

SELECTIVE INVENTORY CONTROL AND RAW MATERIAL PURCHASING PROCESS OF CARBON STEEL

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ABSTRACT

Long products constitute almost half of the annual steel production, which stands at 53 million tones presently. Industry estimates show that the construction sector alone consumes close to 45 per cent of the total long products output. Stainless steel accounts for only 3 per cent of the country's total steel production and about 70 per cent finds application in kitchenware and the rest in industries. The demand for flat steel products will be strong, with rising production of automobiles as automobile sales have risen an annual 15%. Steel along with iron has a weight of 3.64 per cent in the wholesale price index. The present index of basic metal and alloy recorded an 8.55% growth rate. Production of bars and rods recorded 19.67% growth rate and steel wires recorded 11.11% growth rate. India's steel production is likely to surpass the domestic requirement by 2011-2012, easing pressure on price of the alloy. Other allied steel products are HR coils, CR coils, and HDG coil etc. End users sector like auto, consumer durables, construction and electricity have all shown steady growth in recent years and Indian steel import figure further provides evidence of strong domestic demand.

KEYWORDS: *Purchasing Process, Inventory Control*

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INTRODUCTION

The steel industry in India has been moving from strength to strength. India has emerged as the fourth largest producer of steel in the world and the second largest producer of crude steel. Steel production reached 28.52 million tones (MT). India's steel industry has some advantages i.e. sufficient availability of raw materials, particularly quality iron-ore, a rich skill base and an expanding market.

India's steel industry is the happening place in 2010 with global gins in the field showing keen interest in setting shop in India. India is poised to take a big leap in steel capacity creation. By 2015-16, it may become world's second largest steel producer. The National Steel Policy has a target for taking steel production up to 110 MT by 2019–20. Nonetheless, with the current rate of ongoing Greenfield and brownfield projects, the Ministry of Steel has projected India's steel capacity is expected to touch 124.06 MT by 2011–12. In fact, based on the status of memoranda of understanding (MoUs) signed by the private producers with the various state governments, India's steel capacity is likely to be 293 MT by 2020.

OBJECTIVES

- To categorize the raw material in inventory as high, medium, and low value.
- To classify inventory according to annual value of consumption of the item.
- To utilize of scare resource.
- To keep the production on as on-going basis.
- To evaluate supplier to ensure a portfolio of best in class supplier is available for use.
- To reduce purchase risk.
- To maximize overall value to the purchaser.
- To develop long term relationship between buyers and supplier to achieve just in time production.

METHODOLOGY

To achieve aforesaid objective the following methodology has been adopted. The information for this report has been collected through the primary and secondary sources.

Primary Sources

The data is collected through the observation in the organization and interview with officials and workmen.

Direct Interview was done by asking question related to failure in chargers in the production. A part from these some information is collected through the meetings, which were held by SAIL – SSP.

Secondary Sources:

The secondary data have been collected through the various articles about SSP within and outside the production floor, Company Intranet & websites.

METHOD OF ANALYSIS

Selective Inventory Control:

In materials management, the **ABC analysis** (or **Selective Inventory Control**) is an inventory categorization technique. ABC analysis divides an inventory into three categories- "A items" with very tight control and accurate records, "B items" with less tightly controlled and good records, and "C items" with the simplest controls possible and minimal records.

The ABC analysis provides a mechanism for identifying items that will have a significant impact on overall inventory cost, while also providing a mechanism for identifying different categories of stock that will require different management and controls.

The ABC analysis suggests that inventories of an organization are not of equal value. Thus, the inventory is grouped into three categories (**A, B, and C**) in order of their estimated importance.

'A' items are very important for an organization. Because of the high value of these 'A' items, frequent value analysis is required. In addition to that, an organization needs to choose an appropriate order pattern (e.g. 'Just-in-time') to avoid excess capacity. 'B' items are important, but of course less important than 'A' items and more important than 'C' items. Therefore 'B' items are intergroup items. 'C' items are marginally important.

