

MODULE 4: MATERIALS & INVENTORY MANAGEMENT

MATERIAL MANAGEMENT

Materials management is a core supply chain function and includes supply chain planning and supply chain execution capabilities. Specifically, materials management is the capability firms use to plan total material requirements. The material requirements are communicated to procurement and other functions for sourcing. Materials management is also responsible for determining the amount of material to be deployed at each stocking location across the supply chain, establishing material replenishment plans, determining inventory levels to hold for each type of inventory (raw material, WIP, Finished Goods), and communicating information regarding material needs throughout the extended supply chain.

Typical roles in Materials Management include: Materials Manager, Inventory Control Manager, Inventory Analyst, Material Planner, Expediter and emerging hybrid roles like "buyer planner"

Objectives of Materials Management:

Materials management objectives are categorized into:

Primary objective

2. Secondary objectives

1. Primary Objectives:

“Making available (supply) of materials in specified quantity and quality at economic cost and maintaining the continuity of supply. Minimization of investments in materials and inventory costs, and assuring high inventory turnover.”

2. Secondary Objectives:

Secondary objectives help to achieve the primary objectives.

The secondary objectives can be stated as:

1. Purchasing the items from a reliable source at economic price.
2. Reduction of costs by using various cost reduction techniques such as variety reduction, standardization and simplification, value analysis, inventory control, purchase research etc.
3. Co-ordination of the functions such as planning, scheduling, storage and maintenance of materials.

Functions of Material Management

The functions of materials management can be categorized in the following ways:

1. Material Planning and Control
2. Purchasing
3. Stores Management
4. Inventory Control or Management
5. Standardization
6. Simplification
7. Value Analysis
8. Ergonomics
9. Just-in-Time (JIT)

All the above-mentioned functions of materials management have been discussed.

Scope of Material Management

1. Materials planning and control:

Based on the sales forecast and production plans, materials planning and control is done. This involves estimating the individual requirements of parts, preparing materials budget, forecasting the levels of inventories, scheduling the orders and monitoring the performance in relation to production and sales.

2. Purchasing:

This includes the selection of sources of supply finalization in terms of purchase, placement of purchase orders, follow-up, maintenance of smooth relations with suppliers, approval of payments to suppliers, evaluating and rating suppliers.

3. Stores management or management:

This involves physical control of materials, preservation of stores, minimization of obsolescence and damage through timely disposal and efficient handling, maintenance of store records, proper location and stocking. A store is also responsible for the physical verification of stocks and reconciling them with book figures. A store plays a vital role in the operations of a company.

4. Inventory control or management:

Inventory generally refers to the materials in stock. It is also called the idle resource of an enterprise. Inventories represent those items, which are either stocked for sale or they are in the process of manufacturing or they are in the form of materials, which are yet to be utilized. The interval between receiving the purchased parts and transforming them into final products varies from industries to industries depending upon the cycle time of manufacture. It is, therefore, necessary to hold inventories of various kinds to act as a buffer between supply and demand for the efficient operation of the system. Thus, effective control on inventory is a must for the smooth and efficient running of the production cycle with the least interruptions.

STORES MANAGEMENT

Store is an important component of material management since it is a place that keeps the materials in a way by which the materials are well accounted for, are maintained safe, and are available at the time of requirement. Storage is an essential and most vital part of the economic cycle and store management is a specialized function, which can contribute significantly to the overall efficiency and effectiveness of the materials function. Literally store refers to the place where materials are kept under custody.

According to Afford and Beatty____” Store management is that aspect of material control concerned with the physical storage of goods”.

