

Materials Management of Power Transmission Line Project

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ABSTRACT

In materials management, an organization is supplied with the goods and services that it needs to achieve its objectives of buying, storing and movement of materials. Materials management is related to planning, procuring, storing and providing the appropriate material of right quality, right quantity at right place in right time. This is to co-ordinate and schedule the production activity in an integrative way for an industrial undertaking. Several construction projects of large scale nature utilizes prefabricated technologies which is referred to as mass production construction technique. The present case study is carried out at 400 KV Quad DC Transmission line from Rampurato Jagalur. The inventory storage practices for such projects are different from traditional projects.

Keywords: Materials Management, construction projects, material procurement.

1. INTRODUCTION

Materials constitute a major cost component for any Industry. The total cost of installed materials (or Value of Materials) may be 60% or more of the Total cost, even though the Construction cost may be a minor part of the total, probably less than 20-30%. This is because the casted must be stored, transported, and restored before it is put in place or "consumed" at the site. The total cost of Materials will include, in addition to the construction cost, the cost of procurement (cost of placing processing and paying the material, physical Distribution, the distributor's cost, and the transportation of materials), and the site-handling costs (cost of receiving, storage, issuing, and disposal). The efficient procurement and handling of material represent a key role in the successful completion of the work. It is important for the contractor to consider that there may be significant difference in the date that the material was requested or date when the purchase order was made and the time at which the material will be delivered. These delays can occur if the Contractor needs a large quantity of material that the supplier is not able to produce at that time or by any other factors beyond his control. The Contractor should always consider procurement of materials is a potential Cause for delay. Poor planning and control of materials, lack of materials when needed, poor Identification of materials, re-handling and inadequate storage cause losses in labor productivity and overall delays that can indirectly increase total Project costs. Effective management of materials can reduce these costs and Contribute significantly to the success of the project.

2. OBJECTIVE

- To identify how the material procurement process will done in the Rampurato Jagalur Transmission line.
- To know how E-tool will be useful for the procurement of materials.
- How the classification of the materials will be done depending upon the size and no. of items.
- To evaluate how the store management will be done for different types of materials.

3. METHODOLOGY

3.1. Procurement Process

For every procurement project, a formal and professional procurement process will save time, save money and reduce risk. Here in KEC depending on the material usage and value and the number of items the procurement will be done by three separate levels. KEC follows both centralization procurement and decentralization procurement process for easy management of material. In addition, it gives adequate power to project level people to procure project specific material, which is not available (bought items will be procured) with central level material management department and Independent, companies. Before procuring any material the project level people has, get approval from concern authorities either Centralized authorities or Decentralized authorities. Central level means the material required for all ongoing and upcoming projects will be procured at a time under the supervision of Head of Procurement for all the projects.

