Mine Management & Legislation

Materials Management

Materials Management

OBJECTIVES

Materials Management aims at reducing the cost of production so as to help the organisation in maximising its profits. Main objectives of materials management are:

- To reduce material cost.
- Efficient control of inventories, which helps in releasing the working capital for productive purposes.
- Ensure uniform flow of material for production
- Ensure right quality at right price.
- Establish and maintain good relations with supplier.
- Economy in using the. imported items and to find their substitutes.

FUNCTIONS OF MATERIALS MANAGEMENT

Functions of the materials management department are grouped as follows:

1. Materials planning and programming
2. Purchasing.
3. Store-keeping
4. Inventory control
5. Material handling
6. Quality control and inspection
7. Value engineering
8. Standardisation, simplification, variety reduction, product
9. Development, make or buy decisions.
10. Disposal of obsolete, surplus and scrap.

Materials Planning and Programming. Planning of materials requirement and its timely provisioning is the essence of the success of materials management. This function involves the setting up of consumption standard or working out the requirements for all materials for any given manufacturing programme, considering all relevant factors, *i.e.* make or buy, laying down standards and specification, sources of supply available, availability of stock, import substitution etc. Lead time, manufacturing schedule, economic ordering quantity etc. is considered while programming for material requirement. The department should also follow-up for timely deliveries, and to accelerate in case of emergencies.

For the purpose of material planning two concepts are followed depending upon the category. Direct production materials are planned on 'requirement basis', while the stock items are planned on the basis of norms of consumption

Materials Purchase. Purchasing function includes locating and development of sources of supply, market research for purchasing, calling for tenders, selection of suppliers, negotiating, entering into rate contract and issue of purchase orders mentioning specifications, delivery schedule and other terms and conditions.

Purchasing function also include suppliers performance evaluation, preparation of materials budget (or called as purchase budget) with the help of material planning and inventory control sections.

Store-Keeping. Store-keeping involves receipt custody and issue of materials. The materials received against purchase orders placed by purchase section, are kept in stores after they are inspected and checked for quality as per specifications, physical condition and quantity. The materials are kept in stores in such a way that they require minimum handling and remain well protected against any damage or loss. Material is issued from the stores against the authorized indents or store issue vouchers and proper record is maintained for receipt and issues of materials.

Physical verification and salvage and disposal of surplus material is another key function of store-keeping.

Inventory Control. Inventory control is a systematic location, storage and recording of goods in such a way that desired degree of service can be made to the operating shops at minimum ultimate cost. Inventory control has following functions:

- To run the stores effectively.
- To ensure timely availability of material and avoid build up of stock.
- Technical responsibility for the state of materials.
- Stock control systems be developed and followed.
- To maintain specified raw materials.
- To protect the inventories.
- Pricing of material supplies.
- To develop policies, plans and standard essential to achieve inventory control objectives.
- To maintain overall control by checking results and adopting corrective actions.

Material Handling. Various functions related to storekeeping requires lot of handling. Starting from receipt of material, inspection, storage and issue items should be handled in such a way that it requires minimum handling. For large stores suitable material handling equipment like cranes, hoists, forklifts, conveyors etc. are required.

Scientific material handling system not only economies handling but also space, provides better working condition, and effective distribution system. .

Quality Control and Inspection. Quality control in simplest terms, is the control of quality during manufacturing. Quality of a product itself comprises several engineering and manufacturing characteristics which go to make the product meet the performance expectations of the designer and the customers. These characteristics are: dimensions, chemical properties, sensory property. In other words quality includes appearance, performance, life, dependability, reliability, durability, maintainability, smell, taste, feel, sound etc.

Inspection is the process of sorting good from bad, and rejects the bad. Inspection is defined as the art of comparing materials, products, or performances with established standards. The objectives of the Inspection are; to detect errors in manufacturing system, to protect the customer from receiving a product that is below the quality level, and to compile information regarding the conformance of the product with specifications for the use of engineering, production, purchasing, quality control and other divisions.

INVENTORY MANAGEMENT

Inventory means all the materials (may be raw or finished parts/components, in process or finished products, castings and consumable tools, electrodes etc.) recorded on the ledgers/books of the organization and kept in its stocks (in the store or ware houses) for some period of time.

