Effective Material Management Using Abc Analysis In Construction Industry

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Abstract- *Construction Industry in India is one of the major job generators and a major source of investment. But improper management leads to cost-overruns. Construction materials and equipment may account for more than 60% of project cost in construction industry and has a bearing on labour productivity also. Material management directly affects the cost and duration of the project and hence is a vital part of project and construction management but remains understudied and its effects are not given due scrutiny.*

Material handling, inventory management, planning, scheduling, procurement, receiving, monitoring, tracking and controlling are all part of material management. All these aspects of material management are inter-related and inter-dependent and form a complex system. Inventory Management is an important part of Material Management. ABC method of inventory control involves a system that controls inventory and is used for materials and throughout the distribution management. The objective of this paper is to do better material management using abc analysis.

Keywords- inventory management, abc analysis, productivity, material management.

I. INTRODUCTION TO MATERIAL MANAGEMENT

Material management is defined as the planning, acquiring, storing, moving and controlling of materials as per the requirement of the organization. Materials management is basically related with the smooth flow of materials. The major activities covered under materials management are the anticipation of the materials required in the organization from time-to-time. It involves ordering and obtaining materials from the suppliers, introducing the materials to the organization and monitoring the status of materials. It helps to optimize the usage of facilities, personnel and funds and to provide service to the user in the line with the organizational aims.

Materials management is the coordination and control of the various material activities.

The key material activities are:

1.1 Purchasing Activities

It involves mainly identification of materials needs, market research, maintaining materials records etc.

1.2 Procurement Activities

It involves material specifications, materials studies, receiving materials etc.

1.3 Inventory Management

It involves planning and controlling of materials handling, storing materials and managing material supplies etc. Excess inventory is a cost burden to industry in terms of capital tied up, the cost of obsolescence Notes and the cost of servicing product in the supply chain. However, having the right amount of inventory to meet customer requirements is critical. Inventory management is about two things: not running out, and not having too much

When to Order?

This problem of inventory control deals with the point of time when the order for fresh inventory is to be given. The problem of 'when to order' is solved by fixing the appropriate re-order level of each type of inventory. It is determined by compromising the cost of maintaining these stocks and the disservice to the customer if this order is not delivered in time.

1.4 Supply-Chain Management

A supply chain is a system of organizations, people, technologies, activities, information and resources involved in moving a product or service from supplier to customer.

Value Analysis Lawrence Miles conceived of Value Analysis (VA) in the 1945 based on the application of function analysis to the component parts of a product.

Component cost reduction was an effective and popular way to improve "value" when direct labor and material cost determined the success of a product. The value analysis technique supported cost reduction activities by relating the cost of components to their function contributions. Value analysis defines a "basic function" as anything that makes the product work or sell. A function that is defined as "basic" cannot change. Secondary functions, also called "supporting functions", described the manner in which the basic functions were implemented. Secondary functions could be modified or eliminated to reduce product cost. A brief description specifically about each stage is explained below.

1.5 Phase of Construction Project

1.5.1 Initiation Phase of Construction Project

We have to create and evaluate the project in order to determine if it is feasible and if it should be undertaken, at the beginning of the project. Here the project objective or need is identified; this can be a business problem or opportunity.

A suitable response to the need is documented in a business case with recommended solution options. A feasibility study is conducted to examine whether each option clearly identifies the project objective and a final recommended solution is determined.

Many questions related to the issues of feasibility i.e. "can we do the project?" and justification like "should we do the project?" are mentioned and faced.

At this stage, the major deliverables and the participating work groups are identified. This is the time when the project team begins to take shape. Approval is then required by the project manager to move onto the detailed planning phase.

Role of Material Management:

It is one of the key factors in deciding the feasibility of a project. Whether the project if feasible or not depends on the availability of materials and their distance from project site. If the distance is very large then project cost would be enormous. Also if the required materials are not available then the project is not feasible.

1.5.2 Planning Phase of Construction Project

The planning phase involves further development of the project in detail to meet the project's objective. The team identifies all of the work to be done. The project's tasks and resource requirements are identified, along with the strategy for producing them. In a broader sense identification of each activity as well as their resource allocation is also carried out. A project plan outlining the activities, tasks, dependencies, and timeframes is created.

The project manager is the one who coordinates the preparation of a project budget by providing cost estimates for the labor, equipment, and materials costs. This is mainly carried out by project scheduling software like MS project. These scheduling charts would help us to track the stages of our project as time passes. This is also referred to as "scope management."

The budget of the project already estimated is used to monitor and control cost expenditures during project implementation. Finally, we require a document to show the quality plan, providing quality targets, assurance, and control measures, along with an acceptance plan, listing the criteria to be met to gain customer acceptance. At this point, the project would have been planned in detail and is ready to be executed.

Role of Material Management:

Material Management is the most crucial part of this phase because proper execution depends on proper planning. This phase includes material planning when a particular stock should be ordered and what quantity should be ordered is calculated. Wrong planning will lead to heavy losses

1.5.3 Execution Phase of Construction Project

This is the implementation phase, where the project plan is put into motion and the work of the project is performed 3

Progress should be continuously monitored and appropriate adjustments are made and recorded as variances from the original plan.

The project manager uses this information to preserve control over the direction of the project by comparing the progress reports with the project plan to measure the performance of the project activities. If any deviation is found from the already defined plan corrective measures are made.

Status reports should always highlight the probable end point in terms of cost, schedule, and quality of deliverables. Each project deliverable produced should be reviewed for quality and measured against the acceptance criteria.

