

<b>Subject: Purchasing and Materials Management</b>	
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Lesson No.: <b>1</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Purchasing and Materials Management</b>	

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## **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the concept of Purchasing and Materials Management.
- Identify purchasing activities and know the importance of purchase management.
- Describe the concept of Materials Management and explain the relationship between Materials Management Department and other Departments

## **1.1 Introduction**

### **Purchasing**

Purchasing describes the process of buying. It is the learning of the requirement, identifying and selecting a supplier, negotiation price. Purchasing is an element of the wider function of procurement and it includes many activities such as ordering, expediting, receipt and payment. Purchasing is responsible for obtaining the materials, parts, supplies and services needed to produce of a product or provide a service. (Joyce, 2006) Purchasing can be divided into two broad categories, large and small purchases, based on seven characteristics of purchased product – volume, specificity, technological complexity, essentiality, fragility, variability, and economic value. (Parikh, 2005)

### **Bulk Purchase**

In case of bulk purchases there are high volume items, large amount, and more frequent utilization with more specific use. Bulk purchases are handled in large organisations and multinational organisations with the standardized purchasing process, where as some other organizations use separate purchasing process. There are frequent misuse and lack of control in purchasing process in those organizations in which same standardized process is used for both bulk and small purchasing. Large purchases are typically non-urgent in nature. Large-volume, continuous-usage items can be covered by blanket purchase orders, which often involve annual negotiation of prices.

### **Small Purchase**

In case of small purchase there are low volume items, small amount, less frequency of utilization, high variety and low technical complexity. Mainly small purchases include machine parts, auto parts, machine repairs, in frequent supplies of offices and miscellaneous goods. Small purchases are urgent in nature.

There are two basic types of purchasing in the business world: purchasing for resale or purchasing for consumption or conversion. (Dobler, 1984) Purchasing for resale or resale purchasing is mainly performed by retailers and wholesalers (called merchants). Purchasing for internal consumption or conversion is called industrial buying. The industrial buyers generally face different and complex problems with comparisons of merchandise buyers or resellers. For instance, the industrial buyers have to spend time to anticipate in determining what products should be produced or manufactured and what product should be purchased from outside or suppliers. They also correlate their purchasing

with sale forecasts and production schedules. In some books, you will find the terms like purchasing, procurement, supply chain, materials management, supply material and logistics interchangeably. But there is a hair-line difference in all these terms.

## **Important Terms**

### **Purchasing**

Purchasing describes the process of buying. It covers the knowledge of the requirements, identifying and selecting a supplier and negotiating price

### **Procurement**

It is a broader term. It includes purchasing products required for production, stores, traffic, receiving, inspection and salvage.

### **Materials Management**

It includes planning, organising, communicating, directing and controlling of all those activities mainly concerned with the flow of materials into an organisation. Material management views material flows as a system.

### **Logistics Management**

It is the planning and controlling of the flow of raw material in a cost effective manner from the suppliers or point of origin to the manufacturing and then flow of finished goods for consumption in the customers' hands.

## **1.2 Purchasing Management**

Purchasing management is concerned with the planning and controlling of the acquisition of suppliers' goods and resources, to fulfill the administrative and strategic objectives of the organization. In practice, purchasing managers have to deal with both customers internal as well as external. He/she has to respond creatively to internal customers' need on the one hand and to maintain a mutually profitable relationship with suppliers on the other. This dual-role perspective of purchasing management has, in recent years, been increasingly recognized as comprising complex tasks in the integration of internal/external and upstream/downstream supply chain management activities. (Fung, 1999) The part of supply chain management that focuses on the management of inbound goods and services into a firm.

## **1.3 Importance of Purchase Management**

### **For Cost Effective Production**

Purchasing is responsible for learning of the internal requirements, locating and selecting suppliers, obtaining the materials, parts, supplies and services needed to produce a product or provide a service. A purchase manager is responsible for negotiation of price with suppliers too. You can get some idea of the importance of purchasing when you consider that in manufacturing industry more than 60 percent of the cost of finished goods comes from purchased parts and materials. Furthermore, the percentages for purchased inventories are even higher for retail and wholesale companies, sometimes exceeding 90 percent.

Nonetheless, the importance of purchasing is more than just the cost of goods purchased; other important factors include the quality of goods and services and the timing of deliveries of goods or services, both of which can have a significant impact on operations. (Joyce, 2006) The industries like construction, petroleum refineries, sugar, automobile have more than 75 percentages of materials cost as an input percent cost.

### **For Strategic Purpose**

Purchasing is a strategic issue. The manufacturers have to procure capital items like plant and machinery for manufacturing facilities. It requires heavy investment. So, purchasing is an important function. But in some organisations, especially small scale, purchasing is considered as a clerical activity. They assign this job to the persons simply who are loyal to the organisation. But it is a wrong way. In purchasing, the executives must be dynamic, innovative, creative and must have analytical decision making. The emergence of the supply chain management concept has enlightened managers about the strategic role played by purchasing. Purchasing helps to determine a firm's cost structure through negotiations with suppliers. If the executives are efficient in bargaining then they can save for the organisations and this will help the organisations to cut costs and helpful in getting competitive advantage in the market. Purchasing initiatives can lead to reducing inventory and improving the quality of incoming parts and components through vendor selection and supplier development. Purchasing also supports new product development by encouraging supplier involvement in product development.

Organization can realize major benefits from their focus on purchasing management as mentioned below:

**From a Top Management Perspective:**

There are five rights that every management expects from their purchasing executives:

- Right Quantity
- Right Quantity
- Right quality
- Right Time
- Right Supplier
- Right Cost

**From Functional Perspective:**

- Uninterrupted flow of materials and services
- Buying at competitive prices
- Avoiding under-inventory and over-inventory
- To have good relationship with other departments

In nutshell, purchase management has the following benefits:

- Cost reduction or improvement (required utmost to be competitive in market)
- Improved material delivery (required for smooth flow of production)

- Shorter cycle time, including product development cycle times (helpful in fast production)
- Quality improvement (required to satisfy or win the hearts of the customers ultimately)

Manufacturers spend an average of 55 cents out of every dollar of revenues on goods and services, purchasing and clearly a major area for potential cost savings. This fact was recognized first by many Japanese companies in the 1980s when superior management of relationships with supplies gave Japanese automobile companies a \$300 to \$600 per car cost advantage. (A. T., 1994)

**What car/automobile companies buy:** Tires, Brakes leathers, Clutches, Wires, Steel plates, Glasses, Paint, Fabric, Aluminum sheets, Electronic components, Carpets etc.

**What soft-drink producers buy:** Bottles, Sweetner, Carbonation, Flavouring substances, Caps, Cardboards, Plastic Containers, etc.

**What software companies buy:** Computers, Hardware, Chairs, Tables, Wires, Data Cables, etc.

**What hotels/restaurants buy:** Vegetables, Utensils, Air conditioners, Gas Stoves, Carpets, etc.

So, we see that different industries require different types of materials according to their requirements.

## **1.4 Purchasing Activities**

There are two major forms of purchasing activities that take place in an organization:

- i. Tactical purchasing
- ii. Strategic sourcing

### **(i) Tactical Purchasing**

The organisations require some materials for the smooth flow of production. The day to day management of materials flow is called tactical purchasing. These activities generally ensure that products and services are delivered to the right internal people at the right time but are often not carried out using a long term horizon. (Monczka, 2002)

### **(ii) Strategic Sourcing**

The purchasing which affects the long-term profitability is called strategic purchasing. Strategic sourcing is a part of purchasing activities but in a border sense. In the strategic sourcing process there may includes members from other than purchasing department like from engineering, quality, design, manufacturing, marketing and accounting department for managing, developing and integrating with supplier capabilities to achieve competitive advantages like cost reduction, technology development, quality improvement and cycle time reduction.

## **1.5 Types of Purchase**

There are mainly two types of purchases; the individual purchase and the organizational purchase.

### **Individual Purchase**

Individual or personal purchase includes those types of items or products which are purchased for personal or family consumption.

#### **Factors influencing individual purchase behavior:**

In general mainly there are four types of influence factors:

- Cultural Factors
- Social Factors
- Personal Factors
- Psychological Factors

### **Organizational Purchase**

A purchase will be considered to be organizational if it is made in the name of a company or organization, regardless of size, from a medium sized company up to a multinational or state company. Organization consists of business, industries, retailers, wholesaler, government and non- government organizations.

- Business and industries purchase materials for business use or as a raw material to produce other product.
- Wholesalers/Retailers/traders buy product for resell at profit.

- Government organisations purchase products for use in offices or provide services to people.
- Non-government organizations purchase products to provide services to their client.

<b>Consumer Purchasing / Decision making</b>	<b>Industrial Purchasing / Decision-making</b>
Less risky	More risky
Emotional decision-making	Rational / Analytical decision-making
Personal purchasing is sometimes unplanned or on the spot or abrupt buying influenced by promotional activities	Scientific purchasing as whole organization's profitability affects

## 1.6 Purchasing Cycle

The purchasing cycle begins with a request from within the organization to purchase material, equipment, supplies, or other items from outside the organization, and the cycle ends when the purchasing department is notified that a shipment has been received in satisfactory condition, and managerial accounting is actively involved in each step. (Joyce, 2006) The main steps in the cycle are as under:

- Recognition of need
- Description of need
- Selection of suppliers
- Determination of prices

- Preparation of purchase order
- Placing the order with a selected supplier
- Monitoring and follow up the order
- Receiving the ordered materials
- Checking and approving for payment to supplier

## **1.7 Characteristics of a Purchasing Manger**

The following pre-requisite traits are required for a purchase manager:

### **Interpersonal skills**

The purchase manger must have good communication skills. There are many aspects of interpersonal communication such as handling suppliers, respect of other opinion and so on. He or she must be efficient in the same.

### **Analytical Decision Making**

Purchase manager may face many problems in his or her job like placing order, selection of best supplier, to maintain healthy relationship with supplier, and purchase right materials in right quantity at right time and so on. So, a good purchase manager must have analytical decision making.

### **Loyal to the Organisation**

The purchasing manager is involved in large activities of purchasing materials consistently involving very large financial deals. So, he has to be loyal to the organisation and he has to prove his loyalty from time to time.

### **Computer Literacy**

The purchase manager must be well skilled in computer as he requires use of computer in many activities. If he is computer literate, then he can work efficiently.

### **Technical skills**

Now-a-days, in production a very highly sophisticated technology is used. Purchase manager must have technical understanding of the business. The purchase manager has enough technical background to understand the production process, the supplier's processes and scheduling system in order to making improvement.

### **Ability to Make Decision**

The purchasing manager has to take quick decisions in line with procurement strategy of organization vis-à-vis liaison with other departments. He or she has to take decisions with quality, market, economic, social and political environment and issues taken into account.

### **Innovative**

Innovation is very necessary for survive in the market in present competitive market condition. So, a purchase manager should take innovative decisions related to purchase

techniques, maintaining quality, inventory stock, inventory control, re-ordering level and order processing.

### **Bargaining Power**

It must be the prime motive of the purchase manager that organization can purchase more and best materials with less cost. For this a purchase manager should have good bargaining power.

## **1.8 Materials Management**

Material management is defined as the planning, acquiring, storing, moving and controlling of materials as per the requirement of the organisation. Materials management is basically related with the smooth flow of materials. The major activities covered under materials management are the anticipation of the materials required in the organisation from time-to-time. It involves ordering and obtaining materials from the suppliers, introducing the materials to the organisation and monitoring the status of materials. It helps to optimize the usage of facilities, personnel and funds and to provide service to the user in the line with the organizational aims. Materials management is the coordination and control of the various material activities. The key material activities are:

- **Purchasing Activities**

It involves mainly identification of materials needs, market research, maintaining materials records etc.

- **Procurement Activities**

It involves material specifications, materials studies, receiving materials etc.

- **Inventory Management**

It involves planning and controlling of materials handling, storing materials and managing material supplies etc.

- **Supply Management**

It involves monitoring in-plant material handling, strategic planning of materials etc.

## **1.9 Classification of Manufacturing Materials**

The manufacturing materials can be classified into following categories:

- **Raw Materials**

It is the materials that the company is required to transform into finished goods. It is very important. The shortage of halts can stop the production and can cause high losses. It is different for different industries. As for example, for textile industry the cotton is main input. For automobile industry, the spare parts are very important.

- **Manufactured Parts**

These parts are the output of the organizations. These are the finished materials built by the company.

- **Work in Process**

These are semi-finished products found at various stages in the production process.

➤ **Packaged Materials**

These are materials that are packaged together to prevent damage during transportation and deterioration when they are stored.

➤ **MRO Supplies**

These materials are required for maintenance, repairing, and operating supplies used in the manufacturing process regularly for the smooth manufacturing, i.e. soap, lubricating oil, grease, plastic and rubber parts, screw driver, nuts etc.

➤ **Loose Materials**

These are materials that are partially fabricated and that should be handled individually.

## **1.10 Objectives of Materials Management Department**

• **The primary objectives of Materials Management department are:**

Low Procurement price

High inventory turnover

Low cost of acquisition and possession

Continuity of supply

Consistent quality

Low payroll costs

Favorable supplier relations

Maintenance of good records

• **The secondary objectives of Materials Management are:**

New materials, processes and products

Economic make or buy decisions

Standardization

Product improvement (Khana, 2012)

## **1.11 Relationship between Materials Management Department and other Departments**

Materials Management Department plays a very important role in an organization and it must have good relationship with other departments. The departments that are mostly involved are: Production, Engineering design, Quality control, and Finance Department.

### **Materials Management Department and Production Department**

The materials management department must have good relationship with production department. Materials Management is responsible for the purchase of all materials required by the production department. If the needed materials are not supplied at right time then the production process can halt and generate huge losses. So, for the smooth functioning of the production department, the materials department must be vigilant about the latest requirements.

### **Materials Management and Engineering Design Department**

If both materials management and engineering design department work together then the much required innovative strategies can be formulated and implemented. Both departments

can work together for standardization of materials. The suggestions of the materials management are very important for engineering department.

### **Materials Management and Quality Control Department**

The selection and rejection of the materials purchased depends upon the parameters set by the quality control department. So, if both the departments have cooperation and cordial relationship then the delay in the purchasing of raw materials can be avoided.

### **Materials Management and Finance department**

Usually, finance department release fund to materials department for the materials purchased. It is the responsibility of the both departments to clear payments to the suppliers smoothly, without much delay unnecessarily.

## **1.12 Risks to be Considered by Purchase Material Manager**

The purchase and materials manager must avoid the following consequences:

- Receiving materials before they are required, causing more inventory cost and chance of deterioration in quality;
- Not receiving materials at the time of requirement, causing loss of productivity;
- Incorrect materials take off from drawing and design document;
- Subsequent design changes;
- Damage/loss of items;
- Failure on installation;

- Selection of type of contract for specific material procurement;
- Vender evaluation criteria;
- Pilling up of the inventory and controlling of the same;
- Management of surplus materials; and
- Any one of the above or all of the above, or combinations. (Dey, 2001)

### **1.13 Summary**

The smooth functioning of the production department depends upon a large extent on the right type of materials purchased at right time at right quality and at right cost. The right cost of materials leads to good saving. It is possible through efficient buying. The purchase manager must be technically skilled, innovative, intelligent, vigilant and efficient in bargaining. Heavy competition has generated the importance of efficient purchasing. For any industrial project, the purchasing is main function that contributes in the timely execution and delivery. The corporate policy indicates the guidance map for purchasing. It includes the purchasing strategies, plans, programmes and goals. The purchasing department must have good coordination with other departments like finance, engineering, production, quality department, etc. The purchasing department is responsible for avoiding any type of over-inventory or under-inventory. The purchasing department helps in the clearance of all the bills of external parties like suppliers, etc. Every organisation must adopt scientific and analytical way of identifying the need and type of materials, right supplier and smooth flow of materials.

## **1.14 Key Words**

### **Purchasing**

Purchasing describes the process of buying. It covers the knowledge of the requirements, identifying and selecting a supplier and negotiating price

### **Procurement**

It is a broader term. It includes purchasing products required for production, stores, traffic, receiving, inspection and salvage.

### **Materials Management**

It includes planning, organising, communicating, directing and controlling of all those activities mainly concerned with the flow of materials into an organisation. Material management views material flows as a system.

### **Logistics Management**

It is the planning and controlling of the flow of raw material in a cost effective manner from the suppliers or point of origin to the manufacturing and then flow of finished goods for consumption in the customers' hands.

## **1.15 Self-assessment Questions**

1. What is purchasing management? Explain its characteristics.

2. Explain purchasing management concept and enumerate its importance in a construction industry.
3. What is the process of purchasing in a purchase department in Cement Company?
4. Explain different stages in the development of the purchasing function.
5. What is the importance of the materials management?
6. Explain the objectives of the materials management departments.
7. What are the various functions of the materials management? Explain.
8. Describe the duties and responsibilities of the materials manager?
9. What is the concept of materials management? How it is different from purchase management?
10. How will you integrate the various activities of materials management?
11. What types of materials are to be managed by automobile industry?
12. Elaborate the relationship between materials department and other departments?

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Lesson No.: <b>2</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Determination and Description of Material Quantity (MRP and JIT)</b>	

## **Structure**

- 1.0 Objectives
- 1.1 Introduction - Materials Requirement Planning (MRP)
- 1.2 Definition - Materials Requirement Planning
- 1.3 Basic Characteristics of MRP
- 1.4 MRP- Inputs
- 1.5 MRP-Outputs
- 1.6 Just-in-time (JIT) -Introduction
- 1.7 Definitions of JIT
- 1.8 Pre-requisites of JIT Implementation
- 1.9 Just-in-time Uses/Application
- 1.10 Summary
- 1.11 Key words
- 1.12 Self-assessment questions
- 1.13 References/Suggested readings

## **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the concept of Materials Requirement Planning (MRP).
- Describe purchasing activities and importance of purchase management.
- Discuss the concept of materials management and identify relationship between materials management department and other departments.
- Elaborate the concept of JIT, pre-requisites of JIT Implementation and benefits of JIT system.

## **1.1 Introduction**

### **Materials Requirement Planning (MRP)**

Materials Requirement Planning (MRP) was introduced in 1970 as a computerized inventory control system. It helps in knowing the need of raw materials and helps to calculate the demand for a particular item. It takes into account the lead time required to order automatically with the help of software. It helps in tracking the records of the raw materials especially when the materials like raw materials or components parts are required. Basically MRP is an information system which generates automatic results in the area of systematic planning of materials requirement. It is known as computerized ordering and scheduling system for manufacturing. It uses three important input data: bill of materials data, inventory data, and master production schedule to calculate the demand for

particular items like raw materials or components parts. Joseph Orlicky, George Plossl and Oliver Wight introduced MRP and popularized this programme. They imparted training for this programme for many years. Many upgraded versions are made available till now. The benefits of MRP are remarkable as it generates work orders and purchase orders automatically. Now in these days MRP-II is available, which is known as Manufacturing Resource Planning.

## **1.2 Definition - Materials Requirement Planning (MRP)**

**Material requirements planning (MRP)** is a production planning, scheduling, and inventory control system used to manage manufacturing processes. Most MRP systems are software-based, while it is possible to conduct MRP by hand as well.

**Material requirements planning (MRP)** is a production planning and inventory control system. An MRP takes important inputs from inventory and the bill of materials (BOM) to give output in terms of planning purchasing and shipping schedules for the raw materials, parts or components required for the production of a product.

**A materials requirement planning (MRP) information system** is a sales forecast-based system used to schedule, order and track records of raw material, components required and manages deliveries and quantities, helpful in systematic production planning.

A computerized system for managing dependent-demand inventory, calculate the demand for items, scheduling replenishment orders, and meeting all the requirements for the production as given in the Master Production Schedule.

Material Requirements Planning is a time phased priority-planning technique that calculates material requirements and schedules supply to meet demand across all products and parts in one or more plants.

The material requirements plan is a sophisticated computer generated calculation quantifying procurements and production requirements from the relationships of the above four reference questions, 1) What are we going to make?; 2) What does it take to make it?; 3) What have we got?; 4) What do we have to get?. Specifically these inter-relationships are generated from the master production schedule, the inventory records and the bill of material. (Wong & Kleiner 2001)

**MRP is a tool that provides answer for several questions:**

- What material is required?
- How many are required?
- When are they required?
  
- Dependent demand – Demand for items that are sub-assemblies, parts or raw materials to be used in the production of finished goods.
- Independent demand – finished products

### **1.3 Basic Characteristics of MRP**

The following are the features of MRP:

- i. MRP calculate the demand for components, subassemblies, raw-materials, spare parts.
- ii. MRP helps in systematic planning

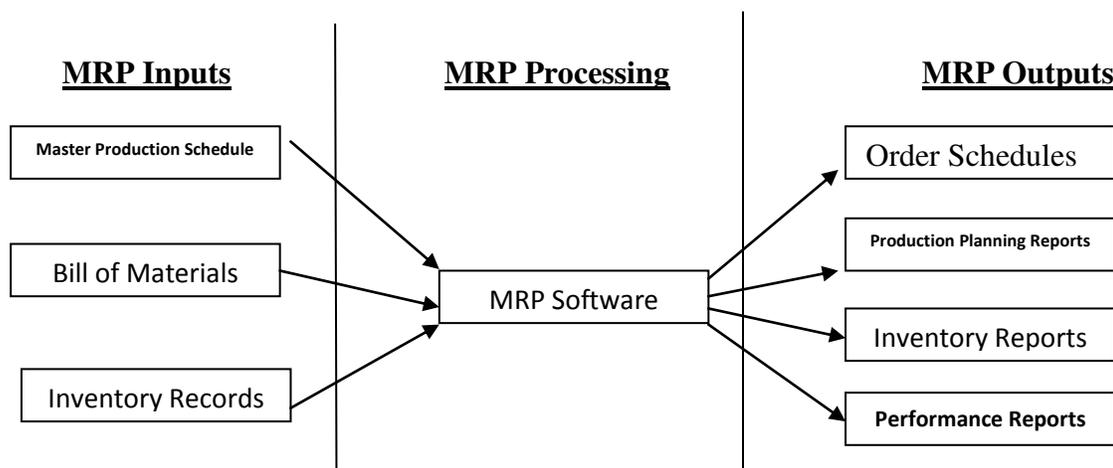
- iii. MRP takes into account the lead time required for orders.
- iv. MRP helps in purchase orders planning and tracking
- v. MRP is helpful in preparing production schedules
- vi. MRP ensures materials are available for production and products are available for delivery to customers.
- vii. MRP maintains the lowest possible material and product levels in store.
- viii. MRP is helpful in planning manufacturing activities, delivery schedules and purchasing activities.

MRP is best suited for the control of purchased materials that exhibit the following characteristics:

- Material that can be purchased on long term contracts with frequent releases for shipment in relatively small quantities.
- Raw material or standard items for which lead item requirements are relatively short and seldom vary appreciably.
- Material that can be purchased repetitively without requiring much creative purchasing analysis or for which value analysis, purchasing research and vendor studies have previously been completed. (Dobler & Burt, 1995)

## **1.4 MRP Inputs**

- Master Production Schedule (It tells what is to be produced, when they are needed, and in what quantities. It is a time-phased plan specifying how many and when the firm plans to build each end item)
- Product Structure
- Inventory Records ( It gives the information about quantity of raw materials and finished goods, details of the suppliers, order lead time etc)
- Demand for all products.
- Lead times for all finished goods, components, parts and raw materials
- Lot sizing policies for all parts
- Bill of Materials (It tells about the requirements of the raw materials, spare-parts, and sub-assemblies needed to manufacture the products)
- Safety stock requirements
- Any orders previously placed but which haven't arrived yet



**Figure 1.1 : MRP Functioning**

## 1.5 MRP Outputs

- Order Release (It gives clear idea about the amount and timing of future orders)
- Planned Inventory Schedules
- Action notices: notices to expedite, de-expedite, or cancel orders, or to change order quantities or due dates
- Priority reports: information regarding which orders should be given priority
- Inventory Reports
- Planning Reports: reports such as inactive items, actual lead times, late orders, etc.

This report is helpful in assessing the materials requirement.

## 1.6 Just In Time (JIT)

Just-in-time was invented by Taiichi Ohno of Toyota Motor Company in Japan shortly after World War II. It is a management philosophy which involves providing the right items of the right quality and quantity at the right place and at the right time. JIT is not merely an inventory reduction programme, but is much broader in effect so that the organization operates more efficiently and with minimum resources. (Mukhopadhyay, 1995) JIT is an inventory strategy in which companies increase efficiency and decrease waste by receiving materials only as they are needed in the production process, thereby reducing inventory costs. JIT is an all-encompassing philosophy found on eliminating waste. Anything that does not add value to process is called waste.

The success of just-in-time (JIT) on the production floor in reducing costs, improving quality and enhancing responsiveness has led many firms to attempt to extend the philosophy to the entire supply chain. The application of JIT to the sourcing arena has become more important in the past few years because the value of purchased inputs, as a percentage of costs of goods sold, has increased steadily in many production environments. Research has indicated that a firm will source outside its home borders if it expects to achieve dramatic and immediate improvement in four critical areas: (Humphreys, Yeung, 1998)

- cost reduction;
- quality improvement;
- increased exposure to technology; and
- delivery and reliability improvements

## **1.7 Definitions of JIT**

Just-in-time is a philosophy which means producing only what is needed, when it is needed, not early, not late; not less, not more. The key target is achieving high volume production using minimal inventories. It is an integrated but simplified system. The JIT mandate is the elimination of all types of waste in the organisation. According to this philosophy, anything which is not generating value is called waste.

Just-in-time (JIT) is a highly coordinated processing system in which goods move through the system, and services are performed, just as they are needed. Supplies and components are 'pulled' through the system to arrive where they are needed when they are needed.

Just-in-time is defined as the production of the minimum number of units in the smallest possible quantities at the latest possible time, which eliminates the need for inventory. It does not mean to produce on time but to produce “just in time”.

