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Cost Optimization Using EOQ

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Abstract - In Construction Industry the problem of exceeding the estimated budget often arises and it seems quite difficult to be precise all the time. To overcome such problems the use of proper inventory control or material planning is needed which is achieved by inventory management. In any construction project the working capital comprises of 60-70% of the total cost of the project.
Thus we have developed a software on EOQ model which creates a matrix of ABC and FSN and prioritizes the materials. The software not only runs the matrix but also gives real time access by knowing the demand and lead time. Using this technique, the ongoing demand of materials can be met without any delay, at a optimum cost. Thus the cost effectiveness is achieved.

Keywords: Inventory management, EOQ, Optimum Cost, Administration.

1. INTRODUCTION

Inventory management is a science primarily about specifying the shape and percentage of stocked goods. It is required at different locations within a facility or within many locations of a supply network to precede the regular and planned course of production and stock of materials. The use of software for managing the inventory will ease the work of the storekeeper as well as give a brief overlook on management to the Administration.

2. EOQ

Economic order quantity (EOQ) is the order quantity of inventory that minimizes the total cost of inventory management.
Two most important categories of inventory costs are ordering costs and carrying costs. Ordering costs are costs that are incurred on obtaining additional inventories. They include costs incurred on communicating the order, transportation cost, etc. Carrying costs represent the costs incurred on holding inventory in hand. They include the opportunity cost of money held up in inventories, storage costs, spoilage costs, etc.
Ordering costs and carrying costs are quite opposite to each other. If we need to minimize carrying costs we have to place small order which increases the ordering costs. If we want minimize our ordering costs we have to place

few orders in a year and this requires placing large orders which in turn increases the total carrying costs for the period.

We need to minimize the total inventory costs and EOQ model helps us just do that.

Objectives- The paper has an objective to serve as a foundation for future development of software and its result will provide an optimum approach to improve the material management practices in construction industry.

- To study various models of inventory management.
- To analyze the data based on inventory techniques.
- To compare the various models and determine the most effective method
- To create a software for efficient inventory management for construction projects.

3. RESEARCH METHODOLOGY

we located an ongoing construction project in Solapur, where we collected the data to study "Inventory Management Techniques".
We started data collection in the month of July 2015 for analyzing them using previous financial year's (2014-2015) data available on site. We studied 'ABC' and 'FSN' models by referring various books on inventory management, journals and research papers. Based on our research and the use of materials at the site we categorized each material in both model based on their consumption rate, availability, cost, stock, etc.
The software was developed using language ".NET". The software developed, will analyze the data in both models, compare and determine the optimum result to place the future orders.
Working of Software- It will classify each material present in the database of software according to ABC and FSN techniques. It will then run EOQ based on user's

input and provide the optimum interval to order the materials.

4. DISCUSSION

The methods used to classify the materials are as follows:-

ABC Analysis - ABC analysis is the analysis of store items in terms of cost criteria.

It is a simple approach which avoids wastage of money over use or over use of resources.

The cost of each item is multiplied by the number used in a given period and then these items are tabulated in their descending numerical value.

It is seen that the first 10% of items approximately account for the 70% the next 20% for the 20% value and the next 70% for the 10% value.

It is seen that a large number of items consume only a small percentage of resources and vice versa.

A items represent a very high cost centre, B items represent the immediate cost centers and C items represent low cost centers.

A very close control is exercised over A items while less stringent control is adequate for those in the B category and less attention for those in C category.

Refer Table1 and Figure1.

FSN Analysis - FSN classification takes into account the pattern of issues from stores. The three letters stand for fast-moving, slow moving and non-moving. This classification comes in very handy when we desire to control obsolescence. Items classified as 'S' and 'N' require attention. There may be several reasons why an item has got into 'N' category. There may have been a change in technology or change in the specification or a particular spare part. When a FSN classification is made, all such information stands out prominently, enabling managers to act it in the best interests of the organization. This analysis

is to help control obsolescence and is based on the consumption pattern of the items. The items are analyzed to be classified as Fast-moving (F), Slow-moving (S) and Non-moving (N) items. The Non-moving items (usually not consumed over a period of two years) are of great importance. Scrutiny of non-moving items is to be made to determine whether they could be used or be disposed off. The fast and slow-moving classifications help in arrangement of stock in stores and their distribution and handling methods.