ABC Analysis Categories

There are no fixed thresholds for each class, different proportion can be applied based on objective and criteria. ABC Analysis is similar to the Pareto principle in that the 'A' items will typically account for a large proportion of the overall value but a small percentage of number of items.

Examples of ABC Class are

- 'A' items – 20% of the items accounts for 70% of the annual consumption value of the items.
- 'B' items - 30% of the items accounts for 25% of the annual consumption value of the items.
- 'C' items – 50% of the items accounts for 5% of the annual consumption value of the items.

Another Recommended Breakdown of ABC Classes

- "A" approximately 10% of items or 66.6% of value.
- "B" approximately 20% of items or 23.3% of value.
- "C" approximately 70% of items or 10.1% of value.

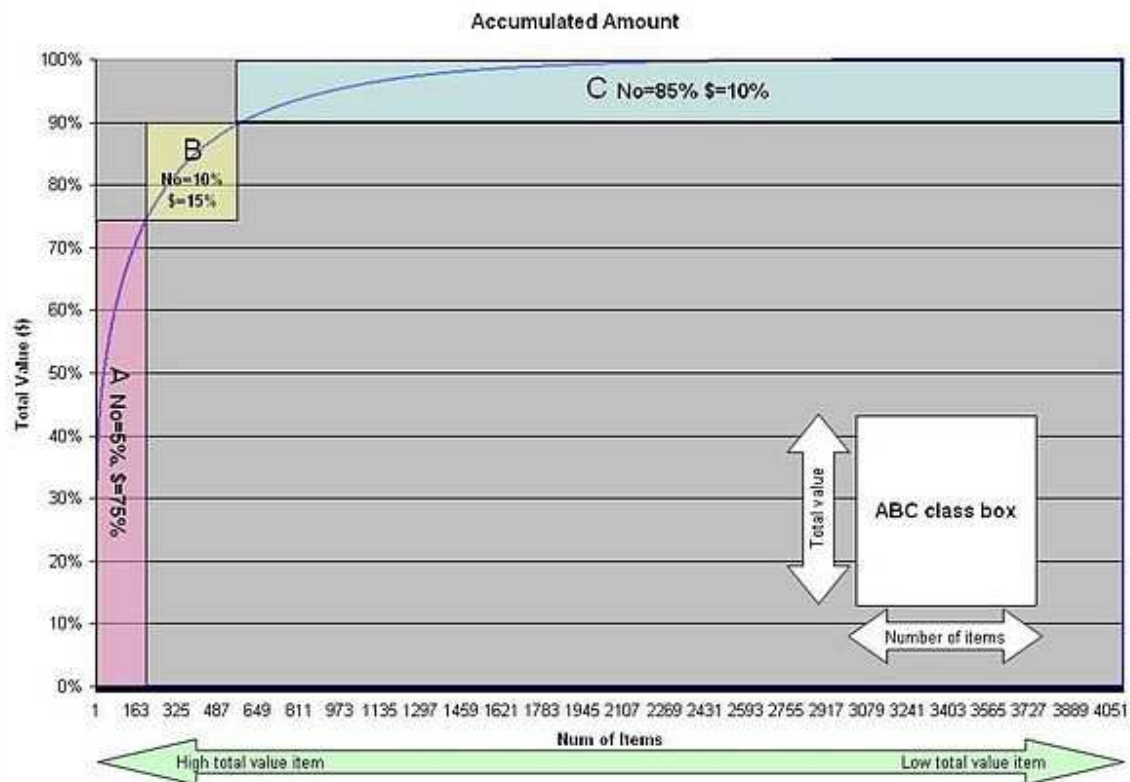


Figure 1

INVENTORY

Inventories are physical stocks of items that a manufacturing or service organization holds in stock or efficient running of activities.