JIT is defined as an approach for providing smoother production flows and making continual improvements in processes and products. (Svensson, 2001)

The fundamental aim of JIT purchasing is to ensure that production is as close as possible to a continuous process from receipt of raw materials/components through to the shipment of finished goods. The success and resulting performance of purchasing system is based upon cooperation between the purchaser and supplier. Some of the elements of this system are as follows: (i) smoothed flow of materials between suppliers and buyers; (ii) order cost reduction; (iii) stock reduction; (iv) quality; and (v) product simplification (Gunasekaran, 1999).

JIT is more than an inventory system. It is an operational philosophy which includes:

- Short lead time
- A maintenance improvement system.
- A quality improvement system.
- A productivity improvement system.
- Minimum inventory-level
- Closely coupled flow-lines

## **1.8 Pre-requisites of JIT Implementation**

Top management is responsible for change in the organisation. For that sake, it has to create an environment in the organisation. The management has to develop a culture in the organisation. In order for JIT implementation to be successful, the organisation must frame these policies regarding JIT and must get commitment from the employees to follow the guidelines lead down in the policies by words and means. The implementation of JIT is not just for the sake of change. Most of the organisations implement JIT just for the sake to beat the competitors. In this way they miss the true essence of the philosophy and the results are like half-hearted. The success of JIT philosophy lies in the commitment of the employees. This philosophy covers the whole organisation under one umbrella. All the departments have to work with coordination and follow the guidelines with full spirit. The top executives have to be the leaders involved in JIT and they must be the guiding light for all the employees. So, the success of JIT philosophy depends upon the strategic planning that runs deep in the commitment of all the departments and all the employees. Getting everyone involved and committed is the first step to successful implementation of JIT and the first step to an increase in continuous improvement.

A properly implemented JIT system must have:

- Visible goals
- Produce products as per the customers' requirements.
- Continuous improvement of all the processes
- Doing right at first time
- Producing at the rate customers want them.
- Delivering right quality and quality at first time.

- Produce instantly with zero unnecessary lead time.
- Advocating zero waste of labor, material or equipment.
- Following zero-defect policy

## **1.9 Just-in-time Uses/Application**

JIT has an enormous impact on a company's profitability, especially in a competitive environment characterized by small profit margins. Furthermore, the application of JIT technologies such as small lot size, lead time reduction and quality improvement play a significant role in achieving JIT purchasing. (Yang & Pan, 2007) The benefits are as follows:

- Part Costs – Low scrap costs; low inventory carrying costs
- Quality – fast detection and correction of unsatisfactory quality, and ultimately higher quality purchased parts
- Capital requirements – reduced rework inventories of purchased parts, raw materials, work-in-progress and finished goods.
- Administrative efficiency – fewer suppliers; minimal expediting and order release work; simplified communications and receiving activities. (Chung & Bakar, 2001)

### **Other financial benefits of JIT include:**

- Lower investments in factory space for inventories and production;
- Less obsolescence risk in inventories;
- Reduction in scarp and rework;
- Decline in paperwork;

- Reduction in direct material costs through quantity purchases. (Kootanaee, Babu, Talari, 2013)

**Benefits of JIT implementation include:**

- Reductions in lead-time ;
- Inventory-levels reduction;
- Consistent quality improvement culture;
- Zero wastage in the organisation;
- Involvement of employees;
- Stabilize production schedules;
- Increased equipment utilization; and
- Reduction in customer-related problems

Applications of JIT are as follows:

- **Inventory Reduction as a Tool for Improvement**

Inventory reduction is directly related with cost. Costs are reduced greatly if inventory is reduced.

- **Waste Reduction**

If any activity that increases cost but does not add value to any process in an organisation is called waste. Eliminate waste of labor, material or equipment. JIT advocates zero waste in organisation.

- **Supplier Relationships**

There must be good relationship with suppliers. Its helps in getting raw material supply exactly when required.

➤ **Minimum batch sizes**

The batch sizes must be kept as small as possible. The defects can be observed easily in small batches.

➤ **Minimum Movements**

The movements must be kept low in production plants. The computerized equipments are very much helpful in minimising the movements in the plants.

➤ **Total Quality Assurance**

The production department must control all the processes time to time to control the variation in the production output in terms of quality. Proper training is very much in the total quality assurance.

➤ **Preventive Maintenance**

The inspection after the accident is useless. Preventive maintenance is needed to reduce variation in the process. This requires a regular and complete examination of all the processes on a regular basis.

## **1.10 Summary**

Materials Requirement Planning (MRP) is a computerized inventory control system. It helps in knowing the need of raw materials and helps to calculate the demand for a particular item. It takes into account the lead time required to order automatically with the help of software. It helps in tracking the records of the raw materials especially when the materials like raw materials or components parts are required. Basically MRP is an information system which generates automatic results in the area of systematic planning of materials requirement. It uses three important input data: bill of materials data, inventory data, and master production schedule to calculate the demand for particular items like raw materials or components parts. Many upgraded versions are made available till now. The benefits of MRP are remarkable as it generates work orders and purchase orders automatically. Now in these days MRP-II is available, which is known as Manufacturing Resource Planning.

Just-in-time is a philosophy which means producing only what is needed, when it is needed, not early, not late; not less, not more. The key target is achieving high volume production using minimal inventories. It is an integrated but simplified system. According to this philosophy, anything which is not generating value is called waste. JIT advocates minimising all types of wastes. Top management is responsible for change in the organisation. For that sake, it has to create an environment in the organisation. The management has to develop a culture in the organisation. In order for JIT implementation to be successful, the organisation must frame these policies regarding JIT and must get commitment from the employees to follow the guidelines lead down in the policies by words and means. The implementation of JIT is not just for the sake of change. Most of the organisations implement JIT just for the sake to beat the competitors. In this way they miss the true essence of the philosophy and the

results are like half-hearted. The success of JIT philosophy lies in the commitment of the employees. This philosophy covers the whole organisation under one umbrella. All the departments have to work with coordination and follow the guidelines with full spirit. The top executives have to be the leaders involved in JIT and they must be the guiding light for all the employees. Getting everyone involved and committed is the first step to successful implementation of JIT and the first step to an increase in continuous improvement.

## **1.11 Keywords**

### **Waste**

If any activity that increases cost but does not add value to any process in an organisation is called waste.

### **Material Requirements Planning (MRP)**

It is a production planning and inventory control system. An MRP takes important inputs from inventory and the bill of materials (BOM) to give output in terms of planning purchasing and shipping schedules for the raw materials, parts or components required for the production of a product.

### **Just-in-time**

It is defined as the production of the minimum number of units in the smallest possible quantities at the latest possible time, which eliminates the need for inventory.

## 1.12 Self-assessment Questions

1. What are the primary objectives of an MRP system?
2. What is Material Requirement planning?
3. What you understand about Just- In- Time technique of materials management?
4. Define Just-In-Time. What are advantages and limitations of Just- In-Time?
5. Discuss the benefits of implementation of JIT system in manufacturing.

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>3</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Receiving and Incoming Quality Inspection</b>	

## **Structure**

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Broad Objectives of the Quality Inspection
- 1.3 Responsibilities of the Receiving and Stores
- 1.4 Stages of Quality Inspection
- 1.5 Receiving and Incoming Quality Inspection
- 1.6 Importance of Receiving and Incoming Quality Inspection
- 1.7 Check-lists for Receiving and Incoming Materials and Parts
- 1.8 Inspecting a shipment
- 1.9 Inspection of Goods at Receiving and in Manufacturing System
- 1.10 Methods of Inspection
- 1.11 Summary
- 1.12 Keywords
- 1.13 Self Assessment Questions
- 1.14 References / Suggested Readings

### **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the basic concept of Quality Inspection.
- Know the importance of receiving and incoming quality inspection.
- Understand the process of receiving materials and parts.
- Know the common methods of inspection.

## 1.1 Introduction

Quality inspection aims at regular checking, measuring and testing of the following: (i) incoming materials and parts; (ii) one or more processes; and (iii) finished goods. Quality inspection is very much helpful in improving the quality, minimising the manufacturing cost and eliminating the scrap losses. It is the most common method used to attain the standardisation and conformance to quality.

In production department, the quality inspection is related with checking, measuring and testing of one or more products and the products that don't comply with the standard specifications are rejected or returned for improvement.

## 1.2 Broad Objectives of Quality Inspection

The Quality Inspection has the following broad objectives:

i) **Identification of the problem:**

Quality inspection is helpful in the identification of the problem. The problem can be related with the incoming materials and parts, one or more processes in the production, or to the finished goods.

ii) **Prevention:**

Quality inspection is helpful in the prevention of the occurrence of problems in the area of incoming and reception of raw materials and parts, in the production process and in the finished goods.

**iii) Elimination of the problem:**

Quality inspection aims to eliminate of the problem(s) of the poor quality, pilferage, shortage or damage of any kind.

### **1.3 Responsibilities of the Receiving and Store Units**

The receiving and store units provide multiple services. First of all, the receiving officers collect information regarding the established standards of the incoming materials and parts for their use in production. This information helps to keep a check on incoming raw materials and parts from the suppliers in terms of quality. The receiving officers inspect all the containers for external damage. After unpacking of the containers they ensure that the items supplied are in good condition. Then they check the quantity of materials and parts. They distinguish good lots from bad lots and good pieces from bad pieces. This process helps to maintain quality standards of incoming materials and parts. It also helps to rate the quality of products as well as suppliers. Thus, receiving and store units are very helpful in the smooth and effective flow of materials required in the production operations.

### **1.4 Stages of Quality Inspection**

There are three stages of Quality Inspection:

- i) Inspection of incoming materials and parts;
- ii) Inspection of production process/processes; and

iii) Inspection of the finished goods.

**i) Inspection of incoming materials and parts:**

It is also called receiving inspection. It is checking, measuring and testing of incoming materials and parts that are supplied before they are taken to store or inventory. Incoming inspection can be conducted either at supplier's end or at manufacturer's gate. If the incoming materials are bulky or large in quantity and involve huge transportation cost, it is economical to inspect them at the place of vendor or supplier.

**ii) Inspection of production process/processes:**

This work of inspection is done while the production process is in progress. Inspection at production house is very important to maintain the quality of products. Inspection at this point is very helpful in preventing wastage of resources like materials, parts, time and money. It prevents defective goods and minimizes the wastage.

**iii) Inspection of the finished goods:**

This is the last stage when finished goods are inspected before delivery to the customers. At this point, the poor quality products are rejected or sent back for further improvement.

## **1.5 Receiving and Incoming Quality Inspection**

Each department makes sure that the goods or services received are acceptable and comply with all the stated terms and conditions of the purchase-document. The entire receiving process consists of the following steps:

**i) Receiving:**

It is the act of taking possession of goods in order to stage them for inspection or place them into inventory.

ii) **Inspecting:**

It is the act of examining goods that have been supplied by the supplier to check the quality of what was ordered via purchase document. It requires specialized skills or expertise to examine the goods to ensure that the goods received comply with the standards.

iii) **Acceptance:**

It is the legal act of documenting that the goods and/or services conform to the requirements of the purchase document terms and conditions

Normally, the purchasing department is responsible for purchasing of materials and parts required. So, the purchasing managers must be well versed in the knowledge of the checking, measuring and testing of raw materials and parts to be purchased. The receiving department is responsible for receipt, identification, general inspection and condition of all incoming raw materials and parts. Now, the receiving manager acts like a controlling agency for receiving and maintaining the quality of the materials to be received. He/she acts as custodial agency too because he/she protects all the materials and parts from pilferage, damage, unauthorized withdrawals, etc.

## **1.6 Importance of Receiving and Incoming Quality Inspection**

Quality Inspection consists of checking, measuring and testing of all the purchased raw materials and parts received from the suppliers. It is must before the materials and parts are taken into stock. Receiving Inspection is the most important aspect because the

purchased raw materials and parts are to be used in the manufacturing. The sub-standard raw materials and spare parts generate sub-standard products which is unacceptable at any stage by any stakeholder.

Receiving and incoming of materials and parts is a routine work, hence, it is considered as clerical task and understated by some companies. Sometimes this job is considered very light in terms of receiving, incoming and generating documents. It is a very serious mistake. If the poor quality, pilferage, shortage or damaged quantity is overlooked at the receiving stage and the problem(s) is discovered at later stage, it will prove to be a disaster. It will not only increase the cost of the product, but also waste the precious time of the employees. The problem(s) must be considered at the receiving to run the production smoothly.

## 1.7 Check-lists for Receiving and Incoming Materials and Parts

### Check-list before Taking Receipt of any Shipment

Statements	Yes	No
The incoming shipment is for the concerned department.		
The number of containers is correct.		
The containers are free from any damage.		
If containers are externally damaged, then it is noted on the receipt.		

### Check-list for Receiving Goods on Behalf of the Department

Statements	Yes	No
The delivery is significantly on time.		
The delivery is complete.		
The specifications and packaging requirements comply with the order.		

Correct items are shipped.		
The delivery requires further inspection by another technical person.		
All the terms mentioned in the purchase document have been met.		
Damage is from supplier side.		
Damage is from carrier side.		

### **Check-list for Completion of the Receiving Report and Documentation**

<b>Statements</b>	<b>Yes</b>	<b>No</b>
Timely inspection is done.		
During inspection all the stated standards are followed.		
Purchase order number is mentioned on the receiving report.		
Partial shipment is clearly mentioned, if any.		

## **1.8 Inspecting a Shipment**

After acknowledging receipt of the order, the receiving staff must conduct an inspection of all the materials and parts received. If the goods are very technical, he/she may accompany a specialized expert. He/she must check/inspect and verify the following very important aspects:

- Verify that all the items are according to purchase document and the specifications, measurements, model, product description, company name, brand are same as mentioned in the purchase document. He/she must carry a copy of purchase order as the purchase is the primary document based on which the supplies are made, examined, accepted and paid for.
- The purchase officer should check and verify that the quantity received is matched against the order given.

- Inspect for any pilferage, leakage, damage or breakage of the container.
- The purchase officer should check and verify the supplier's full name and address, the order number, date, delivery date and schedule, packing instructions etc.
- Check for operability/functionality.
- Confirm instructions regarding special handling or packaging were followed.
- Verify that the unit of measurement count is correct (e.g. if the unit of measurement on the purchase document is one dozen, count 12 in the unit package).
- Verify that delivery documentation (packing slip, certifications, etc.) is acceptable.
- Verify that packaging integrity is preserved.
- Verify that perishable items are in good condition and expiration dates have not been exceeded.

### **Conduct timely inspections**

Inspections should be completed within a reasonable amount of time. If a department knows that the inspection will not be immediate, then the purchase document must provide when the inspection will occur and how it will be accomplished.

### **Installation checklist**

Documentation may include a standard installation checklist for the supplier to complete and provide to a state representative upon completion of the tasks.

### **Documenting the results**

Departments are advised to document all inspection results and provide the results to the department procurement office for filing within the procurement file. The document should, at a minimum, identify what action was performed, who was in attendance, both department and supplier personnel by name and title, when and where the inspection occurred, and the inspection results. Documentation shall be retained within the procurement file.

### **1.9 Inspection of Goods at Receiving and in Manufacturing System**

Inspection is the most common method of attaining standardisation, uniformity and quality of the receiving and incoming materials and parts. It is confirmed that the raw materials and parts are according to the purchase order and conforms standards and specifications. Inspection is must from quality aspect. In fact, it is the function of quality control. If the said item does not fall within the zone of acceptability it will be rejected and corrective measures will be applied to see that the items in future conform to specified standards. Inspection is an indispensable tool of modern manufacturing process. It helps to control quality, reduces manufacturing costs, eliminate scrap losses and assignable causes of defective work. It is important, upon receiving a shipment, to make sure that the material meets quality specifications. If it is of great importance that no defects in quality exist, you will probably want to run a complete inspection check on the materials and items received.

Increased costs of product maintenance and repair, together with increased reliability requirements, have generated both internal and external pressures on firms to intensify their concern for product quality. The introduction of quality inspection in a manufacturing system necessitates higher financial burden. By the strategic allocation

of inspection activities, the product quality can be upgraded to yield substantial economies of manufacturing. Every manufacturing system has a finite number of inspection machines or stations with finite amount of inspection time within which all inspection operations should be completed. (Lee and Unnikrishnan, 1988).

The machines and tools for inspection, such as machine vision devices, coordinate measuring machines (CMMs), and scanning laser systems can differ in the time requirements and costs for similar inspection operations. There are two basic problems in planning quality inspection operations are: (1) At what points in the multistage manufacturing process should inspection be performed, and (2) If inspection is needed, which inspection station should be used? An optimal inspection plan would consider all the inspection station allocation possibilities and the inspection time availability. (Groover, 1996)

A product made from expensive and rare raw material usually needs more alertness in its manufacturing process since its non-conforming item often has insignificant value. In-process correction is considered in addition to in-process inspection, in forming an effective work station that consists of processing, inspecting and correcting to produce better quality of products. (Irianto, 1995)

## **1.10 Methods of Inspection**

The decision of acceptance or rejection of receiving and incoming raw materials and parts depend upon the methods of inspection. There are two methods of inspection. These are (i) 100% inspection/Census method; and (ii) Sampling inspection methods.

### **(i) 100% Inspection/Census Method**

Census means that the data are to be obtained from each and every unit of the population. This type involves careful inspection of quality in detail as every piece is separately inspected. The effort, money and time are required to carry out complete inspection. Even more number of inspectors is required and hence it is a costly method. There is no chance of sampling error as each item has gone through the process of inspection. However, inspection errors arising out of fatigue, negligence, difficulty of supervision etc. cannot be neglected in this case. It is suitable only when a small number of pieces require inspection or a very high degree of quality is required. This method is suitable for the organisations dealing in the business of jet engines, aircraft, medical and scientific equipment etc.

#### **(ii) Sampling Inspection**

Sampling is the process of learning about the population on the basis of a sample drawn from it. In sampling inspection, money and time is saved. Here, less number of inspectors is required in comparison to census method. In this method randomly selected samples are inspected instead of every receiving raw materials and parts. Samples taken from different batches of products are representatives and the conclusions are drawn on that basis for the entire receiving. If the sample proves defective, the entire concerned is to be rejected. Sampling inspection is cheaper and quicker. In this process, how you draw the sample matters a lot. This method is very suitable and frequently used in the organisations making CFL tubes, fans, A.C., music systems, washing machine etc.

### **1.11 Summary**

Quality inspection are the measures aimed at checking, measuring and testing of incoming materials and parts, one or more processes and finished goods at regular basis. The receiving and stores units provide both service and control functions. First of all, the receiving officers collect information regarding the established standards of the incoming materials and parts for the use in production. They are helpful to protect production from receiving poor quality. They inspect all the containers for external damage. After unpacking of the containers they verify the correct items. Then they check the quantity of materials and parts. They distinguish good lots from bad lots and good pieces from bad pieces. They sort out poor quality of the incoming materials and parts and thus maintain standards. They are very helpful to rate quality of product as well as suppliers. The receiving and stores are very helpful in the smooth flow of materials required in the production operations. Normally, the purchasing department is responsible for purchasing of materials and parts required. So, the purchasing managers must be well versant with the knowledge of the checking, measuring and testing of raw materials and parts to be purchased. The receiving department is responsible for receipt, identification, general inspection and condition of all incoming raw materials and parts. The receiving manager acts like a controlling agency for receiving and maintaining the quality of the materials to be received. He/she acts as custodial agency and looks after the store management. Inspection is the most common method of attaining standardisation, uniformity and quality of the receiving and incoming materials and parts. It can be conducted through either 100 %/census inspection methods or sampling inspection method.

## **1.12 Keywords**

## **Quality Inspection**

Quality inspection are the measures aimed at checking, measuring and testing of incoming materials and parts, one or more processes and finished goods at regular basis.

## **Census Inspection**

Census Inspection means that the data are to be obtained from each and every unit of the population.

## **Sampling Inspection**

Sampling Inspection is the process of learning about the population on the basis of a sample drawn from it.

## **1.13 Self Assessment Questions**

1. Define quality inspection. Discuss its stages.
2. Prepare a checklist of the activities of inspection of goods at receiving.
3. “Receiving and incoming raw materials and parts is very important activity and it influence cost.” Comment on this statement.
4. Discuss briefly the responsibilities of a purchase officer.
5. Discuss the importance of receiving and incoming quality inspection.
6. What are the ways of doing inspection? Enumerate advantages and disadvantages of each method.
7. Differentiate between 100% inspection and sampling inspection.

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### **Web links**

<http://www.bizmove.com/general/m6i6.htm>

<http://www.documents.dgs.ca.gov/pd/delegations/chapter10.pdf>

<https://www.intermec.com/public-files/about-us/suppliers/604548-Vendor-Quality-System-Requirements-Procedure.pdf>

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<http://www.foodsafetysite.com/resources/pdfs/EnglishServSafe/ENGSection6.pdf>

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>4</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Acceptance Sampling Plans</b>	

## **Structure**

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Acceptance Sampling – Brief History
- 1.3 Acceptance Sampling – Definition
- 1.4 Acceptance Sampling Procedure
- 1.5 Role of Acceptance Sampling
- 1.6 Acceptance Sampling Plan
- 1.7 Types of Acceptance Sampling Plans
- 1.8 Type I and Type II Errors
- 1.9 Advantages of Acceptance Sampling
- 1.10 Disadvantages of Acceptance sampling
- 1.11 The Operating Characteristic (OC) Curve
- 1.12 Construction of OC Curve
- 1.13 Summary
- 1.14 Keywords
- 1.15 Self Assessment Questions
- 1.16 References / Suggested Readings

## **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the basic concept of acceptance sampling
- Know the procedure, role and importance of acceptance sampling
- Understand the Type I and Type II errors.
- Familiar with the concept of Operating Characteristic (OC) Curve

## **1.1 Introduction**

Quality is the most important concern and it is the backbone of the relationships of supplier and the organisation. The quality materials and parts received by the organisations decide the quality of the products and services manufactured thereafter. So, the role of quality inspection of the incoming materials, parts and components increases very much. Quality inspection is the measures aimed at checking, measuring and testing of incoming materials and parts at regular basis. Quality inspection is very much helpful in improving the quality, minimising the manufacturing cost and eliminating the scrap losses directly. The purpose of the inspection is to give input to the suppliers with evidence that the company is very much cautious about the quality of raw materials, parts and components. Quality inspection for acceptance purposes is nowadays common in the organisations and is done in order to check the performance of the underlying quality systems. Acceptance sampling is related with inspection and decision making regarding the materials, parts and components received from supplier or vendors. It is an applied quality control tool to check whether the incoming materials and parts meet the quality standards/levels required or not. It is concerned with quality

materials and parts supplied by vendors/suppliers, in the production process and quality of finished goods before delivery to the customers.

## 1.2 Acceptance Sampling – Brief History

Acceptance sampling is an important tool in the field of statistical quality control that was popularized by Dodge during World War-II. First of all, this quality technique was applied by the U.S. military to the testing of bullets to be used in the war. The main theme of acceptance sampling is in the following concept: if every bullet was tested in advance, no bullets would be left for war. If, on the other hand, none were tested, it will be very risky to check the functioning of bullets in the actual field of war.

## 1.3 Acceptance Sampling – Definition

Acceptance Sampling is defined as the process of taking a sample from the lot according to the sampling plan and inspecting it and then taking decision about accepting or rejecting the lot based on the results of the sample. It is used to make decision on accepting or rejecting a lot (or batch) of product that has already been produced. Herein, a sample is taken from the lot, and some quality characteristics of the units in the sample are inspected.

Notation:      $N$        =     Batch size  
                   $n$        =     Sample size  
                   $c$        =     Acceptance number  
                   $P_a$      =     Probability that a batch will be accepted

Acceptance sampling is a form of quality testing used for incoming materials, parts & components.

## 1.4 Acceptance Sampling Procedure

The procedure of acceptance sampling consists of the following steps:

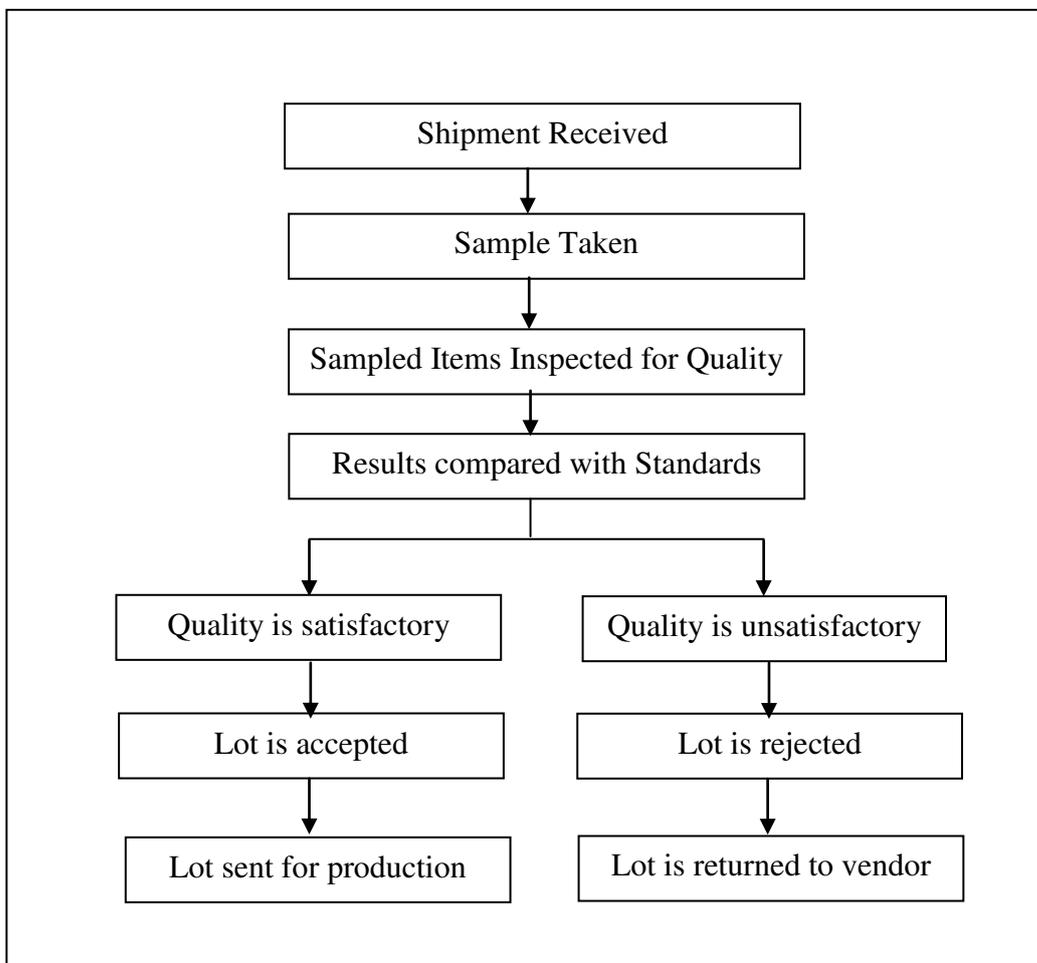
- **Sampling:** It is the process of taking one or more samples at random from a lot (shipment) of items according to the acceptance sampling plan.
- **Inspection:** It is the process of inspection of each of the items in the sample.
- **Decision Making:** It is to decide whether to reject or accept the whole lot based on the inspection results. There are two conditions:

(i) If the sample passes the test:

The entire lot is accepted. It means the entire quantity of items is accepted.