When deliverables have been produced and the customer has agreed on the final solution, the project is said to be ready for closure.

Role of Material Management:

Material Management plays a crucial role in this phase. The aspects which are significant in this phase are

1. Material handling
2. Material Testing
3. Material storage.

From the above it is clear inventory management and control play a key role in this phase. Improper inventory management will lead to delays and financial losses.

1.5.4 Performance and Monitoring Phase of Construction Project

This stage is all related to the measurement of progress and performance to make sure that items are tracking with the project management scheduling. This phase regularly happens at the same time as the execution phase.

Role of Material Management:

A track on material consumption is kept in this phase. The deviation of actual material usage from planned usage is found to minimize the losses. Also the causes which also include theft are inquired into.

1.5.5 Closure Phase of Construction Project

During the final closure, the importance is on providing the final deliverables to the customer, that is:

- Handing over project documentation to the business
- Termination of supplier contracts
- Releasing project resources
- Communicate the closure of the project to all stakeholders.
- Last and final is to conduct lessons-learned studies to examine what went well and what didn't.

Materials do play a role in this phase because of defect liability period clause.

A defects liability period is a set period of time after a construction project has been completed during which a contractor has the right to return to the site to remedy defects. A typical defects liability period lasts for 12 months. If substandard or defective materials have been used the builder will have to incur additional costs in this period.

II. METHODOLOGY

ABC analysis and classification is a method for classifying inventory items that will have a substantial impact on overall spending of an organization. It presents a solution to maladministration of inventory within purchased items or availed services.

The breakdown proposes that inventories are not of the same value; therefore it requires different management tactics and controls. The categories are sorted based on its projected value.

"A" items: are very important for an organization because of its high spend value. Normally A items are those items for which an organization spends close to 80 or even 90% of its money.

"B" items: are those that an organization spends about 10% to 15% of its money. These are not that high in priority but still may need to pay some attention.

"C" items: are those where spend is very low. Usually companies will have around 75% to 80% of suppliers in this category.

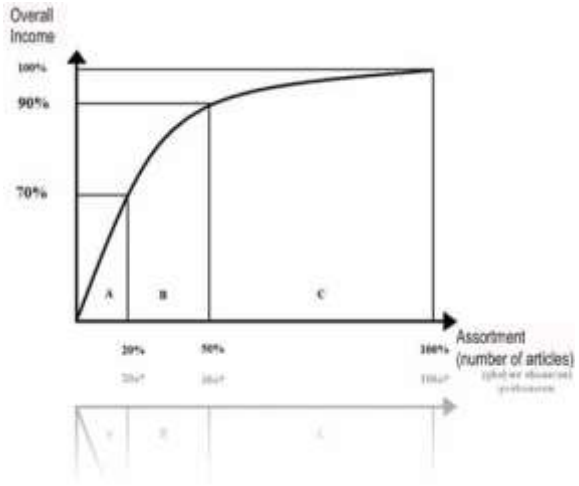

FIGURE 1: ABC ANALYSIS

The A-B-C analysis of the following Case Study is undertaken.

- Site: - Navyangan, Pune
- Client Name: - Calyx Group
- Contractor:- Kedar Associates
- Consultant: - Vijay Mahajan

- Architect: - Kapadia Architects
- Type of Project:- Residential
- Material Management Technique: - Traditional
- Estimated Cost of project: - 8 Cr
- Duration of Project: - 18 months + 12 months of Defect Liability Period (DLP)
- Number of Floor: - Basement and G+7
- Location: - Pirangut Road,Pune
- Type of Contract: - Unit Rate Contract
- Number of Wings/ Tower: - 1

III. RESULTS AND ANALYSIS

After calculating project cost and estimate and analysisng the same the materials have been classified as per abc analysis given below.

TABLE 1: ABC ANALYSIS

CATEGORY	ITEMS	% ITEM	% TOTAL COST	ACTION
CLASS A	SAND,STEEL,SANITARY FITTING	22%	48%	HIGH VALUE ITEMS NEED CLOSE MONITORING
CLASS B	AGGREGATES, PAINTING,DOORS	28%	32%	INTERMEDIATE VALUE ITEM NEED MONITORING AT REGILAR INTERVALS
CLASS C	CEMENT,ELECTRICAL, PIPES,WINDOWS	50%	20%	LOW VALUE ITEM NOT NEEDING REGULAR MONITORING

TABLE 2 : COST OF MATERIAL S

ITEM	UNITS	UNIT RATE	COST	% COST
STEEL	130	69244.5	9001785	14.82370118
CEMENT	46422	350	16247700	26.69433814
SAND	850	7500	6375000	10.49507085
AGGREGATE	1512	2500	3780000	6.214500146
TILES	2836	2068	5864848	10.06721751
PAINT	24000	156	3744000	6.151246146
SANITARY FITTING	5380	2891	15553580	25.55392602

IV. CONCLUSIONS

- The materials having high cost but low item percentage can cause greater loss. Therefore through ABC analysis these items have been found out.
- Sand, sanitary ware, steel have lower amounts but their cost is high so even a few quantity that is damaged the damage incurred in terms of cost would be high. Hence close monitoring and better stockholding facilities need to be provided to avoid damage.
- Though cement, electrical fittings occupy major bulk of item quantity their cost is minimum hence small damages would not lead to major losses.
- As a result of using A-B-C analysis companies will be able to better manage their inventories and be more competitive in the marketplace.

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