There are four different types of inventories:

- Raw Material Inventory.
- Work In Process.
- Finished /brought out parts.
- Finished Goods.

Though Inventories are necessary for efficient running of the activities of the organization but inventories cost money in terms of storage, personnel, insurance, the space that is required for their storage and most importantly the cost of capital incurred towards acquiring the stocks.

On the other hand it is also necessary to maintain sufficient inventories for avoiding the stock outs cost, cost of idle wages of labour, the cost of idle machines and also the loss of business opportunity.

The most important asset of the organization is its material (stock), if you analyse any of the balance sheets of the company we would observe that around 70% of the capital is in inventories. If this area can be managed properly the profit margin of the company can be increased. A nationwide study in this area revealed that in the manufacturing firm, on an average the company loses one percent of the profit due to non-availability of inventories in spite of high inventories investment.

Can there be a more fruitful area of cost reduction than this????

There are several techniques of inventory control one of the techniques used for this is Selective Control of Inventories.

The method of Selective control of inventories is in accordance with Pareto's law of Cause and Effect.

According to this law "20% of the causes are responsible for 80% of effects and vice versa.

Selective control means variation in control of items on selective basis.

The criterion used for the purpose may be:

- Usage Value.
- Unit Price.
- Criticality of item.
- Procurement difficulties.
- Seasonality.
- Issues form Stores.
- Inventory investment.

Needs of Inventory

- To maintain continuous flow of supply through supply chain.
- To maintain safety stock.
- To achieve economy of scale in transportation.
- To make a bulk purchase & get advantage of discount.
- To maintain customer service level.

What is inventory control?

- It is planning, ordering and scheduling of material.
- Right quantity of material available at right time.
- Systematic control over purchasing, storing and using of material.

Functions of Inventory Control

- Effective use of financial resources.
- Protection against all material losses.
- Proper calculation of cost of production.
- Keeps the ball of production bouncing?
- Economies in purchasing.
- Eliminates redundant inventory.
- Keeping prompt delivery to the customers.

Scope of Inventory Control

- Formulation of relevant policies.
- Determining economic order quantity.
- Determining lead time.
- Minimization of material-handling and storage cost.
- Ascertaining Safety Stock.

Let us now take ABC Analysis of selective inventory control for our studies. This analysis is based on the annual usage value. Figures reveal that a handful of items amount for bulk expenditure on materials. ABC Analysis segregates the inventories into three categories:

- **A items:** These are 5-10 % of the items which amounts for 70-75% of total money spent on materials. These items need to be stocked in smaller quantities and should be procured frequently, the quantity per occasion being small.
- **B Items:** These are 10-15 % of the items which amounts for 10-15% of total money spent on materials.
- **C Items:** These are 70-80 % of the items which amounts for 5-10 % of total money spent on materials.

Conducting ABC Analysis

- Prepare a list of items and estimate their annual consumption (units).
- Determine unit price of each item.
- Multiply annual consumption with unit price to get the annual consumption in rupees.
- Arrange the items in descending order of their annual usage starting with the highest and ending with the lowest.
- Calculate cumulative usages and express the same as cumulative usage percentage .Also express the no of items into cumulative item percentage.
- Plot a graph of cumulative usage percentage vs cumulative item percentage and segregate into three categories as A, B and C items.
- Decide the policies for control of these three categories.

VENDOR RATING

In a supply chain, a **vendor**, or a **seller**, is an enterprise that contributes goods or services. Generally, a supply chain vendor manufactures inventory/stock items and sells them to the next link in the chain. Today, the terms refers to a supplier of any good or service.

A vendor, also known as a supplier, is an individual or company that sells goods or services to someone else in the economic production chain. Vendors are a part of the supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user.

Parts manufacturers are vendors of parts to other manufacturers that assemble the parts into something sold to wholesalers or retailers. Retailers are vendors of products to consumers. In information technology as well as in other industries, the term is commonly applied to suppliers of goods and services to other companies.