(ii) If the sample fails the test:

Either (a) the whole lot is subjected to 100 percent inspection and all defective items are repaired or replaced or (b) the whole lot is returned to the vendor.



**Figure 4.1: Flow-chart Showing Procedure of Acceptance Sampling**

## **1.5 Role of Acceptance Sampling**

Acceptance sampling can be used at the following three places in the organisation:

- It is used for incoming or receiving inspection for raw materials and parts;
- It is applied in many stages of production; and
- It is applied for checking quality of final products before delivery to the customers. It is common to find inspection activities of final products being carried out by the producer.

“In a view of ISO standard, an acceptance control chart combines consideration of control implications with elements of acceptance sampling. It is an appropriate tool for helping to make decisions with respect to process acceptance. There are several acceptance sampling methods for attributes and variables. The attribute sampling is a simple statistical method that utilizes representative samples to analyze traits of a large body of data and decides based on the number of defectives in a lot. Variables sampling is designed to predict the value of a given variable and to decide based on measurement values. Thus, statistically valid sampling plan tells us the probability of accepting bad lots and the probability of rejecting good lots in the manufacturing system.” (Aydemir & Olgun, 2010)

In general, three approaches can be considered when receiving a lot:

- No inspection; or
- 100.0% inspection; or

- Sampling inspection. (Acceptance Sampling is exclusively covered under this approach)

Acceptance Sampling (AS) is concerned with inspection and decision making regarding the incoming raw material and parts from vendors. It is often used to determine the quality of incoming raw material or parts when 100 per cent inspection is time consuming and costly. Thus, 100 per cent inspection does not guarantee 100 per cent compliance. Acceptance sampling is a middle road approach between 0 per cent inspection and 100 per cent inspection.

Acceptance sampling is fruitful in the following situations:

- Testing consumes expensive resources.
- When testing is destructive; if performed, all or part of the product will be lost.
- The cost of 100% inspection is very high.
- 100% inspection takes too much time.

## **1.6 Acceptance Sampling Plan**

Acceptance sampling plan consists of procedure for inspecting materials/parts/components or finished goods. It can be prepared for receiving and incoming lots. It can be prepared for finished goods. It identifies:

- Type of sample
- Sample size ( $n$ )
- Criteria ( $c$ ) used to reject or accept a lot

An acceptance plan is negotiable and decided by the organisation & the supplier/vendor. The organisation can follow an effective acceptance sampling plan to

set and maintain an acceptable quality assurance standard while procuring parts or raw material from the suppliers. Sampling plans, which when implemented indicate the conditions for acceptance or rejection of the immediate lot that is being inspected. Rather than evaluating all items, a specified sample is taken, inspected or tested, and a decision is made about accepting or rejecting the entire lot of raw materials and parts.

“Acceptance sampling (AS) procedures can be applied to lots of items when testing reveals non-conformance or non-conformities regarding product functional attributes. It can also be applied to variables characterizing lots, thus revealing how far product quality levels are from specifications. Both AS applications have the basic purpose of classifying a lot as accepted or rejected, given the quality levels required for it.” (Duarte & Saraiva, 2008)

## **1.7 Types of Acceptance Sampling Plans**

Sampling plans depend on the number of sample(s) and average number of items to be inspected by the receiver/organisation of raw materials, parts and components. To keep the cost of inspection low, it is required that the receiver keeps the number of items to be inspected low. There are three often-used sampling plans: (i) Single-sampling plan, (ii) Double-sampling plan, and (iii) Multiple or sequential-sampling plan.

### **➤ Single-Sampling Plan**

The single-sampling plan is a decision rule to accept or reject a lot on the basis of the results obtained from the single random sample from the lot. The procedure is to take a random sample of size ( $n$ ) from the universe (lot) and inspect the quality of each item. If the number of defects does not exceed a specified acceptance number ( $c$ ), the

decision is to accept the whole lot. If the number of defects in the sample is greater than  $c$ , the entire lot is rejected and returns it to the supplier. The single-sampling plan is easy to use.

Let us take an example: In a lot size (total number of items)  $N=100$ , sample size  $n$  is 5, and the acceptance number  $c$  is 1.  $C$  is the important number as it is the maximum allowable number of defects in the sample.

**Parameters:**

- $N =$  Lot size (100)
- $n =$  Sample size (5)
- $c =$  Acceptance number (1)

The acceptance or rejection of the lot is based on the acceptance number. In the above example, out of sample size 5, if the total number of defects is found more than 1, then the lot is rejected.

➤ **Double-Sampling Plan**

In the Double-Sampling plan, we take two samples and plan two acceptance numbers. In the first sample, if the defects are less than planned acceptance number, we accept the lot. Otherwise, if the defects are more than planned, we go for second sample. Now, the total number of defects (in first sample plus in second sample) decides whether to accept the lot or reject the lot. If the total number of defects is more than the total of both acceptance numbers, then we reject the lot otherwise we select the lot.

**Parameters:**

$N =$  Lot size

$n_1$  = Sample size for first sample

$c_1$  = Acceptance number of the first sample

$n_2$  = Sample size for the second sample

$c_2$  = Acceptance number of the second sample

Let us take a lot size ( $N=100$ ) of materials and parts to be delivered for quality check or inspection position. We take first sample ( $n_1=10$ ) and second sample ( $n_2=10$ ) and decide two acceptance numbers ( $c_1 = 2, c_2 = 2$ ).

**Step I:** A first sample of size  $n_1$  (10) is taken from a lot size of 100.

**Step II:** If the number of defects or defectives in the first sample are 2 or less than 2 (acceptance number  $c_1$  of first sample), the lot is accepted and a second sample is not considered.

**Step III:** If the number of defects in the first sample exceeds 2, a second sample is to be considered and inspected.

**Step IV:** If a second sample is inspected and defects in combined first and second sample do not exceed 4 (acceptance number  $c_2$  of second sample), the lot is accepted.

**Step V:** If the defects in combined samples exceed 4, the lot is rejected. The rejected lot is sent back to supplier for further improvement or replacement.

If the defects are less than the first acceptance level of first sample, then the lot is accepted and time is saved. It can be considered as the advantage of this method. If gone for the second sample then it is just like double filter. Reduction in the risk can be considered as advantage of this method.

➤ **Multiple or Sequential-Sampling Plan**

A further refinement of the double-sampling plan is the multiple or sequential-sampling plan. In this plan we randomly select samples from the lot and inspect them one by one. Each time a planned sample is taken, inspected for quality and a decision is made. If the lot is rejected, we go for second sample. If the sample is rejected we go for third sample and keep on going like this. The number of the samples depends upon the sampling plan permitted. This makes the process very tedious. Hence this method is rarely used.

## 1.8 Type I and Type II errors

There can be two types of errors in acceptance sampling, Type –I and Type-II error.

- **Type I error:** The lot is good in quality but rejected.
- **Type II error:** The lot is bad in quality but accepted.

Both Type I and Type II errors are very dangerous. Type I error is committed by rejecting the good lot with acceptable quality and Type II error is committed by accepting a bad lot with rejectable quality.

Decision	State of the Lot	
	Good Quality Lot	Poor Quality Lot
Accept the lot	Correct Decision	Type II Error Accepting a Poor Quality Lot
Reject the lot	Type I Error Rejecting a Good Quality Lot	Correct Decision

**Table 4.1: Type I and Type II errors**

While inspection the aim is to reduce both the types of error, i.e. Type I and Type II. Type II error is more dangerous than Type I error. Type II error will give drastically

bad results at later stage as the bad quality lot will deteriorate the quality of the output. Hence acceptance sampling plan is exposed to some risks known as Producer's Risk and Consumer's Risk. Type I error is producer's risk and Type II is called consumer's risk.

## **1.9 Advantages of Acceptance Sampling**

- The prime objective of the acceptance sampling is to check the incoming and receiving lots of raw materials and parts from quality point of view.
- It helps to eliminate or rectify poor lots and improve overall quality of incoming raw materials, parts and components.
- It is helpful in the risk management of incoming materials and parts as the poor/bad lot in terms of quality is identified at this stage.
- It is helpful in reducing the inspection cost.
- Rejection of lot or consignment on the behalf of identification of poor quality of incoming materials and parts is a clear cut signal the something is going wrong with supplier regarding his quality consciousness and programmes.
- In inspection of sample greater care will be taken so that results may be more accurate.
- The rejection of the lot is a clear-cut signal for production department regarding the disorder of the process(s). There is a requirement of the implementation of statistical control programme in the production.
- Acceptance sampling is helpful in the reduction of inspection errors.
- It helps in the management of damage.
- It is less expensive.

- It reduces damage.
- Reduces the amount of inspection error

### **1.10 Disadvantages of Acceptance sampling**

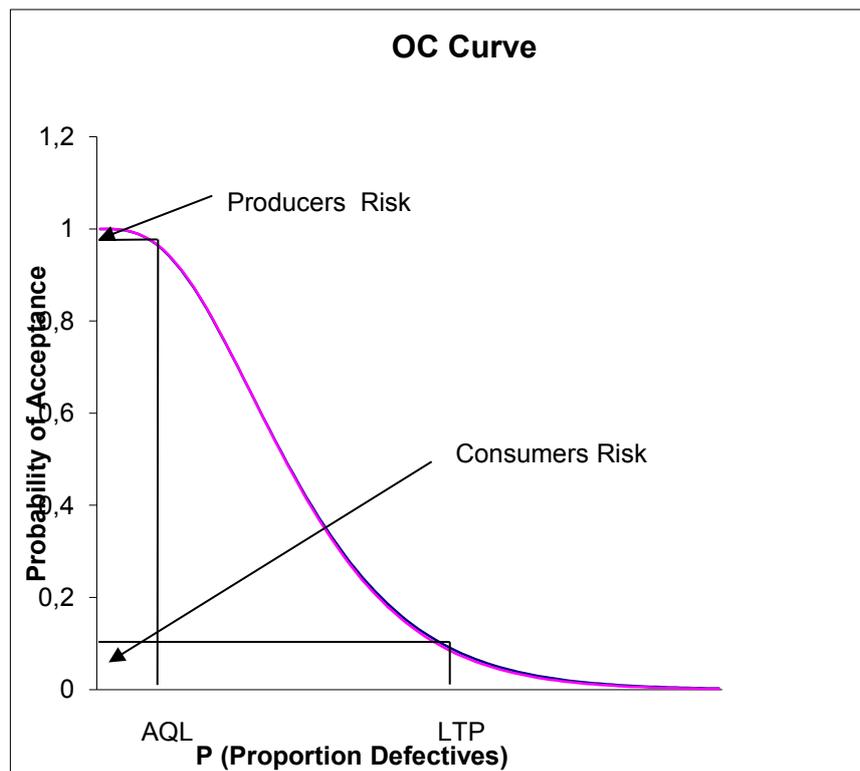
- There are chances of risk of accepting “bad” lots and rejecting “good” lots especially if the officers are not trained or not working consciously.
- Acceptance sampling requires proper planning and documentation. It becomes hectic if the sampling plans are not prepared efficiently.
- Decision making regarding either (a) the whole lot is subjected to 100 percent inspection and all defective items are repaired or replaced or (b) the whole lot is returned to the vendor is very crucial and require experience. A small mistake can be disaster.

### **1.11 The Operating Characteristic (OC) Curve**

The following factors should be decided in a sampling plan:

- “Acceptable Quality Level (AQL) is generally defined as the percent defectives that the plan will accept 95% of the time. Otherwise, lots that are at or better than the *AQL* will be accepted 95% of the time.
- Rejectable Quality Level (RQL) or Lot Tolerance Percent Defective (LTPD) is the poorest level of quality for consumer. It is generally defined as percent defective that the plan will reject 90% of the time. Likewise, a lot at or worse than the LTPD will be rejected 90% of the time.
- Operating Characteristic (OC) Curve is created by plotting the percent defective versus the matching probabilities of acceptance. The probability of acceptance is based on the number of samples to be evaluated and the quantity of rejects that are to be allowed.

- Producer's Risk ( $\alpha$ ) is the probability of rejecting the acceptable and it is typically 5%.
- Consumer's Risk ( $\beta$ ) is the probability of accepting a defective sample and it is typically 10%.
- Average Outgoing Quality Level (AOQL) is a simple relationship between quality shipped and quality accepted.
- Average Total Inspection (ATI) is the average number of units inspected per lot, including all units in rejected lots.
- Average Sample Number (ASN) is the number of samples the receiver has to do.” (Aydemir & Olgun, 2010)



**Figure 4.2: Operating Characteristic (OC) Curve**

## 1.12 Construction of OC Curve

All sampling plans have an operating characteristic (OC) curve. It is an evaluation tool that shows the probability of accepting a lot submitted with a various

range of quality levels. The OC curve is determined by using Poisson distribution. There are two important parameters of an OC curve: the sample size and the acceptance number. The larger the sample leads to more ideal OC curve. The steepness of the OC curve depends upon the sample size. The larger the sample means the steeper the curve. But, practically, large sample size means more cost. The proper sampling plan can be designed with the help of desired quality levels and the probability of acceptance. It measures the performance of an acceptance-sampling plan. It plots the probability of accepting the lot versus the lot fraction defective. It shows the probability that a lot submitted with a certain fraction defective will be either accepted or rejected.

### **1.13 Summary**

Acceptance Sampling is defined as the process of taking a sample from the lot according to the sampling plan and inspecting it and then taking decision about accepting or rejecting the lot based on the results of the sample. The procedure of acceptance sampling consists of Sampling, Inspection and Decision Making. Acceptance sampling can be used at three places in the organisation: for incoming or receiving inspection for raw materials and parts, in production, and for checking quality of final products before delivery to the customers. There are three often-used sampling plans: (i) Single-sampling plan, (ii) Double-sampling plan, and (iii) Multiple or sequential-sampling plan. There can be two types of errors in acceptance sampling: Type –I and Type-II errors. Type I error occurs if lot is good in quality but rejected. Type II error occurs if the lot is bad in quality but accepted. Hence acceptance sampling plan is exposed to some risks known as Producer's Risk and Consumer's Risk. Type I error is producer's risk and Type II is called consumer's risk. All sampling plans have

an operating characteristic (OC) curve. It is an evaluation tool that shows the probability of accepting a lot submitted with a various range of quality levels. The OC curve is determined by using Poisson distribution. There are two important parameters of an OC curve: the sample size and the acceptance number. The larger sample leads to more ideal OC curve. The steepness of the OC curve depends upon the sample size. The larger the sample means the steeper the curve.

## **1.14 Keywords**

### **Sampling**

Sampling is the act, process or technique of selecting a suitable sample or a representative part of population for the purpose of determining parameters or characteristics of the whole population.

### **Acceptance Sampling**

Acceptance Sampling can be defined as the process of accepting or rejecting a lot by inspecting a sample selected from the lot according to a predetermined sampling plan.

## **1.15 Self Assessment Questions**

1. Define acceptance sampling. What is the procedure of acceptance sampling?
2. What is acceptance sampling plan? What are the types of sampling plans?
3. Elaborate the role of type-I and type-II errors in acceptance sampling.
4. What is an OC curve? How to prepare it? How it helps in acceptance sampling?

## 1.16 References / Suggested Readings

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<b>Subject: Purchasing and Materials Management</b>	
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Lesson No.: 5	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Vendor Process Capability and Material Handling</b>	

## Structure

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- 1.1 Introduction to Process Capability
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## **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the basic concepts of vendor process capability and material handling.
- Know the objectives, scope, types and importance of material handling.

## **1.1 Introduction to Process Capability**

In the period of globalisation, the vendors and their subcontractors are found around the world. For the success of production department, it is essential to rely on the vendors' capabilities on the production side. In the cut-throat competition, the dependency of the businesses on vendors is unavoidable. The business houses which are dependent on vendors have to work together to deliver quality production output. The quality of production output of the buyers depends on the vendors' production capabilities and vendors' quality control methods adopted during manufacturing processes. As the quality is highly affected by suppliers, the bottlenecks and weaknesses in suppliers' production can lead to delays and increase the production costs of the buyers. The poor quality output will impact buyers' reputation and competitiveness in the market. It is to make double sure that the vendor is able to deliver quality products which meet the required standards and are in line with the requirement in the requested time.

## **1.2 Concept of Process**

A process is a unique combination of tools, materials, methods, measurements and manpower engaged in producing a measurable output. As for example, manufacturing is a process where raw materials, skilled manpower, machinery, light, equipment etc. is used to give output. All the processes have some inherent statistical variability which can be measured by statistical methods like Statistical Process Control (SPS).

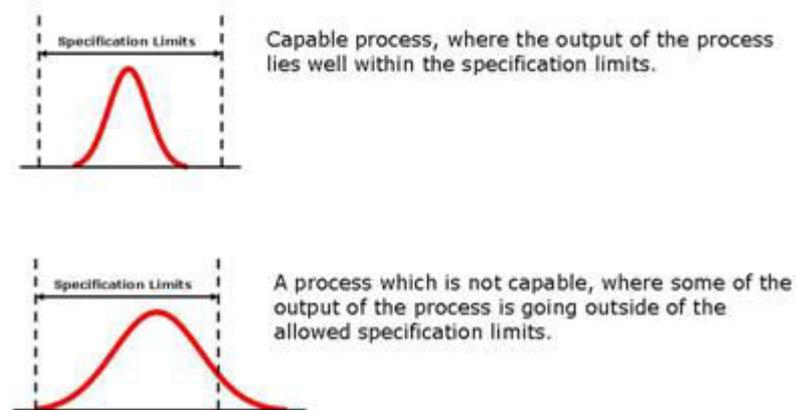
### **1.3 Concept of Process Capability**

Process capability means how well a process can produce acceptable results. The output of a process is expected to meet quality standards, customer requirements, specifications, or engineering tolerances. Process capability can be analysed to determine the extent to which the process can meet these expectations.

Process capability is the long-term performance level of the process after it has been brought under statistical control. In other words, process capability is the range over which the natural variation of the process occurs as determined by the system of common causes. Process capability is the unique combination of people, machine, methods, material, and measurements to produce a product that will consistently meet the design requirements or customer expectation.

Capable process is the process with low levels of variation. It is the ability of a process to make a feature within its tolerance. It means that the process is capable if the output of the process is predictable. The output from the process will be within allowed product specifications. In short, the process must first be brought into statistical control so its performance can be predicted; then its capability to meet specifications can be assessed. Process Capability looks at short term capability and long term performance of a process with regard to customer specifications.

## Process capability



**Figure 5.1: Capable and Incapable Process**

Process capability analysis at vendor's plant is to determine whether a process is stable or instable. If the process is instable, then it is to determine their causes, and take corrective action to resolve such sources of instability. After all sources of instability have been resolved in a process, the natural behavior of the process is called its process capability. Process capability compares the output of a process (process requirements) with the customer's specification (customer requirements). A process must be stable (or have a standard process capability) before it can be improved. Consequently, a process capability analysis must be successfully completed.

### **1.4 Characteristics of Vendor Process Capability**

The characteristics of the vendor process capability are as follows:

- It is the analysis of the output of the process.
- Process Capability shows the inherent statistical variability which can be measured by statistical methods like Statistical Process Control (SPS).

- It measures how well the process is currently behaving with respect to the standard process capability.
- It refers to the uniformity of the process. If it is uniform then quality output is expected from the process.
- Capability is often thought of in terms of the proportion of output that will be within product specification tolerances.
- The frequency of defectives produced may be measured in: Percentage (%), Parts per million (ppm), Parts per billion (ppb).

“Process capability indices are generally used to determine whether a production process is capable of quality characteristic within a specification tolerance. The advantages of using process capability indices to measure process capability are that it is easily understood, straightforward to apply, and transforms process performance into a single unitless number, and thus reflects the ability of a process to meet specifications limits.” (Chen, Chen, & Li, 2005)

## **1.5 Handling the Vendor Process Capability**

The buyer wants to ensure the confidence with respect to the vendor’s quality of output. If not, then how to increase the vendor’s quality of output? It is very much clear that the quality in product or process can be increased only and only by improving the vendor’s capability of the process. Remember, this can be done by reviewing the vendor’s process capability. It is to inspect whether the output from the process is consistent or having variation. The standard process capability is based on two important assumptions; (i) process data is normally distributed and (ii) process is in control. If the vendor’s process is fulfilling these two assumptions then the buyer can be confident

about the quality output. Otherwise, looking at the process itself, there will be a need to identify the sources of variation. It can be due to poor quality raw materials, human factors, environmental factors, old equipment, or wrong test method. The buyer should ensure that the vendors have statistical control process, perform some form of experimental design, conducting staff training regularly, commence a review of operating procedures, maintaining/servicing/ replacing old equipment and machinery, etc. The action(s) to be taken to address vendor's poor process capability need to be carefully considered. However, it is must that the concept of capability can be understood within the vendor's manufacturing process.

## **1.6 Advantages of Vendor Process Capability**

The advantages of vendor process capability are as follows:

- It ensures uniformity in product output.
- It enables successful manufacturing with low defect rates.
- The greater the manufacturing process capability, then lesser is the need for inspections at vendor's manufacturing plant.
- If there is an improved vendor's process capability, then the process engineers have more scope to set product specifications according to the customer requirements or the needs of the business.
- The vendor's improving process capabilities contribute to lowering the levels of sorting, rework, repair, scrap and waste.
- The smooth supply from vendor allows the production jobs to function well.
- It has major impact on cost and schedule of production.

## **1.7 Introduction - Material handling**

In the modern era of competition, material handling has acquired greater importance due to growing need for reducing the manufacturing cost. Today, it is rightly considered as one of the most potentially lucrative areas for reduction of costs. It is very important component of any productive activity in any organisation. It is required every time in manufacturing, warehousing, distribution, consumption and disposal etc. It is the movement, protection, storage and control of raw materials, parts and products in the plant. Wide ranges of manual, semi-automated and automated equipment are incorporated in it. Material handling means providing the right amount of the right raw materials/parts/products, in the right condition, at the right place, in right sequence, at the right time, in the right position, and for the right cost, by using the right method. It is simply picking up, moving, and lying down of raw materials/parts/products in the organisation at various places. It applies to the movement of raw materials, parts in process, finished goods, packing materials, and disposal of scraps. In general, hundreds and thousands tons of materials are handled daily requiring the use of large amount of manpower along with manual, semi-automated and automated equipment. The materials move within the confines of a building, between building and a transport vehicle, from one place to another place, one plant to another plant, from one processing area to another or from one department to another department of the plant. The cost of material handling is very important as it contributes significantly to the total cost of manufacturing. In some industries, the ratio of handling cost to processing cost is very high. In such industries, material handling is a very important function. If our material handling system is properly designed, integrated and automated then it

provides remarkable cost saving opportunities. It is also helpful in providing magnificent and great customer services.

## **1.8 Scope of Materials Handling**

In layman language, materials handling is loading, moving and unloading of raw materials/parts/semi-finished or finished goods from one place to another in the organisation. Two aspects are important such as safety and cost. These two objectives are fulfilled by efficient material handling. To do it safely and economically, different types of tackles, gadgets and wide ranges of manual, semi-automated and automated equipment are used. This activity cannot be neglected in any businesses whether it is small or big. In every business, raw materials/parts/semi-finished or finished goods are to be handled from one place to another. However, the important point in favour of materials handling is that it is a part and parcel of the production activity. Traditionally, the materials handling was considered as mechanical handling of materials/parts/goods. More or less it was manual handling of materials and parts. But today it is considered as an important industrial activity linked with technology and engineering. No doubt that material handling does not add to the value of the product, but it consumes cost. Therefore it should be eliminated or at least reduced as much as possible. Now in these days the properly designed, integrated and automated material handling system is to reduce the cost of production. At the same time many scientific factors are also considered to arrive at the solution.

## **1.9 Material Handling - Definition**

According to American Materials Handling Society, the materials handling is the art and science involving the moving, packaging and storing of substances in any form. It is related with movement of raw material/parts/semi-finished or finished goods in the plant. Other activities involved in materials handling are storing, protecting, and controlling of materials besides movement of materials. It can be manual or with the help of equipment. It can be used to create time and place utility. Material handling function is different from manufacturing, which creates form utility by changing the shape, colour, form, weight and makeup of material.

Material Handling is the art and science of moving, conveying, elevating, positioning, transporting, packaging, storing, protecting and controlling of raw materials/parts/goods. It is to provide right amount of right material, in right condition, at right place, in right position, in right sequence, at right cost and with right method.

“Material handling implements the flow paths planned during facility layout between each department and for connecting departmental islands, enabling parts and material transportation between various stages of processing. It is responsible for ensuring the right product, location, condition, quantity and timing of materials delivery. Therefore, it is an integral part of the total manufacturing system process. Basically, material handling reduces to three primary activities: loading and unloading, movement to and from storage, and order filling.” (Caputo & Pelagagge, 2008)

Material handling is the preparation, placing, and positioning of raw materials/parts/semi-finished or finished goods from one place to another in the plant. It facilitates their movement or storage. It covers all the basic operations involved in the movement and positioning of bulk or individual, packaged or unpackaged, heavy or

light, semisolid or solid state, finished or semi-finished materials by means of machinery, and within limits of a place of business. Materials handling is the moving of materials or products by any means, including storage, and all movements except processing operations and inspection.

