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INTRODUCTION TO MATERIALS MANAGEMENT

Evolution

The term “purchasing” or “procurement” were originally used, later on this term was replaced by “supply management”. While purchasing dealt only purchasing functions, supply management dealt starting from participating in deciding materials specifications, value analysis, supplier selection etc. including purchasing activities. Supply managers participate in new product development and are responsible for selecting sources, managing costs, developing and nurturing supplier partnerships and strategic alliances, and issuing long-term agreements with carefully selected suppliers. Supply management has major focus on :

- (a) to deal with activities that have great potential for impacting the success of the firm, and
- (b) to be interdisciplinary in nature and integrate supply actions with those of other important sections of the firm.

Till 1950 s, purchasing department used to be clerically oriented order-placing unit. Later on, progressive firms started giving managerial emphasis, specialization, and professionalism on purchasing operations. The purchasing function comprises the activities associated with the acquisition of the materials, services, and equipment used in purchasing operations. In 1970 s it was augmented by an emphasis on longer-range strategic planning for materials.

Since the early 1990 s, the strategic emphasis has been enhanced by purchasing participation in various cross-functional teams for various activities such as product design, supplier qualification and selection, quality, commodity management. By accelerating the strategic emphasis by more progressive firms, has led to the development of the *supply management* concept. The supply management is a process responsible for the development and management of a firm’s total supply system—both the internal and external.

Now-a-days, ‘materials management’ concept which is different from purchasing/procurement/supply management concepts has

emerged and is becoming popular. This materials management concept is designed to enhance coordination and control of various materials activities. Materials management deals with following materials activities :

1. Purchasing and supply management activities.
2. Inventory management.
3. Receiving activities.
4. Stores and warehousing.
5. In-plant materials handling.
6. Production planning, scheduling and control.
7. Traffic and transportation.

Materials management provides an integrated systems approach to the coordination of materials activities and the control of total materials costs. All those major activities which contribute to the cost of materials, are assigned to the materials management department. The objective of this is to optimise performance of the materials system. Here the materials means raw materials, spare parts, components, factory supplies, packing materials etc.

Introduction

Materials management is one of the basic functions of every business. Economic success of any manufacturing company has a direct relationship with the efficiency of the materials management. Materials management can be defined as a function, which aims for integrated approach towards the management of materials in an industrial undertaking. Its main object is cost reduction and efficient handling of materials at all stages and in all sections of the undertaking.

Materials Management's functions include several important aspects connected with materials ; such as purchasing, storage, inventory control, material handling, standardization etc. Hence this subject has become very important and requires more attention.

Materials management covers a very wide field and deals with material costs, material supply, utilization and its handling. It is concerned with the planning and programming of materials and equipment, market research for purchase, procurement of materials (capital goods, raw materials, components and semi-finished items), storage and inventory control, transportation of materials, salvage, material handling, disposal of scrap and surplus etc.

For a balanced growth and efficient running of an enterprise, it is necessary that materials cost, materials supply and its utilisation is controlled in such a way so as to result in :

1. Maximisation of production
2. Reduction of cost of production, and
3. Maximisation of profit.

This is achieved by reducing materials cost, preventing large amount of capital locked up in inventory for long, and by improving the capital turn-over ratio.

Materials are purchased for different purposes *e.g.* for house utility by common man, for trade by middle-men, by government for own utilization, for production by manufacturers who convert the materials into products required by the consumers. Here, in materials management we are concentrating on this last category. The manufacturers purchase raw materials, components, consumables, machine tools, spare parts, fuels, lubricants, packing materials etc.

Thus materials management can be defined as the functions responsible for the coordination of planning, purchasing, transporting, storing, and controlling the materials in an optimum manner, so as to provide a predecided service to the customer at a minimum cost.

Materials management is a concept that integrates all the activities of planning, scheduling and controlling materials from design through production and including delivery to the customer. Thus it establishes full responsibility over the material flow system with full accountability for quality, delivery and cost.

Materials management can also be defined as an organizational concept in which a single manager has authority and responsibility for all activities principally concerned with the flow of materials into an organisation, which includes purchasing, production, planning and scheduling, inventory control, receiving and stores.