Refer Table2 and Figure2.

5. CONCLUSION

The developed software will be useful for the following:

- Easy comparison: Various methods of to procure the materials can be compared easily, prompting the optimum result.
- Versatility in use: The software can be used in any type of construction project and the administration can easily monitor the inventory.
- Prediction: The amount of materials to be ordered will be prompted based on the consumption rate.
- Cost Saving: It will prompt the optimum method to procure materials which would reduce the cost of materials.

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ANNEXURE
TABLE No. 1:-

Construction Site			
	Year 2014-15		
	ABC		
Sr.No	Item	Unit	Unit Rate (Rs.)
1	PPC Cement	Bag	230
2	Kaddappa	Sqft.	28.87
3	Marble	Sq.Mt	5701
4	Crush Sand	Brass	2800
5	River Sand	Brass	3200
6	Aggregate (20mm)	Brass	1850
7	Aggregate (10mm)	Brass	1300
8	Steel (TMT)	Kg.	42
9	Fly Ash Bricks (4" ,6" , 8")	Nos.	15.5
10	Red Bricks (4" , 6")	Nos.	15.6
11	Black Granite	Sqft.	105
12	G.I. Chicken Mesh	Mt.	3375
13	Rough Shahbad (24" x 24")	Brass	1100
14	M-Seal	Kg	240
15	Paver Blocks	Sqft	40
16	Grouting Powder	Kg.	55
17	Concrete Admixture	Kg.	36
18	Crack Seal Paste	Kg.	73
19	Sanla	Bag	111.55
20	PVC Pipes (75mm)(10' &20')	Nos.	340.15

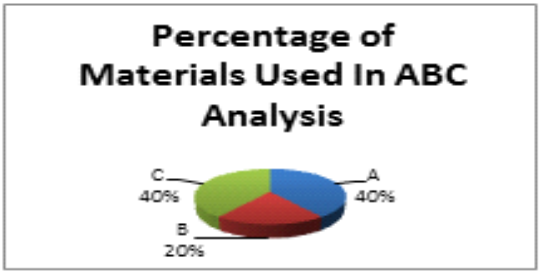

Fig. 1

TABLE No. 2:-

Construction Site			
	Year 2014-15		
	FSN		
Sr.No	Item	Unit	Unit Rate (Rs.)
1	PPC Cement	Bag	230
2	G.I. Chicken Mesh	Mt.	3375
3	Grouting Powder	Kg.	55
4	Crush Sand	Brass	2800
5	River Sand	Brass	3200
6	Steel (TMT)	Kg.	42
7	Fly Ash Bricks (4" ,6" , 8")	Nos.	15.5
8	Red Bricks (4" , 6")	Nos.	15.6
9	Rough Shahbad (24" x 24")	Brass	1100
10	M-Seal	Kg	240
11	Paver Blocks	Sqft	40
12	Marble	Sq.Mt	5701
13	Concrete Admixture	Kg.	36
14	Aggregate (20mm)	Brass	1850
15	Aggregate (10mm)	Brass	1300
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17	Black Granite	Sqft.	105
18	Kaddappa	Sqft.	28.87
19	Crack Seal Paste	Kg.	73
20	Sanla	Bag	111.55