So inventory is an essential part of an organization. Every enterprise/business or manufacturing concern however big or small, has to maintain some inventory. Some definitions explaining the various aspects of inventory are as follows:

- Inventories are referred to raw materials and finished goods lying in stores.
- All items, parts/components, materials, in process or finished products recorded in the books of the organization and kept in the stores are called inventories.
- Inventory is list of names, with complete specifications, quantities and/or money values of usable items.
- Inventory is defined as a descriptive list or items/goods which gives quantity and money value of each item. Inventory includes raw materials, semi-finished products or work in process inventories, finished parts/components and finished final products etc. held in storage awaiting use or marketing.

Functions Or Characteristics Of Inventory

From the definition of inventory, it is clear that it is related to stock of raw materials, semi finished and finished products items maintained by the enterprise/business/organization. The following points will explain the concept and functions of inventory.

Inventories Serve as Cushions. Against shocks due to demand/supply fluctuations, it separates different manufacturing operations from one another and make them independent so that each operation can be performed economically. For example, an organization has to deal with several consumers and vendors and due to their unpredictable behaviour there are always fluctuations in demand or supply of goods which disturbs the schedule of the enterprise. Inventories absorb these fluctuations and help in maintaining undisturbed production i. e. we decouple the manufacturing activities from the consumer and vendor successfully by cushions of stocks. Further more purchasing/order of raw material can be carried out independently of the finished products distribution and both of these activities can be made low cost operations say by ordering raw material and distributing products in one big lot than in small batches. Thus it leads to better utilization of men and machines besides economy.

Inventory, a Necessary evil for any Enterprise. Inventories require valuable space, capital and other overheads for maintaining it. The invested capital remains idle till the stocks are not consumed. On the other hand, smooth working of the organization is not possible without inventory so it is a necessity. Further it has been observed that costs of not having inventory (stock out conditions) are usually greater than costs of having them. Thus inventory is a necessary evil.

Inventory Provides Production Economies. Purchase in desired quantities nullifies the effects of change in prices or supply. Stocks bring economy in purchase of various inputs due to discounts on bulk purchase.

Maintenance of Smooth and Efficient Production Flow. Maintains smooth and efficient production flow thus keeps a process continually operating.

Creation of Motivational Effect in Decision Making. Creates motivational effect in decision and policy making e.g. a person may be tempted to purchase more if inventories are displayed in bulk.

Importance Of Inventory

The following points give the importance of inventory to an organization:

- Good consumer service can be provided and maintained in the organization.
- Enables smooth and efficient production flow of goods items.
- Provides protection against uncertainties regarding demand and supply of materials and output.
- Various production activities can be independently and economically performed.
- Ensure better utilization of men, machines and materials.
- With bulk purchases quantity discounts can be availed.

Types Of Inventory

The term inventory includes all types of goods/items available in the stores, however, it excludes the machinery, jigs and fixtures. Inventories can be classified in different ways depending on their function or convention. The classification of inventory is mentioned below.

Classification According to Function or Material Flow

- **Production Inventory.** Items/goods going into final product such as raw materials, components finished parts/components sub assemblies procured from market or outside source.
- **Work In Process Inventory**. Items in semi finished stage or products required at different stages of manufacturing of the product.
- **Finished Goods Inventory**. These are finished goods or final products ready for dispatch to users or to distributors.
- **Operating and Maintenance Inventory**. These include the items which do not form the part of the final product but are either consumables used during the manufacturing process or items needed required for repair and maintenance functions.
- **Miscellaneous Inventory**. The items/goods other than those mentioned above such as obsolete and unsaleable products or scrap arising from main production process, stationery items used in office, other items required by office, factory and sales department etc.

  In fact inventory is maintained for flow of operations only and as such remains in flow, like raw materials inventory maintained for smooth flow of production and finished goods inventory is maintained for smooth flow of goods under distribution.

Conventional Classification

Inventory may be classified according to convention in the following way:

- **Direct Inventories**. These include materials in any form and of any form after processing or finished components which becomes an integral part of the main/final product to be delivered to distributor or consumer.
- **Indirect Inventories**. These include materials which are not processed and do not become an integral part of the final product but without which the completion of the final product is not possible. These may be cutting fluids. lubricants and other consumables items required during production.
- **Finished Products Inventories**. Products ready for dispatch to the distribution system or market i.e. final products.
- **Purchased Parts Inventories**. Semi-finished, finished parts purchased from the market for utilisation at the time of assembly of the final product.

