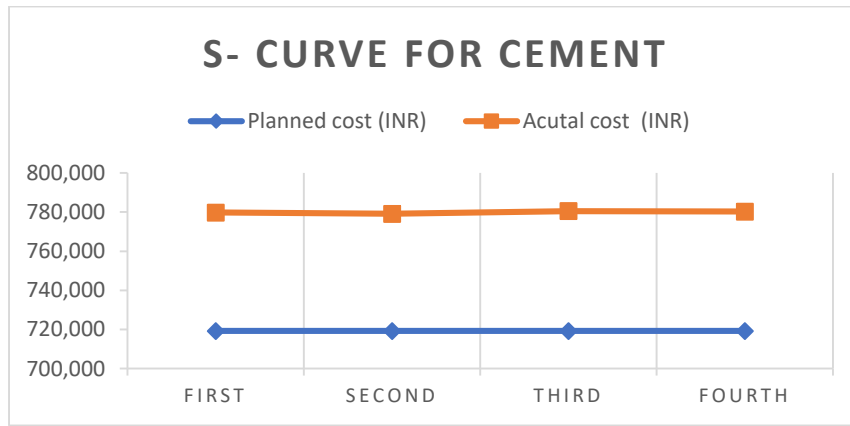
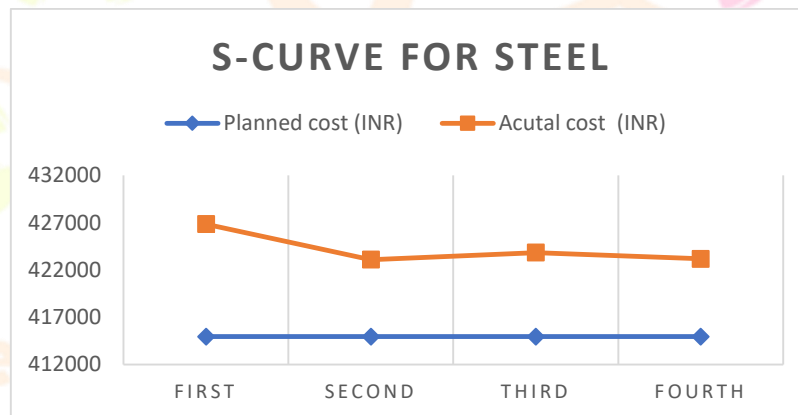


Fig 2 – S-curve Analysis for Cement

Sr. No	Floor	Planned cost (INR)	Actual cost (INR)	Cost variance (INR)	CPI
1	First	414954	426840	11886	0.972
2	Second	414954	423084	8130	0.981
3	Third	414954	423840	8886	0.979
4	Fourth	414954	423172	8218	0.981

Table 2 – Cost Performance for Steel



Reasons for cost variance due to Improper Material Management

- Poor scheduling and estimation of materials
- Poor market prediction
- Scarcity of materials in the market
- Changes in materials condition during transportation
- Materials quality variance from specification
- Damages of materials occurred during storage.
- Inefficient utilization and wrong utilization of materials

V. Result and Discussion

- The results of the S-Curve analysis prove that there is a fluctuation in cost of planned and actual materials cost. From the graphs the actual materials cost is higher than the planned materials cost. Cost Performance Index is calculated for each material, and it supports the results of S-curve analysis by clearly stating that the Cost Performance index is less than 1, which means the project is under cost overrun.
- The reasons for fluctuation in planned and actual materials cost are found to be poor scheduling and estimation, poor prediction of market and field conditions, scarcity of materials, damages occurred due to transportation of the materials and storing in stock yard, issues due to quality, improper planning in material utilization. It can be understood from the results that both internal and external factors contribute to the materials cost overrun.

VI. CONCLUSION

A study indicates that the overall efficiency of the project has increased by 35% by implementing proper material management. For efficient material management some simple tools are proposed in this project work. S-curve analysis is used to show the fluctuation in planned materials cost and actual materials cost. The main cause for this fluctuation is identified. By focusing on these causes the contractors and engineers can improve their material planning and keep overall project costs under control. ABC classification and EOQ analysis can be used to overcome stock out issues and to abate the total inventory cost.

VII. REFERENCE

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