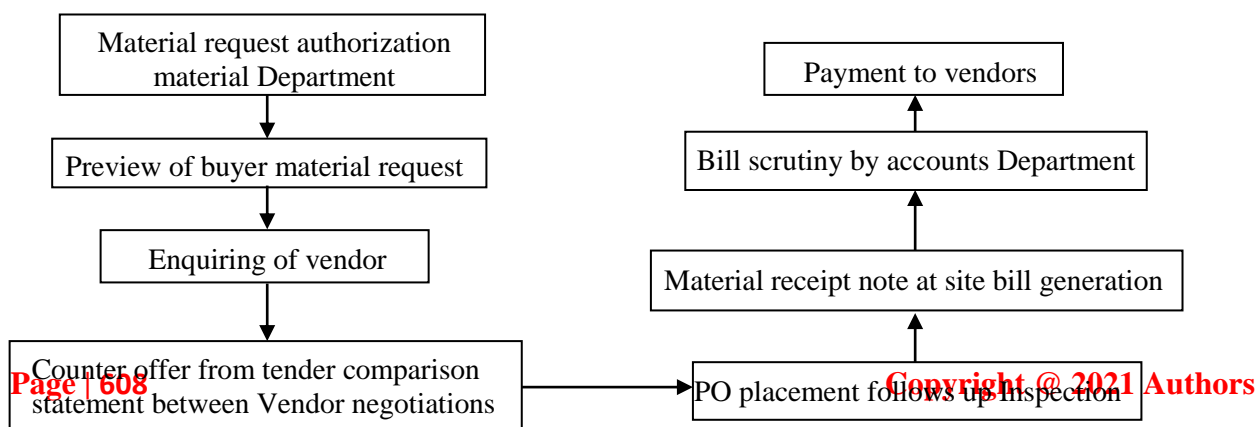
Table 1 Material Procurement levels

S. No	Level	Material(Example)
1	Central level	Conductor(Alumi num, Steel) Steel Cement Capital Rate Contracts Imports ETC (estimate to complete)
2	<i>Independent Company</i>	Logistics support Inventory Management Project Procurement ETC
3	Project level	Project specific items Site bulk materials Inventory control Planning of material ETC

The material procured at the central level will be controlled and monitored by central level people only. The day to day reports has to be send to the concern department for these materials. These materials come under A category items if we look at the ABC analysis which will be discussed later. Care must be taken for these items. Project level items are very low valued items probably comes under C category in ABC analysis. These items are review once in a month or quarterly. These items include very small valued items like water bottles, pen sets.

3.2. Procurement Cycle

The project procurement cycle reflects the procurement activities from the decision to purchase the material or service through to the payment of bills and closing of procurement contracts. KEC follows very transparent and lengthy process for the procurement. It has different stages which need approvals from concern authorities and inspection teams. This cycle starts from Material request from the concern department to payment to the vendor. From Material request from the concern department to payment to the vendor.



Material request: Material request is generated by concern department, which is using that product coordination with store department to the purchase department (Site level) which has the information about quantity, quality, period etc.

Material request authorization: Authorization of material request will be done by the concern person who has authority to verify the in and out flow of material. The authority confirms with the store department and concern usage department about the material requirement.

Material department (buyer): After the authorization, the request will be forwarded to the buyers (Project level, ICs, Central level).

Preview of material request: After receiving the request to concern level of purchase department, the request will be verified or previewed with the concern store, usage, and finance departments regarding the specifications like quantity, quality, and period.

Enquiry of vendor: If the material is new to the purchase department, they will start the process to find out the vendor. If it is previously ordered or used material, the concern vendors will be intimated about the materials requirement.

Counter offer from tender: After requesting for the material, the vendor will counter offer regarding the specifications and their prices etc.

Comparison statement between vendors: A comparative statement will be drawn between all the vendors who gave us the counter offer regarding supply of requested materials.

Negotiation: Depending on the material requirement, 2-4 vendors will be selected and the company will negotiate with them regarding quality, quantity, price, logistics, payment process etc.

PO placement: Once the negotiation is completed, the selected vendors will be given purchase order to supply the materials. PO will include codes of materials, vendors etc. with signed by concern department authorities.

Follow up: After PO is issued to the vendor purchase department do the follow up to the vendor regarding delivery of materials on schedule or sometimes expediting the orders through emails, telephonic calls, letters etc.

Inspection: Material inspection is required at different stages like at plant and transit inspection and at store etc. The material inspection will be done with third parties or with the project quality department people depending upon the client requirements.

Material receipt note at site: The store department after receiving the materials will sign MRN. With the help of this MRN, the bill will be generated. The store has to take care of the materials ordered and received; quantity of material ordered and received quantity of materials etc.

Bill generation: With the help of MRN, the finance department will generate the bills.

Bill scrutiny by Accounts department: The generated bill will be forwarded to all departments which has to approve the payment like finance department, account department, head of the project etc.

Payment to vendors: The payment will be issued to the vendors.

3.3. Key Points in Procurement Process

The procurement process includes determining the category of materials or services, choosing the type of contractual relationship, soliciting bids, selecting bidders, managing the work, and closing the contracts. The decisions made when selecting the type of contract are based on whether the materials can be provided by suppliers, vendors, or partners; how well defined the work is; how the risk will be shared; the importance of the task to the schedule; and the need for certainty of the cost. Companies that bid on contracts are evaluated on past performance

and current financial status. Request for quotations and Request for proposals are sent to those companies. RFQs are evaluated on price and RFPs are evaluated on price and method. Long lead-time items are identified and monitored. Items that are critical to the schedule or delayed are assigned to an expediter. The logistics of handling delivery, storage, and transportation are determined. Work and materials are inspected for quality.