Scope of Materials Management

Scope of materials management can be divided into two categories—namely primary and secondary.

(A) **Primary**

1. Purchasing
2. Inventory Management
3. Maintaining continuity of supplies

4. Quality assurance
5. Good supplier relations.

(B) **Secondary**

1. Make or buy decisions.
2. Standardization
3. Value engineering
4. Product development and introduction of new products.
5. Forecasting.

IMPORTANCE OF MATERIALS MANAGEMENT

A survey conducted by the Directorate of Industrial Statistics showed that the average material cost is 64 per cent of the sales value. Thus only 36 per cent cost is for wages and salaries, overheads and profit etc. These figures themselves show the importance of materials management.

Inventory carrying costs alone come out to be 20 per cent of the material costs. Inventory carrying cost comprises interest charges on the cost of inventory, storage and material handling, insurance, physical deterioration and obsolescence.

Uptil now efforts have been made for saving in the wages (wages are about 16 per cent of sales value), which was not liked by the labour class and such steps created the labour problems. But the above facts show that more efforts must be made for the saving in materials cost by utilizing the techniques of materials management and that too without creating any labour problem.

Materials management results in increased productivity of capital by preventing large amount of blocked capital for long periods in inventories.

In many industries involved in fabrication, petroleum refinery, construction projects, sugar, wool, cotton yarn, jute, automobile, earthmoving machinery etc. input materials including fuel constitute over 60 per cent of the turnover of the final product. Therefore, the importance of the materials management is significant and has major contribution in reducing cost, improving profitability and the rate of return on investment. Thus it affects the entire economic activity and reduction of material cost by 5 per cent will lead to profit equivalent to that generated by increasing the sales by 30 to 40 per cent. Since increasing the sales involve additional expenditure on production, decreasing the cost of material is preferred for increasing the profit.

OBJECTIVES OF MATERIALS MANAGEMENT

Materials Management aims at reducing the cost of production so as to help the organisation in maximizing its profits.

As objectives of materials management are many, they can be classified into two categories, viz; Primary objectives and secondary objectives.

Primary objectives include:

- (1) Provisioning of materials in specified quality and quantity at economic cost at specified time.
- (2) Minimising investments and costs of inventories and assurance of a high inventory turn-over.

Main secondary objectives include :

1. To reduce materials cost by adopting various techniques such as variety reduction, simplification, standardization, value analysis, inventory control etc.
2. Coordination of such functions as planning and scheduling, storage, upkeep and maintenance of materials, materials handling etc.
3. Ensure uniform flow of materials for production.
4. Ensure right quality at right price.
5. Establish and maintain good relations with supplies.
6. Economy in using the imported items and to find their substitutes.

FUNCTIONS OF MATERIALS MANAGEMENT

Functions of the materials management department are grouped as follows :

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

Here only brief description is being given in respect of each of the functions, and details are given in separate chapters in this book.

(1) Materials Planning and Programming.

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

Materials planning also involves maintenance of information system to feed details necessary for its better functioning in future.

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

(2) Materials Purchasing.

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

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

Each organisation has its own purchase policy, which indicates its policies about (i) open, limited and single tenders, (ii) rate and running contracts, (iii) purchase through manufacturers, distributors or suppliers, (iv) delegation of powers to its various levels of personnel.

Import cell of purchase section deals with the importation of items as per prevailing government rules.

(3) Store-Keeping.

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

Physical verification, salvage and disposal of surplus and obsolete materials are another key functions of store-keeping.

(4) Inventory Control.

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

- (i) To run the stores effectively.
- (ii) To ensure timely availability of material and avoid build up of stock.
- (iii) Technical responsibility for the state of materials.
- (iv) Stock control systems be developed and followed.
- (v) To maintain specified raw materials.
- (vi) To protect the inventories.
- (vii) Pricing of material supplied.
- (viii) To develop policies, plans and standards essential to achieve inventory control objectives.
- (ix) To maintain overall control by checking results and adopting corrective actions.

(5) Materials Handling.