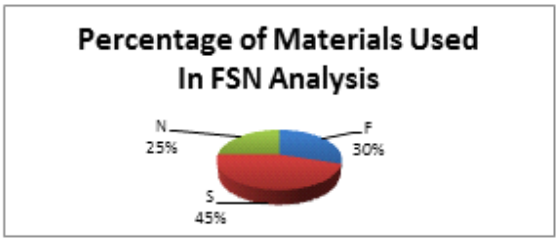
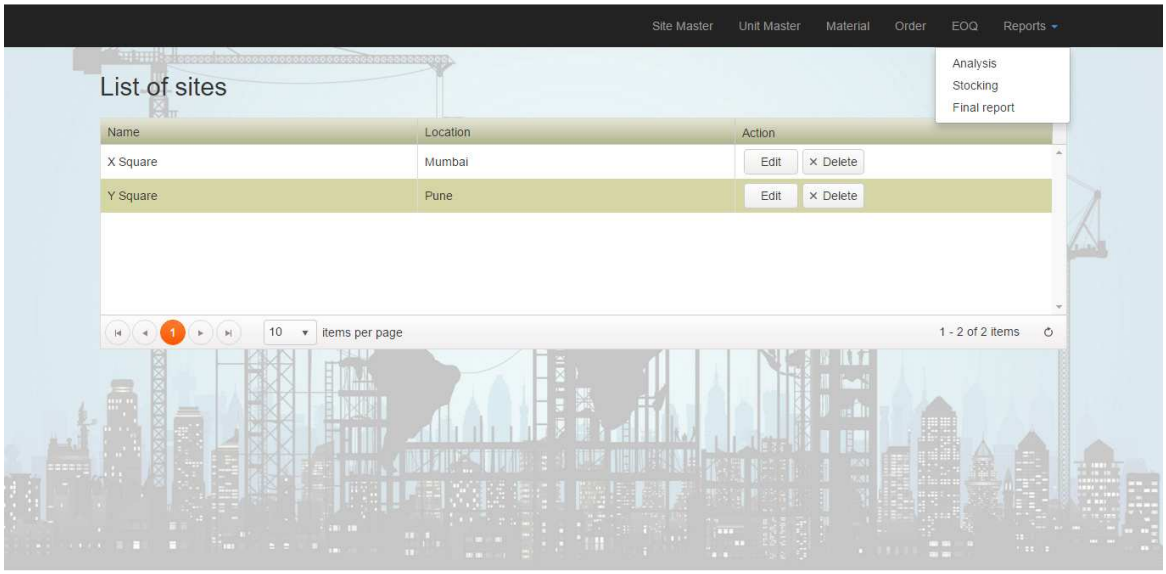
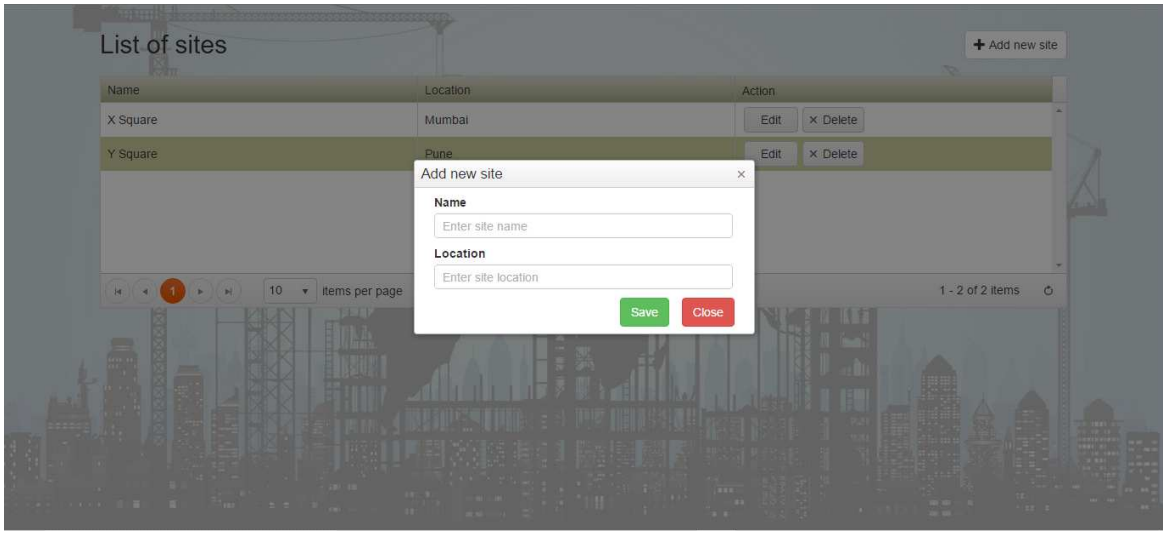
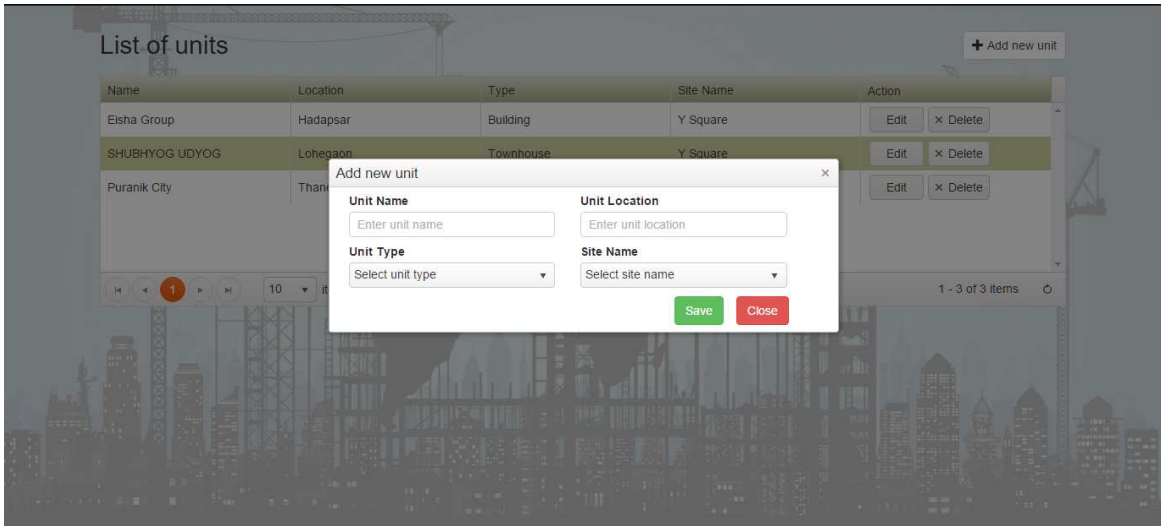