A tier 1 vendor is a large and well-known vendor, often enjoying national or international recognition and acceptance. Tier 1 vendors may be both manufacturers and value-added resellers (VARs). A tier 2 vendor is a smaller and less well-known provider that is often also limited in its geographic coverage as well. As a consequence, a tier 2 vendor is generally regarded as a secondary source rather than the preferred source.

Some organizations implement internal units known as vendor management offices (VMO) dedicated to evaluating third-party providers of goods and services, supervising day-to-day interactions and managing longer-term relationships.

Vendor rating is the result of a formal vendor evaluation system. Vendors or suppliers are given standing, status, or title according to their attainment of some level of performance, such as delivery, lead time, quality, price, or some combination of variables. The motivation for the establishment of such a rating system is part of the effort of manufacturers and service firms to ensure that the desired characteristics of a purchased product or service is built in and not determined later by some after-the-fact indicator. The vendor rating may take the form of a hierarchical ranking from poor to excellent and whatever rankings the firm chooses to insert in between the two. For some firms, the vendor rating may come in the form of some sort of award system or as some variation of certification. Much of this attention to vendor rating is a direct result of the widespread implementation of the just-in-time concept in the United States and its focus on the critical role of the buyer-supplier relationship.

Most firms want vendors that will produce all of the products and services defect-free and deliver them just in time (or as close to this ideal as reasonably possible). Some type of vehicle is needed to determine which supplying firms are capable of coming satisfactorily close to this and thus to be retained as current suppliers. One such vehicle is the vendor rating.

In order to accomplish the rating of vendors, some sort of review process must take place. The process begins with the identification of vendors who not only can supply the needed product or service but is a strategic match for the buying firm. Then important factors to be used as criteria for vendor evaluation are determined. These are usually variables that add value to the process through increased service or decreased cost. After determining which factors are critical, a method is devised that allows the vendor to be judged or rated on each individual factor.

Criteria for Evaluation

Vendor performance is usually evaluated in the areas of pricing, quality, delivery, and service. Each area has a number of factors that some firms deem critical to successful vendor performance.

Pricing factors include the following:

- Competitive pricing. The prices paid should be comparable to those of vendors providing similar product and services. Quote requests should compare favorably to other vendors.
- Price stability. Prices should be reasonably stable over time.
- Price accuracy. There should be a low number of variances from purchase-order prices on invoiced received.
- Advance notice of price changes. The vendor should provide adequate advance notice of price changes.
- Sensitive to costs. The vendor should demonstrate respect for the customer firm's bottom line and show an understanding of its needs. Possible cost savings could be suggested. The vendor should also exhibit knowledge of the market and share this insight with the buying firm.
- Billing. Are vendor invoices accurate? The average length of time to receive credit memos should be reasonable. Estimates should not vary significantly from the final invoice. Effective vendor bills are timely and easy to read and understand.

Quality Factors Include

- Compliance with purchase order. The vendor should comply with terms and conditions as stated in the purchase order. Does the vendor show an understanding of the customer firm's expectations?
- Conformity to specifications. The product or service must conform to the specifications identified in the request for proposal and purchase order. Does the product perform as expected?
- Reliability. Is the rate of product failure within reasonable limits?
- Reliability of repairs. Is all repair and rework acceptable?
- Durability. Is the time until replacement is necessary reasonable?
- Support. Is quality support available from the vendor? Immediate response to and resolution of the problem is desirable.
- Warranty. The length and provisions of warranty protection offered should be reasonable. Are warranty problems resolved in a timely manner?
- State-of-the-art product/service. Does the vendor offer products and services that are consistent with the industry state-of-the-art? The vendor should consistently refresh product life by adding enhancements. It should also work with the buying firm in new product development.

