

Analysis of Factor Affecting Material Management in Building Construction Projects by Using S-Curve Analysis

¹Amar Rajole, ²Milind Darade

¹PG Student, ²Professor
Department of Civil Engineering,
Dr. D. Y. Patil School of Engineering and Technology Pune, India

Abstract— The objective of this study is to realize about the problems occurring in the association because of incorrect use of material management. In construction project procedure, often there is a project cost difference in terms of the material, equipment's, manpower, subcontractor, overhead cost, and general condition.

Project cost can be controlled by taking remedial activities towards the cost difference. Therefore a methodology is made to these materials are identified and are taken up to measure the variations involved by S-Curve analysis. This helped to suggest the root causes for many types of problems that were detected at the project site.

Index Terms— Material Management, Material Requirement Plan (MRP), S-Curve analysis.

I. INTRODUCTION

Materials management is a organization process where coordination, observation and execution of the tasks are related with the flow of materials in and out of an organization. Material management arrangements with principles and practices which effectively improves cost of materials used in the project. A material managing is just the method by which an body is supplied with the goods and services that it needs to achieve its objectives of buying, storage and movement of materials.

II. OBJECTIVE

- S Curve Analysis is used for comparison of planned and actual cost of construction materials.
- To Compare Planned Vs. Actual material consumption then to find the problems in planning, purchasing, procurement & to suggest remedies regarding the material management prescribed; please do not alter them.

III. RESEARCH METHODOLOGY

The data collected to determine the most effective factors on Material management of the project was done through a survey by explorative questionnaire to the respondents involved in daily activities of construction firms in various regions in the Kokan region of India.

Basic Outline of Research methodologies

- Collection of information related to material management through literature review and preliminary study on site.
- Study of current material management for onsite construction project.
- Identify the problems of existing material management by previous data onsite.
- To give suggestive recommendation from various inventory control techniques for further part of project
- Discussion and conclusion of the method which can be suggested for selected case study.



Fig. 1 Research Design

B. Details of Case Study:

Company Profile:

The case study which is selected for this project is Commercial Building under the guidance of Archvision Consultant Pvt. Ltd. Archvision consultants pvt. Ltd. Established as a proprietor firm since 2006. Have been extremely fortunate to provide reputed

establishments in and around pune, kolhapur, sangli, nashik, solapur. He has worked on various projects which include housing campus, school, buildings, industrial structures, farm houses and in interior we have completed office interiors and residential interiors. “ **Construction Of 90 Police Quarters And Police Station For S.P.Ratnagiri At Chiplun, District Ratnagiri.**” is one of their project which has been selected as case study for this work

TABLE I Details of Project

NAME OF THE PROJECT	Construction Of 90 Quarters And Police Station At Chiplun Dist Ratnagiri For S.P. Ratnagiri
NAME OF CONTRACTOR	K.K.Thorat
NAME OF ARCHITECT AND PMC	ARCHVISION CONSULANT PVT. LTD.
PLOT AREA	14,800 SQ.MT
TOTAL BUILT UP AREA	10962.29 SQ.MT
DATE OF COMPLETION	20 FEBRUARY 2018
PROJECT DURATION	18 Months

C Report on Present Investigation

For variation observed between the planned and actual Material consumption S-curve analysis is formulated. The deviations of the quantities is produced by the cumulative expenditure of certain parameters (Material cost) against time and it is the representation of project path. This analysis is carried for comparison of planned and actual cost for material items.

Methodology Adopted

1. The cost variance is computed for these material items which is given by,

$$\text{Cost Variance} = (\text{BCWP} - \text{ACWP})$$

Where, BCWP – Budgeted Cost of Work Performed and
ACWP – Actual Cost of Work Performed.

Cost Performance Index is calculated using the formula

$$\text{Cost performance Index} = (\text{BCWP}/\text{ACWP})$$

2. These variations of material items used in the project plan period are considered along with planned and actual consumption of material items as a function of cost.