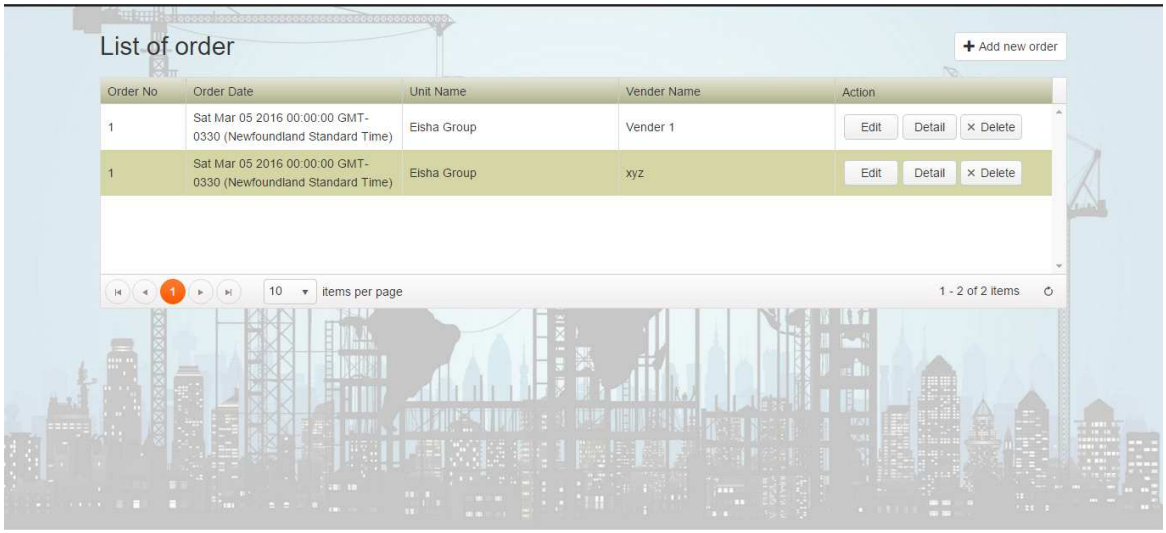
Fig. 2

Screenshots:





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Add new order
Order No
Order Date
Unit Name
Vender Name
Action
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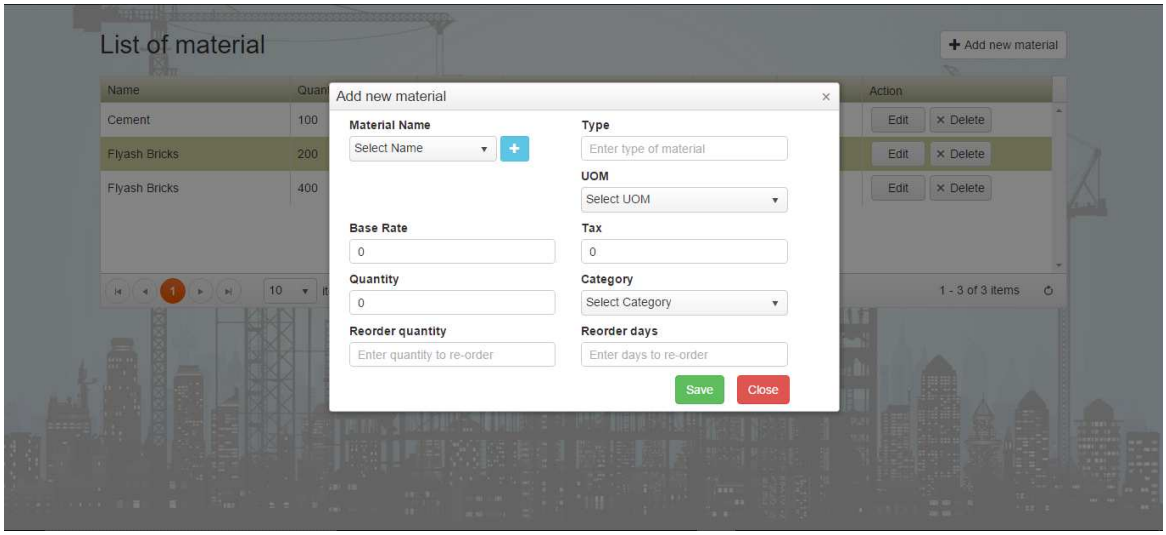
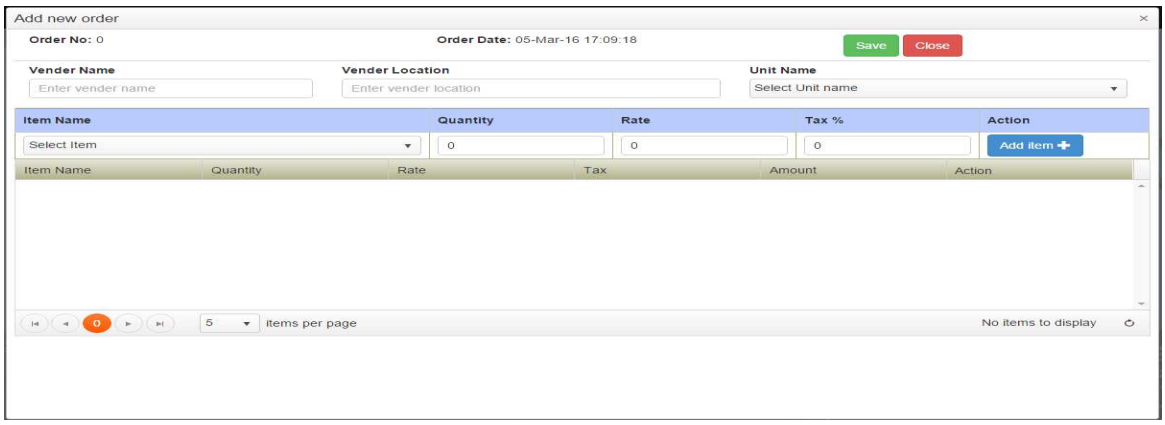
Sat Mar 05 2016 00:00:00 GMT-0330 (Newfoundland Standard Time)
Eisha Group
Vender 1
Edit
Detail
Delete
1
Sat Mar 05 2016 00:00:00 GMT-0330 (Newfoundland Standard Time)
Eisha Group
xyz
Edit
Detail
Delete
10
items per page
1 - 2 of 2 items