3.4. E-Tool

In KEC (CPDC – Central procurement & disposal committee) E-Tool is used for almost all activities and the tool is very efficient to monitor the progress of procurement process. Each authorized employee will get an Identity user name and password. With these details, they can log in to the tool and do the activities. Each activity done by each employee will be registered along with their login details; hence, there is no chance of mistakes or manipulations. Each department has their e-tool which are integrated to the project head and concern authorities. These tools can be used for planning, E-action, E-reverreaction, competitive statements etc.

3.5. Material Classification

Generally construction projects deals with hundreds thousands of materials. It is very difficult to deal with those materials without any classification of coding. Here KEC deals with thousands of materials with need a special kind of coding so that the store, purchase, usage departments can easily identify the required materials and vendors. This project is currently costing around Rs500Cr. A huge project like this deal with high value of materials as the material value will be around 60+% of the total project cost. The most popular inventory control technique adopted as Pareto's Law. Large amount of capital is invested in purchase of costly items in small number. Seventy percent of the cost of materials purchased is required for only Thirty percent costly items for efficient inventory control in stores where the large number of materials are to be handled, the classification of them is necessary to take particular care of costly items, which are less in number. The ABC analysis is commonly used in most of the organizations to classify the materials according to their sales values. KEC is following ABC analysis for classifying materials. The details of ABC analysis of KEC is shown in the given below

3.5.1. Category A

- Small in number, but consume large amount of resources.
- This material will be in Tight control
- Rigid estimate of requirements
- Strict & closer watch
- Frequent orders
- Low safety stocks (Buffer stocks)
- Managed by top management
- Day to day progress of material

3.5.2. Category B

- This material stays in between the A and C category materials in terms of value and number of items (Intermediate)
- Moderate control
- Purchase based on rigid requirements on past experience

- Reasonably strict watch & control

- Moderate safety stocks
- Managed by middle level management
- Monthly once or twice progress reports

3.5.3. Category C

- Larger in number, but consume lesser amount of resources
- Ordinary control measures
- Purchase based on usage estimates
- High safety stock
- In frequent orders
- Monthly once quarterly progress reports

4. STOREMANAGEMENT

The very essence of Materials Management gathers its relevance from stores a place that keeps the materials in a way that the materials are well accounted for and is maintained safe. A typical store has a process and a space within, to receive the incoming materials (Receiving Bay), keep them for as long as they are required for use and then to move those out of stores for use (Issue). In a construction firm, this process forms a cycle to maintain and run the activities of Stores. The basic responsibilities of stores are to act as custodian and controlling agent for parts, supplies, and materials, and to provide service to users of those goods. Well-designed systems provide flexibility to absorb the shock demand variation, and enable purchasing to plan ahead, practice forward buying, and so forth. Thus, the terms Stores, Store house, or ware house all of them refer to a building or room or place where materials are kept. An organization usually has different types of stores like which it refers by different names based on material nature such as :Raw Materials Store, Processed or Semi-Finishing Materials Store, Finished Goods Store, Yard Store Such stores range from ordinary ones with shelves and bins to cold or dehumidified storage's, huge silos for storage of cement or bonded stores for keeping goods on which customs and excise duties have not been paid. Storage is an essential and most vital part of the economic cycle and Storage Management is a specialized function, which can contribute significantly to the overall efficiency and effectiveness of the materials function.

4.1. Different types of Stores based on storage nature are

Closed stores –Closed systems are utilized when close control and accounting for inventories are desirable. In such cases, storage area is kept locked and entry is limited to stores employees or to others only on an authorized basis. Goods enter inventory through a formal receiving process and leave through an authorized requisition or bill of materials. Closed systems typically include industrial or business stores operations, and involve repair parts, consumables, tools, and materials or components for assembly where ongoing control and accuracy is essential.

Open stores – There are instances where the cost of closely controlling inventories outweighs expected losses in a nun controlled environment. In such cases, inventory storage areas may be left open or kept close to the point of use for efficient user access. Such inventories are available for use as needed, with emphasis on expediting production, or operations rather than on security.

