

# Application of ABC Analysis for Material Management and Planning and Scheduling using MSP

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**Abstract** – The main purpose of this work is to highlight the importance of the material management. As it is helpful towards the material saving and economic development. The results demonstrated that using material management which helped in the effective material flow, better quality control and reduce the material wastages. ABC analysis is used in this work for material management this helped in economy development.

**Key Words:** MSP, ABC Analysis, material management.

## 1. INTRODUCTION

With the rapid growth in construction industry a need has raised wherein application of modern tools have started to play a key role. It has a major role in the economic growth of a country. It is challenging than other industries owing to exclusive nature of every project, many conflicting parties are tangled and projects are inhibited by time, money, quality and high risk. The MSP is made to find the tracking of the construction activities of the project duration, and the cost obtained in project duration. ABC analysis is carried out for the same for finding out the difference between relative expensive and few inexpensive items.

### 1.1 OBJECTIVES OF PROJECT

- To estimate the cost of construction materials for the G+3 residential building.
- To apply the material management technique for material cost index.
- To plan and schedule the activities for execution of work by using Microsoft Project Software.

## 2. METHODOLOGY:

### 2.1. ABC ANALYSIS:

ABC investigation is the most sophisticated and systematic tool. It is a method of classifying the listing of items as per their considerable thwack on inclusive disbursement of an organization. It provides the infusion for the faulty listing of the administration with the acquired objects or their amenity.

It is established by the Pareto Principle which mentioned "80% of the overall consumption value and is based on only 20% of the total items". The disintegration suggest that the checklists are of dissimilar efficacy, therefore its important dissimilar gambit and managing controls. The categorization of grouping is dependent on its apprehend values.

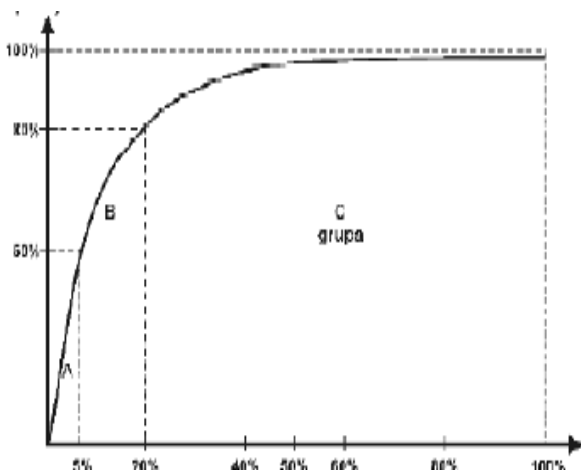
ABC investigation is an "registry distribution technique" who makes the necessary for the element in the three groups namely A,B and C. A consists of highly costly items, C contains of the less valued element and B consists the elements which vary betwixt A and C.

This mainly focuses on A elements that minor items from C list. The elements are registered as per their overall use, its component price and then by considering these the total cost is evaluated. These items are registered in a systematize configuration so that it can be ease for organizing these parameters based on their cost and usage. These items are to be arranged from A to C by the organization and its rules are as follows:

1. **A-item:** these have highest utilization gain of products i.e., 70-80% of the yearly utilization benefit of the organisation but its reviews only 10%-20%of the total registered elements. These registered items requires control over the items, proper storage areas and improve sale factor, regular re-ordering of the items daily, weekly or monthly basis and have to be recorded as per the checks, so A type of items are at highest place.
2. **B-items:** these are inter-category items and they have exhaustion of 15%-25% of yearly utilization value. It consumes of about 30% of overall utilization cost.
3. **C-items:** these have least utilized benefit of products i.e., 10%-15% of yearly utilized benefits. It reports 50% of overall utilized items.

**"The yearly consumption value= (Annual Demand) x (Item Cost per Unit)".**

The stratification of A, B and C elements is represented in a graphical form,



**Fig.No.1 Graph characterizing Percentage of items v/s Percentage of total cost**

## 2.2 METHOD FOR CLASSIFYING OF THE ELEMENTS:

The methods for classifying of the elements are:

- The demand and the unit cost is acquired over a given period.
- To net price is acquired by evaluating the member price by intended unit cost.
- All the annual cost and the items are listed in the descending order.
- To find the total number of items consumed quantity of all the price is added and the integer of elements are then evaluated by removing the percentage on the total checklist of overall price of elements.
- The percentage cost v/s percentage items graph is drawn. The rational limits of A,B and C categories are marked from the curve.