Objectives of Store Management

- Minimizing cost of production through minimizing cost on materials
- Maintaining the value of materials
- Services to User departments
- Establishing Co-ordination with other Departments
- Advising Materials managers

Functions of Store Department

- Receipt: It receives and accounts inventories.
- Storage: It stores and preserves the inventories protecting them from damage, pilferage and deterioration.
- Retrieval: It helps easy accessibility to materials and ensures optimum space utilization. Materials can be located and retrieved with ease.
- Issue: It satisfies the demands of consuming departments by proper issue of inventories on receiving the requisitions.
- Records: It keeps proper records of the issue and receipts.
- HouseKeeping: The space is kept neat and clean so that material handling, preservation, storage, issue and receipt is done satisfactorily.
- Surplus Stock: Scrap and surplus disposal management is a function of stores.
- Verification: Physical verification and purchase initiation to avoid stock-outs.
- Co-ordination and Co-operation: To interface with production and inspection department.

Types of Stores

- i. Main or Centralized Stores: A central store is generally a 'wholesale' supplier to other units, departments or sub-stores which operate on a retail basis issuing goods directly to users. All material is received and issued by one central store.
- ii. Branch or Decentralized Stores: Decentralized or branch stores are provided in the plants which are considerably large in size and where one main store cannot meet the requirements of the plant without wast of time and inconvenience.
- iii. Central store with sub-stores: A very big factory having a large number of product lines may have this type of storage system. It has a main store which can serve as a base with sub-stores for each unit of production, preferably located as near the unit as possible. The sub-stores draw its requirements from the main store for a certain period, say, a fortnight or a month. This fixed quantity of material to the particular department is known as Float or impress. After the completion of the determined period, the storekeeper of the sub-store will give the description of the material consumed, and will issue quantity of material equal to the material consumed to bring the level to the replenishment level. This system of issuing and controlling of materials is known as periodic system of stores control.
- iv. Warehouse: Warehouses are the godowns which take the responsibility of keeping and storing goods and providing ancillary services in order to help the small and medium-size traders and manufacturers who, because of technical and economic reasons, may not like to have their own storehouses. These warehouses undertake to preserve the goods in a scientific and systematic manner so as to maintain their original value, quality and usefulness. They charge a certain prescribed rent at a fixed rate in advance.
- v. Tools and Miscellaneous Stores: Tools and miscellaneous stores are equipped with all the necessary tools needed by the productions and other shops. The stock of tools must be maintained with due regard to the requirements of the work. This store is responsible for issuing tools, spare parts and other accessories to different departments.

INVENTORY MANAGEMENT

Inventory management is an approach for keeping track of the flow of inventory. It starts right from the procurement of goods and its warehousing and continues to the outflow of the raw material or stock to reach the manufacturing units or to the market, respectively. The process can be carried out manually or by using an automated system.

Objectives of inventory management

The main objective of inventory management is to maintain inventory at appropriate level to avoid excessive or shortage of inventory because both the cases are undesirable for business. Thus, management is faced with the following conflicting objectives:

1. To keep inventory at sufficiently high level to perform production and sales activities smoothly.
2. To minimize investment in inventory at minimum level to maximize profitability.

Other objectives of inventory management are explained as under:-

1. To ensure that the supply of raw material & finished goods will remain continuous so that production process is not halted and demands of customers are duly met.
2. To minimize carrying cost of inventory.
3. To keep investment in inventory at optimum level.
4. To reduce the losses of theft, obsolescence & wastage etc.
5. To make arrangement for sale of slow moving items.
6. To minimize inventory ordering costs.

PURCHASE MANAGEMENT

Purchase management is concerned with the procurement of proper equipment, materials and supplies of the right quantities, at the right prices at the right time.

In view of the complex nature of the manufacturing activities today, purchasing has become a specialized function and separate purchase departments are established in almost all large concerns. In large concerns, major activities consist of ordering material upon requisition by the users, checking receipt of the material and maintaining files and records of orders and price movements.

Importance of Purchase Management

Purchasing management is supposed to be a very important department of materials management in any organization. Purchase staff has to manage various vendors and external agencies and thus they represent their organization's reputation to the larger world. They are responsible for negotiating and then finalizing big deals which might mean a lot to their company. Other than that, purchasing management helps in the following:

1 Controlling the costs

The purchasing management has to analyze and decide the best suppliers as per the quality of products and most reasonable cost. They also review many other factors like if the vendor or supplier can guarantee timely shipments, what's their reputation in the industry and relevant

experience. Changing the vendors again and again is expensive; therefore, finding the best and reliable vendor is very important for controlling costs.

