

# Analysis & Optimization of Inventory of Low Value items based on ABC-VED

**Om Prakash Dubey**

**Abstract:-** Inventory control in modern Industry is a challenge due to application of wide range of materials. A most important inventory control technique ABC analysis demonstrate that C class items are available in majority approximate 70% of the total volume. Its a challenge to optimize the stock of all such items to prevent sale lost and improve the service level . So Selective Inventory Management (SIM) is an effective for determine cost-effective inventory control in an organization. It enables to focus on few important control points so that with limited control efforts very significant outcomes are realized. This need is felt in management of inventory because the numbers of different items or stock keeping units (SKU) in most organizations are too large. It easily runs into thousands or even hundreds of thousands of different SKUs and giving equal attention to management of inventories of each SKU may be very counter-productive. Whenever cost of control is higher than the benefits of control; the control becomes ineffective. Hence SIM becomes important if design of cost-effective inventory control is the objective.

**Introduction:-** inventory is physical stock of goods which is kept in store to meet the unexpected demand. However, from materials management perspective, an apt definition of inventory is “a usable but idle resource having some economic value.” This brings to the fore a paradox in the concept of inventory perceived as a “necessary evil.” It is necessary to have physical stock in the system to take care of the anticipated demand because non availability of materials when needed will lead to delays in production or projects or services delivered. However, keeping inventory is not free because there are opportunity costs of “carrying” or “holding” inventory in the organization. Selective inventory management is required to manage the all item because list of item are long. We need to focus the vital item and costly item . Effective purchasing plane all item value wise and criticality wise to achieve the service level.

**Type of inventory:-** Raw materials inventory as input to manufacturing system

1. Bought-out –parts Inventory which directly go to the assembly of product as it is.

2. Work-in-progress inventory or pipe line inventory
3. Finish goods inventory for supporting customers
4. Maintenance, repair and operating (MRO) supplies this include spare parts and other items required for production

### **List of General C-Class items.**

1. Printings (Flex, Board, Books, Pad, tag, Stickers, Visiting card)
2. Stationery items ( Paper, Pen ,Pencil, Marker, loose leaf, eraser, Stapler , File , Punching machine, Calculator , Gum, folder, separator etc.)
3. Welfare and gift items
4. Safety items (Personal Protective Equipment-(PPE) Safety Google, Nitrile glove, Ear plugs, Mouth Mask)
5. Packing items (Poly-bag, Corrugated Box, Tape, Nylon Strip)
6. Low value regular consumables (dhoti cloth, Gloves, detergent powder, bulb, Spray, PVC tape, Teflon tape, Blade, Emery paper)
7. Spare parts (Nut & Bolt, Belt, Bearings, Valve, and O-Rings)

**Need of Inventory due to the following reason:-**

1. Uncertainty of real demand
2. Uncertainty of consumption quantity, quality and timing of deliveries
3. Seasonal access to some materials and goods
4. Service level required by a customer
5. Expected difficulties with an access to some goods (expected rise of prices)
6. Discounts offered for purchases of larger quantities
7. Some technical and/or organizational conditions of deliveries.

**INVENTORY COST:-**

**1.Holding (or carrying) costs.** This broad category includes the costs for storage facilities, handling, insurance, pilferage, breakage, obsolescence, depreciation, taxes, and the opportunity cost of capital. Obviously, high holding costs tend to favor low inventory levels and frequent replenishment

**2.Setup costs.** To make each different product involves obtaining the necessary materials, arranging specific equipment setups, filling out the required papers, appropriately charging time and materials, and moving out the previous stock of material. If there were no costs or loss of time in changing from one product to another, many small lots would be produced. This would reduce inventory levels, with a resulting savings in cost. One challenge today is to try to reduce these setup costs to permit smaller lot sizes. (This is the goal of a JIT system.)

