Analysis of Supply Chain Management In Construction Projects

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Abstract- *Construction industry plays a very important role in infrastructure development of a Country. Also Construction industry plays a important role in Economic and Political development of a Country. Materials Management is very essential for project planning and execution. Materials represents a major expense in Construction projects. The real problem in Construction project is that it was not completed within the estimated cost, time and as a result it was fail on end. There are many reasons of project failure but the main reason is improper materials management. Hence Materials management is very important in construction. If the Materials are controlled dynamically the total project cost would be reduced. In this regard a research methodology has develop to control the Materials cost and their carrying cost. This paper is written to fill the voids created by the absence of proper materials management on construction sites by the use of EOQ (Economic Order Quantity).As per the various published journals lots of construction projects are face losses also their project delayed due to improper materials management. So in this research by the use of questionnaire survey conducted and materials management are done by the use of EOQ.*

Keywords- Material Management, Cost Control, Construction Materials, Planning

I. INTRODUCTION

Construction materials constitutes a major cost component in any construction project. The total cost of installed material may be 60 percent or more of the total cost. The goal of materials management is to ensure that the materials are available at their point of use when needed hence, efficient procurement of materials represent a key role in the successful completion of the work. The material management system attempts to ensure that the right quality and quantity of materials are appropriately selected, purchased, delivered and handled on site in a timely manner and at a reasonable cost. Material. Materials management is need to be more efficient in the construction industries. Management of materials must be effectively managed or taken care of the materials to avoid incurring losses and administrative costs, which affect the construction project cost. However, materials waste is a major problem in the Indian construction industry that has important implications in both the efficiency of the industry and the environmental impact of construction projects due to lack of effective materials management and planning. In this study management of the material is done by the EOQ analysis. The EOQ analysis is the most important methodology to avoid the construction materials waste on site. The opinion of the experts in terms of construction materials such as (cement, steel, bricks, sand and aggregate) is collected and according to this data find out the minimum cost of the construction materials. This study is mostly focus on the difference between Planned and without planned cost of a project

II. OBJECTIVES

- The main objective of project is to reduce of material cost by using EOQ analysis method.
- Improve co-ordination of the functions such as scheduling, storage and maintenance of materials.
- To do efficient material planning and order lot of material which is economical and fulfill the demand.
- To make the project more economical and try to reduce the wastages by apply EOQ analysis method.

III. LITERATURE REVIEW

Ali et al. (2012) conducted that the previous study in Decision tree analysis will determine the best Alternative whether forecasting and EOQ are necessary to be used and it will minimize the cost of raw materials inventory. The result of the analysis are inventory management of iron, cement, sand and split inventory should use Forecasting method and EOQ (Economic Order Quantity) model. So companies can manage their inventory management efficiently and effectively.

Aggarwal et al. (2013) analysed that the overall inventory management system of the company is satisfactory the company is using satisfactory techniques with help of inventory management tools, ABC (Always Better Control) analysis and EOQ (Economic Order Quantity). The purpose to find out the ways of managing the inventory properly, so that

there would be a little impact on the profits and sales of the company.

Neeraj et al. (20120) has expressed that approximately 42% of Indian government funded construction projects are facing time overruns. In an earlier study conducted by one of the author, second-stage questionnaire survey based on these factors was used to identify the significant schedule performing factors.

Hegazy and Menesi (2008) found that scheduling delays occurred in 70%, 40% and50% of government contracted construction projects in the United Kingdom, India and United Arab Emirate (UAE) respectively.

Said et al. (2011)explained that Material procurement and storage on construction sites need to be properly planned and executed to avoid the negative impacts of material shortage or excessive material inventory on-site.

Orabi. et. al (2010)states that the main purpose of this model is to allocate limited reconstruction resources to competing recovery projects in order to generate a recovery schedule for the damaged civil infrastructure system.

Guo (2011)states that the effective implementation of LCM in construction projects relies strongly on a visual communication and collaboration information platform, as information sharing is the key to implementing LCM an effective information platform is needed to gather project information.

Anderson (2005)has commented the research focused on engineering projects, typically complex and large in size since they are through likely to offer more comprehensive coverage and evidence of project management practices that can be transferred to smaller projects.

IV. RESEARCH METHODOLOGY

This research is based on the two types of data collection sources such as Primary source and Secondary source

Primary Source: Primary resource are gives pre idea about research. It also gives theoretical & practical concept. This data is collected from the various researched journals and with the help of internet.

Secondary Source: Secondary data are collected through questionnaire survey in Rajouri division of Jammu and Kashmir as well as Nagpur and Amravati division of Maharashtra state.

A questionnaire survey was designed based on the objectives of the study, which mismanagement of construction material on site. A questionnaire survey was developed to get the opinion and understanding from the experienced respondents regarding to the construction management problems.

Questionnaire have the following questions.

- Annual requirement of Cement on construction project site.
- Annual requirement of Steel on construction project site.
- Annual requirement of Bricks on construction project site.
- Annual requirement of Sand on construction project site.
- Annual requirement of Aggregate on construction project site.

In this research Data analysis done with the help of following points as given below:-

Visit in local market to get the appropriate prices of construction materials.