2 Stabilizing the prices

Another important role that purchasing management has to achieve price stability. In case the production cost goes up and down, other functions face roadblocks. For example, the marketing function gets confused about what price should be charged to the customers, the finance department faces problem in calculating profits and the accounts cannot gauge the company's cash flow. Purchasing managers are the ones who are responsible for stabilizing the production cost by negotiating with suppliers and making long contracts for mutual benefit. They also hedge some items with banks in the form of a forward contract.

3 Supply Chain Management

Buyers also ensure that the material or supplies are received on time and are of the expected quality. In case the shipment is delayed or is not of the expected standard, it would affect the complete production chain. Hence, this function is of utmost importance across all industries.

4 Customer Satisfaction

Wondering how purchasing department is related to customer satisfaction? Purchase management is responsible for customer satisfaction in the following ways: working towards the best quality of the products and ensuring on-time deliveries. When the purchase department opts for highest quality of supplies or ingredients at reasonable costs, it results in cost savings, which are further passed on to the customers. Therefore, purchasing management has a critical role to play in customer's experience with the final products and the organization.

INVENTORY COST

Inventory cost, explained by each business owner with varying importance, plays a major role in the working capital requirements of a business. Based on the overall inventory needs, a company can plan the cash flow cycles properly to avoid problems which may even cause the business to cease operations. This makes sense when one keeps in mind that perhaps the most common reason a business closes is lack of cash.

There are a variety of inventory cost methods to minimize expenditure. On the material side, a business can set up equipment, ranging from simple placement of items for optimal usage to accounting systems which serve as inventory management, which simplify and change based on the needs the business has for its inventory. In reference to processes, employees can be trained to use available resources to achieve maximum effect. When you understand the science of supply chain management, you can make sense of the most complicated of inventory projects. For smaller assignments, the average person can turn a catastrophe to a working system with a foundation of proper planning. Inventory can be as affordable or costly as the business and manager allow it to be.

Inventory cost includes the costs to order and hold inventory, as well as to administer the related paperwork. This cost is examined by management as part of its evaluation of how much inventory to keep on hand. This can result in changes in the order fulfillment rate for customers, as well as variations in the production process flow. Inventory costs can be classified as follows:

1. Ordering costs. These costs include the wages of the procurement department and related payroll taxes and benefits, and possibly similar labor costs by the industrial engineering
2. staff, in case they must pre-qualify new suppliers to deliver parts to the company. These costs are typically included in an overhead cost pool and allocated to the number of units produced in each period.
3. Holding costs. These costs are related to the space required to hold inventory, the cost of the money needed to acquire inventory, and the risk of loss through inventory obsolescence. Most of these costs are also included in an overhead cost pool and allocated to the number of units produced in each period. More specifically, holding costs include:
 4. Cost of space. Perhaps the largest inventory cost is related to the facility within which it is housed, which includes warehouse depreciation, insurance, utilities, maintenance, warehouse staff, storage racks, and materials handling equipment. There may also be fire suppression systems and burglar alarms, as well as their servicing costs.
 5. Cost of money. There is always an interest cost associated with the funds used to pay for inventory. If a company has no debt, this cost represents the foregone interest income associated with the allocated funds.

Inventory Cost Formula

The inventory cost formula, summing total cost of inventory, is often referred to as inventory carrying rate.

Inventory Carrying Rate = (Inventory Costs / Inventory Value) + Opportunity Cost (as a percentage) + Insurance (as a percentage) + Taxes (as a percentage)

VENDOR

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: 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.

