
UNIT – 1 MATERIALS MANAGEMENT – AN OVERVIEW

Structure

- 1.1 Introduction
 - Objective
- 1.2 Materials management – definition and meaning
- 1.3 Roles in materials management
- 1.4 Significance of materials management
- 1.5 Objectives of materials management
 - 1.5.1 Primary objectives
 - 1.5.2 Secondary objectives:
- 1.6 Issues in materials management
- 1.7 Functions of materials management
- 1.8 Scope of materials management
- 1.9 Integrated materials management
- 1.10 Keywords
- 1.11 Summary
- 1.12 Further Readings

1.1 INTRODUCTION

Materials management is a core supply chain function that runs through supply chain planning and supply chain execution capabilities. It includes all the functions with reference to the material sourcing, stocking, serving, safeguarding and sending.

Objective

After going through this unit you should be able to

- Describe the goals and objective of inventory
- Understand the functions and responsibilities of materials management
- Describe the significance and advantages of stocking
- Integrate the materials management activities with other departments or the relevant functional areas
- Coordinating and correlating the functions of integrated materials management with other areas

1.2 MATERIALS MANAGEMENT – DEFINITION AND MEANING

Specifically, materials management is the capability plan of total material requirements communicated to procurement and other functions for sourcing. It is also responsible for determining the amount of material to be deployed at each stocking location across the supply chain, establishing material replenishment plans, determining inventory levels to hold for each type of inventory (raw material, WIP, finished goods), and communicating information regarding material needs throughout the extended supply chain. In addition, the materials department is also charged with the responsibility of managing new launches.

Materials management is defined as “*the function responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling materials in an*”

optimum manner so as to provide a predetermined service to the customer at a minimum cost”.

As per De Rose all those functions which start with the procurement of materials and end with completion of manufacturing are a part of material management. In his words, “Material management is the planning, directing, controlling and co-ordination of all those activities concerned with material and inventory requirements, from the point of their inception to their introduction into manufacturing process.”

From the above definitions, it is clear that the scope of materials management is vast. Therefore, it covers several areas, each of which requires a special attention and specific functional roles to play.

1.3. ROLES IN MATERIALS MANAGEMENT

Typical roles of in the top brass of materials management include

- Materials Manager,
- Purchase Manager
- Inventory Control Manager,
- Inventory Analyst,
- Stores Manager
- Material Planner
- Expediter
- Auditor
- Emerging hybrid roles like "buyer planner".

A good materials manager finds his success if he emphasizes on the co-ordination of all those activities which are related to the efficient use of materials. In this context, the materials management can be defined through the following lines.

“Material management is the integrated functioning of the various sections of an organization dealing with the supply of materials and allied activities in order to achieve maximum co-ordination.”

1.4 SIGNIFICANCE OF MATERIALS MANAGEMENT

Strictly speaking, Material management is a service function. It is as important as manufacturing, engineering and finance. The supply of proper quality of materials is essential for manufacturing standard products. The avoidance of material wastage helps in controlling cost of production. Material management is essential for every type of concern.

The need for materials management was first felt in manufacturing undertakings. The servicing organizations also started feeling the need for this control. And now even non-trading organizations like hospitals, universities etc. have realized the importance of materials management. Every organization uses a number of materials. It is necessary that these materials are properly purchased, stored and used.

The importance of material management may be summarized as follows:

1. The material cost content of total cost is kept at a reasonable level.
2. Scientific purchasing helps in acquiring materials at reasonable prices.
3. Proper storing of materials also helps in reducing their wastages. These factors help in controlling cost content of products.

4. The cost of indirect materials is kept under check.
5. Sometimes cost of indirect materials also increases total cost of production because there is no proper control over such materials.
6. The equipment is properly utilized because there are no break downs due to late supply of materials.
7. The loss of direct labour is avoided.
8. The wastages of materials at the stage of storage as well as their movement is kept under control.
9. The supply of materials is prompt and late delivery instances are only few.
10. The investments on materials are kept under control so that under and over stocking is avoided.
11. Congestion in the stores and at different stages of manufacturing is avoided.