The following characteristics are common in material handling in the above definitions:

- It is the movement, protecting, storage and controlling of raw materials/parts/semi-finished or finished goods in the businesses.
- It is to provide right amount of right material, in right condition, at right place, in right position, in right sequence.
- It is done at the lowest possible cost.
- It is through the use of proper method(s) and equipment.
- It is separate from processing operations and inspection.

## **1.10 Objectives of Material Handling**

The primary objective of a properly designed, integrated and automated material handling system is to reduce the cost of production. The other objectives are:

- The material handling is helpful to lower unit materials handling cost.
- It provides better control of the flow of materials in the organisation.
- It reduces the manufacturing cycle time.
- It reduces delays and damage of raw materials/parts/semi-finished or finished goods.
- It increases storage capacity.
- It promotes safety and improves working conditions in the organisation.

- It is helpful to maintain or improve product quality.
- It provides contribution for better quality by avoiding damages to products.
- It provides higher productivity at lower manufacturing costs.

## **1.11 Material Handling Costs**

The main costs involved in designing and operating a material handling system are:

- **Equipment cost**

It comprises the purchasing of the equipment, auxiliary components, and installations required for handling the materials.

- **Operating cost**

It consists of maintenance, electricity, fuel, and labor cost. It covers both wages and injury compensation.

- **Unit purchase cost**

It is associated with purchasing the pallets (portable platform for storing or moving goods that are stacked on it) and containers. It involves the cost due to packaging of materials for movement and storing.

## **1.12 Types of Material Handling**

There are three types of material handling (i) Manual Handling; (ii) Mechanical Material Handling and (iii) Automated Material Handling as follows:

### **Manual Material Handling**

The Manual Handling Operations Regulations define manual handling as ‘any transporting or supporting of a load (including the lifting, putting down, pushing, pulling, carrying or moving thereof) by preceded hand or by bodily force’. It is related with the movement of raw materials/parts/semi-finished goods or finished goods by lifting, lowering, carrying, holding, twisting, bending, pushing or pulling by workers. It requires the use of force exerted by a worker. It refers to the use of a worker’s hands to move the materials. It is one of the most costly methods and can expose workers to physical conditions that can lead to injuries. It can cause musculoskeletal disorders, strains and sprains to the lower back, shoulders, and upper limbs. It is very important for the employer to assess the load, the best method to move the load, the pathway of the movement of materials etc. before hiring the services of the worker. The employer must avoid hazardous manual handling operations and try to reduce the risk of injury so far as is reasonable practicable. It is important to give proper training to the workers like stretching before attempting manual handling tasks, handling sudden movement, height for the material handling etc. The employers must have some improvements to reconstitute the task and provide positioning equipment like lift/tilt/turn tables, hoists, balancers, and manipulators to reduce reaching and bending. Slippery or unstable floors, variations in floor level, fluctuation or poor light, poor ventilation, high temperature in the plants must be avoided for safer manual material handling.

### **Mechanical Material Handling**

Materials handling with the help of equipment are known as mechanical materials handling. In it, mechanical equipment is used to reduce or eliminate the need of workers for check-in, check-out, sorting, moving or storing materials. Whenever technically and economically feasible, equipment can be used to reduce and sometimes replace the

manual materials handling. Generally, the mechanical equipment used in mechanical systems is sorters, conveyors, singulators, stackers, pulleys, belts, chutes, cranes, industrial trucks etc. Mechanical equipment handling is also known as semi-automated because a human operator is needed for tasks such as loading/unloading, moving, and driving.

### **Automated Material Handling**

Innovation in materials handling has thrilled the businesses. The latest technologies like sensing, machine intelligence, and robotics have made it possible to fully automate the materials handling task. Now the automated solutions are available for order fulfilment, sorting, picking, automated guided vehicles, cash flows, conveyor systems, industrial robotics, mobile robotics etc. The main advantages of the modern automated materials handling system is that it minimizes errors, reduce labour costs, increases throughput, maximize the customer service experience. The main limitation is that the initial cost of installation of fully automated system is very high. Additional investment is required to have automated materials handling system. But in the long run it is an ultimate solution and is beneficial for the businesses. It is generally found that automated material handling system is not as flexible as a human operator. It lacks flexibility as it is not being able to be as easily redeployed to do other tasks as needs change. Moreover, it is vulnerable to downtime whenever there is breakdown. The whole system becomes paralysed with a small fault or problem in the system.

### **1.13 Summary**

The quality is highly affected by suppliers. The bottlenecks and weaknesses in suppliers' production can lead to delays and increase the production costs of the buyers.

The quality of production output of the buyers depends on the vendors' production capabilities and vendors' quality control methods adopted during manufacturing processes. The process capability is the unique combination of people, machine, methods, material, and measurements to produce a product that will consistently meet the design requirements or customer expectation.

Material handling is related with movement of raw material/parts/semi-finished or finished goods in the plant. Other activities involved in it are storing, protecting, and controlling of materials besides movement of materials. The material handling is helpful to lower unit materials handling cost. It provides better control of the flow of materials in the organisation. It reduces the manufacturing cycle time. It reduces delays and damage of raw materials/parts/semi-finished or finished goods. The main costs involved in designing and operating a material handling system are: Equipment cost, Operating cost and Unit purchase cost. There are three types of material handling Manual Handling; Mechanical Material Handling and Automated Material Handling.

## **1.14 Keywords**

### **Process**

A process is a unique combination of tools, materials, methods, measurements and manpower engaged in producing a measurable output.

### **Process Capability**

The natural behaviour of the process is called its process capability. It is the unique combination of people, machine, methods, material, and measurements to produce a product that will consistently meet the design requirements or customer expectation.

### **Material**

It can be of any form solid, liquid or gas. It can be in bulk form or in unit form. Occasionally, paperwork and information is also considered as material.

### **Materials Handling**

Material handling is the movement and storage of raw materials/parts/semi-finished or finished goods at the lowest possible cost through the use of proper methods and equipment.

## **1.15 Self Assessment Questions**

1. Define process and process capability.
2. Enumerate the characteristics of vendor process capability
3. How to handle the vendor process capability? How the vendors' output contribute in the quality production of buyers.
4. List the advantages of vendor process capability.
5. Define material handling. What is the scope of materials handling?
6. Enumerate the objectives of material handling in the organisations.
7. What are the types of material handling costs? Discuss how these costs can be lowered down?
8. What are the types of Material Handling?

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>6</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Cost-Reduction Techniques : Standardization, Simplification &amp; Variety Reduction</b>	

## Structure

- 1.0 Objectives
- 1.1 Cost-Reduction Techniques - An Introduction
- 1.2 Standardization
- 1.3 Standardized (Consistent process) vs. Non-Standardized (Inconsistent process)
- 1.4 Process for Creating Standardized work
- 1.5 International Standards from ISO
- 1.6 Benefits of Standardization
- 1.7 Limitations of Standardization
- 1.8 Standardization as Winning Strategy
- 1.9 Simplification
- 1.10 Variety Reduction
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- 1.13 Self Assessment Questions
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## **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the basic concept of cost reduction techniques.
- Know the concept and importance of standardization.
- Understand the process of creating standardized work.
- Make you familiar with the benefits and limitations of standardization.

## **1.1 Cost-Reduction Techniques - An Introduction**

Cost is an important factor in purchasing and materials management. A proper management leads to efficient and economical purchasing decision. Let's first of all discuss the meaning and concept of cost, cost control and cost-reduction.

### **Cost**

Cost is a measurement of the amount of resources required for the purpose of production of goods or rendering services in monetary terms. In other words, the amount spent for acquiring any goods and services is termed as 'cost'.

### **Cost Control and Cost Reduction**

Cost Control is the guidance and regulation by management regarding the costs of operating an activity according to the stated budgets. It includes planning, communication, motivation, reporting and decision making related to cost. While cost reduction is the systematic effort for the achievement of real and permanent reduction in the per unit cost of the products or services produced or purchased.

**The difference between Cost Control and Cost Reduction is as following:**

<b>Cost Control</b>	<b>Cost Reduction</b>
It is setting up norms and targets.	It is systematic effort.
It works through setting budgets, standards etc.	It works through better designs, improved planning, communication, motivation etc.
The budgets, standards are once set up and are bound to be followed.	The budgets, standards are variable and are improved constantly.
It is a temporary concept.	It is a permanent concept.
It is a preventive function.	It is a corrective and continuous effort.
It has limited scope as it is related to predetermined budgets and standards.	It has wider scope. It covers many techniques such as product design, factory layout and equipment, business process reengineering, product planning, ABC analysis, codification, simplification, standardization etc.
It is concerned with budget and standards only.	This is usually brought by elimination of wasteful and non-essential elements in the design of products and from techniques and practices carried out.

There are many tools and techniques for cost reduction listed as under:

- Value Analysis;
- Training and Development;
- Business Forecast;
- ABC Analysis;
- Market Research;

- Standardization, Simplification;
- Codification and Variety Reduction;
- Economic Batch Quantity;
- Economic Order Quantity;
- Improvement in Design;
- Substitute Material Utilisation;
- Operational Research;
- Quality Control;
- Production Planning and Control; and
- Business Process Reengineering, etc.

The following description regarding Standardization, Simplification and Variety Reduction is given below:

## **1.2 Standardization**

In the world of competition, the industries require quality tools to compete and improve the quality of their products and services. They need standardisation of all the processes to deliver consistent quality to their customers. Standardization is where all the systems, methods, procedures are uniform and consistent. In standardization, every time same process is adopted. Every process meets the same input requirement, same transformation and same output is produced. Everything is standardized. Employees have to focus on the stated work. Standardized work nips common problems in bud.

### **Meaning of Standardization**

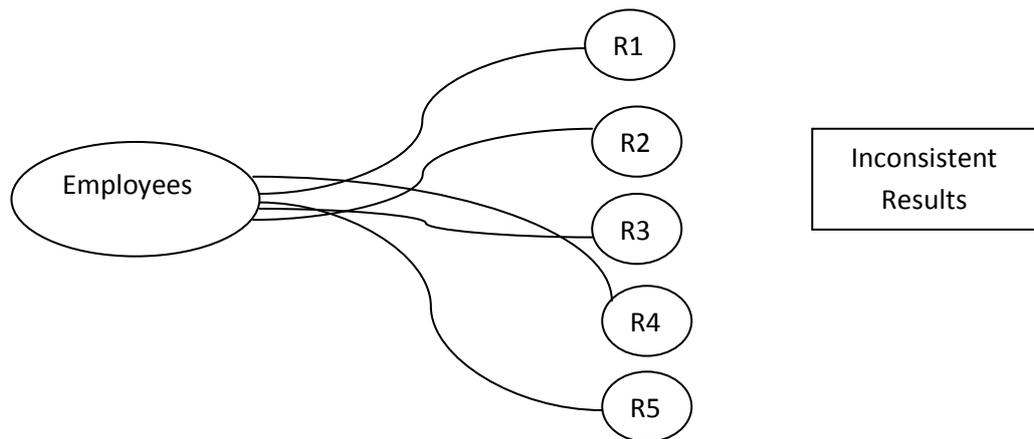
According to the International Standards Organisation located in Geneva, standardization is defined as the process of formulating and applying rules for an orderly approach to a specific activity, for the benefit and with the cooperation of all concerned and in particular for the promotion of the overall economy taking due account of functional performance conditions and safety requirements. The process of formulating, issuing and implementing standards is called standardization.

It is the process of establishing basic specifications for a set of commonly used characteristics of design, technology, size, shape, colour and performance for product or service. The examples of standards are as follows: Product Standards, Engineering Standards, Material Standards, Design Standards, Quality Standards, Process Standards, Equipment Standards, Safety Standards, Administrative Standards, etc. A standard provides requirements, specifications, guidelines or characteristics. It can be used consistently to ensure that materials, products, processes and services are fit for their purpose and use. Standardization assures all the processes are standardised. It leads to quality products. It helps organisations to work effectively. It brings technological uniformity.

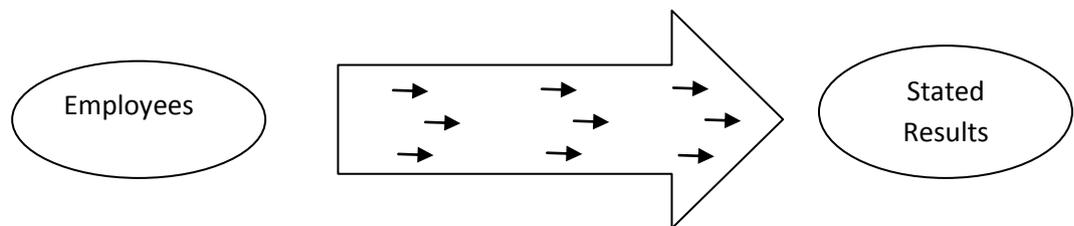
A uniform identification that is agreed on by experts in open market is called a standard. In business practices, the concept of standardization is applied for industrial and managerial standardization. Industrial standardization can be defined as the process of establishing agreement on uniform identifications of systems, procedures, processes for a particular size, colour, technical specification, quality, design, performance, quantity, service, etc. Managerial standardization deals with standard operating practices, procedures, processes and systems.

### 1.3 Standardized (Consistent process) vs. Non-Standardized (Inconsistent process)

Non-Standardized (Inconsistent Process) results in higher maintenance costs and unpredictability of outcomes. It translates into higher cost of operations. Non-standardized/inconsistent processes give inconsistent results.



**Figure 6.1 : Non-Standardized (Inconsistent Process)**



**Figure 6.2: Standardized (Consistent Process)**

The employees following standards give consistent results in terms of size, colour, technical specification, quality, design, performance, quantity, service etc. The employees who use the standardized processes give consistent results as under:

- Cost savings
- Increased customer satisfaction

- Easier and more effective training
- Predictability and better results
- Improved productivity
- Consistent quality
- Consistency in the improvement of quality of products and services
- Improved competitiveness

There are two vital elements related to standardisation - Waste and Variation. Waste means non-value activities. These activities do not add value to the product or service the customer receives. The deviation means change in the output of the process. The standardization gives guidelines about how to complete tasks step by step. The employees have to follow a set series of steps to complete a process without variation and waste. No variation means no risk. It creates a smooth system where there is no confusion and everybody is doing their task. It generates better customer service without variation.

## **1.4 Process for Creating Standardized Work**

The process for creating standardized work consists of the following steps:

- **Define Scope and Conditions:** What to standardize? This is the basic question raised at the first step. The answer automatically comes when we come to know the list of problems, complaints generated by both internal as well as external customers. The list of problems and complaints give clue about which process is lacking and required improvement in terms of standardization. At this step the

area of scope is decided. Area of scope is basically an area of focus and the area of focus is the process(s) identification for improvement.

- **Structure Improvement Teams:** The team for standardization consists of the present internal employees working on the process(s), suppliers, external customers, support service providers, experts etc.
- **Study the Present State to Gain Deep Understanding:** the present state of the process(s) is observed, measured, analysed and documented. Variations are identified in terms of input, data, people, equipment, supplies, output, etc.
- **Design the Improved State:** It is the time to think about what could be the best practices to mitigate the wastes, errors, complaints? The process flow chart is helpful in giving the vision of the improved state.
- **Document the Improved State:** The required standardization should be clear and concise. List all the functions required to be done. The complex process may have 8-10 tasks to be performed.
- **Finalize and Implement New Standardized Process:** The finalization and implementation of new standardized process depends upon the test of the process. The results are measured and adjusted, if required.
- **Monitor the Ongoing Performance:** The true success of the standardized process depends upon the long run success of the process. Therefore, consistent monitoring is required.

## **1.5 International Standards from ISO**

The process for creating standardized work gives us knowledge about how the organisations can frame their own standards. However, the organisations can buy and

use standards from the organisations like ISO and implements the bought standards to standardise their processes. ISO stands for International Organisation for Standardisation. Today, it has 163 member countries and the headquarter is in Geneva, Switzerland with more than 150 official staff to facilitate the international coordination. The organisation has formed 3,368 technical bodies for standard development. It is a nongovernmental organisation. ISO have published more than 19,500 International Quality Standards covering almost all the areas of technology, manufacturing and business. These quality standards have some specifications for standardisation of products, services and good practices. These standards are developed to help organisation work effectively. The ISO standards provide a framework that can provide guidance for the processes to be made auditable. These standard practices help the organisations to be more efficient and effective. To follow ISO standards is voluntary. It is not legally to require these standards. But, ISO standards are recognised internationally as these are made by experts and market driven. The standard like ISO-9000 is helpful to show the customers that the organisation have adopted quality procedures, quality processes and quality standards. It helps external auditors to show that all the internal processes are in place and well documented. The ISO-9000 was developed to effectively design and implement efficient quality systems. Other ISO quality standards are frequently used for food safety, data security, education & training etc. in various industries like agriculture, healthcare, information technology, textile, food processing.

## **1.6 Benefits of Standardization**

The standardization of the processes of manufacturing leads to uniformity in the products and services. The consumers that use the products and services are safe, reliable, efficient and meeting all the quality parameters. The costs are reduced automatically with the reduction in waste and errors, and increasing productivity. The companies start to access new markets. Standardization facilitates free and fair global trade. It assures customers that the organisation has designed and managed its process according to the standards to assure delivery of a quality product and services. The standardization is beneficial for the organisations because it is helpful in cost savings as the operations are standardised and wastes, errors are lowered drastically. Ultimately the customers get quality products and services which generate customer satisfaction. Increase in customer satisfaction and increase in sales means the market size of the organisation is increasing. Ultimately there will be increase in productions. The standardization of road safety, toy safety and secure medical packaging etc. help to make the world a safer place for happy living. Standardization benefits an organization in a variety of ways: it enables mass production, enables customization, improves supplier coordination, improves quality, enables simplification, enables delayed differentiation and, as a result of many of the other benefits, lowers inventories.

➤ **Enables Mass Production**

Standardized parts, components, materials, designs enable management to reduce the variability in the production processes and focus on continuous improvement, thereby reducing wastes, errors, and ultimately costs. The standardization of materials, components and production methods makes it possible to reduce waste and to carry out mass production in an economic way.

➤ **Better Utilization of Resources**

The important benefit of the standardization is the achievement of maximum overall economy through better utilization of resources such as capital, human effort and materials. The resources are optimally used after the implementation standardization philosophy in the organisation.

➤ **Enables Easy Assembly**

Standardized parts and modules enable manufacturers to make a wide variety of standardized finished products. The wide variety of finished products can be easily assembled when ordered without disorder or confusion. Therefore, standardization is helpful in reducing inventory carrying costs and increasing flexibility to meet specific consumer demands. Amazon exemplifies this in its ability to ship products to customers on the same the day the order is placed. Dell accomplishes customization largely through standard packaging parts, components, labels and items.

➤ **Improves Supplier Coordination**

The requirement of the standardized parts and components gives very clear instructions and specification for the supplier. The size, design, dimensions, characteristics, technology, specifications and performance of a standard part or component is helpful in giving fast order and fulfilment of the orders subsequently between the buyers and suppliers companies.

➤ **Improves Quality**

Standard parts and components are repetitively manufactured with same design, specifications, colour, dimensions, characteristics, size, and technology is helpful in

producing the quality of products and services. The result is a significantly lower defect rate, errors and waste.

➤ **Lowers Inventories and Safety Stock**

Standard parts and modules usually generate more certain, shorter supplier order lead times and reduce safety stock thereby reducing overall inventory levels.

➤ **Transfer of Technology**

Standards act as a good vehicle for technology transfer. Newer or upgradation of standards are the results of the development in the technology. As standardization is a dynamic process, standards are updated as new technologies are developed.

## **1.7 Limitations of Standardization**

➤ **Resistance to Change**

The employees could vote against standardization. They can show resistance to change or newer/upgraded standardization.

➤ **Mechanical View**

The managers may concentrate on standards and not on human beings. As a result, the employees start thinking that they are going to become 'robot'.

➤ **Rigidity**

The employees may lose/restrict creativity as they have to work according to the standardized process.

### **Ways to Minimize Limits**

The organisation can minimize the limitations of the standardization by introducing job rotation, introducing creative tasks and encouraging employees to do better with standardized processes and practices. The standardization is vital, move out variation, removes waste, refine the processes. All this leads to the great success of the organisation.

## **1.8 Simplification**

It is closely related concept like standardization which refers to the reduction in the number of different sizes and shapes of items produced and stocked. It means reducing the number of standard items a firm uses in its product design and carries in its inventory.

## **1.9 Variety Reduction**

The process of standardization logically leads to simplification and variety reduction. Variety reduction defined as a form of standardization consisting of the reduction of the number of types of products or materials or parts within a definite range to a lesser number which is adequate to meet prevailing needs at a given time.

## **1.10 Standardization as Winning Strategy**

Standardization of processes, technology and even people as a winning strategy is the highest business priority today. Non-standardized/inconsistent process results in higher maintenance costs, inconsistent results and higher cost of operations. Standardized processes give consistent results such as: cost savings, increased customer satisfaction, effective training, predictability and better results, improved productivity, consistent

quality, improved competitiveness etc. Let us take some examples of companies and try to know how they benefited from standardization.

### **McDonald**

McDonald is a very good example of standardization. They have standardized production processes and standardized services. With the help of standardized products, there is consistency in the quality of burger and manpower costs are very low. Repetitive work is automated through technology. With the standardization of services, the McDonald has good brand positioning in the minds of the customers. With standardized processes and products, the company has differentiated and got competitive advantage.

### **Amazon India**

To compete in e-Commerce industry, the Amazon has standardized packaging for goods to source supplies to customers from different vendors/sellers. The company is having tough competition with Flipkart and Snapdeal in Indian market. Now the vendors will have pallet of particular specification, boxes of correct size, attached printed labels and correct displayed items. Under this new initiative of standardized packaging, the vendors will have to buy Amazon branded packaging materials such as corrugated boxes, thermocol balls, and air filled packets on the portal of Amazon. This initiative will generate a quality experience of the vendors/sellers in terms of business sustainability. Packaging is used for shipments of goods to the customer buying products online. Standardized packaging is helpful to minimize the cost or wastage per package. Amazon will build brand with on pack for all. (Ref: The Economic times, Friday, 13 May 2016, p. 5)

## **1.11 Summary**

In the world of competition, industries require quality tools to compete and improve the quality of their products and services. They need standardisation of all the processes to deliver consistent quality to their customers. Standardization is where all the systems, methods, procedures are uniform and consistent. The standardization gives guidelines about how to complete tasks step by step. The employees have to follow a set series of steps to complete a process without variation and waste. No variation means no risk. It creates a smooth system where there is no confusion and everybody is doing their task. It generates better customer service without variation. The organisation can minimize the limitations of the standardization by introducing job rotation, introducing creative tasks and encouraging employees to do better with standardized processes and practices. The standardization is vital, move out variation, removes waste, refine the processes. All this leads to the great success of the organisation.

## **1.12 Keywords**

### **Cost**

Cost is a measurement of the amount of resources required for the purpose of production of goods or rendering services in monetary terms. In other words, the amount spent for acquiring any goods and services is termed as 'cost'.

### **Cost Control**

Cost Control is the guidance and regulation by management regarding the costs of operating an activity according to the stated budgets. It includes planning, communication, motivation, reporting and decision making related to cost.

### **Cost Reduction**

Cost reduction is the systematic effort for the achievement of real and permanent reduction in the per unit cost of the products or services produced or purchased.

### **Value Addition**

Any operation or activity that external customers value and ready or would be willing to pay for.

### **Non-value addition**

Any operation or activity that does not add value to the product or service that customer receives.

### **Standard**

A standard is a document which provides requirements, rules, and guidelines for a process, product or service.

### **Standardization**

The process of formulating, issuing and implementing standards is called standardization.

## 1.13 Self Assessment Questions

1. What is standardization? How it is helpful for companies in this competitive world?
2. Discuss why standardization is the key to mass production.
3. Do you think standardization and simplification are similar? Discuss.
4. Enumerate the benefit of standardization with the help of some examples of companies. Discuss how these companies benefited.
5. What are the limitations of standardization? How these limitations can be overcome?

## 1.14 References / Suggested Readings

‘Amazon to Build Brand with one Pack for all’, The Economic times, page 5, Friday, 13 May 2016.

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>7</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Value Analysis &amp; Engineering</b>	

## **Structure**

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- 1.1 Value Analysis - An Introduction
- 1.2 Value Analysis – A Brief History
- 1.3 Meaning of Value
- 1.4 Meaning of Value Analysis
- 1.5 Difference between Value Analysis and Value Engineering
- 1.6 Objectives of Value Analysis/Value Engineering
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- 1.8 Value Analysis Process
- 1.9 Benefits of Value Analysis/Value Engineering
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### **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the basic concept of Value Analysis/Engineering
- Know the objectives, process and benefits of Value Analysis/Engineering
- Understand the techniques Value Analysis/Engineering
- Make you familiar with the process of Value Analysis/Engineering

## **1.1 Value Analysis – An Introduction**

The competition is tough among companies due to globalisation. Domestic as well as international companies are competing for same market share. The national as well as international Multinational Companies (MNCs) are in search of competitive strategies like cost cutting techniques that can provide them competitive advantage. The managers in production houses are always in hunt of new quality tools, new production techniques, and in search of cheaper quality raw materials, etc. The materials managers, production managers, and design managers are usually having get-together and maximum times the talk of the meeting or the agenda is how to reduce the cost of the product of the product? In this scenario, value analysis is synonymous with cost reduction and is not only a powerful but also practical cost reduction technique available for production, design and materials manager. Value analysis is concerned with ascertaining whether the material purchased is good value for money, for the required purpose or not. It is a planned and scientific way of cost reduction. It reviews and changes the materials composition and design of the product. The modifications

and improvements in terms of cost reduction are made subsequently but the values to be given the customers are not compromised.