## 2.3 BENEFITS OF ABC EXAMINATION:

Following are the benefits of ABC analysis:

- This determines the area collecting the utmost profit to the organisation in a superior manner.
- It is aptitude of assigning the overhead and direct cost kindred with the censorious tasks of the organisation.
- It has a better control on high-priority inventories and also aids demanding.
- Allocation of the resources is most systematized through revolution counting.
- Its motto is to gain finance by managing the materials in a proper way.

- Where hefty amount is invested it safeguards the control over expensive items.
- Stock is retained at optimum level and clerical costs are reduced substantially.

## 2.4 MICROSOFT PROJECT SOFTWARE

In this project, Microsoft Project software is used for planning and scheduling of the project undertaken. A calendar is created and assigned to the project. It shows the work timings and the working as well as non-working days. Duration required for each task is fed which gives the total duration required for project completion as an output. By assigning task relationships, critical activities are obtained. Different resources are applied according to their work profile. These resources are allocated based on the quantity of work, unit rate for resources are assigned and the total amount for each work is obtained.

Microsoft Project is a contemporary tool for Project Management that assists in overcoming the hindrances faced owed to the traditional approach. It promotes optimum and efficient grouping of activities which provides a vision to finish the project according to the scheduled duration and within the budget.

It is a project managing software which is developed and traded by Microsoft. It is designed to help the project manager in planning, allocating resources to tasks, tracing progress, managing expenses and analysing the workloads.

Project generates budgets upon the work assignment and cost of resources. As the resources are allotted to the task, the software determines the cost which is equal to the work times the rate, which moves up to the task level, then to the summary task level and lastly to project level.

Resources are well-defined (Work, Material and Cost), they are shared among projects via a shared resource option. Each individual resource can have its own peculiar calendar, which outlines resource work time. Resource assignment costs are obtained using resource rates. Single resource can be allocated to several tasks in various projects also every task can be given abundant resources. Execution of the scheduled works depending on the availability of resource as defined already in resource calendar.

The software crafts a critical path. Resource can be levelled and Gantt chart depicts the task linkages. Furthermore, Microsoft Project identifies deviating classes of users. These users of different classes can have different levels access to projects, views and other data. Personalisation of facets in Microsoft Project like views, calendars, filters, tables and fields are stored in a global enterprise which can be accessed by all the users.

**2.5. FEATURES OF MSP:**

1. Timeline view of project.
2. Generation of report.
3. It has an ability to manage multiple report.
4. Resource pod can be implemented.
5. It highlights late tasks.
6. It creates baseline.
7. It is a standard tool for industry.
8. It integrates other tools properly.
9. Customization of different views.
10. It is user friendly and has basic rights.

**2.6. BENEFITS OF MSP:**

Following are the benefits of Microsoft project software:

1. This software helps to improve the project productivity.
2. The projects can be updated as per the changes in the tasks occurring or resources after the scheduling has been done.
3. Management of cost and control.
4. Allocation of resources.
5. Quality management.
6. Critical path and tracing of the progress.

**2.7. PROJECT DETAIL:**

A residential cum commercial building(G+3) was considered in this study. A detailed estimate of the building using structural and architectural plans for the work. This includes the land cost, contingency charges, labour cost and transportation and water charges. It gives the budget required for the project. An abstract sheet for the same is prepared. After obtaining an estimate for different construction tasks, the materials are tabulated in a descending order of their total costs for the total usage of different materials. ABC analysis is applied, which classifies materials into different categories according to their highest amount occurred for individual materials to prioritize them. A graph for total percentage of items v/s total percentage of cost is plotted. This helps in managing various materials according to their criticality or impact on material cost. This technique aids for efficient material management.