1.5 OBJECTIVES OF MATERIALS MANAGEMENT

The goal of materials management is to maintain an unbroken chain for sales or production or manufacture of goods on time for customers. The materials department is assigned with releasing materials to a supply base, ensuring that the materials are delivered on time to the user. This goal is clubbed with economic aspects and framed into the objectives.

For the ease of understanding and study, the objectives of Materials Management can be categorized into:

1. Primary objective
2. Secondary objectives

1.5.1. Primary Objectives

In a broader way, the primary business objective of Materials Management is assured supply of material, optimum inventory levels and minimum deviation between planned and actual results.

- Making available (supply) of materials in
 - in specified quantity and
 - with acceptable quality
 - at economic cost and
 - maintaining the continuity of supply
- Minimization of investments
 - in materials and
 - inventory costs
- assuring high inventory turnover
 - decision making for material flow
 - inventory trade off
 - tracking and levelling

1.5.2. Secondary Objectives:

Secondary objectives help to achieve the primary objectives. The secondary objectives can be stated as:

- Forward planning for material requirement by
 - forecasting
 - estimation
- Identifying vendors for purchasing the items from as
 - reliable source
 - at economic price

- prompt and timely supply
- Reduction of costs by using various cost reduction techniques such as
 - variety reduction,
 - standardization
 - simplification,
 - value analysis,
 - inventory control,
 - purchase research
 - Co-ordination of the functions such as
 - planning,
 - scheduling,
 - storage and
 - maintenance of materials
 - One time activities such as
 - location planning,
 - layout planning
 - coding and classification
 - Designing Material handling & automation
 - Computerization and Information System design

In some companies materials management is assigned with the procurement of materials by establishing a supply base while in other companies the procurement and management of the supply base is detached and views as the responsibility of a separate purchasing department. If so, the purchasing department is made responsible for the purchased price variances from the supply base. In large companies with multitudes of customer changes to the final product there may be a separate logistics department that is responsible for all new acquisition launches and customer changes. This logistics department ensures that the launch materials are procured for production and then transfers the responsibility to the plant materials management

The efficacy of materials management is generally measured by accomplishment of on time delivery to the customer, on time delivery from the supply base, attaining a freight, budget, inventory shrink management, and inventory accuracy and so forth.

1.6 ISSUES IN MATERIALS MANAGEMENT

The major challenge that materials managers face is maintaining a consistent flow of materials for production. There are many factors that inhibit the accuracy of inventory which results in production shortages, premium freight, and often inventory adjustments. The major issues that all materials managers face are

- incorrect bills of materials,
- inaccurate cycle counts,
- un-reported scrap,
- shipping errors,
- receiving errors, and
- production reporting errors

Materials managers have striven to determine how to manage these issues in the business sectors of manufacturing since the beginning of the industrial revolution.

SAQ-1.1

- a) Define materials management.
- b) List out the role of materials management
- c) What is the need for materials management?
- d) Explain the importance of materials management
- e) State few objectives of materials management
- f) What are the primary and secondary objectives of materials management?
- g) Enumerate the issues and challenges in materials management.

ACTIVITY 1.1

Visit any construction site nearby you. Identify the various activities that are carried out as a part of materials management. Divide various activities into components of materials management. Identify the problems linked with materials management that they come across during construction. Suggest solutions to fill the gap created by the absence of proper materials management on construction site.

.....
.....
.....
.....
.....

1.7 FUNCTIONS OF MATERIALS MANAGEMENT

Material management covers all aspects of material costs, supply and utilization. The major functions of materials management can be studied under the following four categories:

- 1. Material Planning and Control
- 2. Purchasing
- 3. Stores Management
- 4. Inventory Control or Management

In addition to the above, there is a large scope for materials management to probe into the following functional aspects.