Delivery Factors include the Following

- **Time:** Does the vendor deliver products and services on time; is the actual receipt date on or close to the promised date? Does the promised date correspond to the vendor's published lead times? Also, are requests for information, proposals, and quotes swiftly answered?
- **Quantity:** Does the vendor deliver the correct items or services in the contracted quantity?
- **Lead time:** Is the average time for delivery comparable to that of other vendors for similar products and services?
- **Packaging:** Packaging should be sturdy, suitable, properly marked, and undamaged. Pallets should be the proper size with no overhang.
- **Documentation:** Does the vendor furnish proper documents (packing slips, invoices, technical manual, etc.) with correct material codes and proper purchase order numbers?
- **Emergency delivery:** Does the vendor demonstrate extra effort to meet requirements when an emergency delivery is requested?

Finally, these are service factors to consider:

- Good vendor representatives have sincere desire to serve. Vendor reps display courteous and professional approach, and handle complaints effectively. The vendor should also provide up-to-date catalogs, price information and technical information. Does the vendor act as the buying firm's advocate within the supplying firm?

- Inside sales. Inside sales should display knowledge of buying firm’s needs. It should also be helpful with customer inquiries involving order confirmation, shipping schedules, shipping discrepancies, and invoice errors.
- Technical supports Does the vendor provides technical support for maintenance, repair, and installation situations? Does it provide technical instructions, documentation, and general information? Are support personnel courteous, professional, and knowledgeable? The vendor should provide training on the effective use of its products or services.
- Emergency support. Does the vendor provide emergency support for repair or replacement of a failed product?
- Problem resolution. The vendor should respond in a timely manner to resolve problems. An excellent vendor provides follow-up on status of problem correction.

Benefits

Benefits of vendor rating systems include:

- Helping minimize subjectivity in judgment and make it possible to consider all relevant criteria in assessing suppliers.
- Providing feedback from all areas in one package.
- Facilitating better communication with vendors.
- Providing overall control of the vendor base.
- Requiring specific action to correct identified performance weaknesses.
- Establishing continuous review standards for vendors, thus ensuring continuous improvement of vendor performance.
- Building vendor partnerships, especially with suppliers having strategic links.
- Developing a performance-based culture.

Vendor ratings systems provide a process for measuring those factors that add value to the buying firm through value addition or decreased cost. The process will continually evolve and the criteria will change to meet current issues and concerns.

ANALYSIS OF DATA

ABC Analysis

Table 1

Product Name	Item Code
Phosphorus(P)	1
Chromium(Cr)	2
Nickel(NI)	3
Zirconium(ZR)	4
Carbon(C)	5
Sulphur(S)	6
Manganese(MN)	7
Copper(CU)	8
Niobium(NB)	9

Table 1: Contd.,

Aluminium(AL)	10
Titanium(TI)	11
Molybdenum(MO)	12
Silicon(SI)	13
Vanadium(V)	14

Table 2

Item Code	Cost/Unit	Annual Demand/Week	Usage Value	Rank
1	120	1000	150000	12
2	600	120	72000	14
3	1200	100	120000	13
4	3300	80	264000	8
5	30000	65000	1950000000	1
6	12000	800	9600000	4
7	108000	7000	756000000	2
8	900	200	171000	10
9	12000	400	4800000	5
10	180	1000	180000	9
11	1500	200	300000	7
12	4800	300	1440000	6
13	150	90000	13500000	3
14	1200	150	168000	11

Re Arranging**Table 3**

Item Code	Usage Value	Cumulative Value	% Cumulative Usage Value	% Of Item
5	1950000000	1950000000	71	7
7	456000000	2456000000	88	14
13	13500000	2509500000	90	21
6	9600000	2729100000	99	28
9	4800000	2733900000	99	35
12	1440000	2735340000	99	42
11	300000	2735640000	99	50
4	264000	2735904000	99	57
10	180000	2736084000	99	64
8	171000	2736255000	99	71
14	168000	2736423000	99	78
1	150000	2736573000	99	85
3	120000	2736693000	99	92
2	72000	2736765000	99	100