“VE is an organized way of thinking or looking at an item or a process through a functional approach. It involves an objective appraisal of functions performed by parts, components, products, equipment, procedures, and services; and so on anything that costs money. Value methodology is commonly applied under the names Value Analysis (VA), Value Engineering (VE), and Value Management (VM). These term can be used interchangeably with the value methodology throughout the places according to need of the situation.” (Sharma & Belokar, 2012)

Therefore, Value analysis is an organized creative approach aimed at identifying unnecessary costs and eliminating the same from the product without affecting the quality of the product. While eliminating the unnecessary costs of the product, due care must be given that there is not loss of functional utility/guarantee/safety performance. There is no compromise regarding the functional utility or safety performance of the product. The concept of value analysis or value engineering works before the actual production starts. This process involves the right substitution of materials/parts/components of the product to be manufactured at the lowest cost. It is an approach of providing the required function of the product at the desired time and place at the lowest cost. This approach is a perfect blend of right quality, right design specification, right standards, right methods of manufacture, etc. and involves the substitution of materials/parts/components at a lesser price or better quality. The application of the value analysis/value engineering ideas during design and engineering stage of the product before its actual production is known as Value Engineering. ‘Value analysis’ is the most generalized term associated with the application of value-based

processes. Other terms include ‘value management’ and ‘value engineering.’ The terms are used interchangeably in manufacturing processes & procedures and in the construction industry. For many of the world’s leading companies, including names like Hewlett Packard, Sony, GE, Panasonic, Toyota, Nissan, and Ford, the value analysis process has provided major success. The key to product design success depends on the knowledge of the customers’ requirements, the product design, and the costs associated with product, deep knowledge of production process and the costs associated with the product design changes or improvements. The above features of value analysis process are vital, if decisions regarding product and process re-design are aimed at lowering costs and enhancing customer value. Value Engineering should not be treated as a mere cost reduction technique or cheapening of the product. It is more comprehensive and the improvement in value is attained without any sacrifice in quality, reliability, maintainability, availability, aesthetics, etc.

## **1.2 Value Analysis – A Brief History**

Value Engineering had its origin at the General Electric Company (GEC). Value analysis technique was developed by accident. During the World War II, there was shortage of supplies of labour, components, parts, raw materials due to World War in General Electric Co. in U.S.A. Engineers like Lawrence D. Miles, Jerry Leftow, and Harry Erlicher at G.E. looked acceptable substitutes to avoid delay in production. They observed that the substitutions of raw materials, components and parts often reduced costs, improved the product, or both. They noticed that the methods of substitutions started out as an accident of necessity was turned into an organised process. Through team-oriented creative techniques they made changes in products to lower their cost

without affecting their utility and quality. They called their systematic methods as “Value Analysis”. Miles found that many of the substitutes used were providing equal or better performance at lower costs. Lawrence D. Miles is known as the father of the Value Analysis/Value Engineering technique.

### **1.3 Meaning of Value**

Value is the ratio of function to cost. It is a relationship between the worth or utility of the product and the actual monetary cost of the product. Value can, therefore, be increased by either improving the function or reducing the cost. It is the association between a function for customer satisfaction and the cost of that function. Value analysis/engineering is a systematic method to improve the ‘value’ of products to be manufactured by analytically examining the functions of the products. According to Lawrence D. Miles, “Value is the lowest price you must pay to provide a reliable function or service.” The determination of value requires a combination of the following considerations:

➤ **Cost Value**

It is the cost of production and selling an item.

➤ **Exchange Value**

It is the price a customer is prepared to pay for the product, or service.

➤ **Use Value**

It is the purpose the product fulfils. It can be called functional value.

➤ **Esteem Value**

It is the prestige a customer attaches to the product. It is related with the pride of possession of the customer.

### ➤ **Scrap Value**

It is related with the write off value of the product whenever it is not in use.

The concept of the value changes with time. A product having use value today will have scrap value with the passage of time.

## **1.4 Meaning of Value Analysis**

According to Lawrence D. Miles, “Value Analysis is a philosophy implemented by the use of specific set of techniques, and a group of learned skills. It is an organized creative approach which has the purpose of the efficient identification of unnecessary cost, i.e., cost which provides neither quality, nor use, nor appearance, nor customer features.”

“Value analysis/engineering is a systematic rating of all distinctive features of the value chain and elimination of unnecessary cost associated with an item with the objective of promoting the quality and satisfaction of customer needs in a cost effective manner.” (Olaore & Adebisi, 2013)

“Value analysis is a systematic analysis that identifies and selects the best value alternatives for designs, materials, processes, and systems. It proceeds by repeatedly asking "can the cost of this item or step be reduced or eliminated, without diminishing the effectiveness, required quality, or customer satisfaction?" Also called value engineering, its objectives are (i) to distinguish between the incurred costs (actual use of resources) and the costs inherent (locked in) in a particular design (and which determine the incurring costs), and (ii) to minimize the locked-in costs.” (<http://www.businessdictionary.com>)

“Value analysis/engineering is a systematic and organized approach to provide the necessary functions in a project at the lowest cost. Value engineering promotes the substitution of materials and methods with less expensive alternatives, without sacrificing functionality. It is focused solely on the functions of various components and materials, rather than their physical attributes. It is also called value analysis.”  
(<http://www.investopedia.com>)

Society of Japanese Value Engineering defines VE as: “A systematic approach to analyzing functional requirements of products or services for the purposes of achieving the essential functions at the lowest total cost.

According to the Office of Management and Budget, Value Analysis (VA) is “an organized effort directed at analyzing the functions of systems, equipment, facilities, services, and supplies for the purpose of achieving essential functions at the lowest life-cycle cost consistent with the required performance, reliability, quality, and safety.”

Value analysis is a systematic approach to improve the value of a product or process by analysing its constituent components and their associated costs subsequently. Further, the components/parts are improved by either reducing their cost or increasing the value of the functions. This methodology is helpful to increase the value of the product by analysis of the existing or a new product or process. It is a team work. In other words, value analysis is the answer to every problem project, and to others it is a cost-cutting, quality-reducing exercise that infringes on both the design team and the owner. In fact, value analysis is a very important tool. It is to identify and eliminate the products features that do not add value to the customers and incur the cost

to the manufacturer. When properly applied, it gives excellent results. When applied incorrectly, it can be fatal and it can create problems of its own.

## 1.5 Difference between Value Analysis and Value Engineering

Value Analysis	Value Engineering
<ul style="list-style-type: none"> <li>➤ For exiting product or service</li> <li>➤ Manufacture, after sales</li> <li>➤ Process improvement</li> <li>➤ Concentrate on eliminating unnecessary cost, improvement performance</li> </ul>	<ul style="list-style-type: none"> <li>➤ For new product or service</li> <li>➤ Prototype development, Design and engineering stage of product (before manufacturing)</li> <li>➤ Functional improvement</li> <li>➤ Concentrate on delivering value</li> </ul>

**Table 7.1: Difference between Value Analysis and Value engineering**

- ✓ Value Analysis concept is used in connection with cost-function analysis of existing product or process.
- ✓ Value Engineering is a concept of design analysis and engineering stage of the product prior to manufacturing and commercialization.

However, in both VA and VE the teams concentrate on the cost reduction without the compromising the value of the functions of the products or processes. The difference in both terms is not considered at large scale in maximum texts and these two terms are used interchangeably.

## 1.6 Objectives of Value Analysis/Value Engineering

Value Analysis/Value Engineering is an activity that focuses on improving the value of the functions of product, process, service, or organization. The main objectives are as under:

- The main objective of value analysis/engineering is to provide only the necessary functions to meet the required performance at the lowest overall cost of product or processes.
- To improve the products or processes in terms of designs.
- To provide better value to a product/service/process.
- To use the multi-disciplined teams of specialists to identify essential versus non-essential functions of the products or processes.
- The next important objective is to think creatively and to identify the ways to segregate the necessary functions from the unnecessary functions.
- To identify the costs associated with each type of functions.
- To improve the design, process, service, or product effectiveness by exploring the alternate ways of performing the functions at a lower overall cost.
- To improve the company's competitive position.

Value analysis/engineering is a team effort and it improves value by sustaining or improving the functions of the products/processes. It is a planned and scientifically systematic technique which concentrates on reducing the overall cost. This technique does not compromise with the value to be given to customer via product.

## **1.7 Techniques of Value Analysis**

The most important technique of value analysis is the design analysis. It is a systematic analysis of the parts of the product or service or process.

### **Design Analysis**

It is a step-by-step analysis of the design of a product in relation to the function it performs. In this approach the component parts of the products are dismantled or taken apart to pieces. All the pieces/parts of the products are demonstrated separately. The theme is to demonstrate visually the functional relationships of the various pieces/parts. The most important issues in design analysis are: Can any piece/part be removed permanently without affecting the functions of the product? Can the design be altered without compromising the value delivery? Can the part(s) be replaced with cheaper part(s)? Can the overall design be simplified to make it more functional? The discovery of such potential improvements is the net result of the product design approach. The design approach is a very difficult process which requires highly creative expertise in value analysis. Thus some companies hire value analysis experts for this exercise. Different experts use different practices to solve this mystery. Some of the commonly used practices are the value analysis checklist, brainstorming, cost analysis checklist, supplier analysis as follows:

#### **a) The Value Analysis Checklist**

The companies develop the value analysis checklist to assist the analyst. This list consists of questions related with product design analysis. This list can have hundreds of questions and key ideas related with value analysis concept.

<b>Sr.</b>	<b>General Questions</b>	<b>Yes</b>	<b>No</b>	<b>Remarks,</b>
------------	--------------------------	------------	-----------	-----------------

No.				if any
1.	Can any part of the product be eliminated without affecting the functions of the complete product?			
2.	Can the design of the part of the product be altered?			
3.	Can the overall design of the product be simplified?			
4.	Can the material(s) be substituted with other material(s) in the product?			
5.	Can the parts of the product be standardized?			
6.	Can the weight of the overall product be reduced?			
7.	Can any part of the product be made more cheaply in any of our production plants?			

**Figure 7.2: The Value Analysis Checklist**

**b) Brainstorming**

Brainstorming is a technique designed to stimulate creative thinking. The core philosophy of brainstorming sessions is to emphasis on generation of as many ideas as possible. During this exercise, no one is going to judge/evaluate the ideas as they come. The brainstorming group for design analysis consists of six to seven experts of different backgrounds drawn from different departments like materials department, design department, purchasing department, finance department, production department etc. The ideas given by members are listed for evaluation and development of promising idea(s) to generate a satisfactory solution of the problem. This technique is an integral part of the total value analysis procedure.

**c) Cost Analysis Checklist**

The companies develop cost analysis checklist to assist the analyst. This list consists of questions related with cost analysis of the part(s) of the product,

overall product, standardization, product weight, product design, etc. This list can have hundreds of questions and key ideas related with cost analysis concept.

<b>Sr. No.</b>	<b>General Questions</b>	<b>Yes</b>	<b>No</b>	<b>Remarks, if any</b>
1.	Can any part of the product be eliminated to minimise the overall cost of the product?			
2.	Can the design of the part of the product be altered to lower down the cost?			
3.	Can the overall design of the product be simplified with less cost?			
4.	Can less expensive materials be used in the product?			
5.	Can the parts of the product be standardized to lower down the overall cost?			
6.	Can the weight of the overall product be reduced to minimise the carrying/packaging cost?			
7.	Can any part of the product be made more cheaply in any of our production plant?			

**Figure 7.3: The Cost Analysis Checklist**

#### **d) Supplier Analysis**

The organisations invite the current and potential suppliers for the purpose of offering possible cost-reduction suggestions for the product(s), the parts of the products, standardization of part(s) and product(s), weight, packaging etc. The interaction with supplier(s) provides valuable suggestions and solutions of the value analysis problems. Here, the experience, creativity and production facility of the suppliers is utilized.

## **1.8 Value Analysis Process**

The first step of the value analysis process is to define the problem and its scope. Once this is done, the functions of the product and its items are derived. The value analysis process is normally organized by a value analysis team. It is conducted in the sequential phases (which may overlap in practice). The phases are Problem Identification Phase, Selection of the Members for the Functional Analysis Team, Information Phase, Function Analysis Phase, Creative Phase, Evaluation Phase, Development and Presentation Phase, and Implementation Phase:

### **➤ Problem Identification Phase**

The first step of the value analysis process is the identification of the problem by the management and preparation for the value analysis. The problem can be complex design of the product and the production cost is high. Other reasons for selecting a particular product for value analysis might be apparently the high cost, low yield rates or the manufacturing problems. The competitors are offering better product and the market demands remodelling or some changes in the product. There can be a need for a more compact design.

### **➤ Selection of the Members for the Functional Analysis Team**

Usually six to eight members from different departments such as materials accounting, production, purchasing, engineering, design and marketing, etc. are selected for further analysis.

### **➤ Information Phase**

This is a very important phase in which the issues/problems are addressed. The targets for improvement and evaluation factors are discussed by the team members. For that purpose, the information from both inside the organisation like present detailed design, materials, manufacturing and marketing information and outside the organisation like the competitors' product designs, information about new technologies, etc. is collected.

➤ **Function Analysis Phase**

In this phase, first of all the major function(s) and supporting functions of the product are identified. Further, all parts of the products are dismantle or taken apart to pieces. All the pieces/parts of the products are demonstrated separately. The theme is to demonstrate visually the functional relationships of the various pieces/parts. In last, a table illustrating the relationship between the functions and the parts of the product, as well as relevant existing costs, is drawn up.

➤ **Creative Phase**

The core philosophy of this step/phase is to emphasis on generation of as many ideas as possible to solve the problem identified in the first phase. During this exercise, no one is going to judge/evaluate the ideas as they come. The brainstorming group for idea generation consists of six to seven experts of different backgrounds. The ideas given by members are listed for evaluation and development of promising idea(s) to generate a satisfactory solution of the problem. This technique is an integral part of the total value analysis procedure.

➤ **Evaluation Phase**

In this phase, the best idea(s) for the problem(s) is refined and selected. The idea selected might be to use new materials or parts / to adopt a different method of manufacturing / to adopt completely new product / to add on new product functions / to modify the function(s) of the product / to combine the different functions / to eliminate of certain function(s). The best idea can be new design / compact design / new packaging / new technology etc. The core of the selection of the best solution for the problem is to lower down the cost.

➤ **Development and Presentation Phase**

At this stage, the ‘best’ alternative(s) is developed finally for the presentation to management. Next is the commitment to follow a course of action for initiating the ‘best’ alternative.

➤ **Implementation Phase**

In this stage, the final approval of the proposal is obtained from the management and facilitates its implementation.

## **1.9 Benefits of Value Analysis/Value Engineering**

Value analysis/engineering is an effective problem solving and quality assurance tool that can facilitate goals of cost-function analysis. The benefits of this concept are as under:

- The biggest benefit of value analysis/engineering is the improvement in the functions of the product and value delivery.
- Value analysis / engineering delivers best product designs at lower costs.

- Value analysis/engineering is a team approach to solve many problems of product, parts, standardisation, packaging, weight, design, technology, materials, etc.
- Value analysis/engineering provides a method of communication within a product development team and achieving team consensus. Good outcome is expected as it is a team effort of experts of various departments.
- It meets standards and safety objectives.
- It improves a product's performance while maximizing quality and value delivery.
- It decreases the cost of a product without compromising the functions of the product and quality of product. The entire focus is to provide essential functions to fulfill the product requirements.

## **1.10 Summary**

Value is the ratio of function to cost. It is a relationship between the worth or utility of the product and the actual monetary cost of the product. Value can, therefore, be increased by either improving the function or reducing the cost. It is the association between a function for customer satisfaction and the cost of that function. Value analysis/engineering is a systematic method to improve the 'value' of products to be manufactured by analytically examining the functions of the products. The components/parts are improved by either reducing their cost or increasing the value of the functions. This methodology is helpful to increase the value of the product by analysis of the existing or a new product or process. It is a team work. Value analysis is the answer to every problem project, and to others it is a cost-cutting, quality-reducing

exercise that infringes on both the design team and the owner. In fact, value analysis is a very important tool. It is to identify and eliminate the products features that do not add value to the customers and incur the cost to the manufacturer. When properly applied, it gives excellent results. When applied incorrectly, it can be fatal and it can create problems of its own. Value analysis concept is used in connection with cost-function analysis of existing product or process. It is a concept of design analysis and engineering stage of the product prior to manufacturing and commercialization. However, in both VA and VE the teams concentrate on the cost reduction without the compromise of value of the functions of the products or processes. Remember, the difference in both terms is not considered at large scale in maximum texts and these two terms are used interchangeably. The most important technique of value analysis is design analysis. It is a systematic analysis of the parts of the product or service or process. Some of the commonly used practices are the value analysis checklist, brainstorming, cost analysis checklist, and supplier analysis. The first step of the value analysis process is to define the problem and its scope. Once this is done, the functions of the product and its items are derived. The value analysis process is normally organized by a value analysis team. It is conducted in the following sequential phases (which may overlap in practice) as follows: Problem Identification Phase, Selection of the Members for the Functional Analysis Team, Information Phase, Function Analysis Phase, Creative Phase, Evaluation Phase, Development and Presentation Phase, Implementation Phase. The biggest benefit of value analysis/engineering is the improvement in the functions of the product and value delivery. Value analysis / engineering delivers best product designs at lower costs.

## **1.11 Keywords**

## **Value**

It is the ratio between a function for customer satisfaction and the cost of that function.

## **Value Analysis**

It involves a current product being analysed and evaluated by a team to reduce costs and improve product function or both without the compromise of value delivery to the customers.

## **Functional Analysis**

It is a significant part of value analysis. In this technique, the product is broken down and reviewed as a number of assemblies. Further, the function of each assembly is identified and costs are assigned to each one.

## **1.12 Self Assessment Questions**

1. Define value analysis. What are the objectives of value analysis?
2. What is design analysis? How is it used in a value analysis program?
3. Elaborate various techniques used in design analysis by experts.
4. Enumerate various phases of the value analysis process.
5. What are the benefits of value analysis/engineering?
6. How value is related to purchasing decisions?

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>8</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Make or Buy Decisions: Appraisal Methods for Buying Capital Equipment</b>	

## **Structure**

- 1.0 Objectives
- 1.1 Introduction – Make or Buy Decision
- 1.2 Factors affecting Make or Buy decisions
- 1.3 Importance of Make or Buy decision
- 1.4 Advantages of Make or Buy Strategy:
- 1.5 Reasons for ‘Make’ instead of ‘Buy’
- 1.6 Risks involved in Decision ‘to make’
- 1.7 Reasons for ‘Buy’ instead of ‘Make’
- 1.8 Summary
- 1.9 Self-assessment questions
- 1.10 References/Suggested readings

### **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the concept of Make or Buy Decisions.

- Examine the factors affecting Make or Buy decisions.
- Identify the reasons for 'Make' instead of 'Buy' and Reasons for 'Buy' instead of 'Make'.

## **1.1 Introduction – Make or Buy Decision**

The make-or-buy decision process is the process that decides whether to make or buy an activity or product. Most organizations today use a combination of both make and buy strategies. (Moses, 2011) Make or buy is a critical strategic decision. Such decisions are taken at the top management level. For manufacturing organisations, the make decision can be an extension and part of the activities already conducted at the production location by production department. But for non-manufacturing organisations, buy decision is suitable for maximum companies. Sweden based Volvo Company was importing engines initially but they started manufacturing engines in India on the very next year when the sale of car crossed 500 in numbers. They got the advantage of local, skilled and cheap labour. Let us take another example. Germany's BMW have international supply office at Gurgaon. They outsource their car spare parts from German companies like Bosh and Mico. Both Bosh and Mico companies are very famous worldwide for their quality spare-parts. BMW prefers to buy quality and standardized products from these highly specialised and sophisticated companies. Although BMW could manufacture the car spare parts itself but it consider strategically an advantage in buying quality spare parts from Bosh and Mico which are famous in worldwide for their supply and products. Both Volvo and BMW are

international Multinational companies but their decision regarding make or buy are different.

In the 'make' case, the firm has to organize the whole production process by itself, it must launch new factories, organize the supply chain, and faces all the costs, which arise during the production process. To the 'buy' case, the possibility we can refer as to the outsourcing. It means that the firm delegates all the rights to produce the components and services to another firm. ([www.wiwi.hu-berlin.de](http://www.wiwi.hu-berlin.de))

The importance of the make-or-buy decision in purchasing and materials management can be judged by the fact that every type of manufacturing concerns have to indulge in this crucial issue at some time during the course of their operations. And they have to make a decision of either make or buy.

## **1.2 Factors affecting Make or Buy decisions**

The make-or-buy decision is a classic management issue. Every firm uses thousands of inputs, and for each there is a potential to either manufacture the inputs or acquire it on the market. If a firm decides to make input, it will transact internally with a division or another part of firm. If it decides to buy, It will contract with other organization. (Fill, 2000)

Make-or-buy decision is one of the most crucial decisions. It is faced by every company and it is one of the main concerns of industrial organizations. The factors affecting the MoB (Make or buy) decision-making can be subdivided into two categories: positive and negative. Positive factors are those, which support the decision to outsource and can be called as drivers for outsourcing. Negative factors are those criteria, which suggest against

outsourcing and therefore, can be named as concerns for outsourcing. Better focus on core business and cost reduction appears to be the major motivating factor for a firm to analyze the MoB (make or buy) decision. (Kulkarni, 2008)

The make or buy decision is influenced by many factors like the market, technical, economic, availability of skilled labour, cheap labour, etc. The list of these factors is as following:

- Strategic impact;
- Competitive threat based on supply, demand and price;
- Quality considerations
- Economic forecasts, raw materials availability, electricity supply and water conditions;
- Choice of technology;
- Machine capabilities;
- Impact on current vendor relation;
- Capacity utilization;
- Plant efficiency and engineering features;
- Compatibility with existing system;
- Nature of demand;
- Maintenance and spare requirements;
- Replacement decisions;
- Physical life-span;
- Purchase costs;

- Current capacity utilization;
- Break-down analysis; and
- Lead time for producing the products.

The above given list of variables affecting the make or buy decision is very long. That is why the puzzle ‘to make’ or ‘to buy’ is very difficult. Comparison of the relevant costs of both the alternatives in such cases shows whether to continue the existing arrangement of production or outsource the materials. The answer depends upon whether the firm has the option to use the freed capacity, profitably, or not.

### **1.3 Importance of Make or Buy decision**

The choice of whether to manufacture an item internally or purchase it on the outside can be applied to a wide variety of decisions on the following: parts needed for the production of goods for sale, a new building, new equipment, tooling and the like. Thus the make-or-buy decisions are often major determinants of profitability and can be significant to the financial health of a company. (Yoon, 1994)

Typically, manufacturing companies have hundreds of components, each of which can be made in-house or outsourced. Besides cost and profit, outsourcing decisions also involve consideration of strategy issues, efficiency, and risk dimensions relating to supplier quality, lead times and delivery performance. When all of these factors are taken together, a sourcing decision can be highly complex that impacts the profitability of the firm. (Kulkarni, 2008)

The “make-or-buy” decisions have a direct effect on corporate strategy. A decision to make production equipment “in-house” frequently begins with an assignment given to the research and development department specializing in production technology to solve a particular problem. The results influence corporate strategy, but at the same time corporate strategy also affects the importance attached to, and the policies adopted for, research and development. (Manders, 1995)

## **1.4 Advantages of Make or Buy Strategy**

### **➤ Cost Factor**

It is advantageous to make for the companies specially having exposure of production. Already they are producing and have skilled labour, machinery, technical know-how etc. Moreover if the culture of the organisation and policy favours the production then the organisation must go for ‘make’ decision. If space, machinery, skilled labour, technical skills, equipment and time are not available then the company can go for ‘buy’ strategy.

### **➤ Quality Control**

Make or buy decisions benefit your company by giving you control over the materials that go into the products you provide for your customers. If you are dissatisfied with the quality of the materials your vendors provide, you can make them yourself, in accordance with your company's specifications. Your interest in creating a high quality product may spur you to learn how to produce high quality materials. On the other hand, your production routine may be so specialized that it would not be worth developing the capability to make

a product whose quality is comparable to the item your vendor provides.  
([www.smallbusiness.chron.com](http://www.smallbusiness.chron.com))

➤ **Requirements of Materials**

Small scale business houses need very limited quantities of materials. So, outsourcing of the materials is the right decision. For multinational companies, especially manufacturing standard products, the raw materials, equipments are required in huge quantity. So, the 'make' decision is right strategy for big companies.

## **1.5 Reasons for 'Make' instead of 'Buy'**

➤ **Desired Quality**

Sometimes the organisations require specific equipment/ raw material/product/item and vendors/suppliers are not interested in providing and fulfilling the requirements because of the reasons like company's policy, no technical know-how or cost concern. the option left is to manufacture the item in its own production house.

➤ **Technical Advantage**

Sometimes organisations work hard in their research and development labs and find innovative products. The organisations wish to preserve the technological secrets. To gain technical advantage, the organisations take decision to manufacture items/equipments/products/ raw materials by their production departments.

➤ **To Gain Production Advantage**

Some organisations have expertise in production and their advantage is because the organization's technical skilled labour, production capacity and achievements in economies of scale. The overall cost advantage because of efficient production leads the organisations to 'make' rather 'buy'.

➤ **Use of Surplus Production Capacity**

Particularly in depression / recession or off season, the idle equipment and labour can be utilized to manufacturing.

➤ **Cheaper to Manufacture**

For some companies 'to make' decision is an integral part of the overall plan of the company. This strategy is an integral part of the corporate culture and policy. Organizations can run smoother production and produce more cheaply than outsourcing the items. The cheaper production efficiency is very helpful for organisations to be competitive.

## **1.6 Risks involved in Decision 'to make'**

➤ **Dispose off Problem**

Due to sudden change in demand, the produced items can become surplus. Inventory can pile up and ultimately the decision of 'to make' starts to prove very costly. Nobody wants to face losses.