- 5. 3-S Functions (Standardization/Simplification/Specification)
- 6. Value Analysis
- 7. Ergonomics
- 8. Just-in-Time (JIT)

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

Functional Areas of Material Management

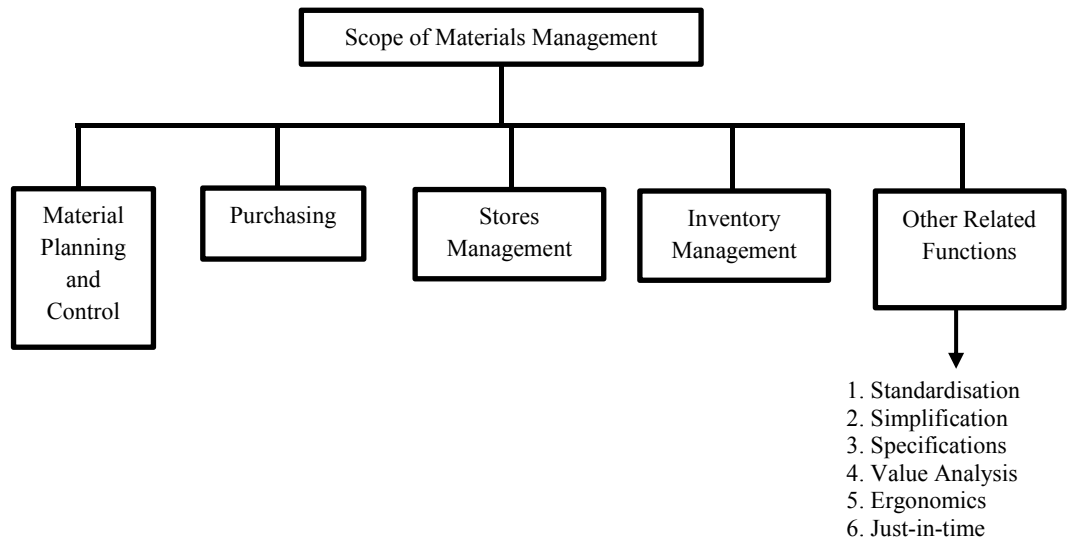


Figure 1.1: Scope and Areas of Materials Management

1. Materials planning and control

The material planning and control, in short called MPC, starts with the forecast and estimation. Using the sales forecast and production plans, the rest of the function is performed.

In case of manufacturing systems, the Production manager takes the initiative to prepare schedules of production to be carried out in future. The requirements of parts and materials are determined based on production schedules. These production schedules are often prepared on the basis of orders received or anticipated demand for products. It is ensured that every part or material is made available so that uninterrupted production is carried out smoothly.

Thus, this function involves estimating the individual requirements of parts, preparing materials budget, forecasting the levels of inventories, scheduling the orders and monitoring the performance in relation to production and sales.

2. Purchase Management

This function begins with the selection of sources of supply followed by finalization of terms of purchase, placement of purchase orders, follow-up, maintenance of good relations with suppliers, approval of payments to suppliers, evaluating and rating suppliers.

In medium and large scale industries, a separate department named as Purchase department or procurement cell, with appropriate autonomy is established and is authorized to make buying arrangements on the basis of requisitions issued by other departments. This department keeps contacts and contracts with suppliers and collects quotations etc. at regular intervals. The efforts by this department are to purchase proper quality goods at reasonable prices. Purchasing is a managerial activity that goes beyond the simple act of buying and includes tactics along with the planning and policy activities covering a wide range of related and complementary activities.

The transporting of materials from suppliers is an important function of materials management usually undertaken by the purchase department or a separate Transport

department or Traffic-cell under purchase department is made responsible for arranging transportation service. The vehicles may be purchased for the business or may be chartered from outside. It all depends upon the quantity and frequency of buying materials. Ultimately, the purpose is to arrange cheap and quick transport facilities for incoming materials.

3. Stores Management

This function starts with the receipt of material and deals with the physical control of materials, preservation in stores, minimization of obsolescence and damage through timely disposal and efficient handling, maintenance of store records, proper location and stocking.

The sub-function of stores management, namely, receiving department is responsible for the unloading of materials, counting the units, determining their quality and sending them to stores etc. The purchasing department is also informed about the receipt of various materials.

This function is also concerned with the movement of materials within a manufacturing establishment and at the same time, the cost of handling materials is kept under control. It is also observed that there are no wastages or losses of materials during these movements. Special equipment, such as trolleys, chain drives, cranes etc. may also be used for material handling.

The stores management also involves the physical verification of stocks and reconciling them with book figures. Thus stores management plays a vital role in the operations of the company.