**3.Ordering costs.** These costs refer to the managerial and clerical costs to prepare the purchase or production order. Ordering costs include all the details, such as counting items and calculating order quantities. The costs associated

with maintaining the system needed to track orders are also included in ordering cost

**4.Shortage costs.** When the stock of an item is depleted, an order for that item must either wait until the stock is replenished or be canceled. When the demand is not met and the order is canceled, this is referred to as a stock out. A backorder is when the order is held and filled at a later date when the inventory for the item is replenished. There is a trade-off between carrying stock to satisfy demand and the costs resulting from stock outs and backorders. This balance is sometimes difficult to obtain because it may not be possible to estimate lost profits, the effects of lost customers, or lateness penalties. Frequently, the assumed shortage cost is little more than a guess, although it is usually possible to specify a range of such costs.

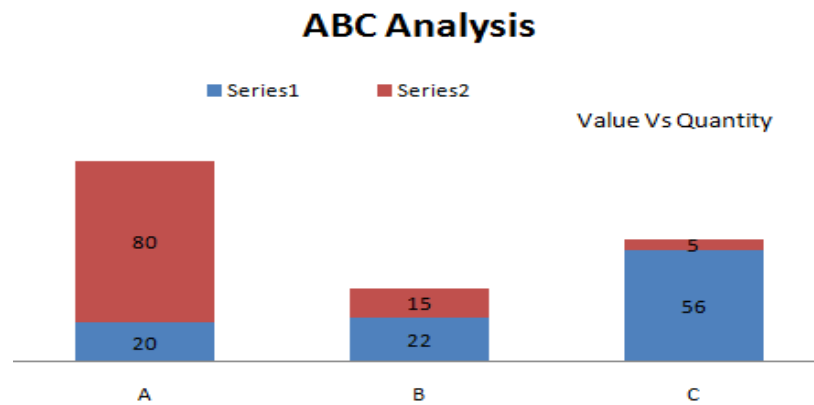
**Stock Reduction Technique:-**

1. Just in Time (JIT)
2. Quick Response (QR)
3. Efficient Consumer Response (ECR)
4. Vendor Managed Inventory (VMI)
5. Co managed Inventory (CMI)
6. Collaborative Planning, Forecasting and Replenishment (CPFR)
7. Agreements based purchase
8. Minimum , Reorder & Maximum stock level excel based or
9. ABC & VED analysis
10. Economic order quantity

**Calculation & Analysis:-**

**ABC analysis:**

The ABC method is an analytical method of stock control which aims at concentrating efforts on those items where attention is needed most. It is based on the premise that a small number of the items in inventory may typically represent the built money value of the total materials used in production process, while a relatively large number of items may represent a small portion of the money value of stores used and that small number of items should be subject to the greater degree of continuous control. Under this system, the materials stocked may be classified into a number of categories according to their importance, i.e., their value and frequency or replenishment during a period. The first category, we may call if the group of 'A items may consists of only a small percentage of total items handled but its combined value may be large portion of the total stock value. The second category, naming it as group of B items may be relatively less important. In this third category, consisting of C items, all the remaining items of stock may be included which are quite large in number but their value is not high.



	Percentage of items	Percentage value of annual usage	
Class A items	About 20%	About 80%	Close day to day control
Class B items	About 22%	About 15%	Regular review
Class C items	About 56%	About 5%	Infrequent review