Random access – In random access systems, goods are stored without regard for commodity groupings. Instead, goods are stored in the next or nearest available space of suitable size. However, it is good planning to select from available storage spaces with consideration for the anticipated frequency of issue. Locating items in random access storage usually requires a computerized system. Random access systems tend to be used in conjunction with a closed store.

Automated warehouse – A large variety of automatic storage and retrieval systems (ASRS) are being used today. ASRS systems have the capability of bringing goods from storage or placing goods into storage upon computer entry of the item identification and/or storage location. Such systems may range in size from small rooms to whole warehouses, and may handle items ranging from small parts into large materials on pallets.

Contractor operated system, or integrated supplier systems – Where business volume is sufficiently large, suppliers may operate a firm's supply or inventory storage facility using supplier personnel, under contract with the using organization. Depending on the agreement, a contractor may either acquire on-site inventories or just manage them. In some cases, supply contractors have branches built next door to industrial plants, for the sole purpose of supplying all needs of the plant. In some cases, the two facilities are separated by a common wall and supplies are issued through an opening in the wall. This is an emerging trend for MRO and office supply goods. The main objective of the store is receiving and issuing goods. Here in KEC INT LTD Jagalur casting yard they have open store and closed store and one ready-made steel plant which is used to store steel. The cement is stored in silos which have capacity of 450T, and they have two silos. The daily usage of cement is 250T. 300T cement is stored as buffer stock. Cement is major supplied by Ultra Tech, Pennaa, and JP cement.

1 month buffer stock is maintained for B, and C category items. If any item is not moved from stock within 90days it is considered as Non Moving Item, will be disposed to the other sites which has requirement. Daily 15-20 A category items are checked physically, remaining items are checked weekly or monthly basis depending on their values. Audit checks will be done once or twice a month regularly by IC so rout side agencies. Separate storages are maintained for different items like Chemicals, Heavy items, Oil storages, Gas storages, Oxygen and DA storages, Consumables storages etc

Petrol is supplied and stored by HP petroleum. Safety and storage is responsibility of HP people. If any stock is reached to the store for the delivery the process followed is:

Store
Inward Entry
Terms and conditions
End user inspection
Material Receipt note

- The entire stock is insured for the fire and other accidents including theft.
- Cement storage is computerized; hence stock values will be accurately maintained.
- Before unloading any item, head approval has to be obtained and inspection must be done.
- 4, 5 Photocopies will be generated to the MRN and will be given to the accounts department, finance department, project head, and store department. The original MRN will be with store department only.
- Physical stock and recorded stocks must verify every day before starting the work and closing the work. There should not be any differences between the physical and recorded values.

- If the material is urgently required and the project head is not available to accept the material to unload, then the situation will be communicated to him and the material will be unloaded but it will be recorded in the books as it is not approved by head physically, in this situation physical and recorded stock will be different.

The material will be issued as per planning section and execution department. Every week and month ending meetings will be conducted with the planning department and execution department regarding the work and material requirement.



Figure1 Open store



Figure2Materialstorage



Figure3Store yard

5. RESULTSANDDISCUSSIONS

The survey results obtained from the company was considered as the analysis of the material management in transmission lines in KEC international limited. To obtain all this results I have discussed mainly with KEC jagalur Stores In-charge. Project manager also played a main role for this because in this we have discussed about

- Centralization Procurement
- Decentralization Procurement

In Centralization Procurement the main authority given for top management. Therefore, for this we have classified the materials in three categories.