Stores management is assigned with yet another function, which may not be directly useful to the production. These non-production materials like office supplies, perishable tools and maintenance, repair and operating supplies are also maintained as per the needs of the business. These stores may not be required daily but their availability in stores is essential. The non-availability of such stores may lead to stoppage of work.

4. Inventory control or Inventory Management

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

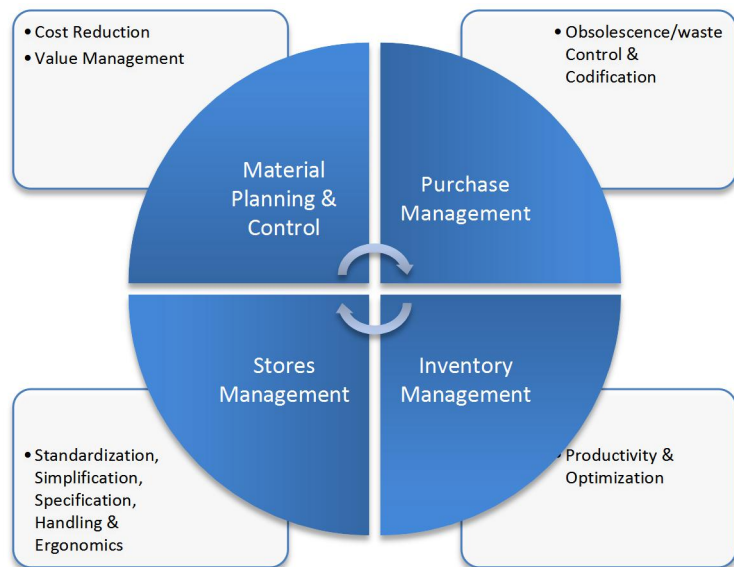


Figure 1.2: Functions of Materials Management

1.8 SCOPE OF MATERIALS MANAGEMENT

The scope of materials management can be understood under the following five heads:

- (i) Simplification & Standardization
- (ii) Cost Reduction, Codification & Value Management
- (iii) Obsolescence Control & Optimization
- (iv) Productivity
- (v) Ergonomics

These can be remembered with the acronym as SCOPE (the first letters of the above five). We shall now elaborate these.

(i) Simplification & Standardization

Standardization means producing a maximum variety of products from the minimum variety of materials, parts, tools, and processes. It is the process of establishing standards or units of measure by which extent, quality, quantity, value, performance, etc. may be compared and measured.

The concept of simplification is closely related to standardization. Simplification is the process of reducing the variety of products manufactured. Simplification is concerned with the reduction of product range, assemblies, parts, materials, and design specification [**Specifications:** It refers to a precise statement that formalizes the requirements of the customer. It may relate to a product, process or service. **Example:** Specifications of spindle Dia. = 10 ± 0.05 mm and Length = 5 ± 0.5 cm]

(ii) Cost Reduction & Value Management

Value Management is concerned with the costs added due to inefficient or unnecessary specifications and features. It makes its contribution to the last stage of the product cycle, namely, the maturity stage. At this stage research and development no longer make positive contributions in terms of improving the efficiency of the functions of the product or adding new functions to it.

(iii) Obsolescence Control & Optimization

Any avoidable amount spent on materials or any loss due to wastage of materials increases the cost of production. The object of materials management is to attack materials cost on all fronts and to optimize the overall end results. Materials management connotes controlling the kind, amount, location and turning of the various commodities used in and produced by the industrial enterprises. It is the control of materials in such a manner that it ensures maximum return on working capital.

There is wide scope for optimization in entire supply chain of materials management. The major area is in inventory control through calculating the economic order quantity (EOQ) and selective inventory control in stores management.

(iv) Productivity

The materials function to be effective, the objective must be to maximise materials productivity. Productivity can be enhanced through procurement by purchase of the proper materials, machinery and equipment, and maintaining the stores by issuing appropriate quantities and quality materials used in manufacturing of the product in proper time, distributing to marketing in the proper quantity and quality at the proper time and at the lowest price consistent with quality desired.

(v) Ergonomics

The human factors or human engineering is concerned with the man-machine system that eases the operations. Ergonomics is “the design of human tasks, man-machine system, and effective accomplishment of the job, including displays for presenting information to human sensors, controls for human operations and complex man-machine systems.” Each of the above functions is dealt with in detail.