4. Compute the cumulative planned and cumulative actual cost of material items for the same period.

5. Graph is plotted between the cumulative planned and cumulative actual costs of material items for the same period.

6. A graph showing S-Curve for the material items is plotted.

7. The variation between the planned and actual cost is Computed using the formula.

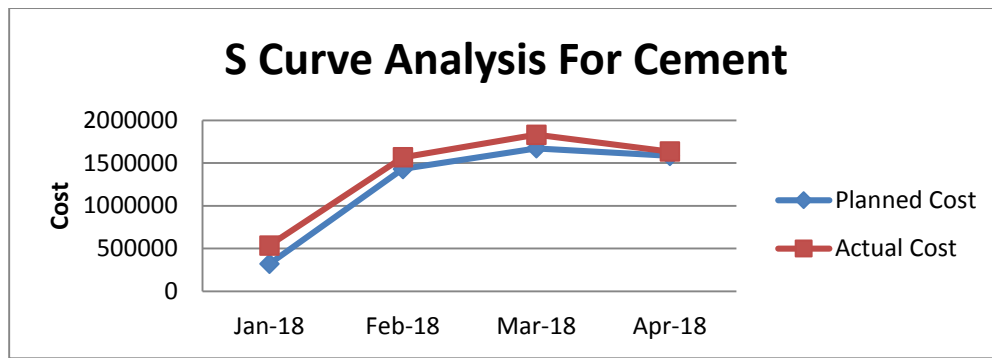
$$\text{Percentage under run} = \left(\frac{\text{Planned cost} - \text{Actual cost}}{\text{planned cost}} \right) * 100$$

D Result from Qualitative Analysis

The Cost variance and the Cost Performance index for the materials is as shown in the table below.

TABLE II Cost variance of cement

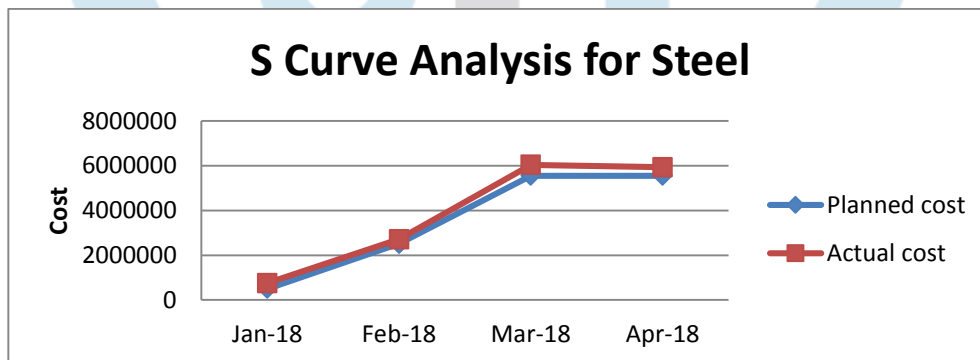
Cement OPC 53 Grade					
Sr.No	Period	Planned cost (BCWP)	Actual cost (ACWP)	Cost Variance (BCWP-ACWP)	Cost Variance Index (BCWP/ACWP)
1	Jan-18	321600	536000	-214400	0.6
2	Feb-18	1430584	1567800	-137216	0.912478632
3	Mar-18	1672588	1830440	-157852	0.913762811
4	Apr-18	1584148	1634800	-50652	0.969016393



Graph I S Curve of Cement

TABLE II Cost variance of steel

Structural Steel -SRS FE500					
Sr.No	Period	Planned cost (BCWP)	Actual cost (ACWP)	Cost Variance (BCWP-ACWP)	Cost Variance Index (BCWP/ACWP)
1	Jan-18	503000	754500	-251500	0.666666667
2	Feb-18	2515000	2716200	-201200	0.925925926
3	Mar-18	5553623	6036000	-482377	0.920083333
4	Apr-18	5553623	5935400	-381777	0.935677966



Graph II S Curve of Steel

All the above graphs show the comparison of cumulative cost of planned actual material. This cost is less at initial stage. But when execution stages it's too much increased. This S curve Analysis recognize that there is too much increase in material cost while actual execution.

IV. CONCLUSION

Construction material creates a most important cost factor in any construction project. The total cost of material may be 60% of total cost; so that it is important for contractor to consider that timely readiness of material is possible cause of successful completion of project.

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

- Inadequate staff of contractor is main reason for increase the material cost in execution.
- Lack of experience of material management team.
- Material Planning is not done at before execution stage but it affect on material cost.
- Due to irregular geographical conditions in case soling extra depth of excavation to be considered.

- Inaccessibility to the site area during harsh weather conditions. (rainy season)Concrete cycle not being done as per the planned schedule. One of the major reasons being the shortage of concrete during the planned period. Concrete plants were not available to fulfill requirements of the execution of work.
- Storage limitations: Problems with inadequate storage of material items. There is often inadequate site storage space (Cement and Steel).

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