- i) Category– A ii) Category–B iii) Category–C

Table 2 Material classification

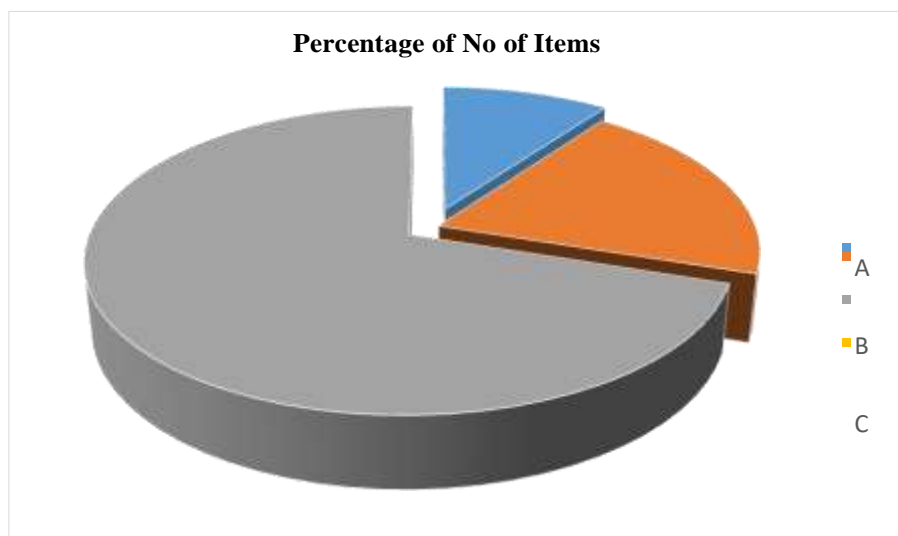
Category	Value Percentage (%)	No. of items	Value of items (Cr)	Purchase level
A	0-70	1406	350	Central
B	70-90	5275	100	IC
C	90-100	12072	50	Project level

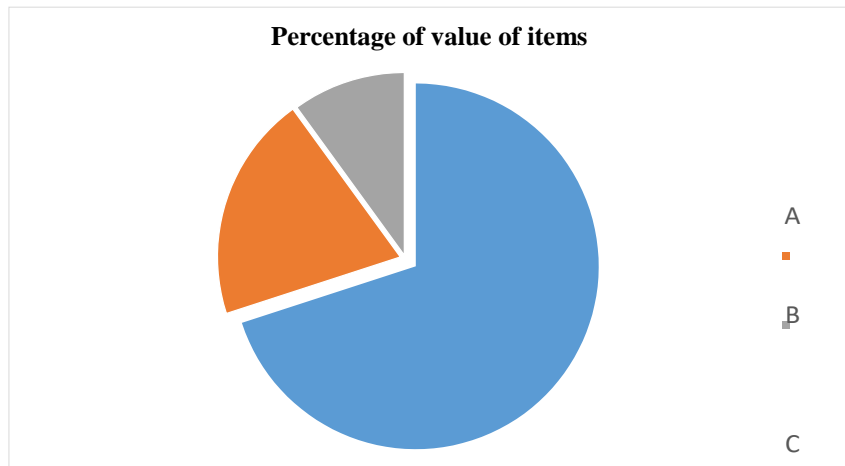
In above we have discussed value of percentage of materials that were required for the completion of the project successfully. From this we again evaluated them into number of items again for those number of items we did the value of item category wise. Now the category wise items will be purchased by different levels, (a) Central level (b) Independent company. (c) Project level.

Table 3 Percentage values of ABC Analysis

Category	Items Percentage (%)	Value Percentage (%)
A	10.00	70.00
B	20.00	20.00
C	70.00	10.00
Total	100	100

In the above table we clearly discussed about percentage values of ABC analysis. From the discussion we got item wise percentage of materials required for the project and also value of percentage. Below we have results which were shown in pie-chart elaborately category wise in levels i) Percentage of No. of items ii) Percentage of Value of items





In last we have discussed about store management, in this we got what type store should be allotted for the different types of materials we are using for the total completion of rampura to jagalur project. In this we have

- a) Open stores b) Closed stores c) Automated ware house d) Contract or operated system.

6. CONCLUSIONS

The present case study is done on KEC INTERNATIONAL LIMITED Rampura to Jagalur Transmission line, Jagalur casting yard material management department. The study is carried out to find out the techniques followed by casting yard site and especially Transmission Lines Project works. Starting from the Material requirement stage to final payment stage each step is included with different stages and each stage is interlinked with other one. Store department is placing a major role in material supplying to the casting yard. The entire project material is used for the ABC analysis. This is one of the best and mostly using classifications for easy handling of materials. This study gives information about the strategies followed by any high valued projects like Transmission lines etc. The steps followed by KEC are one of the best ways to control wastages and decrease project cost from the material management activities.

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