SAQ-1.2

- a) Briefly explain the following functions of materials management
 - i. Material Planning and Control
 - ii. Purchasing
 - iii. Stores Management
 - iv. Inventory Control or Management
- b) Describe the scope of materials management in manufacturing industry.
 - i. What do you understand by standardization and simplification in materials management?
 - ii. Explain inventory management as a function of materials management.

ACTIVITY 1.2

Conduct a study on how medical stores/pharmacy shops manage their materials. Brief out few techniques that are followed in arranging materials in such cases.

.....

.....

.....

.....

.....

.....

1.9 INTEGRATED MATERIALS MANAGEMENT

The idea of integrated materials management is to bring all the functions of materials management under one umbrella. Integrated Materials management encompasses all the aspects of the materials i.e. material costs, material supply and material utilization. Materials management is concerned with material planning and materials control activities. The details of planning and control activities are represented in table 1.3* (*Check table number).

Table 1.3. Planning and Control Activities of Materials Management

• Planning	-	Right type, quantity of purchasing of materials
• Sourcing	-	Selecting a right source of material supply and procurement from these sources
• Controlling	-	Follow up and monitoring, inventory control.
• Storing	-	Receiving, inspection, storing and issue of materials.
• Handling	-	Flow or movement, packaging, transportation.
• Distribution	-	Distribution of finished goods, warehousing and shipping.

Integrated Materials Management (IMM) is concerned with management functions supporting the complete cycle of material flow, from the purchase and internal control of production materials through planning and control of work in process, to warehousing, shipping and distribution of the finished product. An effective materials management process ensures that the right kinds of materials are at the right place whenever needed.

Integrated Materials Management is concerned with planning, directing and controlling the amount, kind, location, movement and timing of various flows of materials used in and produced by the process.

Materials required for the purpose of manufacturing are normally procured and stored in the plant and issued when there is a requisition. Materials are to be purchased in advance and stored to ensure uninterrupted supply.

Therefore, the focus of IMM is on proper co-ordination and co-operation among different functional heads of materials department to optimise the operations of materials management. An integrated approach to materials management i.e. materials planning and control must look in to the problem areas in a co-ordinated manner in order to maximise the effectiveness of materials management.

Thrust Areas to Integrate

Though the areas to integrate are not limited to the following list, some of the important areas to integrate for the improvement in materials management are given below:

- Value Management & Price Analysis
- Purchase Management and Vendor Development
- Materials Planning and Control
- Inventory Management & Control & Cost Optimization
- Stores Management & Selective Inventory Control

- Waste management and Obsolescence Control
- Materials handling & Distribution

Elements to Integrate

Various elements of integrated materials management are represented in table 1.4.
(*Check table number)

Table 1.4: Elements of Integrated Materials Management

1. Materials Planning

- Forecasting materials and parts requirements.
- Preparation of material budgets.
- Forecasting material, inventory levels.
- Scheduling orders and monitoring of performance

2. Inventory Control

- Selective control of materials.
- Determining economic order quantity (EOQ).
- Fixing level of safety stock or reorder level.
- Lead time analysis.

3. Purchasing

- Selection of source and supplier evaluation.
- Finalisation of terms and conditions of supply (negotiation).
- Planning orders and follows up.

4. Stores Management

- Receipts, issue and storage of materials.
- Preservation of stores.
- Efficient handling and disposal.
- Maintenance of stores records.

Merits

An integrated materials management will result in the following advantages:

- Better performance and effectiveness.
- Adaptability to automated and computerised systems.
- Better accountability for materials and material concerned costs.
- Better co-ordination within the materials functions and also other functional areas of business.

Flow of Materials in Manufacturing

In any manufacturing organisation, there is a flow of materials at various stages of manufacturing i.e. from input to output. The flow of tangible materials from input through manufacturing to output of a manufacturing operation is represented in the fig (1.10). (*Check figure number)

The flow with reference to inputs involves such activities as purchasing, traffic control and receiving. The activities associated with flow within the factory include the material handling activities at different workstations as per the order of processing. Output related activities include packaging, shipping and distribution.