Objectives/Reasons for Holding Inventory

Any comprehensive system of control covering all types of inventory is directly or indirectly aimed at accomplishing a great variety of purposes. Most of them are as follows:

Financial Objectives. The major financial objective of holding the inventory is to keep the investment involved within the enterprise's cash position so that the working capital is not thrown seriously out of balance.

To Create a Buffer Stock Between the Input and Output. So that, the out going flow of products is as little dependent on the input material characteristics as possible.

To Ensure Against Delay in Deliveries. The delay in delivery of finished product to the buyer is avoided by holding inventory stock of finished goods.

To Allow for a Possible Increase in Output if so Required. Market requirements may disturb the manufacturing programme of the enterprise. Depending upon the production requirements stocks are to be maintained and supplied.

To Ensure Against Scarcity of Materials in the Market. Sometimes input materials may become scarce and difficult to get when there are large fluctuations in output and demand for them. A reserve stock of raw materials is must for smooth manufacturing operations.

To Make Use of Quantity Discounts. Input materials and components/parts may be cheaper when purchased in bulk quantities owning to quantity discounts and lower transportation costs/charges.

To Utilize to Advantage Price Fluctuations. Price fluctuation may have a marked effect on the procurement policy of an enterprise or organization. If these fluctuations are to be utilized to advantage of the unit, materials have to be purchased in adequate quantities when prices are lowest.

All the above reasons or objectives involve cost. The inventory control is mainly concerned with making optimum decisions regarding above variables which are subject to control.

INVENTORY COSTS

Ordering costs

Ordering costs, also known as setup costs, are essentially costs incurred every time you place an order from your supplier.

Examples include:

- Clerical costs of preparing purchase orders — there are many kinds of clerical costs, such as invoice processing, accounting, and communication costs
- Cost of finding suppliers and expediting orders — costs spent on these will likely be inconsistent, but they are important expenses for the business
- Transportation costs — the costs of moving the goods to the warehouse or store. These costs are highly variable across different industries and items

- Receiving costs — these include costs of unloading goods at the warehouse and inspecting them to make sure they are the correct items and free of defects
- Cost of electronic data interchange (EDI) — These are systems used by large businesses and especially retailers, which allow ordering process costs to be significantly reduced.

Holding costs

Also known as carrying costs, these are costs involved with storing inventory before it is sold.

- Inventory financing costs — this includes everything related to the investment made in inventory, including costs like interest on working capital. Financing costs can be complex depending on the business
- Opportunity cost of the money invested in inventory — this is found by factoring in the lost alternatives of tying money up in inventory, such as investing in term deposits or mutual funds
- Storage space costs — these are costs related to the place where the inventory is stored and will vary by location. There will be the cost of the storage facility itself, or lease payments if it is not owned. Then there are facility maintenance costs like lighting, heating, and ventilation. Depreciation and property taxes are also included in this
- Inventory services costs — this includes the cost of the physical handling of the goods, as well as insurance, security, and IT hardware, and applications if these are used. Expenses related to inventory control and cycle counting are further examples
- Inventory risk costs — a major cost is shrinkage, which is the loss of products between purchasing from the supplier and final sale due to any number of reasons: theft, vendor fraud, shipping errors, damage in transit or storage. The other main example is dead stock

Shortage costs

These costs, also called stock-out costs, occur when businesses become out of stock for whatever reason.

- Disrupted production — when the business involves producing goods as well as selling them, a shortage will mean the business will have to pay for things like idle workers and factory overhead, even when nothing is being produced
- Emergency shipments — for retailers, stock-outs could mean paying extra to get a shipment on time, or changing suppliers
- Customer loyalty and reputation — aside from the loss of business from customers who go elsewhere to make purchases, the company takes a hit to customer loyalty and reputation when their customers are unhappy

Spoilage costs

Perishable inventory stock can rot or spoil if not sold in time, so controlling inventory to prevent spoilage is essential. Perishability is a concern for many industries such as the food and beverage, pharmaceutical, healthcare and cosmetic industries, all of which are affected by the expiration and use-by dates of their products. Spoilage not only costs money but also means you fail to realise a return on your initial investment.