**2.7 RESULTS FROM ABC ANALYSIS AND MSP:**

A comprehensive estimate is carried out to evaluate the overall project cost occurring. Results are as follows:

**Table-1 Total Project Cost**

TOTAL CONSTRUCTION COST	Rs. 7,25,40,469
LAND COST	Rs. 7,00,00,000.00
WATER AND TRANSPORTATION CHARGES 5% OF THE TOTAL COST	Rs. 71,27,023
CONTRACTOR'S GAIN IS 10% OF THE OVERALL COST	Rs. 1,49,66,750
<b>GRAND TOTAL</b>	<b>Rs. 16,46,34,243</b>

According to this estimation Rs.16,46,34,243 which the foreseeable cost for the construction of a built up area 57,535 Sq.Ft. As the rate per Sq.Ft. is Rs.2861.31.

A thorough case study was done at the site on the material management. A extempore was made on the material management measures. ABC Analysis was carried out on the site based on the input and regrouping of the materials in A, B and C type was carried out.

With the use of this method, while constructing a building, there was an ease in the use of materials and also strengthened the economic guidance and properly managing and scheduling of the tasks.

After evaluating the different quantities of the items according to their quantity are tabulated. The following results of ABC analysis of unit price of each item and total cost is as follows:

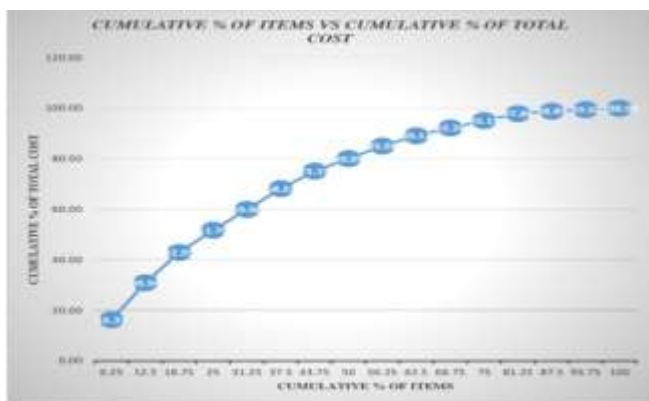
**Table-2 Percentage of the total cost of items as per the usag**

SL.NO.	ITEM DESCRIPTION	TOTAL DEMAND	UNIT	TOTAL COST PF ITEMS(Rs.)	USEAGE AS % OF TOTAL COST OF ITEM
1	CEMENT	13082	BAGS	3924600	8.2
2	STEEL	155511.08	KG	6997998.6	14.61
3	BLOCKS	45047	NOS	4219722.5	8.81
4	SAND	781.74	BRASS	7817400	16.33
5	AGGREGATE	531.4	BRASS	2391300	4.99
6	FLOORING	70446	SQ.FT.	5751350	12.01
7	PAINTING	192936.05	SQ.FT.	3962816	8.28
8	FORMWORK	75102.332	R.FT	1502046.4	3.14
9	DOORS	9430.75	SQ.FT.	3312171.5	6.92
10	WINDOWS	10547.28	SQ.FT.	1934537.2	4.04
11	PAVERS	3673.36	SQ.FT.	238768.4	0.5
12	GLASS RAILING	925	SQ.FT.	1295000	2.7
13	PIPES	5078	R.FT	293230	0.61
14	KITCHEN PLATFORM	448.5	R.FT	493350	1.03
15	BATHROOM FITTINGS	144	NOS	2362500	4.93
16	ELECTRICAL FITTINGS	1416	NOS	1387800	2.9
	<b>TOTAL</b>			<b>47884590.6</b>	