➤ **Difficult to Reverse**

The manufacturers cannot go back or reverse the decision without suffering losses, once 'to make' decision is taken. In fact, it is very difficult to determine the true long-run costs of 'to make' strategic decision making.

## **1.7 Reasons for 'Buy' instead of 'Make'**

➤ **Lack of Production Exposure**

Companies do not have skilled technical labour, technical know-how and lack of production exposure. The companies consider no profitable investment opportunities in 'to make; decision. Outsourcing is better decision for these companies. Cost is the most important consideration. These companies find very high cost of manufacturing than outsourcing. Right decision for these companies is 'to buy'.

➤ **Problem of Small Companies**

Small companies have small volume requirement of components. 'To make' decision does not strategically fit in their policies. Moreover, the financial health of such companies is not so much sound to start the production. In some cases, patent rights are required to start production and usually it requires heavy payments in terms of royalty. So, the companies go for 'to buy' or outsource strategy.

## **1.8 Summary**

The make-or-buy decision process is the process that decides whether to make or buy an activity or product. Most organizations today use a combination of both make and buy strategies. Make or buy is a critical strategic decision. Such decisions are taken at the top management level. For manufacturing organisations, the make decision can be an extension and part of the activities already conducted at the production location by production department. But for non-manufacturing organisations, buy decision is suitable for maximum companies. Sometimes the organisations require specific equipment / raw material/product/item and vendors/suppliers are not interested in providing and fulfilling the requirements because of the reasons like company's policy, no technical know-how or cost concern. The option left is to manufacture the item in its own production house. Sometimes organisations work hard in their research and development labs and find innovative products. The organisations wish to preserve the technological secrets. To gain technical advantage, the organisations take decision to manufacture items/equipments/products/ raw materials by their production departments. Some organisations have expertise in production and their advantage is because the organization's technical skilled labour, production capacity and achievements in economies of scale. The overall cost advantage because of efficient production leads the organisations to 'make' rather 'buy'. Particularly in depression / recession or off season, the idle equipment and labour can be utilized to manufacturing. Due to sudden change in demand, the produced items can become surplus. Inventory can pile up and ultimately the decision of 'to make' starts to prove very costly. Nobody wants to face losses. The manufacturers cannot go back or reverse the decision without suffering losses, once 'to make' decision is

taken. In fact, it is very difficult to determine the true long-run costs of ‘to make’ strategic decision making.

## 1.9 Self Assessment Questions

1. What considerations are taken into account for ‘Make or Buy’ decisions?
2. Discuss the approach to be adopted in “Make or Buy” decision?
3. What is ‘Make or Buy’ decision strategy? What is its importance for a business?
4. Explain various risks involved in ‘Make or Buy’ decisions.

## 1.10 References/Suggested readings

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>9</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Material Logistics &amp; Warehousing Management: Store Layout</b>	

## **Structure**

- 1.0 Objectives
- 1.1 Logistics Management - An Introduction
- 1.2 Meaning of Warehouse Management
- 1.3 Warehouse operations
- 1.4 Warehouse Administration and Management of Store Floor
- 1.5 Duties and responsibilities of store manager
- 1.6 Store Maintenance
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- 1.8 Benefits of Warehousing
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- 1.10 Benefits of Warehouse Management System
- 1.11 Summary
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- 1.13 Self Assessment Questions
- 1.14 References / Suggested Readings

### **1.0 Objectives**

After going through this lesson, you will be able to:

- Describe the concept of logistics management.
- Explain the concept of management, operations and administration of warehouse.
- Understand the concept and benefits of warehouse management system (WMS).
- Make you familiar with the concept of store floor, store management, and store maintenance

## **1.1 Logistics Management – An Introduction**

According to Webster’s New Encyclopedia Dictionary logistics is “the branch of military science having to do with recurring, maintaining and transporting material, personnel and facilities.”

According to Council of Logistics Management, Logistics management can be defined as: “It is the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements.”

“Logistics is the management of the flow of goods, information and other resources, including energy and people, between the point of origin and the point of consumption in order to meet the requirements of consumers. Logistics involve the integration of information, transportation, inventory, warehousing, material-handling, and packaging” (Wikipedia).

Logistics management tries to have the “right product”, in the “right quantity”, at the “right place”, at the “right time”, with the “right cost”.

In brief, logistics management is the planning, implementing, and controlling the efficient, effective total flow of materials, from acquisition of the raw materials and purchased component parts, storage and to delivery of a finished product to the customer. It involves integration of information flow, modes of transportation, inventory management, warehouse management and material-handling efficiently and effectively.

## **1.2 Meaning of Warehouse Management**

Different types of goods are needed in our houses in day-to-day life. Sometime we may buy in bulk, sometimes we buy in small quantity. When we buy in bulk we store them in our house. Similarly, organisations also need a variety of items, materials and parts of different uses for different purposes at different time. Some items/materials/ parts are required instantly and some are required after some time. Some are required throughout the year without any break. Some are required in high amount in a particular season. So, storage is very important concern. Storage involves proper arrangement for preserving items/materials/parts from the time of their production or purchase till the actual use. The role of storage is very important in smooth production. When the storage is done on a large scale and in a specified manner it is called ‘warehousing’. The place where goods are kept is called ‘warehouse’.

‘A warehouse is a planned space for the storage and handling of goods and material.’

(Fritz Institute)

Warehouses provide a very essential function in the operations of many organisations. The warehouses are for storage, distribution, consolidation and transition of different types of cargos.

Warehousing refers to the activities involving storage of raw materials/parts and finished goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed. Warehousing is one of the important auxiliaries to trade. It creates time utility by bridging the gap between requirements of materials/parts and production.

A warehouse is typically viewed as a place to store inventory. However, in many logistical system designs, the role of the warehouses is more properly viewed as a switching facility as contrasted to a storage facility. The objective of warehouse management is to efficiently and effectively coordinate all warehouse processes and activities. Warehouse management includes all planning and control procedures to operate the warehouse. (Faber, de Koster, & Smidts, 2013)

Warehouse management has very important role in the logistics management. To improve the logistic business performance it is important to:

- appropriately design the layout of the warehouse, considering that space assigned to incoming freight does not influence the delivery service, whereas space for outgoing traffic is a relevant factor;
- effectively execute vehicle routing and to determine the proper number of vehicles; and
- efficiently use the productivity of human resources. (Marco & Giulio, 2011)

### **1.3 Warehouse Operations**

A warehouse is a place where all the materials and parts are to be stocked to meet the consumption requirements. The success of a warehouse depends how efficiently it does its day to day operations. The store operations play very important role in the profitability and long term survival of the organisation.

Typically, warehousing comprises six major activities: receiving; transfer; handling; storage; packing; and expediting. The first task is the transfer of materials from different vendors to the store. Handling of materials is an important activity while flow of materials in the warehouse. To minimize the time expended in retrieving orders, it is suggested that items that have the highest turnover are located nearest to the shipping area. Slow-moving items would be kept at the other end of the store. Packing is an important element of the despatch function. Although it is not directly connected with the warehouse operation, it usually finds its place within the same building. The warehouse must assume the responsibilities of linking containerization which would improve the cost-effectiveness of transportation, facilitate the mechanisation of the warehouse, reduce the amount of packaging material used and save on an expensive recycling scheme. (Gunasekaran, Marri, & Menci, 1999)

Each warehouse has its own operations or different steps depending on their industry and product requirements. But there are some basic steps of its operations as under:

➤ **Receiving**

At this stage, the materials and parts are received from different vendors/suppliers and unloaded. The materials/parts received at this stage are scanned and ownership is taken. Both the quality and quantity are checked.

➤ **Storing the Material**

Materials are assigned a location in the warehouse. These locations in the warehouse will determine how fast the materials are required by user department. Before product can be put away, an appropriate storage location must be determined. This requires managing the storage locations. The store manager must know at all times what storage locations are available, how large they are, how much weight they can bear, and so on. Storage is the main activity in a warehouse. It is related with how much to store and in what time the materials will be required by user department (inventory control issues). The next issue is where to store.

#### ➤ **Packing and Delivery**

When an order from user department is received, a checking process is to be performed to verify whether the required materials are available or not. Before the packing and delivery, the materials are scanned to keep the record. All the records regarding date, time, department, person etc are recorded in computer.

### **1.4 Warehouse Administration and Management of Store Floor**

Warehouse administration deals with various aspects like maintaining the record of each raw material and parts received efficiently and prudently and to deliver the goods to various user departments without any disruption. It includes cleanliness of the whole store particularly the main floor, maintenance the store etc. Administrators make sure that store need to be maintained as per the criteria and the rules set by top management.

### **1.5 Duties and Responsibilities of Store Manager**

From store's management point of view, to run the day to day activities of a store is a major element of the cost. Having a long term systematic planning and vision are

therefore, must for the success of store activities. For a store manager it is important that he should execute his day to day activities in an effective way. The store manager is a person who is responsible for the success or failure of a store. His calculation, forecasting and way of functioning can affect a store. The designation of a store manager holds infinite duties. According to the requirement and size of the store, management recruits single or more store managers to fulfill/accomplish day to day activities performed in a store. It differs from store to store and even some times difference in his portfolio varies from small sized to big size of a same store. He is responsible for management of store operations, maintaining the store environment, cost minimization, holding inventory, extending user departmental services and preparing overall plan for all the in-house operating functions.

## **1.6 Store Maintenance**

- It includes all the activities involved in managing store's facilities such as management of exterior and interior physical facilities.
- The exterior facilities include the parking arrangement, the entrances to the store, loading and unloading area of the store etc.
- Interior facilities include the arrangement for racks, walls, flooring, ceiling, climate control, energy use, fixtures and shelves, displays and signs and sidewalks etc.
- Good store maintenance lengthens the useful life of air conditioning units, floors, electric equipments, shelves and fixtures.

## **1.7 Energy Management**

- It is all about the management of expenses on lighting, heating and cooling.

- It is important for some items to save from decay and rusting.
- Replacing traditional bulbs with CFLs, LED's and other energy saving equipments
- Using 'photo sensor' to monitor the level of lights

#### **Common Practices in Store Management:**

- Using 'climate sensors' to control the need for air conditioning
- Appointment of uniformed security
- Thorough check at entry and exit points
- Use of TV cameras can be beneficial to catch the stealers / theft cases
- Brighter lighting arrangements
- Coordination between all security personnel
- Accessibility to storage areas and ware houses should be restricted

## **1.8 Benefits of Warehousing**

The benefits of the warehousing are as under:

#### **➤ Seasonal Production**

There are certain agricultural commodities that are harvested during certain seasons, but their consumption or use takes place throughout the year e.g. sugarcane in sugar industry. As for example, Adani Agri Logistics Company has many warehouses in India to store 'Basmati Rice'. They have stored tonnes of rice at particular temperature, humidity etc. They have automated warehouses. Firstly, in these warehouses the commodities are saved from birds, rain, sunlight, fungus, insects etc. Secondly, the materials can be shipped/ supplied as and when required without much delay.

➤ **Large-scale Production**

Now-a-days production takes place to meet the existing as well as future demand of the products. Manufacturers also produce goods in huge quantity to enjoy the benefits of economies of scale. So, the materials and parts are required in large scale and need to be stored properly without losing the actual property of the materials.

➤ **Quick Supply**

It is always good to have warehouse near the place of consumption, so that without making any delay the materials can be made available to the user departments.

➤ **Continuous Production**

Continuous production requires consistent supply of raw materials and parts. Warehouses are helpful in providing consistent supply of raw materials and parts for the smooth production.

## **1.9 Warehouse Management System (WMS)**

Warehousing is very important activity to outperform competitors on customer service, lead time and costs. However, if warehouse is to be source of competitive advantage, then the implementation of a warehouse management system (WMS) is a necessary condition to achieve efficiently the high performance of warehousing operations required in today's marketplace. A major practical question is then whether a given warehouse should a standard or tailor-made WMS. A standard WMS offers many advantages; it is a proven solution, it is less costly, the implementation lead time is shorter, and after-sales service is better. (Faber, de Koster, & van de Velde, 2002).

Warehouse management system is a pivotal part of the supply chain which mainly controls the storage and movement of materials within a warehouse and processes the transactions, including receiving, shipping, picking and put away. Warehouse management system works on Auto ID Data Capture technology, such as mobile computers, barcode scanners, wireless, RFID and LAN's to efficiently monitor the flow of materials and parts. The database provides the status of goods in the warehouse accurately. The main objective of WMS is to provide an automated (computerized) procedure to handle the records of incoming and outgoing goods. WMS provides a helpful link to logistics management and also for order processing in order to pick-up, packing and shipping the product out of the facility.

Now-a-days, different types of labels such as bar codes, 2D data codes and radio frequency identification (RFID) facilitate automatic reading, and operatives carrying hand-held scanners are used in warehouse to speed up the task. Even more useful are rugged handheld computers with sophisticated interfacing capabilities that can identify the products and communicate in real time to back-office database systems. Furthermore, the bar code readers and RFID scanners can be placed at the entrance and exit of the warehouse to keep the database up to date with all goods arriving and departing, giving a continual real-time inventory and theoretically removing the need for regular stocktaking. Fully automated systems are now coming into use in which cranes or fork-lift trucks are controlled direct from them database, and radar or inertial sensing systems accurately monitor the position of the machine. (Connolly, 2008)

### **1.10 Benefits of Warehouse Management System (WMS)**

- Complete automation of warehouses leads to reduction in manpower. Less no of employees are required in the warehouse to manage operations.
- The materials and parts can be traced accurately and orders can be fulfilled quickly. Hence, inventory management is efficient and effective and the production is fast.
- Automated system controlled by database management system is helpful in quick decision making. Database decision making reduces risk in the business.
- Space in warehouse can be managed automatically with the help of WMS.
- All the warehouse operations such as receiving, picking and packing by maintaining the data electronically, hence there is a drastic reduction in paper work.

## **1.11 Summary**

Logistics management is the planning, implementing, and controlling the efficient, effective total flow of materials, from acquisition of the raw materials and purchased component parts, storage and to delivery of a finished product to the customer. It involves integration of information flow, modes of transportation, inventory management, warehouse management and material-handling efficiently and effectively. Warehousing refers to the activities involving storage of raw materials/parts and finished goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed. Warehousing is one of the important auxiliaries to trade. It creates time utility by bridging the gap between requirements of materials/parts and production. The benefits of the warehousing are seasonal production; large-scale production; quick supply; and continuous production. Through/full automation of warehouses leads to reduction in manpower. The materials and parts can be traced

accurately and orders can be fulfilled quickly. Hence, inventory management is efficient and effective and the production is fast. Automated system controlled by database management system is helpful in quick decision making. Database decision making reduces risk in the business. Space in warehouse can be managed automatically with the help of WMS. All the warehouse operations such as receiving, picking and packing by maintaining the data electronically, hence there is a drastic reduction in paper work.

## **1.12 Keywords**

### **Warehouse Management**

A warehouse is a planned space for the storage and handling of goods and material. It is a place where all the materials and parts are to be stocked to meet the consumption requirements.

### **Warehouse Operations**

The six major activities in warehouse namely receiving; transfer; handling; storage; packing; and expediting are called warehouse operations.

### **Warehouse Management System**

It is an automated (computerized) procedure to handle the records of incoming and outgoing of raw materials and goods. It works on Auto ID Data Capture technology, such as mobile computers, barcode scanners, wireless, RFID and LAN's to efficiently monitor the flow of materials and parts.

## 1.13 Self Assessment Questions

1. Give an introduction of logistics management.
2. What is the meaning of warehouse management?
3. Briefly enumerate various warehouse operations.
4. Elaborate the warehouse administration and management of store floor.
5. Enumerate the duties and responsibilities of store manager.
6. What is the importance of store maintenance?
7. Discuss the importance of energy management in warehouses.
8. What are the benefits of warehousing?
9. What is Warehouse Management System (WMS)?
10. Enumerate the benefits of Warehouse Management System

## 1.14 References / Suggested Readings

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>10</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Price Determination and Negotiation</b>	

## **Structure**

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Objectives of Pricing
- 1.3 Factors Influencing Pricing
- 1.4 Types of Pricing Strategies
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## 1.0 Objectives

After going through this lesson, you will be able to:

- Understand the basic concept of pricing and negotiation.
- Know the factors, objectives of pricing and types of pricing strategies.
- Understand the types and process of negotiation.
- Make you acquainted with the skills and obstacles of negotiation.

## 1.1 Introduction

The word 'price' is derived from a Latin word '*pretium*'. Price is the amount of money paid by the customer or buyer for acquiring a product or service. It refers to a physical product or service for which a buyer is ready to pay. It is the result of a complex set of calculations. Generally, the manufacturer or supplier produces and sells product or service in the market place. The buyer pays money to the seller or supplier in exchange of goods or services. The amount of money which a buyer pays for one unit of a good or service to the seller is called the price of the good or service.

Pricing is a method adopted by a firm to set its selling price. It usually depends on the firm's average costs, and on the customer's perceived value of the product in comparison to his or her perceived value of the competing products.  
([www.businessdictionary.com](http://www.businessdictionary.com))

Pricing is the process whereby an organisation sets the price at which it will sell its products and services. In setting prices, the organisation will take into account the price to acquire raw materials, parts, the production cost, the competitors' costs, brand value

etc. It is targeted for the defined customers. Generally, the pricing considers the factors like fixed and variable costs, competition, company objectives, target customers and the capacity to pay by customers etc. Pricing is a strategic decision making. No matter what type of product or service you sell, the price you charge from your customers or clients will have a direct effect on the success of your business.

## **1.2 Objectives of Pricing**

Pricing objectives are overall goals that describe what the organisation wants to achieve through its pricing efforts. It is very important for an organization to determine the pricing objectives that the organization wishes to achieve. The pricing objectives or goals give direction to the whole pricing process. Later on, the pricing strategies are framed to fulfil these pricing objectives. The pricing objectives must be consistent with the overall organizational objectives. Some of the common pricing objectives are as follows:

- For small scale organisation or new venture, the pricing objective can be the survival in the medium to long term or to generate cash flow/liquidity so that the organization can be in a position to stay in business;
- For old organisations, the pricing objective can be to maximize the long-run profit or short-run profit on a year-by-year basis;
- For the large scale or big organisations, the pricing objective can be to maximize the market share or increase sales volume or to achieve a specified level of return on investment (ROI).

- The organisations can have pricing objectives like creating illusions of high product quality or to enhance the image of brand/company/product. They can use price to make the product visible or socially acceptable.

### **1.3 Factors Influencing Pricing**

There are a number of factors that might affect pricing decisions. The factors influencing pricing are market demand, cost of raw materials and part, production cost, competition, branding strategy, economic conditions, government, prices fixed by competitors etc. Various factors influencing pricing are as follows:

- **Market Demand**

The market demand for a product or service obviously has a big impact on pricing. When there is high demand of product or service, then the price is high. It means market is ready to pay high for the product or service. But if the demand is very low, then the price will be low.

- **Cost of the Raw Materials and Parts**

The price of a product or service depends upon the cost of raw materials and parts used in the manufacturing of the products. If the raw material is cheap and locally available then the product cost will be low. But if the raw material cost is high or it is imported then the chances of price high are more.

- **Competition**

The competitive conditions affect the pricing decisions. The high competition means more number of companies in an industry. A company can fix the price equal to or lower than the competitors. If the quality of the product or service is very high, the premium prices are charged from the customers.

➤ **Branding Strategy**

The companies having high brand image and high brand value charge high prices from the customers.

➤ **Economic Conditions**

The economic conditions of the country influence pricing of the product or service. If there is a recession in the economy, the prices are generally found low and vice-versa.

➤ **Government and Regulators**

Government's decisions affect the prices of products and services through enactment of legislation. Generally government controls excise duty, custom duty, subsidy, export-import duty, bank rates etc. In some cases the prices cannot be fixed higher, as the government keeps control and close watch on the prices.

➤ **Cost of Production**

A seller fixes the market price of his commodity which is more than the per unit cost of production of commodity. The cost of production depends on various factors like technology used (first hand or second hand), machinery (latest technology or old technology), manpower (skilled, experienced or semi-skilled), overhauling & regular repair of machinery, wastage produced by machinery, environment (temperature,

humidity) etc. Generally, the difference between the per unit price and per unit cost of production of the product or service is profit per unit. Thus, higher the difference between price and per unit cost of production greater will be the margin of profit. So, if the competition is very high, the price is difficult to be raised high. The cost cutting tool left is to lower down the production cost to remain competitive in the market. We can say that per unit cost of production is of great importance in fixing the price of the product or service by a manufacturer or supplier.

#### ➤ **Price Fixed by Competitors**

While fixing the price of goods or services, the manufacturer or supplier also considers the price of goods or services fixed by the other manufacturers or suppliers. If he fixes the price of his products or services which is much higher than the price fixed by other sellers of similar products or services, he may not be able to sell more quantity of the goods or services. So, in order to be competitive in the market he has to decrease the price of his products or services. He can fix high price if he is delivering more values through products or services.

#### ➤ **Product Life-cycle**

The product life-cycle consists of mainly four stages namely introduction, growth, maturity and decline. The organisations generally choose skimming pricing strategy at the introduction stage for new products. The price is fixed high at this stage to recover some costs spent on research and development of the product. The basic intention of fixing high pricing is to cover initial cost in a short time period. In growth stage, pricing remains generally stable as the demand continues with minimal competition. In the maturity stage, the sale of products or services or the demand starts to decline. The

competitors start selling similar products in the market and the prices have to be kept low to attract more customers. In this stage, the price is reduced in order to compete in the market. In decline stage, prices are reduced further.

## **1.4 Types of Pricing Strategies**

An organisation can adopt a number of pricing strategies. Setting pricing strategy is a strategic issue. The pricing strategy is usually based on corporate objectives. Though pricing strategies are complex, the basic rule of pricing is basic, clear-cut, simple and straightforward that it must cover costs and profit. The pricing strategies have to be reviewed constantly in order to tune with the changes in costs, market demand, response to the competition, business environment and profit objectives. Various types of pricing strategies like Skimming Pricing, Penetration Pricing, Bundle Pricing, Product line Pricing, Mark up Pricing, Psychological Pricing, Marginal Cost Pricing, Charging What the Traffic Will Bear Pricing are as follows:

### **➤ Skimming Pricing**

One of the most commonly used strategies is the skimming strategy. The organisation fixes an initial high price and then slowly lowers the price to make the product available to a wider market. This means that at high price high profits in the introduction stage of the product. This method is especially useful in the pricing of new innovated products. The objective of this pricing is to skim the profits of the market layer by layer. It also helps the firm to get the feel of the demand of the product and then make appropriate changes in the pricing strategy.

### **➤ Penetration Pricing**

As opposed to the skimming strategy, the prime objectives of penetration price strategy are to gain share and increase sales in highly competitive market. In this pricing strategy, the organisation fixes a low price initially. Once the market share is captured, the prices are increased layer by layer. Penetration pricing in such cases will help the organisation to have a good share of the market.

➤ **Bundle Pricing**

The organisations sell multiple products/bundle of products for a lower rate than consumers would pay if they buy each item individually. In fact, they bundle a group of products at a reduced price. This strategy is very common in FMCG (Fast Moving Consumer Goods) companies. The common method can be buy one and get one free promotions or buy two get one free. Bundling can be of different products. This strategy can be effective way of selling the slow moving or unsold products. This strategy increases the value perception of the consumers as they are getting something free or more products at less price.

➤ **Product Line Pricing**

It is the pricing of different products within the same product range. As for example HUL is selling Lifebuoy, Lux, Breeze, Rexona, Hamam, Moti and Dove soaps under Product Line Soap. All the soaps have different pricing according to its target, positioning, contents, brands, packing etc. Product line pricing is very complex. “As the price of one product may impact on others supplied by the organization, either through interrelated demand, such as hardware and software, or interrelated costs. For example, oil and petrol are created from the same process. Thus the various printed and electronic products generated from a database, such as the INSPEC database share costs, and

prices of some products may be determined by the opportunity to recoup costs on other products.” (Rowley, 1997)

➤ **Mark-up Pricing (Cost Plus Pricing)**

In mark-up pricing the selling price of the product is fixed by adding a particular margin or mark up to its cost. Under this strategy, the organisation add together the direct material cost, direct labour cost, overhead cost etc. and add to it a percentage to create a profit margin in order to fix the price of the product or service.

➤ **Psychological Pricing**

Psychological Pricing strategy is commonly used by the marketers. The seller here considers the psychology of buyers while fixing price and the positioning of price within the market place. Generally, the price tags Rs. 99 or 4999 instead of Rs. 100 and 5000. The reason of fixing this type of pricing is the psychology of the buyers. The buyer still says that he purchased the product under Rs. 100 or 5000 even though it is Rs. 1 away. Here the customers respond on emotional levels rather than logical ones. The target of this pricing strategy is to increase demand by creating a psychological illusion of low price tag in the consumers’ mind.

➤ **Marginal Cost Pricing**

“Marginal cost pricing targets at maximising the contribution towards fixed costs. Marginal costs include all the direct variable costs of the product. In marginal cost pricing, these costs are fully realised and also a portion of fixed cost is also realised. Under competitive market conditions, marginal cost pricing is more useful. The disadvantage of the marginal costing makes certain assumptions regarding cost and

revenue behaviour, that can be turn out to be incorrect in few cases. Marginal costing ignores a third class of costs i.e. the semi –fixed, semi-variable costs, or mixed costs.” (Priti & kumar, 2014)

➤ **Charging What the Traffic Will Bear**

“It points out demand price. As there are two principles in pricing, one is called cost of service principle and other is termed as value of service principle. The second term is charging what the traffic can bear. Professionals like doctors, lawyers, chartered accountants etc., adopt this principle. They charge their fees on the basis of ability to pay and the cost factor comes secondary in their charges. A monopolist can afford to adopt this principle to maximise his profits. This pricing strategy is also adopted by railways in India.” (Singh, 2013)

## **1.5 Negotiation – An Introduction**

The word ‘Negotiation’ has its origin from Latin civil law which signifies trading deliberation leading to an agreement. It is one of the most important and most interesting parts of purchasing. Negotiation is the process by which two or more individual/parties/groups confer or interact to reach consensus or agreement. It is an activity with a start, middle and end. The interested parties must have predetermined goals and some expectations of outcome. The parties understand the meaning and true purpose of negotiation and are willing to modify their positions to reach resolution and consensus. Sometimes more than two parties may be involved in the negotiation. When three parties are involved it is called tri-partite and when more than three parties are involved it is called multi-partite negotiations. All the parties need to reach a single

consensus or agreement. Such negotiations are difficult and require careful management.