Inventory spoilage and waste is not simply a result of isolated cases of poor inventory control, spoilage is now a global environmental concern. When you consider that in the United States alone, an estimated $200 billion is spent growing, processing, transporting and disposing of food that is never eaten.

Solid inventory control is your front line to preventing spoilage and waste. With the right inventory system, you can improve forecasting, boost efficiency, access real-time inventory data and up-to-date information on the lifecycle of your stock, enabling staff to rotate and manage stock to ensure older products get sold first.

This approach is used in the grocery and FMCG sectors where products with shorter expiry dates are rotated to the front of the shelf. Items that are due to expire are often heavily discounted to clear the inventory stock.

INVENTORY CONTROL MANAGEMENT

It may be defined as the scientific way of finding out the quantities to be kept in stock to meet the production requirements and the systematic location, storage and recordings of the goods/items in such a way that desired degree of service can be provided at competitive prices or at minimum ultimate cost.

Causes of Poor Inventory Control

- Over buying without consideration of demand estimates in order to take advantage of favourable market conditions leads to poor control.
- Over production or keeping inventory stocks of finished products without consideration of customer requirements.
- In order to provide quick and better service to consumer over-stocking may take place. Also to cut down the cost of production, bulk production will result in huge inventories both these shall lead to poor inventory control.
- Cancellation of orders may also give rise to large inventories thus may result in poor inventory management.

Functions Of Inventory Control

The functions of inventory control are listed below:

- **To develop policies, plans and standards required**: So as to achieve the inventory control objectives.

- **Effective running of stores**: This may include problems of layout, utilization of storage space, issuing and receiving procedures of items kept in stock.
- **Technological responsibility for the state of different materials**: This may include the method of storage, maintenance procedures, studies of deterioration and obsolete materials and corrective action required.
- **Stock control system:** This includes purchase procedures of materials, ordering policies, physical verification and records of items stored.
- **To ensure the timely availability**: Of requisite input materials and avoid building up of stock levels of final product.
- **Maintenance of specified inputs:** Specified raw materials, finished components/parts work in process, general supplies in sufficient quantities are maintained to meet the production requirements of the enterprise.
- **Protection of inventories:** The inventories are to be protected from improper material handling; wrong and unauthorized removal from the stores.
- **Pricing:** Pricing of all input materials being supplied to various shops is essential for further cost estimation of final products.

Advantages of Inventory Control

- It creates buffer between input and output.
- It ensures against in deliveries.
- It allows for possible increase in output
- It allows advantage of quantity discounts
- It ensures against scarcity of materials in the market
- It utilizes the benefit of price fluctuations
- It avoids inventory build-up.

Economic Order Quantity

The economic ordering quantity is obtained by the quantity whose procurement cost is equal to inventory carrying cost.

Let A = total items consumed per year

P = procurement cost per year

C = annual inventory carrying cost per item

Q = economic order

Now $Q = \sqrt{(2AP/C)}$

Proof

Procurement cost/year = No. of orders placed in a year x cost per order

$$= \frac{AxP}{Q} \qquad (1)$$

and Inventory carrying cost/year

= Average value of Inventory in a year x Annual inv. carrying cost/item

$$= \frac{Q}{2}xC \qquad (2)$$

$$\therefore \text{ Total cost} = \frac{AxP}{Q} + \frac{QxC}{2} \qquad (3)$$

This total cost will be minimum if

$$\frac{AxP}{Q} = \frac{QxC}{2}$$

or $$Q^2 = \frac{2AP}{C}$$

or $$Q = \left(\frac{2AP}{C}\right)^{1/2}$$

Hence most economic ordering quantity

$$= \sqrt{\frac{2AP}{C}}$$

Note: Another way of expressing EOQ formula is

$$Q^* = \sqrt{\frac{2C_oD}{C_c}}$$

No. of orders = D/Q*

Time between orders = D/Q*

where

D = annual demand in units

C_o = ordering cost/order

C_c = carrying cost/unit/year

P = purchase price/unit

Q = order size

Limitations of EOQ Model

- Demand is assumed to be uniform and known with certainty. In actual practice, the demand is neither uniform nor known with certainty. When the fluctuations are more, this model loses its validity.
- Ordering is not linearly related to the number of orders. As the number of orders increases, the ordering cost rises in a stepped manner.
- Ordering cost may not be independent of the order quantity.
- Instantaneous supply of inventory is not possible when inventory level touches zero.
- The formula is not applicable when inventory cost is meaningless.
- It is cumbersome to calculate inventory carrying cost for B and C class of items.