Sr. No	Description	Make	Quote	avg Consumption monthly	Qty	Amount	ABC Category
1	PACKING TAPE 2" FMGIL PRINT	Manglam	20	560	1681	33620	A
2	PHOTO COPY PAPER A-4	Century	130	41	123	15990	A
3	FLOOR MARKING TAPE 2 " ( YELLOW )	Manglam	140	25	75	10500	A
4	LASER PRINTER CARTRIDGE 12A	HP	3100	1	2	6200	A
5	SEALING MACHINE FOR POLY BAGS	Sepack	3000	1	2	6000	A
6	RENOLD PEN	Rotiro	4.5	432	1295	5827.5	A
7	COMPUTER STATIONERY 804	Naman	480	2	7	3360	A
8	COMPUTER STATIONARY 802	Naman	380	2	7	2660	A
9	PERMANENT MARKER	Luxer/Cam lin	13	65	195	2535	A
10	PVC LOOSE LEAF	Infinity	3	250	750	2250	A
11	HP 9808 A-3 SIZE PRINTER CARTRIDGE COLO	HP	2200	0	1	2200	B
12	CELLO TAPE 1"	National	10	73	218	2180	B
13	PRINTER RIBBON CARTRIDGE TVS HD 745	prodot	160	4	13	2080	B
14	SONA INDEX FILE	SR	70	10	29	2030	B
15	HP 9808 A-3 SIZE PRINTER CARTRIDGE BLAC	HP	1700	0	1	1700	B
16	FILE SEPARATOR	Infinity	50	9	28	1400	B
17	PACKING TAPE DISPENSOR	Ikon/Best	280	1	4	1120	B
18	DELUXE COBRA FILE	Manglam	25	14	43	1075	B
19	CALCULATOR CT 512	Citizen	190	2	5	950	B
20	Case Card A-3	Deer	50	6	18	900	B
21	SKETCH PEN	Luxer/Cam lin	14	19	58	812	B
22	STAMP SELF INKING	Manglam	250	1	3	750	C
23	COBRA FILE	Manglam	10	20	61	610	C
24	Case Card A-4	Deer	28	5	15	420	C
25	PLASTIC FOLDER	infinity	50	3	8	400	C
26	Cello tape 2'	National	15	8	25	375	C

27	STEPPLER PIN	Kangaroo	5	24	73	365	C
28	PHOTO COPIER PAPER COLOUR	Sprint	180	1	2	360	C
29	WHITE BOARD MARKER	Luxer/Camlin	17	5	16	272	C
30	PENCIL HB	Natraj/Camlin	30	2	6	180	C
31	GUM TUBE	Manglam	28	2	5	140	C
32	CARBON PAPER	Korse	110	0	1	110	C
33	PUNCHING M/C	Kangaroo	100	0	1	100	C
34	STEPPLER	Kangaroo	40	1	2	80	C
35	SCALE STEEL 1 FT	Omex	12	0	1	12	C
36	PAINT MARKER	Camlin	35	0	0	0	C
37	CHART PAPER FOR DRAWING	Manglam	5	0	0	0	C
38	PHOTO COPY PAPER A-3	Century	260	0	0	0	C
39	CORRECTION FLUID	Infinity/Luxer	19	0	0	0	C
40	RIBBON DMP PRINTER	prodot	25	0	0	0	C
41	DOUBLE ENDED TAPE	Deer	40	0	0	0	C
42	SHARPNER PENCIL	Natraj/Camlin	2	0	0	0	C
43	INK FOR STAMP PAD	Ashoka	20	0	0	0	C
44	CLIP BOARD	Diplomat	68	0	0	0	C
45	TRACING PAPER A-3 SIZE	Citizen	680	0	0	0	C
46	BOARD DUSTER	Omega	20	0	0	0	C
47	SCALE STEEL 2 FT	omex	50	0	0	0	C
48	ABSTRACT CHART	Local	110	0	0	0	C
					<b>Total</b>	<b>10956</b>	<b>Value</b>
						<b>3.5</b>	<b>in %</b>
					A	87650.8	80
					B	16434.53	15
					C	5478.175	5

#### VED Analysis:

VED stands for vital, essential and desirable. This type of classification is applicable mostly in the case of parts. The peculiarity about parts is that they do not follow the usual methods outline dealer; we might get into difficulties when the demand pattern suddenly changes. The categorization is made in terms of importance or critically of the part of the operation of the plant. If it is very vital, it is given a 'V' classification. If an item is important it is classified as 'E' item. If it is not so important, it is given a

‘D’ classification. For ‘V’ items, a reasonably large quantum of stocks might be necessary, while for ‘D’ items, no stocks are, perhaps, required to be kept, especially if that item also happens to be in the ‘A’ or ‘B’ classification. For ‘V’ items of ‘A’ classification, a close control should be kept on stock levels, but if it is a ‘C’ item, then large quantities may be stored. The whole objective is to select items for special control and thus expand time and effort in a prudent way.