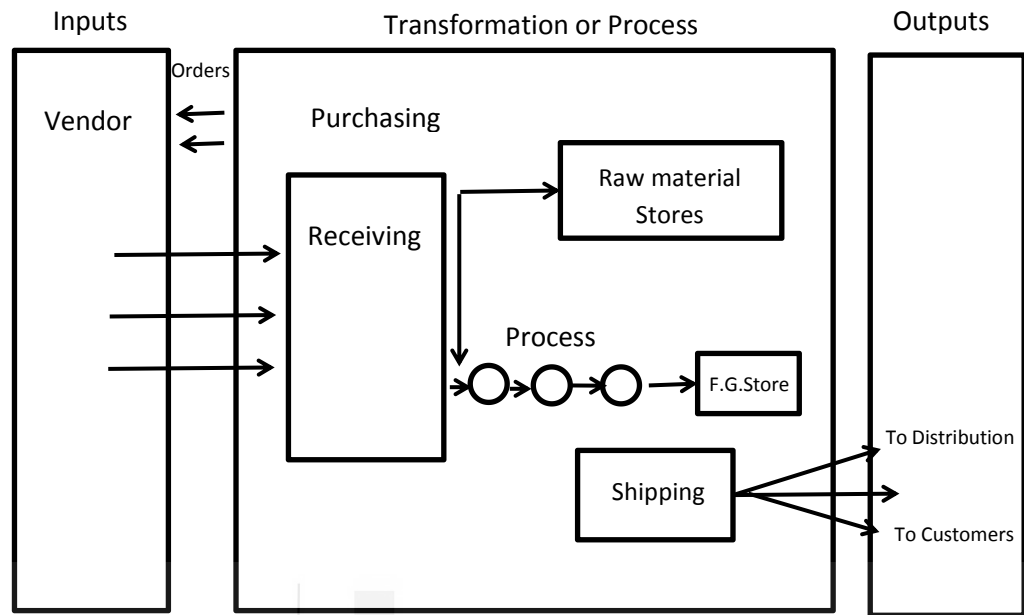


Fig. 1.10 Flow of Materials Through a Company

Activities to be Integrated

Irrespective of the type of the organisation, the following basic material related activities performed at the organisation are to be integrated with Finance Department, Production Department, Planning Department, Sales & Marketing Department, Transport Department and so forth:

1. Material Planning
2. Vendor development
3. Purchasing
4. Inbound traffic from suppliers to company
5. Receiving Inspection
6. Inventory Control
7. Payments to suppliers
8. Warehousing
9. Material handling
10. In plant storage
11. Material distribution
12. Packaging and shipping
13. Outbound traffic
14. Obsolescence control
15. Rejections/Wastage control

Integration of Purchase Activity

For example, let us consider Purchase function to integrate. Then, first of all, we need to understand the key points of the purchase cycle and buying strategies for various situations. Then the salient elements of the cycle are integrated.

The Purchasing Cycle

The purchase procedure followed varies from company to company and also from one industry to other. The purchasing cycle is represented as shown in fig (1.11). (*Check figure number)