Example

The rate of use of a particular raw material from stores is 20 units/year. The cost of placing and receiving an order is Rs. 40. The cost of each unit is Rs. 100. The cost of carrying inventory in percent/year is 0.16 and it depends on the average stock. Determine the economic order quantity.

Solution

A = Number of units consumed/year = 20, P = ordering and set up cost = Rs. 40

C = annual inventory carrying cost per unit

= Total annual inventory carrying cost/total items consumed in a year

= 20 x 100 x 0.16/20 = Rs. 16

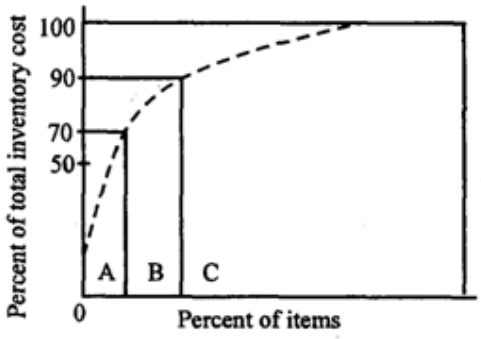
$\therefore$ $Q = \sqrt{2AP/C} = \sqrt{(2 \times 20 \times 40/16)} = \sqrt{100} = 10$ items

Example

ABC company purchases 9000 parts of a machine for its annual requirements. Ordering one month usage at a time. Each part's cost is Rs. 20. The ordering cost per order is Rs. 15 and the carrying charges are 15% of the average inventory per year. Determine the economic order quantity.

Solution

See figure



Given A = parts purchased per year = 9000

C = cost of each part = Rs. 20

P = ordering cost/order = Rs. 15

I = carrying charges per year = 15% = 0.15

Economic order quantity

Q = √2AP/CI = √(2 x 9000 x 15/20 x 0.15 = 300 units

Example

Krishna Industry needs 24,000 units/year of a bought-out component which will be used in its main product. The ordering cost is Rs.150 per order and the carrying cost per unit per year is 18% of the purchase price per unit. The purchase price per unit is Rs. 75. Find

(a) Economic order quantity

(b) No. of orders per year

(c) Time between successive orders

Solution

Given data

D = 24,000 units/year

C_o = Rs. 150/order

Purchase price/unit = Rs. 75.

C_c = Rs. 75 x 0.18 = Rs. 13.5/unit/year

EOQ

$$Q^* = \sqrt{\frac{2C_oD}{C_c}} = \sqrt{\frac{2x150x24,000}{13.50}} = 730\,units$$

No. of orders/year

D/Q* = 24,000/730 = 32.88

Time between successive orders

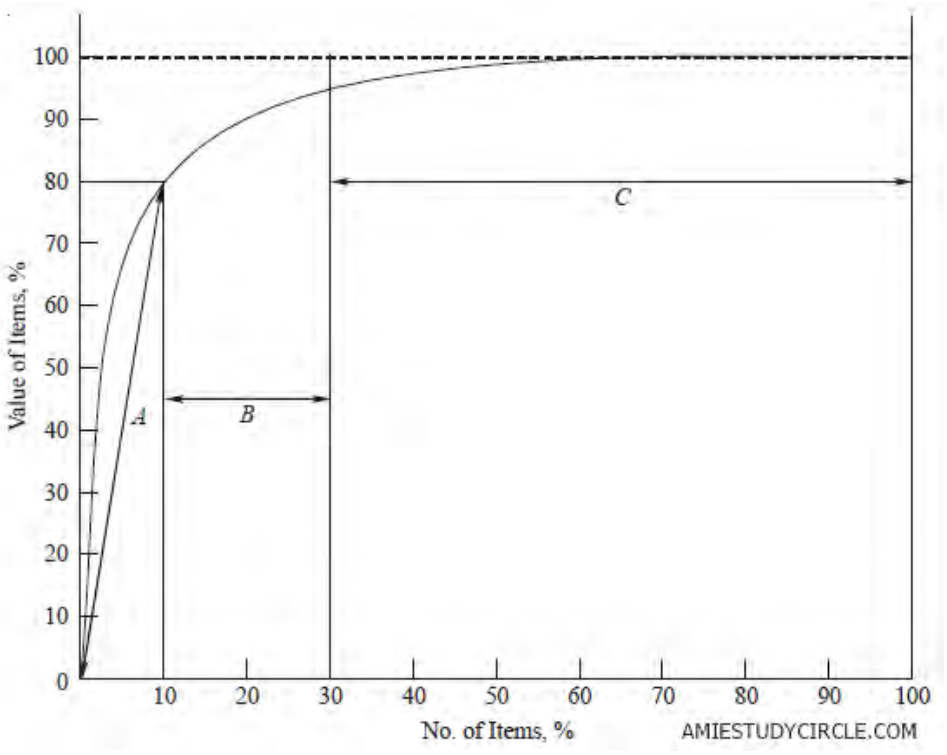
Q/D* = 730/24,000 = 0.0304 year = 0.37 month = 11 days