Various functions related to store-keeping requires lot of handling. Starting from receipt of material, inspection, storage and issue items should be handled in such a way that it require minimum handling. For large stores, suitable materials handling equipment like cranes, hoists, fork lifts, conveyors etc. are required.

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

(6) Quality Control and Inspection.

Quality control in simplest terms, is the control of quality during manufacturing. Quality of a product itself comprises several engineering and manufacturing characteristics which go to make the product to meet the performance expectations of the designer and the customers. These characteristics are : dimensions, chemical properties, sensory properties etc. In other words quality includes appearance, performance, life, dependability, reliability, durability, maintainability, smell, taste, feel, sound etc. We can also say that, quality of any product is regarded as the degree to which it fulfils the requirements of the customer.

Since quality of a product depends upon the application of materials, men, machines and manufacturing conditions, the systematic control of these factors is the quality control. In the words of Alford and Beatly, "quality control" may be defined as that "Industrial Management technique by means of which products of uniform acceptable quality are manufactured". Quality control is concerned with the making things right rather than detecting and rejecting those made wrong.

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

(7) Value Engineering.

Value engineering is a tool of management which approaches the question of saving cost from the point of view of value. In other words value engineering is a study of relationship between the design function and cost of a part, keeping this in view, reduce the cost through change in design, modification in specifications of the materials used, changing the source of supply etc.

Term 'Value' is used in different ways and has different meanings. Generally the value can be categorized as :

- (a) *Cost value.* This is the sum of all the elements of costs required to produce an item or provide a service.
- (b) *Use value.* Use value is equal to the value of the functions performed.
- (c) *Esteem value.* The properties, features or attractiveness which creates a desire to possess an article.
- (d) *Exchange value.* The properties or qualities which will remain attractive enough to other people to permit resale in the future.

(8) (A) Simplification (Variety-reduction).

This is a form of standardization for the reduction of the number of types of products within a definite range to that number which is adequate to meet the prevailing needs at a given time. Simplification reduces range of products, their types, sizes and also reduces their complexity of manufacturing procedure.

(B) Standardization.

Standardization is the setting up of standards for quality, raw material, sizes, and performance etc. of any product. It is helpful for checking the quality performance and value of product.

Thus, simplification is the selection of those items which are of greatest demand and elimination of other items, while standardisation is to set the standard for that particular simplified item.

(C) Product Development.

A product is an article obtained by the transformation of raw material. Under modern conditions of competition, and customers high expectations and changing requirements about product, a continuous process of product development is essential.

Product development is done in following stages :

- (i) Idea generation.
- (ii) Screening.
- (iii) Market research.
- (iv) Design the product.
- (v) Develop the product by preparing prototype.
- (vi) Test the product.
- (vii) Reproduction and test marketing by producing few products and inviting suggestions or observe the performance and reactions.
- (viii) Manufacture from commercial point of view.

(D) Make or Buy Decisions.

Make or Buy decision is a ticklish as well as vital decision. Both have their own advantages and disadvantages which needs careful evaluation and the choice which is optimum in long run is considered as final decision.

(9) Disposal of Surplus, Obsolete and Scrap items.

Holding surplus, obsolete and scrap stock is a costly affair as it includes inventory carrying costs, cost of periodic stock-taking, cost of maintaining records, cost of security, and locked up costs.

MATERIALS MANAGEMENT AS A SCIENCE

As we know that management means performing the functions of planning, organizing, staffing, directing and controlling to accomplish stated objectives by the use of human beings and other resources. The basic resources are : Men, Money, Materials, Machines, Methods and Markets.

Best of materials should always be available in time to avoid idleness of machines and men. Materials management, therefore, form the key to the productivity of machines and other capital assets and labour, and can contribute considerably towards achieving efficiency, effectiveness and cost reduction. Materials management is responsible for coordination of materials requirement planning, sourcing, purchasing, handling, storing and controlling materials in an optimum manner so as to achieve its objectives.

Materials management is a science in the sense that it adopts a systematic and scientific approach integrated for improving the management process, by adopting :

- (i) management Science techniques ; like network, quantitative and simulation approach *e.g.* linear, and dynamic programming, queing theory, break-even point theory, Monto Carlo, probability theory, equipment replacement theory etc.
- (ii) scientific Management Information System and electronic computers.
- (iii) scientific methods of decision making.
- (iv) information feed back system for better controlling.
- (v) Human behavioural Science approaches.