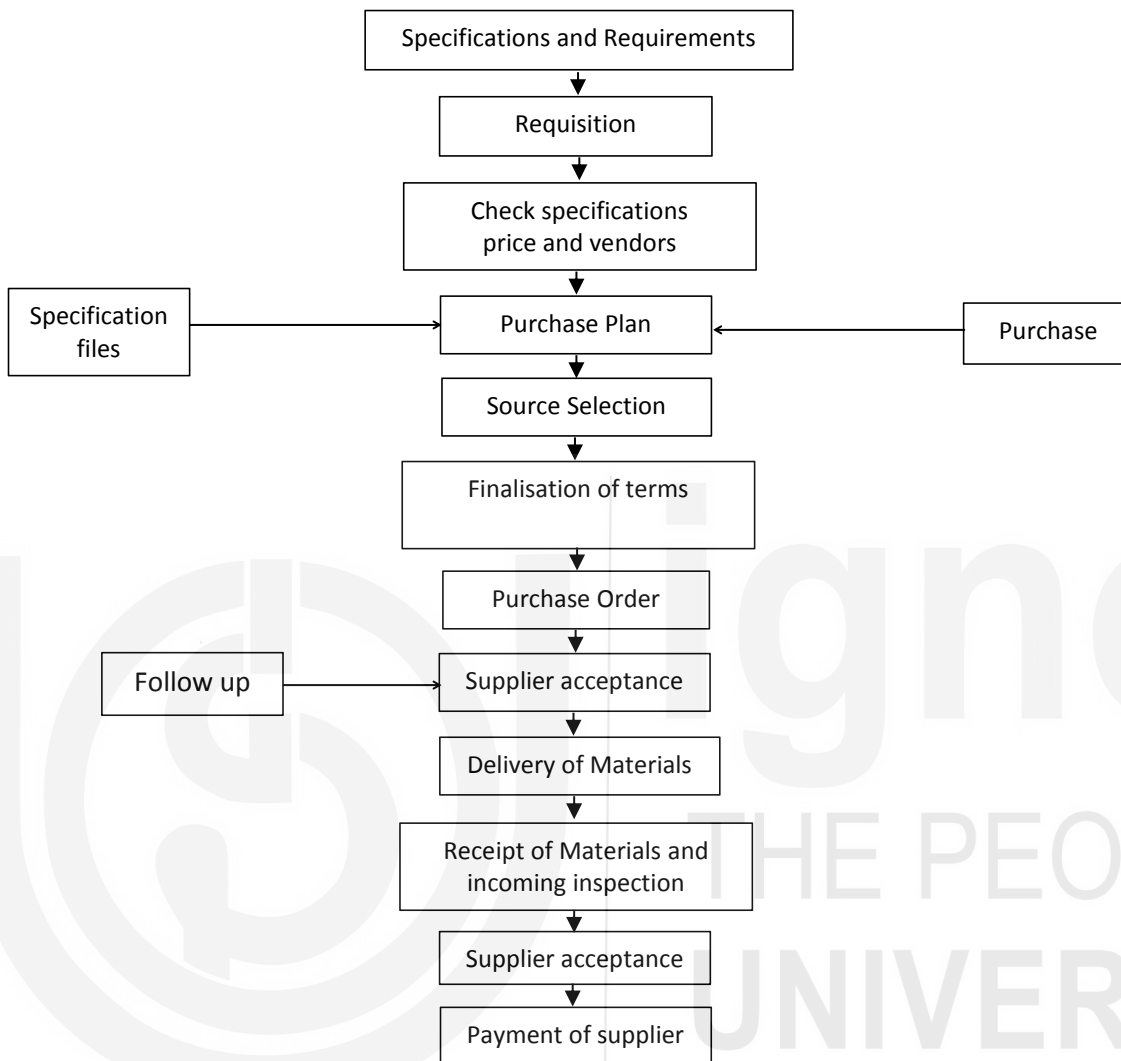


Fig. 1.11 Purchasing cycle

Buying Strategies

Methods of purchasing will vary according to the nature of demand and the market conditions. The principal methods of buying are

1. Purchasing by requirement (Hand to mouth buying).
2. Purchasing for a specified future period.
3. Market purchasing.
4. Speculative buying.
5. Contract buying.
6. Group purchasing of small items.
7. Forward buying.
8. Hedging.

The basic elements in purchasing are now to be integrated. Let us now think of these points with which functional area it is to be integrated:

1. The origin of demand for materials and components based upon the requisitions made to purchase department by *user departments* with all the details like *descriptions, quantity* and *quality specifications*.

Thus, at this point on careful observation, we can understand that this activity is connected with

- the production (user) department to check actual requirement,
 - planning (to check the description of the product),
 - estimation & finance departments (cost vs quantity),
 - quality department (to make sure of the quality specification).
2. Specifications are checked and verified and purchase plan is made for items demanded.

This activity requires the coordination with

- quality assurance department to ensure the specification,
 - forward planning to verify with master schedule, and
 - purchase department to check it is already in pipe line
3. Selection of source of supply.

This function is concerned with the vendor selection, vendor rating, and vendor development in association with costing departments.

4. Preparation of purchase order by supplier (order acceptance) and acceptance of terms and conditions.

This should be approved by the top management, materials management, production, quality and finance departments particularly for non-routine and costly (A-class) items.