ABC Method of Inventory Control

This analysis is based on the universal Pareto's law that in any large number, there are 'significant few' and 'insignificant many.' For example, only 20 per cent of the items may be accounting for 80 per cent of the total material cost annually. The analysis is believed to have originated in the General Electric Company of America and is also known as Always Better Control (ABC) analysis.

In order to exercise more effective control over materials, A. B. C. (Always Better Control) method is of immense utility. Under this method materials are classified into three categories in accordance with their respective values.

Given figure shows a typical ABC analysis showing the relationship between the percentage of the number of inventory items and the percentage of average inventory investment (annual usage value).



Annual usage value is the demand multiplied by unit price, thereby giving the monetary worth of annual consumption. The figure shows that 10 per cent items claim 80 per cent of the annual usage value and thus constitute the 'significant few.' These items are classified as A-class items. Another 20 per cent items account for 17 per cent annual usage value and are

called B-class items. The balance 70 per cent items account for only 3 per cent expenditure on material consumption and constitute 'insignificant many' and are called C-class items.

Procedure for drawing an ABC type curve

(a) Arrange items in the descending order of the annual usage value.

Annual usage value Annual demand × Unit price.

(b) Identify cut-off points on the curve when there is a perceptible sudden change of slope.

Mechanics of ABC analysis

Step 1

Obtain a list of items along with information on their unit cost and the periodic (generally annual) consumption.

Step 2

Determine the annual usage value for each item by multiplying unit cost by the number of units and rank them in descending order on the basis of their respective usage values.

Step 3

Express the value for each item as a percentage of the aggregate usage value. Now, cumulate the per cent of annual usage value.

Step 4

Obtain the percentage value for each item. For n items, each item shall present 100/n per cent. Thus, if there are 20 items involved in a classification, then each item would represent 100/20 = 5 per cent of the material. Next, cumulate these percentage values as well.

Step 5

Using the data on cumulated values of items and the cumulated percentage usage values, plot the curve by showing these respectively on X and Y axes.

Step 6

Determine appropriate divisions for A, B and C categories. The curve would rise steeply up to a point. This point is marked and the items up to that point constitute A-type items. Similarly, the curve beyond this point would only be moderately sloped towards upright. The point beyond which the slope is negligible is marked and the items covered beyond that point are classed as C-type items because they cause only a negligible increase in the cost. The other items are the B-type items for which the curve depicts a gradual upward rise.

After classification of items, inventory decisions are made on the basis of the A, B and C categories. 'A' items call for a strict control and should be delivered near the time of use. The

'C' items may be kept in open storage and issued without formalities. With regard to 'B' class items, the policy should be of a fairly tight control—though not as strict as for A-type items.

Application of ABC Analysis

In the absence of ordering and carrying cost, the ABC analysis is also helpful in rationalizing the number of orders to be placed, and in reducing capital from inventory.

Limitations of ABC Analysis

In ABC analysis, ranking of items is based according to the annual consumption value. However, a minor item, though of small monetary value, may be important for running the plant and therefore requires constant attention. Hence, if the inventory of items is analysed according to the value of items in storage (XYZ analysis), then the results of the ABC analysis would be different from those of the XYZ analysis. Therefore, if the results of the ABC analysis are not periodically reviewed and updated, then the analysis loose its purpose.

PURCHASING OFFICER

Purchasing Officers source and buy materials, goods, and services on behalf of the employer to be resold or used in daily operations. Purchasing Officers maintain stock levels, and may also conduct research, negotiate with vendors, and interview prospective suppliers.