VENDOR RATING**Table 4**

Suppliers	Coded No	State
Kiriburu	1	Jharkhand
Meghahatuburu(jha)	2	Jharkhand
Bolani	3	Orissa
Barsua	4	Orissa
Kalta	5	Orissa
Gua	6	Jharkhand
Manoharpur(chiria)	7	Jharkhand

Quality Rating

- Lot Accepted / Lot Received * Qty Factor
- Weight Age Factor = 40 %

Table 5

Supplier	Lot Received	Lot Accepted	Quality Factor	Quality Rating
1	150	140	40	37
2	120	120	40	40
3	120	110	40	43
4	100	90	40	36
5	70	60	40	34
6	150	130	40	34.6
7	50	50	40	40

Price Rating

- Least Price*/Net Price * Price Factor
- Weight Age Factor = 30 %

Table 6

Supplier	Unit Price	TPT	Net Price	Proportion	Price Rating
1	22 kg	4000	26000	0.99	19.8
2	25 kg	4200	29200	0.88	17.6
3	25 kg	4200	29200	0.88	17.6
4	23 kg	4000	27000	0.95	19
5	23 kg	4000	27000	0.95	19
6	22 kg	3800	25800*	1	20
7	25 kg	3800	28800	0.89	17

Delivery Rating

- Proportion of Delivery Accepted * Delivery Factor
- Weight Age Factor = 20%

Table 7

Supplier	% Of Missing	% Of Accepted	Rating
1	–	100%	30
2	4%	96%	28
3	4%	96%	28
4	8%	92%	27.6
5	10%	90%	27
6	–	100%	30
7	15%	85%	25.50

Composite Rating

- DR+PR+QR

Table 8

Supplier	DR(a)	PR(b)	QR(c)	Composite Rating = a+b+c
1	30	19.8	37	86.8
2	28	17.6	40	85.6
3	28	17.6	43	88.6*
4	27.6	19	30	80.6
5	27	19	34	0.80
6	30	20	34.6	84.6
7	25.50	17	40	82.5

Supplier 3 is preferred more than the other suppliers.

Findings

- **A items:** These are 5-10 % of the items which amounts for 70-75% of total money spent on materials. These items need to be stocked in smaller quantities and should be procured frequently, the quantity per occasion being small.
- **B Items:** These are 10-15 % of the items which amounts for 10-15% of total money spent on materials.
- **C Items:** These are 70-80 % of the items which amounts for 5-10 % of total money spent on materials.

Vendor Rating

Supplier 3 is preferred more than the other suppliers.

CONCLUSIONS

- By selective inventory control technique the raw material in inventory are categorized as high, medium, and low value under consumption of annual demand of the item by ABC analysis.

Table 9

HIGH (A)	MEDIUM (B)	LOW (C)
Carbon(C), Manganese(MN), Silicon (SI).	Sulphur(S), Niobium(NB)	Phosphorus(P), Chromium(Cr), Nickel(NI), Copper(CU), Aluminium(AL), Titanium(TI), Molybdenum(MO), Vanadium(V)

So that scarce resource utilized in proper and production is kept on on going basis

- In purchasing process suppliers are rated using vendor rating and according to this supplier 3 are preferred more than the other to reduce purchase risk and maintain standard relationship between buyers and supplier to achieve just in time production.

SUMMARY

With few weeks of study about the production process of HRM and the various supporting departments related with production process. I was interested with the issue that was occurring in the production which was quite related to SELECTIVE INVENTORY CONTROL AND RAW MATERIAL PURCHASING PROCESS OF CARBON STEEL

These guidelines are then reported to the assistant general manager (SAIL) of production and then he helped to implement these guidelines in action by making the workmen follow during the next entire week.

Therefore the main objective of my project was fulfilled and I was able to contribute something to the company during my project

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