List of material
Add new material
Name
Action
Cement
100
Flyash Bricks
200
Flyash Bricks
400
Edit
Delete
1 - 3 of 3 items
Add new material
Material Name
Select Name
Type
Enter type of material
UOM
Select UOM
Base Rate
0
Tax
0
Quantity
0
Category
Select Category
Reorder quantity
Enter quantity to re-order
Reorder days
Enter days to re-order
Save
Close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Order No: 0
Order Date: 05-Mar-16 17:09:18
Save
Close
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Enter vender name
Vender Location
Enter vender location
Unit Name
Select Unit name
Item Name
Quantity
Rate
Tax %
Action
Select Item
0
0
0
Add item
Item Name
Quantity
Rate
Tax
Amount
Action
5
items per page
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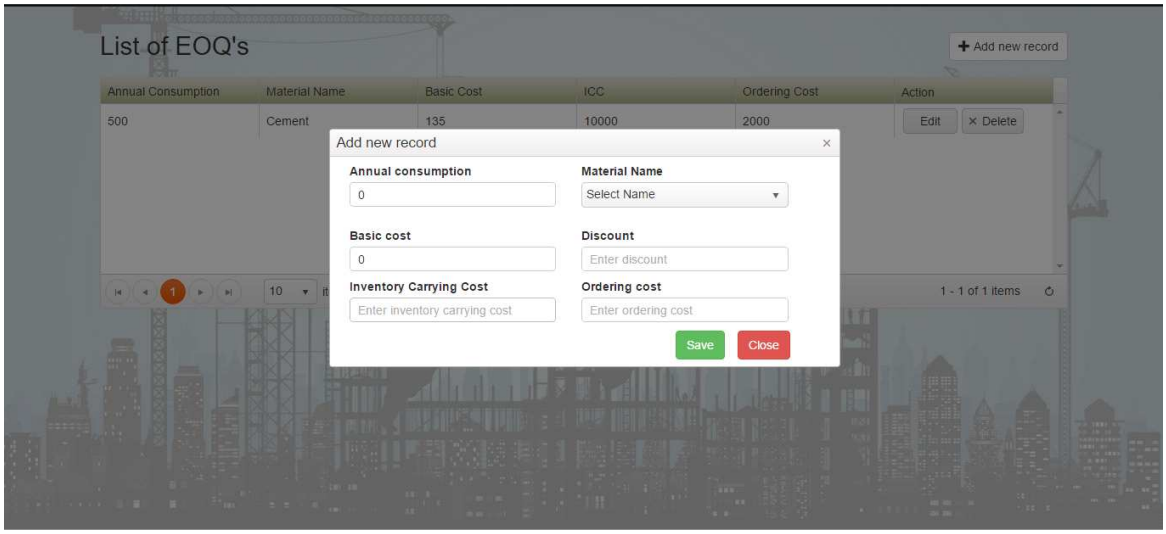
List of EOQ's
+ Add new record
Annual Consumption
Material Name
Basic Cost
ICC
Ordering Cost
Action
500
Cement
135
10000
2000
Edit
× Delete
1 - 1 of 1 items
Add new record
Annual consumption
0
Material Name
Select Name
Basic cost
0
Discount
Enter discount
Inventory Carrying Cost
Enter inventory carrying cost
Ordering cost
Enter ordering cost
Save
Close