Negotiation is an essential business activity. It can be formal or informal. It can be face-to-face or without any direct human interaction through mobile phone, video-conferencing, internet etc. The consensus/agreement or the output of the negotiation can be the result of a short single event or can be an ongoing series of interactions and discussions. It establishes good trade relationships between the organisations. It is a dialogue between two or more parties like supplier and buyer intended to reach a desired goal. It is a win-win game. The loss of any party is not the true outcome of the negotiation. At the end of the negotiation, both supplier and buyer must be in a win-win situation. The outcome in the form of an agreement must be arrived with the consent of all of the parties involved in the negotiation. In a general context, negotiation is a bargaining process between two or more individuals/parties/groups, seeking to reach a mutually satisfactory agreement on, or settlement of, a matter of common concern. Each party bargains within their opinion, arguments, viewpoints, influence and objectives. Negotiation is an essential business activity for purchasing and establishing trade relationships between partners.

## **1.6 Meaning of Negotiation**

Negotiation is a discussion between people, with the goal of reaching an agreement on some pre-determined issues, and separating the parties when neither party has the power to get its way.

“Negotiation is a bargaining (give and take) process between two or more parties (each with its own aims, needs, and viewpoints) seeking to discover a common ground and reach an agreement to settle a matter of mutual concern or resolve a conflict.” ([www.businessdictionary.com](http://www.businessdictionary.com))

“Negotiation is the process of discussing something with someone in order to reach an agreement with them, or the discussions themselves.” For example there is a negotiation between interviewer and interviewee for salary at the time of interview. ([www.dictionary.cambridge.org](http://www.dictionary.cambridge.org))

“Negotiation is a formal discussion between people who are trying to reach an agreement: an act of negotiating.” ([www.merriam-webster.com/dictionary](http://www.merriam-webster.com/dictionary))

Negotiation is a method by which people settle differences and result a compromise or agreement. It is a process by which a consensus is reached while avoiding any conflict or dispute. It is like an argument between two parties over an issue to be settled down. In the agreement, parties understandably aim to achieve the best possible outcome for their position in the best interest of their organisation. However, the principles of fairness, seeking mutual benefit and maintaining a relationship are the keys to a successful outcome.

“Negotiation is a method by which people settle differences. It is a process by which compromise or agreement is reached while avoiding argument and dispute. Negotiation is the decision-making process through which a buyer and a seller establish the terms of a purchase agreement. It is a fundamental phenomenon in inter-firm exchange behavior in industrial markets.” (Perdue & Summers, 1991)

## 1.7 Examples of Negotiation

In negotiation, individuals/parties/groups interact with each other with some purposes and find a way to sort out the differences to reach a resolution or agreement. The examples where negotiation needed and used are as follows:

- The buyer and supplier negotiate for acceptable price, terms, conditions and basis for raw materials and parts;
- The interviewee and interviewer negotiate for acceptable terms & conditions of the job, job profile and salary etc.
- The management and the union negotiate for acceptable terms and conditions of issues like compensation, welfare issues, insurance etc.
- The countries negotiate on the various issues like border sharing, defence issues, loans, sharing information technology cooperation etc.
- Negotiation at the time of securing the safe release of a hostage.
- Negotiation at the time of an online e-auction.

Negotiation involves communication and some sort of exchange between the individuals. The traditional approach demands that it should be face-to-face. As for example, salespersons like to have face-to-face interactions because it helps them to build relationship, instilling trust, dedication and helps them to settle down the negotiation as soon as possible. Man is a social animal and responds more favourably when the other person is just opposite to us. Face-to-face interaction also increases the

opportunity to 'read' the eye movements of the other party and helpful in bargaining. It is beneficial in the cases of bulk buying especially when one rupee reduction during bargaining can bring a huge saving. However face-to-face interaction is not always possible and practical. Furthermore with the invention of internet and with the help of latest information technology, now-a-days negotiations are conducted through internet, phone, web-conferencing and video-conferencing. These forms of new technology offer a new and alternative approach to negotiation. In fact, it had made negotiations very fast and now the parties can have negotiations while sitting at different locations. They do however introduce a series of new challenges and skills.

## **1.8 Types of Negotiations**

There are two basic types of negotiations namely (i) Win-Win Negotiation or Integrative Negotiation; and (ii) Zero-Sum Negotiation or Distributive negotiations require different approaches. The details of the types of negotiations are as follows:

### **➤ Win-Win Negotiation or Integrative Negotiation**

The characteristic feature of win-win or integrative bargaining is that it believes in friendly and constructive situation. The supplier and buyer involved in negotiation process sit together and try to find an acceptable agreement. Integrative negotiations are based on cooperation of the parties. The outcome of the win-win negotiation is acceptable to both parties without giving up something important. The simple approach in win-win or integrative negotiations is problem solving. Its principle behind this approach is information sharing. Both parties share information so that acceptable agreement can be achieved with smooth communication, trust and cooperation.

### ➤ **Zero-Sum Negotiation or Distributive Negotiations**

The most distributive feature is that it operates under a zero sum game, that both parties play game to get bigger slice. The gain made by one party is the loss incurred by the other party. Each party involved in the negotiation decide ultimate gain where the settlement will be made. When one wins and other loses then it is called zero-sum game. The principal behind zero-sum game is that the parties keep secret and don't share information. The target of both parties is to win only and both the parties are less interested in forming a relationship. They are not interested in cooperation and trust with each other.

## **1.9 The Process of Negotiation**

The negotiation must be planned and controlled to achieve the desirable outcome. A well thought-out process can give acceptable agreement. It is highly recommended to follow a structured approach of negotiation in order to achieve a desirable outcome. The negotiation process has five stages. In this process, the involved parties bargain in a systematic way while maintaining each other's interests. The stages of the process of negotiation are (i) Preparation for Negotiation; (ii) Discussion & Clarification of Goals; (iii) Bargaining for Win-Win outcome; (iv) Agreement; and (v) Implementation of a course of action. The details are as follows:

### ➤ **Preparation for Negotiation**

It is important to have some prior research and collect information about when and where a meeting will take place, who will attend the negotiation and what to settle for? This stage involves ensuring and knowing all the important facts of the situation in

order to take your position and viewpoint. In this regard the negotiators must prepare themselves. Here the knowledge of the organisational policies is must which can be required for reference during the negotiation. This preparation will be beneficial to avoid any deadlock during negotiation.

➤ **Discussion & Clarification of Goals**

During this stage, the parties give their viewpoints reasonably and in an amicable environment. They listen carefully, argue carefully, and clarify to each other so that they can reach an agreement in a very cooperative way. The individuals or members of each side put forward the case and try to understand the situation. Each side must have an equal opportunity to present their viewpoint and case. Discussion is helpful in the clarification of all the goals, interests and viewpoints. Clarification is an essential part of the negotiation process as it gives the solution to all the doubts and misunderstandings. All the barriers to reach a beneficial outcome are overcome through it.

➤ **Bargaining for 'Win-Win' Outcome**

The heart of negotiations is in bargaining and the 'win-win' outcome is the expected result from it. It is the adjustment of what is being discussed with the satisfaction of both parties. Both parties must feel that their point of view has been taken into consideration. Suggestions of alternative strategies and compromises need to be considered at this point.

➤ **Agreement**

Agreement is an acceptable solution with an open mind involvement of all the parties. It is achieved once the understandings of both parties' viewpoints and interests have been considered. Any agreement needs to be doubt free so that both parties know what has been decided.

➤ **Implementing a Course of Action**

The final step in the negotiation is the formalization of the agreement that has been worked out. From the agreement, a course of action has to be implemented to carry through the decision.

## **1.10 Skills for Successful Negotiating**

Negotiation requires skills like effective presentation, effective speaking, effective listening, good sense of humour, a positive attitude, high intelligent quotient, emotional control, persistency in behaviour, patience, creativity, decision making etc. A successful negotiation requires the two individuals/parties/groups to come close together to find out an agreement that is acceptable to both. It is very difficult to reach successful agreement without skills. A successful negotiation requires the following skills:

➤ **Problem Analysis**

The problem analysis skills are helpful to identify the real issue, the interest of the parties and the probable or expected outcome of the negotiation. Identification and analysis of the issues are helpful for both parties to find an agreeable solution.

➤ **Active Listening**

It is a very important skill because it is important to listen to the other party to find the scope of compromise during the negotiation. It is valuable to listen to other party instead of spending the bulk of the time in giving your viewpoint. One sided communication can be disaster for negotiation.

➤ **Verbal Communication**

Effective communication skills means to clearly express your own thoughts and ideas in such a way that it is easily followed and understood by others. It is to deliver the intended message clearly. The negotiators must have effective verbal communication skills because both the parties must be able to understand each other during the process of discussion over the issue. There can be misunderstanding of the issues if the parties do not state their cases and desired outcomes clearly. Effective communication plays a fundamental role in any interaction and is essential for the successful negotiations.

➤ **Emotional Control**

Emotional control can play a pivotal role in successful negotiations. The higher the perceived risk-reward ratio in a negotiating process, the greater the chance that emotions will play an important role in the final outcome. It is necessary for the negotiator to control his emotions during the negotiations. Lacking control on the emotions can be disastrous and can lead to a win-lose situation.

➤ **Quick Decision Making**

The parties must have the skill to take quick decision during the negotiation to reach the settlement over contentious or controversial issues.

➤ **Sense of Humour**

A sense of humour and a positive attitude are necessary because they allow for a sense of give and take. The art of giving and taking requires good sense of humour. It requires the ability to see the other side's point of view sensibly while being alert with regard to what you can achieve. Of course you will want as much as you can get – but the other side needs to achieve what they can, too. Good negotiators understand the importance of balance between giving and taking.

## **1.11 Obstacles to Negotiation**

➤ **Limited Knowledge**

Sometimes people fail to negotiate because they do not conduct some prior research and collect information about when and where a meeting will take place, who will attend the negotiation and what to settle for?

➤ **Illogical Presentation**

Sometimes people fail to negotiate because they do not present their viewpoints reasonably. They don't listen carefully, don't argue carefully, and don't clarify to each other which lead to an un-agreeable environment.

➤ **Reasons to Negotiate**

Sometimes people fail to negotiate because they do not recognize the need for bargaining and do not fully understand the process of negotiation.

➤ **Lack of Communication Skills**

Sometimes people fail to negotiate because they lack good negotiating skills.

➤ **Lack of Proper Training**

If the trained people are not involved in negotiations, the process is not likely to succeed.

## **1.12 Summary**

Price is the amount of money paid by the customer or buyer for acquiring a product or service. It refers to a physical product or service for which a buyer is ready to pay. The pricing considers the factors like fixed and variable costs, competition, company objectives, target customers and the capacity to pay by customers etc. For small scale organisation or new venture, the pricing objective can be the survival in the medium to long term or to generate cash flow/liquidity so that the organization can be in a position to stay in business. For old organisations, the pricing objective can be to maximize the long-run profit or short-run profit on a year-by-year basis. For the large scale or big organisations, the pricing objective can be to maximize the market share or increase sales volume or to achieve a specified level of return on investment (ROI). The organisations can have pricing objectives like creating illusions of high product quality or to enhance the image of brand/company/product. They can use price to make the product visible or socially acceptable. The factors influencing pricing are: market demand, cost of raw materials and part, production cost, competition, branding strategy, economic conditions, governments, prices fixed by competitors. Various types of pricing strategies are Skimming Pricing, Penetration Pricing, Bundle Pricing, Product line Pricing, Mark up Pricing, Psychological Pricing, Marginal Cost Pricing, Charging What the Traffic Will Bear Pricing.

Negotiation is a bargaining (give and take) process between two or more parties (each with its own aims, needs, and viewpoints) seeking to discover a common ground and reach an agreement to settle a matter of mutual concern or resolve a conflict. The two basic types of negotiations are namely Win-Win Negotiation or Integrative Negotiation and Zero-Sum Negotiation or Distributive negotiations. The stages of the process of negotiation are Preparation for Negotiation; Discussion & Clarification of Goals; Bargaining for Win-Win outcome; Agreement; and Implementation of a course of action. Negotiation requires skills like effective presentation, effective speaking, effective listening, good sense of humour, a positive attitude, high intelligent quotient, emotional control, persistency in behaviour, patience, creativity, decision making.

### **1.13 Keywords**

#### **Price**

Price is the amount of money paid by the customer or buyer for acquiring a product or service. It refers to a physical product or service for which a buyer is ready to pay.

#### **Pricing**

Pricing is a method adopted by a firm to set its selling price. It usually depends on the firm's average costs, and on the customer's perceived value of the product in comparison to his or her perceived value of the competing products.

#### **Negotiation**

Negotiation is a bargaining (give and take) process between two or more parties (each with its own aims, needs, and viewpoints) seeking to discover a common ground and reach an agreement to settle a matter of mutual concern or resolve a conflict.

### **1.14 Self Assessment Questions**

1. Define pricing. What are its objectives?
2. Enumerate the factors influencing pricing.
3. Elaborate the types of pricing strategies opted by organisations now-a-days.
4. Define the concept of negotiation with suitable examples.
5. Enumerate different types of negotiation.
6. Discuss the process of negotiation.
7. What types of skills are required for Successful Negotiating?
8. How pricing affects the purchasing decisions?
9. What are the limitations of negotiation? How these can be removed?
10. What are the probable obstacles to Negotiation? How these can be overcome?

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>11</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Evaluating Suppliers' Efficiency: Vendor Rating, Selection and Development</b>	

## **Structure**

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Vendor/Supplier Evaluation
- 1.3 Need for Measuring Supplier Performance
- 1.4 Categories of Suppliers
- 1.5 Supplier Evaluation and Selection Process
- 1.6 Vendor Rating
- 1.7 Factors Affecting the Selection of Optimal Suppliers or Vendor Rating
- 1.8 Suppliers Evaluation Methods/ Vendor Rating Methods
- 1.9 Advantages of Vendor/Supplier Rating
- 1.10 Summary
- 1.11 Keywords
- 1.12 Self Assessment Questions
- 1.13 References / Suggested Readings

### **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the basic concept vendor/supplier evaluation and selection, vendor rating.
- Know the need and process of measuring supplier performance.
- Understand the process of supplier evaluation and selection.
- Make you familiar with the factors affecting vendor rating and methods of vendor rating.

## **1.1 Introduction**

Supplier evaluation is a term used in businesses and it refers to the process of evaluating the supplier's potential by quantitative assessment. The evaluation and selection of suppliers is an important task and requires a strategic direction. Every organization especially manufacturing organizations needs to evaluate the suppliers' efficiency. It requires a typical suppliers' evaluation framework which blends with company's basic vision, mission, philosophy, values, and helps in establishing a strategic policy to evaluate the suppliers' efficiency. It includes vendor rating, selection and development. Vendor evaluation is a system for recording and ranking the performance of a supplier. The vendor can be evaluated on the basis of delivery performance, lead time, and the supply of quality of raw materials and parts. The most compelling reason for evaluating the suppliers is that it helps to manage risks. The majority of businesses are dependent on the continuous and smooth flow of supplies and if this flow is interrupted, problems will soon appear. The wrong decision regarding suppliers can have serious consequences. Evaluating suppliers' efficiency also outlines ways and means to reward a supplier and establish long-standing relationships with

suppliers. The increased communication with the supplier helps to understand exactly what the organisation needs and helps to reduce the potential for defect. The evaluation of suppliers' efficiency helps to bring about better co-ordination between the supplier and the organisation. Thus the organisation is able to give the supplier an indication of when extra supplies are required well in advance. The evaluations can act as an incentive for the supplier to implement new procedures or tasks.

“Supplier selection and evaluation is one of the most critical activities in purchasing or procurement process. The evaluation process consists of four stages such as defining objective, formulating the selection criteria, qualifying the suitable alternatives, and final selection. To qualify the prospective suppliers, the effective defining of selection criteria is necessary. Beyond the high significance on the product cost and partners relationship, it has considerable impacts on the buyer's corporate competencies.”  
(Thanaraksakul & Phruksaphanrat, 2009)

The vendor rating is essential for effective purchasing. Usually, the most important measure of a supplier's service is his record of past performance. Vendor rating is the result of a formal vendor evaluation system. Vendors or suppliers are given ranking, status, or title according to their attainment of some level of performance, such as delivery, lead time, quality, price, or some combination of variables. Vendor selection is crucial because of its strategic importance especially when it comes to large buying of raw materials and spare parts especially in the case of large organisations.

## **1.2 Vendor/Supplier Evaluation**

“Supplier evaluation is the assessment of the existing or new suppliers on the basis of their delivery, prices, production capacity, quality of management, technical capabilities and services.” (www.businessdictionary.com)

Evaluating suppliers' efficiency is a regular exercise within purchasing departments. It is a process applied to present suppliers in order to measure and monitor their efficiency. Evaluation of suppliers' efficiency is must for the purpose of reducing cost, reducing business risk, and developing continuous improvement. It is a cordial working cooperation between the supplier and organisation. The evaluation process often includes use of questionnaire tools, interviews and supplier's site visit. A typical suppliers' efficiency evaluation framework must be used where the standard production material is required for quality production. It can be used for both the existing and potential suppliers. It includes evaluation of suppliers' existing production process, capacity, quality, use of technology etc. Existing suppliers get the benefit of expertise in taking corrective action. It also helps companies in rewarding suppliers for their excellent performance and punishing them or de-listing them if found otherwise.

“Most firms navigate nowadays in a fierce competitive environment, characterized by thin profit margins, high consumer expectations for quality products, and short lead-times. These complex conditions have enticed managers to focus on the management of their complete supply chain, from upstream suppliers to the final end-users of their products. More specifically, firms are involved in improving the performance of their supply chains through various strategic and operational tools. One such strategy utilized by companies is to concentrate on their core competencies in the value chain and outsource the other functions. Purchasing managers need periodically to evaluate

supplier performance in order to retain those suppliers who meet their requirements in terms of several performance criteria.” (Saen, 2008)

### **1.3 Need for Measuring Supplier Performance**

There are various benefits associated with an evaluating suppliers’ efficiency. It is helpful in identifying poor supplier performance in terms of failure to deliver quality products consistently. This process is helpful to motivate the suppliers to further improve their performances. It is helpful them in developing a robust and effective system. It gives continuous feedback to suppliers about their actual performance and monitor them to improve consistently. “Supplier performance has to be measured for the following reasons:

- It is helpful to increase performance visibility.
- It uncovers and removes hidden waste and cost drivers in the supply chain.
- It leverages the supply base.
- It aligns customer and supplier business practices.
- It mitigates risk.
- It improves supplier performance.” (Elanchezhian, Ramnath, & Kesavan, 2010)

### **1.4 Categories of Suppliers**

There are many types of suppliers like wholesale suppliers, strategic suppliers, preferred suppliers, transactional suppliers, franchisers, registered suppliers, panel suppliers etc. The explanation is as follows:

- **Wholesale Suppliers**

These suppliers are companies that take order in bulk. These supplier companies manufactures in high quantity and fulfil the orders themselves.

➤ **Strategic Suppliers**

Strategic suppliers are those that are strategically important for the buying organisations. They supply the buying firm with important materials/parts and their manufacturing capabilities cannot be easily replaced. The buyer organisations develop good coordination with such firms and have good communications for long term relationships

➤ **Preferred Suppliers**

Preferred suppliers are those that are important to the buying organisations. There may be large number of suppliers available in the market for the same materials or parts. Hence, these types of suppliers can be searched in the market with less effort. However, the selection of such suppliers is very important.

➤ **Transactional Suppliers**

The dependency of the buyer organisation on this type of suppliers is very less. These suppliers can be easily replaced in a short time.

➤ **Franchisers**

These types of suppliers have developed their own network in the wide spectrum of the geography so that they can be approached easily. They work with their own trademarks, brands and business systems.

➤ **Registered Suppliers**

The registered suppliers are those suppliers who are registered in the buying organisations and have shown interest in supplying specific types of materials, parts,

goods or services. A proper list about the active suppliers is found in the buyer organisations that are ready to meet deadlines for responses.

➤ **Panel Suppliers**

These types of suppliers are pre-approved by an agency and who have agreed to the terms and conditions for supply.

## **1.5 Supplier Evaluation and Selection Process**

This process covers evaluating and analysing the suppliers' performance and seeks suppliers who support or meet buyers' strategic goals while continually looking for ways to manage cost, quality and other evaluation parameters. The supplier evolution and selection process consists of steps like indentifying the need of the supplier evaluation, identifying criteria for supplier evaluation, determine sourcing strategy, determine method of supplier evaluation and selection and select supplier and reach agreement.

➤ **Identifying the Need of Supplier Evaluation**

At this stage, the buyer organisations identify a need to evaluate and select a supplier. The supplier evaluation may be requested by purchase officers, production manager, quality manager or design managers.

➤ **Identifying Criteria for Supplier Evaluation**

At this stage the criteria for supplier evaluation is fixed. It can be on-time delivery/delivery commitments, quality of raw materials/parts, technical performance, production capabilities, design verification, evaluation of product samples, innovation

and management expertise, meeting specific requirements/standards, suppliers' financial viability, customer service, reliability and responsiveness, records of past achievement etc. These are the parameters on which the evaluation of the supplier(s) is decided.

➤ **Determine Sourcing Strategy**

The sourcing will differ from requirement to requirement of the buyer organisations. It can be like dependency on single supplier or multiple suppliers, short-term or long-term contracts and domestic suppliers or foreign supplier. According to sourcing strategy, the supplier(s) are identified. Various internal as well as external sources of information are used to identify the supplier(s). The buyer organisation may get a long list of suppliers. The list must be narrowed down on the basis of some criteria like financial risk analysis evaluation of previous performance of the suppliers, evaluation of information provided by suppliers etc.

➤ **Determine Method of Supplier Evaluation and Selection**

After reducing the number of suppliers, the method is to be determined regarding suppliers' evaluation and selection. The evaluation process often includes use of questionnaire tools, interviews and supplier's site visit. The possible areas to evaluate during a supplier visit are workforce capability, production capability, quality parameters, supplier agility and flexibility, supplier's supply chain management capabilities, production scheduling and control systems, statistical quality control methods etc.

➤ **Select Supplier and Reach Agreement**

In the last stage, the supplier(s) is finalised and negotiated for certain stipulated terms and conditions.

## **1.6 Vendor Rating**

A vendor is any person or company that supplies raw materials/parts, goods or services to the buyer organisations. The effectiveness of the purchasing department is judged by the quality and reliability of its suppliers. Good suppliers need to be cultivated to meet current and future demand of the buyer organisations. The buyer organisations want to work with the suppliers that give them value. Therefore, the suppliers' performance matters a lot. Vendors or suppliers are rated on the basis of their performance, consistency in delivery, lead time, quality products and services, price or some combination of these variables. Rating evaluation is done on a periodic basis and it may take the form of a hierarchical ranking from poor to excellent.

### **Objectives of Vendor Rating**

Assessment of vendor's performance on certain criteria is called vendor rating. Vendor rating is the result of a formal vendor evaluation system. It can be used to "assess and monitor supplier performance, provide accurate feedback to suppliers, provide benchmark data, improve overall competitiveness in the market, minimize subjectivity in judgment, make it possible to consider all relevant criteria in assessing suppliers, providing feedback from all areas in one package, establishing continuous review standards for vendors, and select vendors for further development." (John, Baby, & Mangalathu, 2013)

The key objectives of vendor rating are as under:

➤ **Selection of Right Suppliers**

It helps the buyer organisations in the selection of right suppliers.

➤ **Rating Assessment of Suppliers**

It rates the entire performance of the suppliers and gives a clear-cut vision about the quality, cost, reliability of the products and services to be provided by the suppliers.

➤ **Negotiation with Suppliers**

It provides buyer organisations with the information helpful in subsequent negotiation with suppliers.

➤ **Proper Feedback**

It gives a feedback to suppliers to further improve their performances.

➤ **Useful Information**

It provides the buyer organisations with the important information which is helpful in the development of the suppliers.

➤ **Reward**

It recognizes and rewards outstanding suppliers.

➤ **Standardised Practices**

It generates suppliers' standard practices.

### **1.7 Factors Affecting the Selection of Optimal Suppliers or Vendor Rating**

Most buyer organisations want all the suppliers to provide supply of quality raw materials/parts, defect -free goods and services and deliver them when required. To fulfil these objectives the buyers need right suppliers and to identify right supplier it is required that to evaluate them from time to time so that their performance can be certified. There are many factors like quality, cost, delivery, service, consistency,

reliability, technically upgraded, quality factors etc. on which suppliers' performance is usually evaluated. A more comprehensive approach covers 7 C's (Competency, Capacity, Commitment, Control, Cash Resources, Cost, and Consistency) which are need to be measured to evaluate the suppliers' performance. "From research, it was found that quality, delivery and cost are the most considered criteria with percentages over 90. Quality, delivery, cost, production facility and capability, technical capability and support, and financial criteria are significant basic criteria generally used for last forty years." (Thanaraksakul & Phruksaphanrat, 2009)

## **1.8 Suppliers Evaluation Methods/ Vendor Rating Methods**

The buyer organisations know the importance of evaluating the suppliers. It is important to evaluate each supplier before signing an agreement or orders. The improper vendor evaluation and selection process lead to production loss and raw materials/parts rejection. Therefore, the buyer organisation requires an appropriate suppliers evaluation method or vendor rating method. There are three key methods of vendor rating methods: categorical method, weighted score method and cost-ratio method.