**Table-3 ABC Analysis**

SL.NO.	ITEM REARRANGED AS PER USEAGE AS % OF THE TOTAL COST	CUMMULATI VE % OF ITEM	TOTAL DEMAND	UNIT	TOTAL COST OF ITEM (Rs.)	USEAGE AS % OF TOTAL COST OF	CUMMULATI VE % OF TOTAL
1	SAND	6.25	781.74	BRASS	7296240	16.33	16.33
2	STEEL	12.5	155511.08	KG	6997998.6	14.61	30.94
3	FLOORING	18.75	70446	SQ.FT.	5410948	12.01	42.95
4	BLOCKS	25	45047	NOS	4819722.5	8.81	51.76
5	CEMENT	31.25	13082	BAGS	4578700	8.2	59.96
6	PAINTINGS	37.5	192936.05	SQ.FT.	3962816	8.28	68.23
7	DOORS	43.75	9430.75	SQ.FT.	3896672.3	6.92	75.15
8	BATHROOM FITTINGS	50	144	NOS	2625000	4.93	80.09
9	AGGREGATE	56.25	531.4	BRASS	2391300	4.99	85.08
10	WINDOW	62.5	10547.28	SQ.FT.	1934537.2	4.04	89.12
11	FORMWORKS	68.75	75102.332	R.FT	1502046.4	3.14	92.26
12	ELECTRICAL FITTINGS	75	1416	NOS	1387800	2.9	95.15
13	GLASS RAILINGS	81.25	925	SQ.FT.	1295000	2.7	97.86
14	KITCHEN PLATFORM	87.5	448.5	R.FT	493350	1.03	98.89
15	PIPES	93.75	5078	R.FT	293230	0.6	99.5
16	PAVERS	100	3673.36	SQ.FT.	238768.4	0.5	100

In this table, different items are categorized according to their effect on the total mater cost. With the help of this the items are grouped in the Class A, Class B and Class C.



**Chart -1: ABC Analysis**

The percentage of items v/s percentage of cost is arranged for the different items. This is shown in the tabulation format:

**Table-4 Categorization of elements using ABC examination**

CLAS SES	ELEMENTS	% OF ELEME NTS	% OF OVER ALL COST	EXERTIO N
<b>CLAS SA</b>	SAND, STEEL, FLOORING	20%	43.03 %	CLOSE CONTRO L
<b>CLAS SB</b>	BLOCKS,CEMENT, PAINTING,DOORS, BATHROOM FITTINGS	30%	36.9%	REGULA R REVIEW
<b>CLAS SC</b>	AGGREGATES, WINDOWS, FORMWORK,ELEC TRICAL FITTINGS, GLASS RAILING, KITCHEN PLATFORM, PIPES, PAVERS.	50%	29.9%	INFREQU ENR REVIEW

This analysis gives the detailed information of different elements used in construction of residential building and its effect on the overall project price. It concentrated on those elements which makes the utmost creditable penny-pinching.

Exact use of material managing method lowers the havocs of elements on the plot and impersonate the scanty and require for acquisition of material.

Planning and scheduling of different construction activities by using Microsoft Project. After assigning respective resources and scheduling different activities, the results obtained are:

As per the work packages the different activities are divided. Duration of 476days is obtained for the total project.

The estimated cost of the total project cost is Rs. 62,599,522.25.Which the cost as Rs. 1,263 per Sq.Ft.

Proper tracking is obtained and unnecessary delays in scheduled is avoided by using Microsoft Project. The critical activities seek the longest path and help is knowing the total project cost.



- A. The overall time period is 447days.
- B. The overall project price is Rs. 7,25,40,470.

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**3. CONCLUSIONS**

- 1.The classification of materials was done using ABC analysis which gave the percentage of cost each category of materials share from the total estimated cost.
- 2.The ABC analysis gives the prices of the A type B type and C type of elements wherein A type bestow of 43.03%, B type bestow of 36.9% of the material price and C type bestow of about 29.9% of the overall material price.
- 3.Based on this determination the materials are also classified based on the stocking, need controlling and checks which are given in the table:

CATEGORY	CLASS A	CLASS B	CLASS C
CONTROL	HIGH	INTERMEDIATE	LOW
REQUIREMENT	LOW	INTERMEDIATE	HIGH
CHECK	TIGHT	INTERMEDIATE	LOW
SAFETY	HIGH	LOW	RARE

- 4.Use of Microsoft Project interpret the dealing with the variation in the statistics pinpointing the critical tasks which helps in attributing the critical tasks tyrannizes the period of the project.
- 5.Solicitation of MSP, the results obtained are:

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