Materials Management is an art also, as it is an application of human skills to utilize the talent of the people, and because it manages human beings to achieve the desired results.

Materials management department, if not managed scientifically and systematically *e.g.* by scientific purchasing, inventory control, entire organisation may lead to losses. Therefore in order to achieve optimum results, this department must adopt scientific, rational and logical approach.

INTEGRATED MATERIALS MANAGEMENT APPROACH

As explained earlier materials management is a very wide term and covers a wide range of activities. Various functions performed by materials management must be well integrated, otherwise a conflict of interest might arise, in case they function independently. In such a situation ;

(a) Purchase department, in order to avail the discount may buy large quantities without taking into account its impact in inventory carrying costs and warehousing costs.

(b) Marketing department may be interested to have a high level of finished goods inventory to satisfy his customer needs.

(c) Production department may be interested to have high raw material inventory to achieve a optimum level of machine utilization.

(d) Purchase department may be interested to have the materials well in advance to avoid the chance of stockout.

These individual interests on inventory level create a lot of problems in the non-liquidity of money and sometimes lead to bankruptcy of financial resources.

In order to sort out these problems "Integrated Materials Management" concept is adopted to take care of needs of all functions, and a close control of inventory is ensured to make use of resources in an optimum way. Inventory carry costs are as high as 25% which means idle resources without any productive use, and an avoidable burden on finances of the enterprise.

An ideal situation of inventory level is 'Just in Time', which is practiced in Japan, where only 6 hours inventories are kept. In integrated approach all the departments make efforts to optimize the inventories.

Advantages of Integrated approach

Integrated materials management approach has following advantages :

1. It ensures better support and cooperation in the accomplishment of materials functions.

2. It creates an atmosphere of trust and better relations between different sections/departments.
3. This ensures faster and accurate communication.
4. It establishes clear accountability.
5. This helps in evaluating the performance of materials management in an objective manner.
6. This develops team spirit, resulting in better morale and cooperation.
7. This ensures better opportunities for growth and development of the organisation.

CHARACTERISTICS OF MATERIALS FUNCTIONS

Following characteristics are necessary for the success of materials functions :

1. Corporate policies regarding purchasing plans, programmes and strategies must be clear.
2. Action plan for the purchasing must be laid down.
3. Organizational matrix *i.e.* inter-relationship between concerned departments be specified.
4. Responsibilities for analysing material requirements, vendor analysis, analysis of quotations, placing of orders, expediting, and stock level controlling must be clearly specified.
5. Adopting integrated materials management approach.
6. Training, manpower planning, motivation and morale aspects must be considered well.
7. Objectives of materials management must be given top priority for accomplishment.
8. Materials must be standardized and varieties be reduced.
9. Inventory management be adopted for achieving minimum inventory carrying costs.
10. To adopt scientific methods of cost reduction.
11. Minimum stock/sales ratio.
12. Less material in 'move' *i.e.* work-in-process.
13. Systematic record keeping.
14. Maximum inventory turnover ratio.
15. Reduced losses due to obsolescence, surplus, deterioration, and scraps.

16. Lower materials handling cost.
17. Shorter lead-times.
18. Better 'Management Information System'.
19. Better customer satisfaction.
20. Better relations with the materials suppliers.

Questions

1. (a) What is materials management ? Explain its importance.
(b) Write an essay on evolution of "materials management".
2. Explain the different functions of 'materials management department' in brief.
3. (a) What are the objectives of materials management ? Explain them.
(b) Give any two definitions of materials management.
4. Write short notes on :
(a) Integrated materials management approach.
(b) Characteristics of the good materials management.
(c) Materials management as a science.
5. Define and discuss the significance of the materials management concept.
6. Discuss the key factors involved in purchasing-production relationships.
7. Compare and contrast supply management and materials management.
8. Write short notes on:
(a) Scope of materials management.
(b) Advantages of integrated materials management approach.