1. Find out the value of value of Q (Economic Order Quantity) from the formulae of EOQ analysis as given below.
2. Find out the no of orders per year (based on EOQ).
3. Find out the frequency of ordering per year.
4. Find out the Total cost.
5. Now find out the difference between Economic cost (with EOQ) and general cost (without EOQ)

Data are analyzed by the use of below said formula

$$EOQ = \sqrt{\frac{2*S*Co}{Cu*i}}$$

Where
S = Annual Requirement
Co = Cost of Ordering
Cu = Item's cost.
i = Carrying inventory cost = Assume 30 % = 0.3

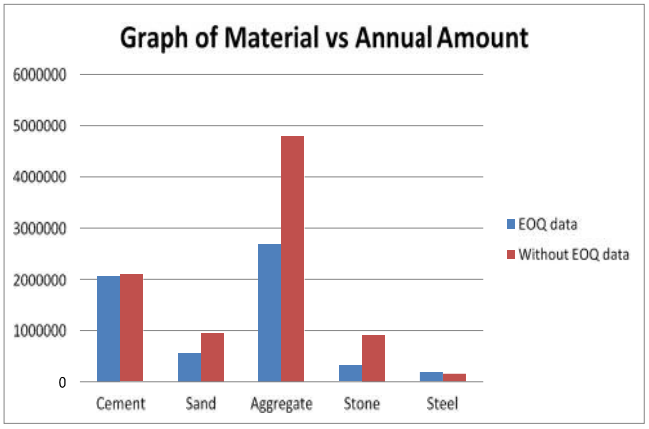
V. RESULTS AND DISCUSSIONS

As per the data collection done and further calculation work, we calculated annual material demand by EOQ analysis and without EOQ on two road construction project run in Rajouri division of the Union Territory of Jammu and Kashmir we see our EOQ analysis gives better result for cement, sand, Aggregate and stone. But steel not give appropriate results for both the the projects as the material order by the project authority is satisfied their annual demand for Steel only. In this Chapter we show results of pervious calculation in the form of tables and graphs.

CALCULATION FOR PROJECT 1

Table 1: Comparison of EOQ analysis and without EOQ analysis annual amount

Name of materials	Without EOQ analysis annualprice in rupees	EOQ analysis annual price inrupees	Difference between EOQ and without EOQ annual price in rupees
Cement	2097000.00	2069900.00	27100.00
Sand	947700.00	562000.00	385700.00
Aggregate	4795200.00	2694600.00	2100600.00
Stone	920700.00	313600.00	607100.00
Steel	168000.00	204000.00	-36000.00
Overall Total	8928600.00	5844100.00	3084500.00

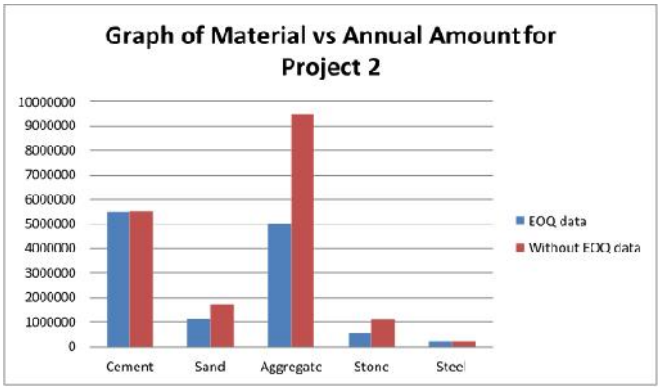


Graph 1: Material vs Annual Amount (Project 1)

CALCULATION FOR PROJECT 2

Table 2: Comparison of EOQ analysis and without EOQ analysis annual amount

Name of materials	Without EOQ analysis annualprice in rupees	EOQ analysis annual price inrupees	Difference between EOQ and without EOQ annual price in rupees
Cement	2097000.00	2069900.00	27100.00
Sand	947700.00	562000.00	385700.00
Aggregate	4795200.00	2694600.00	2100600.00
Stone	920700.00	313600.00	607100.00
Steel	168000.00	204000.00	-36000.00
Overall Total	8928600.00	5844100.00	3084500.00



Graph 1: Material vs Annual Amount (Project 2)

VI. CONCLUSION

- After EOQ analysis for materials, it is concluded that Economic Order Quantity and frequency of ordering has overcome the problem of stock out successfully over the actual site stock record.
- Also the total cost of inventory after adoption of EOQ analysis is less than without adopting EOQ.
- EOQ analysis gives better result for all the materials i.e Cement, Sand, aggregate, Stone expect Steel.
- When we apply EOQ on steel for both the Projects then we conclude that the annual amount of steel with EOQ analysis is greater than the annual amount of steel with without EOQ analysis. So in that case our EOQ analysis is fail in this case.
- It is conclude that if we apply EOQ analysis on the above two projects then we can save 35% of total amount for project 1 and 32% of total project cost for project 2.
- So, EOQ analysis gives better result for both the projects i.e project 1and project 2.

VII. FUTURE SCOPE

We can use EOQ analysis for all types of projects. With the help of EOQ analysis we can manage our project material and amount both. If we adopt EOQ analysis then we can run our project on time and can make proper plan and schedule because if we adopt EOQ analysis than we need accurate annual material demand. So we need accurate estimation and annual material in units than we can use EOQ analysis and save about 30% to 35% of total project cost.

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