Purchasing Officer Responsibilities

- Conducting product research and sourcing new suppliers and vendors.
- Sourcing materials, goods, products, and services and negotiating the best or most cost-effective contracts and deals.
- Performing inventory inspections and reordering supplies and stock as necessary.
- Conducting market research to keep abreast of emerging trends and business opportunities.
- Inspecting stock and reporting any faulty items or inconsistencies immediately.
- Updating and maintaining records of all orders, payments, and received stock.
- Coordinating with the delivery team and following up on delays or orders that have been rescheduled.
- Attending product launches and networking with industry professionals.
- Establishing professional relationships with clients as well as vendors and suppliers.
- Ensuring all stock is packaged appropriately and delivered to the correct location in a timely manner.

Purchasing Officer Requirements

- Bachelor's Degree in Business, Logistics, or a related field may be required.

- Previous experience in a similar position.
- Proficiency in the relevant management software programs.
- Superb written and verbal communication and negotiation skills.
- Great organizational and planning skills.
- The ability to identify market trends and make decisions in a high-stress environment.
- The ability to follow client specifications.
- Excellent networking and time management skills.

PURCHASING AND PROCUREMENT OF MATERIAL

Purchasing and procurement is the term denoting the function of and the responsibility for procuring materials, supplies, and services. Recently, the term "**supply management**" has increasingly come to describe this process.

Employees who serve in this function are known as buyers, purchasing agents, or supply managers. Depending on the size of the organization, buyers may further be ranked as senior buyers or junior buyers. Once seen as a purely clerical function, purchasing and procurement is today a central managerial function and a key to the competitive success of any firm.

Role of purchasing

There are two basic types of purchasing: purchasing for resale and purchasing for consumption or transformation. The former is generally associated with retailers and wholesalers. The latter is defined as industrial purchasing.

Purchasing can also be seen as either strategic or transactional—"direct" and "indirect" are terms that can also be used to distinguish the two types.

Strategic (direct) buying involves the establishment of mutually beneficial long-term relationships between buyers and suppliers. Usually strategic buying involves purchase of materials that are crucial to the support of the firm's distinctive competence. This could include raw material and components normally used in the production process.

Transactional (indirect) buying involves repetitive purchases, from the same vendor, probably through a blanket purchase order. These orders could include products and services not listed on the bill of materials, such as MRO goods (maintenance, repair, and operating supplies), but are used indirectly in producing the item.

The purchasing department is responsible for determining the organization's requirements, selecting an optimal source of supply, ensuring a fair and reasonable price (for both the purchasing organization and the supplier), and establishing and maintaining mutually beneficial relationships with the most desirable suppliers. In other words, purchasing departments determine what to buy, where to buy it, how much to pay, and ensure its availability by managing the contract and maintaining strong relationships with suppliers.

In more specific terms, today's purchasing departments are responsible for the following:

- Coordinating purchase needs with user departments
- Identifying potential suppliers
- Conducting market studies for material purchases
- Proposal analysis
- Supplier selection
- Issuing purchase orders
- Meeting with sales representatives
- Negotiating
- Contract administration
- Resolving purchasing-related problems
- Maintenance of purchasing records

Importance of purchasing

While purchasing is of some importance to nearly all firms, the relative importance of purchasing in a particular firm is determined by four factors:

- Availability of materials
- Absolute dollar volume of purchases
- Percent of product cost represented by materials
- Types of materials purchased

PHYSICAL SUPPLY/DISTRIBUTION

Physical supply/distribution includes all the activities involved in moving goods, from the supplier to the beginning of the production process, and from the end of the production process to the consumer.

The activities involved are as follows:

- Transportation
- Distribution inventory
- Warehousing
- Packaging
- Materials handling
- Order entry

Materials management is a balancing act. The objective is to be able to deliver what customers want, when and where they want it, and do so at minimum cost. To achieve this

objective, materials management must make trade-offs between the level of customer service and the cost of providing that service. As a rule, costs rise as the service level increases, and materials management must find that combination of inputs to maximize service and minimize cost. For example, customer service can be improved by establishing warehouses in major markets. However, that causes extra cost in operating the warehouse and in the extra inventory carried. To some extent, these costs will be offset by potential savings in transportation costs if lower cost transportation can be used.