VENDOR RATING

Vendor rating (also called: **supplier rating**) is a system used by buying organizations or industry analysts to record, analyze, rank and report the performance of a supplier in terms of a range of predefined criteria, which may include such things as:

- Quality of the product or service
- Delivery performance and reliability
- Cost, price
- Capabilities
- Service
- Financial continuity of the firm

INVENTORY MANAGEMENT TOOLS

Managing inventory is a big factor in many businesses, particularly in manufacturing. Inventory records are the most likely area of the business to be computerized and every ERP system and CRM system is built around an inventory management function.

Basic inventory management maintains what's called a perpetual inventory record. Put simply, the system accepts inventory movement reports (transactions) and maintains a continuous record of the quantity on-hand.

Of course, inventory management software does a lot more than that. Here are some of the tools that can and should be integrated with inventory management to give you the control and visibility you need to support efficient operations.

1. Barcode data collection

The perpetual inventory system is highly dependent on timely and accurate reporting.

Manual reporting can be plagued by delays, errors, missing transactions, and undue burden on the workforce to collect and enter the data. Automated data collection, most often through barcode scans, removes much of the reporting burden while greatly improving accuracy and timeliness of transactions.

2. Cycle counting

Inventory accuracy is very important to the effective planning and control of inventory. Sadly, most inventory tracking systems are woefully inaccurate without an active and disciplined cycle counting system in place.

Cycle counting replaces the cumbersome and error-prone periodic (usually annual) physical inventory count with a regular program of counting selected items such that more important items are counted more often than less important ones.

The magic of cycle counting is that it provides a structure for identifying and eliminating the source of errors to improve accuracy in a sustainable way.

3. ABC analysis

Cycle counting is usually set up using ABC analysis to identify the more important and less important items mentioned above.

The most common ABC analysis (also called Pareto analysis) method is to rank all inventory items according to the total value of each on an annual basis (annual "usage" or movement times unit cost).

Typically, the top 20 percent of items represent 80 percent of the annual value through the warehouse (80/20 rule). The next 30 percent (B items) account for 15 percent of the value and the remaining 50 percent, the C items, total five percent of annual value.

In addition to setting cycle counting frequency, ABC classifications should drive item location in the warehouse, lot sizing and safety stock rules, and other management parameters to put your focus on the items that matter, where you can get the most return for your investment.

4. Integrated planning and execution

The primary focus of ERP is to improve customer service (meeting demand) while optimizing resources including inventory (and reducing costs).

While the inventory system provides critical information for the planning and execution systems within ERP, these functions return the favour by managing the use and replenishment of

inventory to minimise shortages and lowering the overall inventory investment.

5. Lot tracking and traceability

Not every company needs serial number or lot tracking traceability; more and more are collecting this information in recognition of the increasing risk of product recalls.

In addition, life-cycle information, genealogy, configuration history and product performance data can be of great value to engineering, development, product servicing, spare part provisioning, and other areas of the business.

Inventory tracking is a requirement for financial control and basic business management processes. But inventory management and inventory data can be a valuable resource in the quest for performance improvement, higher levels of customer service, cost control, product development, and overall company success.

Integrated inventory management systems, a critical part of ERP, provide the basic tools and significant additional capabilities to make ERP even more beneficial for your company's future..

ECONOMIC ORDER QUANTITY (EOQ)

The Economic Order Quantity is a set point designed to help companies minimize the cost of ordering and holding inventory. The cost of ordering inventory falls with the increase in ordering volume due to purchasing on economies of scale. However, as the size of inventory grows, the cost of holding the inventory rises. EOQ is the exact point that minimizes both of these inversely related costs.

EOQ Formula:-The Economic Order Quantity formula is calculated by minimizing the total cost per order by setting the first-order derivative to zero. The components of the formula that make up the total cost per order are the cost of holding inventory and the cost of ordering that inventory. The key notations in understanding the EOQ formula are as follows:

Components of the EOQ Formula:

- **D:** Annual Quantity Demanded
- **Q:** Volume per Order
- **S:** Ordering Cost (Fixed Cost)
- **C:** Unit Cost (Variable Cost)
- **H:** Holding Cost (Variable Cost)
- **i:** Carrying Cost (Interest Rate)