	<b>A</b>	<b>B</b>	<b>C</b>
<b>V</b>	AV NOS 3 VALUE 45820 Rs	BV NOS 3 VALUE 5380 Rs	CV NOS 2 VALUE 1125 Rs
<b>E</b>	AE NOS 5 VALUE 38337 Rs	BE NOS 3 VALUE 5930 Rs	CE NOS 0 VALUE 0
<b>D</b>	AD NOS 2 VALUE 4785 Rs	BD NOS 5 VALUE 5137 Rs	CD NOS 12 VALUE 3049 Rs

Preferential Treatment on Basis of ABC Analysis

ABC Category	Annual Consumption Value	Nos Of Order	Value per Order	Average Inventory
A	87650.8	8	10956.35	5478.175
B	16434.53	3	5478.176667	2739.088333
C	5478.175	1	5478.175	2739.0875
			Total Inventory Rs	10956.35083

Equal Treatment to all

ABC Category	Annual Consumption Value	Nos Of Order	Value per Order	Average Inventory
A	87650.8	4	21912.7	10956.35



Filing Cost	200 nos order Rs 150	1.33
Ordering making cost	200 nos order process Rs 21000	105
Pr requisition cost	Fix price	50
Approval Cost	Fix price	100
Telephone Cost	5 call Rs@2	10
	Total	271.33
	Appox. with Misc.	280

$Q^* = 45.48$   $Q^* = 46$

If  $Q^* = 50$  , Economic Order Quantity Discount= 10%

**Precautions to be taken in using EOQ:**

- Costs are not the same: while applying EOQ, it is observed that the costs of component are not the same for all items and supplies. In case one order has many deliveries, the costs can be computed per delivery. But here the cost of a first order is certainly not the same as that of repeat order placed on an established vendor. One order may contain several items, thus reducing the effective number of orders. For critical items, the organization banks upon several suppliers, and so the numbers of orders are more. Low value items are covered by a contract with a single supplier. Although the receiving costs may be the same, one cannot apply a uniform rate for delivery costs may be the same, one cannot apply a uniform rate for delivery costs inspection and testing fluctuate in either direction. In short, the ordering costs are not the same for all suppliers.
- The inventory holding cost in engineering industry depends not only on value of the item but also on its weight, volume and nature.
- There are special cases like impending price rise, closure of suppliers units, change in import policy, etc. Some vendors give frequent delivers. But many vendors prefer to deliver goods in bulk. In spares, critically of an item overrides all other considerations.
- There are instances when EOQ should not be applied. If the requirements are known but irregular, the technique of material requirement planning is used. In such a case, flexible ordering is followed depending on the master production plan

**Conclusion:-** Effective purchase planning and selective inventory management is required to achieve the desired service level and prevent the stock out situation because the list of item are more. ABC and VED analysis categorized the item which are Vital and valuable. We can reduce the ordering cost by calculating the EOQ. If numbers of order is less our ordering cost will be saved . Agreement based purchasing reduce lot of repetitive effort to arrange quote of a order which help us in focused purchasing ,So we need not to arrange the quote every time .

**References:-**

- [1] Stanislaw Krzyżaniak ECR EUROPE FORUM & MARKET PLACE, # Springer India 2014
- [2] P. Vrat, Materials Management, Springer Texts in Business and Economics, Operations Research V.K.Kapoor Sultan Chand and Sons 1999
- [3] 7th edition , Cost and Management Accounting Jain & Narnag Kalyani publishers 2002
- [4] 4th edition ,Financial Management Prasanna Chandra Tata Mc Graw Hill 2004
- [5] 6th edition, Financial Management P.N. Reddy H.R.Appanniah G.Sathyaprasad Himalaya Publishing house 2000 2nd edition