### **➤ Categorical Method**

Categorical method is a very easy method. The buyer organisation prepares the lists of relevant performance variables or factors according to their experience. Then the buyers assign performance ratings of each variable in categorical terms, like 'very good', 'good', 'neutral', 'very poor' and 'poor'. Each supplier is evaluated against each factor on the basis of performance ratings. The supplier who obtains highest score will then be

the best performer. The main advantages of this method are that it is very easy to implement, requires minimal data and low cost.

➤ **Weighted-Score method**

Weighted-point method is the most frequently used method for evaluation process. In this method, different weights are given to different variables according to the importance level. The most important variables get maximum weights and least important variables get least weights. The evaluator assigns the score to each supplier performance in each attribute and then the score will be multiplied by the assigned weight of each variable accordingly. Finally, the weighted score is totalled to find out the final performance rating of each supplier. The supplier who obtains highest score is the best performer. The main advantage of this method is that the weights are given according to the importance of variables/factors. It is very suitable as the importance of different variables is different in different industries.

➤ **Cost – Ratio Method**

In this method, the supplier rating is done on the basis of various costs incurred for procuring the materials/parts from various suppliers. The cost ratios are calculated for different factors such as quality, price, timely delivery, etc. the cost ratio is calculated in percentages on the basis of total individual costs and total value of purchases. As for example, the total delivery cost is Rs. 10,000 and the total purchase is of Rs. 1,00,000 then the delivery cost ratio will be  $(10,000/1,00,000) \times 100 = 10$  per cent. “The supplier with the lowest net adjusted cost would be the best preferred supplier. However, this approach is complicated and requires a comprehensive accounting system to identify

the accurate cost data. Hence, it is usually used only in the big-sized companies.”  
(Humphreys et al., 1998).

## **1.9 Advantages of Vendor/Supplier Rating**

There are many advantages of vendor rating as follows:

➤ **Comparison of Suppliers**

The key advantage of vendor rating is that it is helpful in identification of best suppliers. The best suppliers give best results in terms of right quality, right quantity, right time delivery, at right cost.

➤ **Performance of Suppliers/Vendors**

It gives clear-cut picture about the performance of the suppliers.

➤ **Feedback about Suppliers**

It provides feedback regarding the suppliers about all areas in one package to the manufacturer.

➤ **Feedback to the Suppliers**

It gives feedback to the suppliers about specific action(s) to correct their identified performance weaknesses.

➤ **Better Communication**

It facilitates better communication with vendors which generates cordial relationships. It helps building supplier partnerships.

➤ **Control**

It provides overall control of the supplier base.

➤ **Revision/Review**

It establishes continuous review standards for vendors, thus ensuring continuous improvement of vendor performance.

## **1.10 Summary**

A vendor is any person or company that supplies raw materials/parts, goods or services to the buyer organisations. Vendors or suppliers are rated on the basis of their performance, consistency in delivery, lead time, quality products and services, price or some combination of these variables. Rating evaluation is done on a periodic basis and it may take the form of a hierarchical ranking from poor to excellent. There are three key methods of vendor rating methods: categorical method, weighted score method and cost-ratio method.

Vendor evaluation is a system for recording and ranking the performance of a supplier. The vendor can be evaluated on the basis of delivery performance, lead time, and the supply of quality of raw materials and parts. Evaluation of suppliers' efficiency is must for the purpose of reducing cost, reducing business risk, and developing continuous improvement. It is a cordial working cooperation between the supplier and organisation. The evaluation process often includes use of questionnaire tools, interviews and supplier's site visit. There are many types of suppliers like wholesale suppliers, strategic suppliers, preferred suppliers, transactional suppliers, franchisers, registered suppliers, panel suppliers etc. The supplier evolution and selection process consists of steps like indentifying the need of the supplier evaluation, identifying criteria for supplier evaluation, determine sourcing strategy, determine method of supplier evaluation and selection and select supplier and reach agreement.

## **1.11 Keywords**

### **Supplier Evaluation**

Supplier evaluation is the assessment of the existing or new suppliers on the basis of their delivery, prices, production capacity, quality of management, technical capabilities and services.

### **Vendor Rating**

A vendor is any person or company that supplies raw materials/parts, goods or services to the buyer organisations. Vendor is rated on the basis of their performance, consistency in delivery, lead time, quality products and services, price or some combination of these variables. It is done on a periodic basis and it may take the form of a hierarchical ranking from poor to excellent.

## **1.12 Self Assessment Questions**

1. What do you mean by vendor/supplier evaluation? What is the need for measuring supplier performance?
2. Enumerate the categories of suppliers.
3. What are the steps of supplier evaluation and selection process? Explain.
4. Define vendor rating. How it is useful in purchasing decisions?
5. Elaborate the factors affecting the selection of optimal suppliers or Vendor Rating.
6. Enumerate the supplier evaluation methods or vendor rating methods.
7. Discuss the advantages of vendor/supplier rating.

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<b>Subject: Purchasing and Materials Management</b>	
Course Code: <b>POM-325</b>	Author: <b>Dr. Vijender Pal Saini</b>
Lesson No.: <b>12</b>	Vetter: <b>Dr. Sanjay Tiwari</b>
<b>Legal Aspects of Purchasing: Public Purchasing and Tendering &amp; International Purchasing</b>	

## **Structure**

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- 1.1 Legal Aspect of Purchasing Management: An Introduction
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- 1.3 Law of Agency
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## **1.0 Objectives**

After going through this lesson, you will be able to:

- Understand the basic concept of legal aspect of Purchasing Management, Public Purchasing, Tendering and International Purchasing.
- Know the fundamental principles of Public Buying.
- Understand the process of Procurement and Tendering.
- Make you familiar with the concept of modes of tendering and rationale behind international buying.

### **1.1 Legal Aspect of Purchasing Management: An Introduction**

Every institutional purchase is done through a structured legal process. Legal aspects are to be considered while taking a purchasing decision by the purchase agent or purchase manager. The purchasing manager is an agent for the firm. He/she administers the purchasing function so he is responsible for all types of purchase of raw materials/parts, goods and services. He is the actual buyer or purchasing agent on the behalf of the organisation. Generally the authorities are delegated to purchasing staff by

the management for purchasing. It means that the purchasing staffs are responsible for routine purchases. The other responsibilities of the purchasing managers are defined by the organisation policy. The policy generally depends on the nature of the goods purchased, technology of the products, levels of available expertise, levels of involvement of expertise required, the degree of autonomy, centralisation of the purchasing function, etc. the purchasing policy must be in written form and clearly communicated to all the purchasing managers. There is no doubt from any side regarding any article or point of the policy. The most important task of the purchasing officer is the representation of the organisation in development and negotiation of contracts with third parties. He/she accepts the terms and conditions of all the purchasing of the contract on the behalf of the organisation. From legal point of view, the title purchasing agent is used for purchasing manager. Practically purchasing agent and purchasing manager terms are same. The purchasing executives are required to understand all the types of commitment, pre-set financial limits, technicalities, sections, guidelines, terms and conditions for which they are permitted to enter into a contract for public procurement. It is a daily routine to sign purchase orders and contracts committing the organisation to the specific terms and conditions of purchase orders and contracts. The purchasing executives must have the knowledge of the legal issues that are likely to arise routinely as part of their jobs, especially Law of Contract, Law of Agency, Law of Sale of Goods Act 1930, Companies act, Taxation Laws, Central Sales Tax 1956 etc. In particular, the purchase manager must know how and when the company may be legally bound and how contracts may be carried out or varied or terminated. Let us discuss how these laws are beneficial for purchase executives/managers.

## **1.2 Provisions of The Indian Contract Act, 1872 Regarding Purchasing**

The Indian Contract Act, 1872 is the main source of laws dealing with all types of contracts in India except Jammu & Kashmir. It determines the guidelines through various sections in which promises made by the parties in a contract will be legally binding on them. The purchasing manager enters into a number of contracts everyday on the behalf of the organisation. By default each contract covers some rights and duties of the contracting parties. The various provisions of the Indian Contract Act deal with the enforcement of these rights and duties on the parties.

The Act has 266 Sections and has wide scope. It has two parts. Part one covers the General Principles of Law of Contract (Sections 1 to 75). Part two covers special contracts like Indemnity, Guarantee, Bailment & Pledge from Sections 124 to 238. The contracts relating to Partnership are covered in Sections 239 to 266.

Section 2 covers various definitions like what is Offer/Proposal, Promise, Acceptance, Promisor and Promise, Consideration, Agreement (Section 2(e)), Contract (Section 2(h)), Valid Agreement, Void Contract, Voidable Contract etc. The Contact Act 1872 gives knowledge about the various types of contacts to the purchase manager. The types are based on creation, validity, execution and liability.

This law clearly explains about what is Offer (Section 2(a)), the essential elements of an offer, legal rules of valid offer, differentiate between offer and invitation to offer, lapse of an offer, kinds of offer like express offer, implied offer, specific offer, general offer, cross offer, counter offer, standing open and continuous offer etc. Section 2(b) gives an idea about what is Acceptance, the legal rules of Acceptance, general rules as to

communication of Acceptance. Capacity to Contract gives detail about the parties which cannot enter into contract like minor, unsound mind (lunatic, idiot, drunken and intoxicated) and person disqualified by law (alien enemy, foreign sovereign, convict, insolvent). Section 2(g) gives detail about Void Agreement.

The laws related to Fraud, Wagering Agreement, Illegal Agreement, Contingent Contract, Performance of Contract, Types of Tender, Discharge of Contract, Remedies for the Breach of Contract, Quasi Contract etc are exclusively covered in the act. The knowledge of this act is must for any purchase manager.

### **1.3 Law of Agency and Purchasing**

Law of Agency is exclusively covered in Section 182 in The Indian Contract Act, 1872. The law of agency is an area of commercial law that deals with a set of contractual relationships that involves between agent and principal. “As per the law, an ‘agent’ is a person employed to do any act for another, or to represent another in dealings with third person. The person for whom such act is done, or who is so represented, is called the ‘principal’.” (<https://indiankanoon.org>)

The Law of Agency regulates the relationships between: agents and principals called as the principal-agent relationship. The rights and liabilities between a principal and an agent are clearly defined in this law. Under this law, the principal authorizes the agent to work under his or her control and on his or her behalf. Thus, the agent works and negotiates on behalf of the principal or brings him or her and third parties into contractual relationship. The agent performs the duty to undertake the task or tasks

specified by the terms of the agency and discharge his duties with care and due diligence.

This law further explains the broad classes of agent, three kinds of authority (actual authority (whether express or implied), apparent authority, and ratified authority) duties of the agents, termination of agent-agency relationships etc. This type of knowledge is must for the purchasing executives.

#### **1.4 Provisions of Law of Sale of Goods Act, 1930 related to Purchasing**

In 1930, the Sections from 76 to 123 of the Contract Act, 1872 were repealed and a separate act named The Law of Goods Act was formed. According to this Act, contract of sale of goods is contract whereby the seller transfer or agrees to transfer the property in goods to the buyer for a price.

Further, this Act gives distinction between sale and agreement to sell, conditions and warranties, when condition to be treated as warranty, rules to delivery of goods, rights of an unpaid seller, distinction between right of lien and right of stoppage in transit, auction sales etc.

#### **1.5 Provisions of Law of Carriage of Goods related to Purchasing**

In business, there is a need for carrying goods from one place to another within country or may be outside the country or from one country to another country. The Law of Carriage of Goods is framed for these purposes. Under this act, a contract of carriage is to be entered into. The persons, organisations or associations which carry goods are known as carriers. There are three types of transportation modes: by land, sea or air.

Accordingly, the law relating to carrying of goods is contained in the following enactments:

- **In case of carriage of goods by land:** The Carriers Act, 1865, The Railways Act, 1989.
- **In case of carriage of goods by sea:** The (Indian) Bills of Lading Act, 1856, The Carriage of Goods by Sea Act, 1925, The Merchant Shipping Act, 1958, The Marine Insurance Act, 1963.
- **In the case of carriage of goods by air:** The Carriage by Air Act, 1972.

Further this law gives knowledge about the Contract of Carriage, Classification of Carriers, distinction between a Common Carrier and a Private Carrier, carriage of goods by land, rights of a common carrier, duties of a common carrier, liabilities of a common carrier, carriage of goods by rail, responsibility of a railway administration as a carrier of goods etc. (<http://www.iimm.org>)

Besides the law mentioned above, the purchasing department must have applied knowledge about the following laws: Income Tax Act, Direct Taxes, Indirect Taxes, Service Tax, Property Tax, Duties of Customs including Export Duties, Central Sales Tax Act, Corporation Tax, Taxes on capital value of assets, exclusive of agricultural land, of individuals and companies, taxes on capital of companies, Estate Duty, Taxes on agricultural income, Taxes on luxuries, including taxes on entertainments, amusements, betting and gambling, Stamp duty, etc. Now, the GST Bill, 2016 has been passed by the parliament and some states. The purchasing decision will set drastic changes with the passage and implementation of GST bill in future.

## **1.6 Public Purchasing or Procurement**

Public purchasing is also called Government Purchasing or Government Procurement. Public purchasing can be defined as the procurement of raw materials, parts, goods, services, works, projects, construction etc. by the Government departments, agencies, statutory corporations (e.g. STC, MMTC), public sector undertakings (e.g. HPCL, BPCL, Indian Coal, Indian Oil), municipalities in the centre and all the states governments within stipulated terms and conditions. It amounts to a great share of the public sector's overall budget.

Public purchasing is subject to special rules in order to secure that goods and services acquired at competitive prices in a transparent and fair way. It usually requires the procuring authority (purchasing executives) to float public tenders if the value of the procurement exceeds certain fixed limit. Public procurement is efficient if it provides value for money, good quality and timely delivery of product/services/works in a transparent, accountable and fair manner. The public procurement system depends upon the procurement laws, rules & regulations, instructions, procurement processes & methods, the organizational structure and the purchasing employees/managers. The Government of India has issued various manuals on policies and procedures for the purchase of goods/services, procurement of works, employment of consultants, tendering, etc. Major ministries including Defence, Railways, Public Works, Telecommunication and Central Purchase Organization (Directorate General of Supplies and Disposals) have also released particular instructions regarding procurement practices in their sectors.

“When comparing public and private sector procurement it appears that the demands on public procurement are greater and more highly varied than those on private sector procurement. Still, many of the items and services bought and produced in the public sector could be delivered by the private sector, although conditions for the two sectors differ substantially with regard to regulations and transparency.” (Arlbjorn & Freytag, 2012).

## **1.7 Procurement Process**

The procurement process refers to the steps followed by government departments to purchase goods or services from suppliers/contractors/service providers/bidders. When the value of procuring goods or service is above the fixed limit of the purchasing officers, the requirement of a competitive bidding process is generated. The government department is required to follow certain rules, regulations and guidelines designed to ensure that the goods or services are genuinely purchased from a quality and genuine suppliers/contractors/service providers/bidders within a time frame with transparent and fair process. The general stages of this process are:

### **➤ Pre-tendering**

At this stage, first of all the requirements of the goods or services are assessed then the time frame, mode of tendering and the budget for tender are considered. The guidelines for the tendering are typically considered and followed at this stage.

### **➤ Tendering**

It is a very important stage of tender process. At this stage, the tenders are invited from the competent suppliers/contractors/service providers/bidders. Tenders may be technical bids or financial bids. The sealed tenders are opened at public place following a transparent process. The bids are evaluated and awarded to the lowest supplier/contractor/service provider/bidder who is going to fulfil all terms and conditions.

➤ **Post-award**

At this stage the goods or services are received as per the order or tender. The samples are taken and checked physically and technically. After getting the quality goods or services, the process of payment is started.

## **1.8 Fundamental Principles of Public Buying**

Indian government has given various guidelines which are found in the General Financial Rules, 2005 (GFR) and Delegation of Financial Powers Rules (DFPR). The very fundamental principle of government purchasing is Rule 137, GFR 2005 which states that, “Every authority delegated with the financial powers of procuring goods in public interest shall have the responsibility and accountability to bring efficiency, economy, and transparency in matters relating to public procurement and for fair and equitable treatment of suppliers and promotion of competition in public procurement.”

The procedure to be followed in making public procurement must conform to the following fundamental principles:

➤ **Transparency**

The tenders should be invited following a fair, transparent and reasonable procedure. Contracting authorities shall treat all the suppliers/contractors/service provider/ bidders equally and without discrimination. They must act in a transparent and fair manner;

➤ **Specifications**

The specifications in terms of quality, quantity, colour, technology, size, shape, design, type etc. regarding the goods/services to be procured must be clearly spelt out keeping in view the specific needs of the procuring organizations;

➤ **Competition**

The healthy environment for competition must be generated among suppliers/contractors/service provider/ bidders; and

➤ **Legal Procedures / Guidelines**

The procuring authority must be satisfied that all the guidelines of the manual are strictly followed in all respects.

## **1.9 Tendering: An Introduction**

Tendering refers to the process whereby the governments invite bids for goods, services, works, various projects that must be submitted within a finite deadline. It is the most important method to manage the qualified suppliers and ensuring a consistent as well as desired quality supply. Such suppliers make a direct contribution to the firm's success. To begin this process, an organisation issues a procurement notice in newspapers, official government publications and over the internet for purchasing goods or services. The tenders are generally widely advertised to offer opportunities to

a number of suppliers and to encourage healthy competition. It provides a greater pool of offers to select from.

“Tendering is the process of making an offer, bid or proposal or expressing interest in response to an invitation or request for tender. Tendering is the purchasing procedure whereby potential suppliers are invited to make a firm and unequivocal offer of the price and terms which an acceptance shall be the basis of the subsequent contract.”  
(Okello & Richu , 2016)

## **1.10 Terminologies used in Tendering**

Tendering is one of the most important methods of managing supply and to ensure that the best as well as qualified suppliers are selected and to sure that they perform consistently at the designed levels. The terminologies used in tendering are as follows:

➤ **RFT/RFP**

It means ‘Request for Tender’ / ‘Request for Proposal’. It is an invitation to submit a tender to enter into the contract with the principal. These documents outline the particular requirements, criteria, and instructions that are to be followed by the tenderer.

➤ **Tender**

It is a document submitted by a tenderer in response to RFT/RFP.

➤ **Tenderer**

Tenderer is a person/organisation who has been invited to submit a tender in response to RFT/RFP.

## **1.11 Tendering Process**

Tendering is a public purchasing procedure whereby potential suppliers (who are agreed on the terms, conditions, rules, regulations and price) are invited to make a firm and unequivocal offer on the price and terms in which they will supply specified goods, services or works which on acceptance shall be the basis of a subsequent contract. Tendering process consists of the following stages: Prequalification; Invitation to Tenders; Submission and Receipt of Tenders; Opening and Changes to Tender; Evaluation of Tenders; Award of Contract; Notification of Contract Award; Debriefing; Post-Tender Negotiation; and Contracts.

## **1.12 e – Tendering**

e – Tendering is the carrying out of the tendering cycle/process using electronic means such as internet. It is also called online tendering. It is done through websites and through special e – tendering software applications. It is very helpful in saving time.

## **1.13 Modes of Tendering**

Broadly, there are three modes of tendering: Open Tendering; Limited/Selective Tendering; and Single/Restricted Tendering. Maximum government departments go for open tendering. Depending on the nature of the required goods, the quantity & value involved and the period of supply, the purchase committee (PC)/technical & purchase committee (T&PC) can adopt limited/selective or single/restricted tendering with the approval from concerned higher authorities.

### **➤ Open Tendering**

In open tendering, all the interested suppliers/contractors/service providers/bidders are invited and free to submit their tenders as per the terms and conditions.

➤ **Limited/Selective Tendering**

In limited/selective type of tendering, only the relevant approved lists of suppliers /contractors/service providers/bidders are invited to submit tenders. The respective government departments may establish lists of qualified suppliers /contractors/service providers/bidders for particular services or articles. This type of lists is developed in those departments where there is a frequent need to invite tenders for goods, services, works or articles.

➤ **Single or Restricted Tendering**

In single/restricted type tendering the tenders are invited from only one or a very limited number of suppliers /contractors/service providers/bidders. Single or restricted tender procedures shall only be used in circumstances when open competitive tendering would not be an effective means of procurement of goods/service/works/projects.

## **1.14 Time Frame for Tendering**

Every tender is time bound tender so a fixed time frame is given to the suppliers /contractors/service providers/bidders. The time frame is allowed to the suppliers /contractors/service providers so that they can quote their best possible price. In case of urgency or adequate availability of sources, the time period can be reduced with proper justification and acceptance from authorities. However, it should be ensured that adequate competition exists and fair chances are given to all the interested suppliers

/contractors/service providers/bidders to enable them submit their offers in time. Generally, the time frame can be two-three weeks for limited/selective tenders; three weeks for open tenders; and four weeks for global tenders.

## **1.15 International Purchasing**

In the time of globalisation, the companies have businesses in many countries. The multinational companies (MNCs) have business transactions in many countries. The MNC's acquire valuable resources like man, material, machine, money from all over the world from where they are cheaper. In this scenario, the purchasing or procurement from international market takes important role. In today's global economy, the company can get advantage when the supply base is competitive on a worldwide basis. Successful companies do not limit their sourcing horizons to national boundaries but seek to find, establish and develop sound working relationships with the best suppliers/contractors/bidders all over the world. International purchasing can be a good strategy to beat the competition as the companies are able to procure the raw materials, parts, goods, services at lower cost from markets abroad. It will lowers down the cost of production ultimately. International purchasing cannot be considered a stand-alone process. It must be integrated with the overall purchasing strategies of the company. The purchasing from international market must be aligned with the corporate policy.

“Global sourcing, which differs from international buying in scope and complexity, involves proactively integrating and coordinating common items and materials, processes, designs, technologies, and suppliers across worldwide purchasing, engineering, and operating locations.” (Trent & Monczka, 2003)

## **1.16 Rationale behind Purchasing Internationally**

### **➤ Increasing global Practices**

Globalisation is the main reason because of which the business environment is changing in a very fast way. Now, the organisations can buy and sell anywhere in the world. The whole world is like a village. Moreover, all the restrictions, duties of trade are very relaxed for the members of the World Trade Organisation (WTO) and the trade among the countries is free and fair. So, in such scenario the importance of purchasing internationally has become very high.

### **➤ Emergence of Internal/IT/Social Media**

The evolution of internet has contributed in international purchasing. Now, the tenders can be floated and invited globally through online.

### **➤ Accessibility of Natural Resources**

Some countries are rich in natural resources and they are providing natural resources of better quality with better deliveries at lower prices. The companies are ready and cashing this phenomenon.

### **➤ Domestic Production and Supply**

Insufficient domestic capacity is also the reason for purchasing internationally.

## **1.17 Summary**

While making an institutional/organisational purchase, a set of legal formalities are required. The purchasing executives are required to understand all the types of commitment, pre-set financial limits, sections, guidelines, terms and conditions for

which they are permitted to enter into a contract for public procurement. It is a daily routine to sign purchase orders and contracts committing the organisation to the specific terms and conditions of purchase orders and contracts. The purchasing executives must have the knowledge of the legal issues that are likely to arise routinely as part of their jobs, especially, Law of Contract, Law of Agency, Law of Sale of Goods Act 1930, Companies act, Taxation Laws, Central Sales Tax 1956 etc. In particular, the purchase manager must know how and when the company may be legally bound and how contracts may be carried out or varied or terminated.

Public purchasing is also called Government Purchasing or Government Procurement. Public purchasing can be defined as the procurement of raw materials, parts, goods, services, works, projects, construction etc. by the Government agencies of the centre and all the states within stipulated terms and conditions. It amounts to a great share of the public sector's overall budget. The general stages of procurement process are: Pre-tendering, Tendering and Post-award. Indian government has given various guidelines for procurement which are found in the General Financial Rules, 2005 (GFR) and Delegation of Financial Powers Rules (DFPR).

Tendering refers to the process whereby the governments invite bids for goods, services, works, various projects that must be submitted within a finite deadline. To begin this process, an organisation issues a procurement notice in newspapers, official government publications and over the internet for purchasing goods or services. The terminologies used in tendering are: RFT/RFP, Tender and Tenderer. e – Tendering is the carrying out of the tendering cycle/process using electronic means such as internet. It is also called online tendering. Broadly, there are three modes of tendering: Open

Tendering; Limited/Selective Tendering; and Single/Restricted Tendering. Generally, the time frame can be two-three weeks for limited/selective tenders; three weeks for open tenders; and four weeks for global tenders.

In today's global economy, the company can get advantage when the supply base is competitive on a worldwide basis. International purchasing can be a good strategy to beat the competition as the companies are able to procure the raw materials, parts, goods, services at lower cost from markets abroad. It will lower down the cost of production ultimately. International purchasing cannot be considered a stand-alone process. It must be integrated with the overall purchasing strategies of the company. The purchasing from international market must be aligned with the corporate policy. Some countries are rich in natural resources and they are providing natural resources of better quality with better deliveries at lower prices. The companies are ready and cashing this phenomenon. Insufficient domestic capacity is also the reason for purchasing internationally.

## **1.18 Keywords**

### **Agent**

An 'agent' in Contract Act (purchasing manager) is a person who is authorized to act on behalf of another called the 'principal' (organisation) to create a legal relationship with a third party.

### **Tendering**

Tendering refers to the process whereby the governments invite bids for various projects that must be submitted within a finite deadline.

## **Public Purchasing**

Public purchasing is the acquisition of goods, works, and services by public institutions of centre and states. It encompasses ministries, departments, agencies, statutory corporations, public sector undertakings and municipalities at all levels of government.

### **1.19 Self Assessment Questions**

1. What is the legal aspect of purchasing management? Illustrate.
2. 'The purchasing manager must have the knowledge of the legal issues that are likely to arise routinely as part of their jobs.' Examine the statement critically.
3. What do you mean by public purchasing? Explain.
4. Elaborate the process of public procurement.
5. Enumerate the fundamental principles of public buying.
6. Give brief introduction of tendering and technical terms used in tendering.
7. Elaborate the tendering process and differentiate between tendering and e-tendering.
8. What are the modes/types of tendering? Differentiate them.
9. Discuss the concept of international purchasing. What is the rationale behind it? Why should the companies go for it?
10. Explain various provisions of Indian Contract Act, 1872 related to purchasing.

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.....**The End**.....