5. Follow up to ensure prompt delivery of right quality and quantity of materials.

This is concerned with purchase, receiving and stores to act according its delivery schedules.

6. Incoming inspection of materials (both to check quality and quantity) to ensure correct material as per specification.

This is connected with quality assurance department and also stores and production departments for information.

7. Checking supply invoice against purchase order and goods received and payments are made.

This is again coordinated with the finance department.

SAQ-1.3

- a) Name the elements involved with Integrated Materials Management
- b) List out the merits of Integrated Materials Management
- c) Enumerate the idea behind the Integrated Materials Management
- d) What are thrust areas to integrate in materials management?
- e) With the help of a flow diagram, explain the flow of materials in manufacturing.
- f) What are the activities to be integrated in materials management?

ACTIVITY 1.3

Visit a paper plates manufacturing unit near to your surroundings. Observe the flow of materials in the unit and illustrate the same in the form of a sketch.

.....
.....
.....
.....

1.10 SUMMARY

The supply of proper quality of materials is essential for manufacturing standard products. Materials Management refers to planning, organizing and controlling the activities that are related to the flow of materials in a company. The goal of materials management is to maintain an unbroken chain for sales or production of goods on time for customers. Its primary is assured supply of material, optimum inventory levels and minimum deviation between planned and actual results. Material planning and control, purchasing, stores management and inventory management are some functions of materials management. Simplification & standardization, cost reduction, codification & value management, obsolescence control & optimization, productivity and ergonomics are also included in materials management. The integration of all the functions of materials management is known as integrated materials management. It is concerned with management functions supporting the complete cycle of material flow, from the purchase and internal control of production materials to warehousing, shipping and distribution.

1.11 KEY WORDS

Purchasing	:	Acquiring required materials by paying for it
Inventory costs	:	It includes the costs to order and hold inventory
Forecasting	:	It is the practice of using past data, trends and known upcoming events to predict needed inventory levels for a future period
Planning	:	Planning is the process of making plans for material
Scheduling	:	It is the process of arranging, controlling and optimizing work and workloads in a manufacturing process
Standardization	:	It means producing a maximum variety of products from the minimum variety of materials, parts, tools, and processes.
Simplification	:	It is concerned with the reduction of product range, assemblies, parts, materials, and design specification
Stores Management	:	It is concerned with ensuring that all the activities involved in storekeeping and stock control are carried out efficiently and economically
Inventory Management:		It refers to the process of ordering, storing and using a company's inventory.

Productivity	:	It measures how efficiently production inputs, such as labour and capital, are being used in an economy to produce a given level of output.
Ergonomics	:	It is the design of human tasks, man-machine system, and effective accomplishment of the job
Codification	:	It is the process of assigning a number or symbol to each store item in addition to its name for making its identification easy and convenient

1.12 FURTHER READINGS

- [1] N.V.S.Raju. (2013), Industrial Engineering and Management, Cengage Learning India Pt. Ltd, New Delhi, ISBN-13: 978-81-315-1948-6
- [2] N.V.S.Raju. (2018), Operations Research, Theory and Practice, BS Publications, Hyderabad, India, and CRC Publication (A unit of Taylor& Francis) ISBN: 978-93-5230-190-4
- [3] Buffa; E.S. (1990): Modern Production/Operations Management, Wiley Eastern Limited.
- [4] Everett E. Adam, Jr and Ronald J. Ebert (1986), Productions and Operations Management: Concepts, Models and Behaviour, Prentice Hall International.
- [5] Hadley G. and Whitin, T.M.(1963), Analysis of Inventory System, Prentice Hall, N.J.,U.S.A.
- [6] Levin, R & Kirkpatrick,. C.A., (1978), Quantitative Approaches to Management, McGraw Hill, Kogakusha Ltd., International Students Edition.
- [7] Mustafi, C K. (1988) : Operations Research, Methods and Practice, Wiley Eastern Limited.
- [8] Peterson R and Silver, E.A. (1979), Decision Systems for Inventory Management and Production Planning, Wiley, New York.
- [9] Taha, H.A. (1976): Operations Research, An Introduction, MacMillan PublishingCo. Inc. New York.