By grouping all those activities involved in the movement and storage of goods into one department, the firm has a better opportunity to provide maximum service at minimum cost and to increase profit. The overall concern of materials management is the balance between priority and capacity. The marketplace sets demand.

Materials management must plan the firm's priorities (what goods to make and when) to meet that demand. Capacity is the ability of the system to produce or deliver goods. Priority and capacity must be planned and controlled to meet customer demand at minimum cost. Materials management is responsible for doing this.

SUPPLY CHAIN MANAGEMENT (SCM)?

Supply chain management is the management of the flow of goods and services and includes all processes that transform raw materials into final products. It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the marketplace.

SCM represents an effort by suppliers to develop and implement supply chains that are as efficient and economical as possible. Supply chains cover everything from production to product development to the information systems needed to direct these undertakings.

Typically, SCM attempts to centrally control or link the production, shipment, and distribution of a product. By managing the supply chain, companies are able to cut excess costs and deliver products to the consumer faster. This is done by keeping tighter control of internal inventories, internal production, distribution, sales, and the inventories of company vendors.

SCM is based on the idea that nearly every product that comes to market results from the efforts of various organizations that make up a supply chain. Although supply chains have existed for ages, most companies have only recently paid attention to them as a value-add to their operations.

The supply chain manager tries to minimize shortages and keep costs down. The job is not only about logistics and purchasing inventory. According to Salary.com, supply chain managers, "make recommendations to improve productivity, quality, and efficiency of operations."

Improvements in productivity and efficiency go straight to the bottom line of a company and have a real and lasting impact. Good supply chain management keeps companies out of the headlines and away from expensive recalls and lawsuits.

A supply chain is the connected network of individuals, organizations, resources, activities, and technologies involved in the manufacture and sale of a product or service. A supply chain starts with the delivery of raw materials from a supplier to a manufacturer and ends with the delivery of the finished product or service to the end consumer.

Objectives of supply chain management

- Supply chain management looks at the process behind how goods are made, delivered, and sold to the consumer.
- Supply chain management aims to reduce waste wherever possible.
- Supply chain management can be used to improve the quality of the customer experience.
- Supply chain management looks for long term stability of the overall supply chain.

ASSIGNMENT

Q.1. (AMIE W18, 7 marks): In connection with materials management, explain the following:

(i) marketing and procurement of materials and purchasing

(ii) distribution of materials

Q.2. (AMIE W11, 18, 10 marks): Discuss the concept of inventory control. Mention different types of inventory control policies.

Q.3. (AMIE S19, 8 marks): Explain the concept of inventory system. In the Indian industry, what is the importance of inventory management. What are its functions. Narrate briefly the classification of inventory system.

Q.4. (AMIE S18, 7 marks): In the context of materials management what do you understand by ABC analysis and its utility for inventory control?

Q.5. (AMIE S14, 8 marks): What are the qualification, duties and responsibilities of a purchasing officer?

Q.6. (AMIE S14, 6 marks): Write short note on materials management.

Q.7. (AMIE S17, 6 marks): Explain the concept of inventory system. In the Indian industries, what is the importance of inventory management. What are its functions? Narrate briefly the classification of inventory system.

Q.8. (AMIE S17, 19, 10 marks): (i) Narrate briefly the classification of inventory system. (ii) Depending upon the value, criticality and usage frequency of an item, what role is played by inventory management to decide or select an appropriate type of inventory policy. Narrate briefly, the different analysis involved in selection procedure.

Q.9. (AMIE S17, 4 marks): Explain the inventory related costs.

Q.10. (AMIE W13, 5 marks): Write a short note on economic order quantity.

Q.11. (AMIE S18, 6 marks): Discuss on economic order quantity in the context of functioning of inventories.

Q.12. (AMIE W14, 10 marks): Derive an expression to calculate the economic order quantity, when the annual production rate is more than the annual demand rate in a manufacturing industry.

Q.13. (AMIE W15, 4 marks): Discuss the objectives of supply of chain management.

Q.14. (AMIE S14, 6 marks): The annual requirement of raw material for a manufacturing company ABC is 5000 kg. It is estimated that the cost of planning an order is ₹ 100 and cost of carrying inventory is 2 per kg per year. The cost of raw material is ₹ 10 per kg. Calculate the (i) economic order quantity (ii) optimal ordering cycle time and (iii) minimum annual total cost.