

TECHNIQUES OF INVENTORY CONTROL

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Brief accounts of inventory Management techniques are presented in this chapter. Inventory accounts for a substantial portion of the capital employed in any organisation. It constitutes stocks of resources held for future production activity or sale. Inventory holdings are often considered as the graveyard of business, as surplus stocks have been a principal cause of business failure¹. This kind of attitude in the outlook of business towards inventory may be attributed to the increasing size, wide variety and complexity of business enterprises, urgency of modern requirements to cope up with the business world and high idle cost of machines and men. At the same time "the efficient management and control of inventory not only solves the acute problem of liquidity but also enhances annual profits and causes substantial reduction in the working capital of a firm"². The increasing importance of inventories as a core ingredient in gross working capital obviously calls for maximum efficiency in managing them for the careful efficient management of working capital.

Concept

The literary meaning of the word inventory is stock of goods. The term inventory¹ in its broader sense is referred to as idle resources provided that such resources have economic value³. As per accounting terminology, inventory means, "the aggregate of those items of tangible property which -

- a. Are held for sale in the ordinary course of business.
 - b. Are in the process of production for such sale and
 - c. Are to be currently consumed in the production of goods or services to be available for sale⁴.
- From the definition it is clear that inventories consist of the following types⁵.
1. Raw materials and bought in components are the stock of material held prior to their utilisation in the production process.
 - ii. Work-in-Progress includes products, which are only part way through manufacturing process. Raw materials labour, sub contracting and other manufacturing costs all together-constitute work-in-progress.
 - iii. Finished goods are products, which the company sells to its customers.
 - iv. Spares are the items required keeping plant and machinery in working condition.

In a typical manufacturing concern, in addition to the above, there are other inventories, which include supplies. These are the materials used in running the plant or employed in producing products. These include miscellaneous consumable stores such as cotton waste, oil and greases and other general office supplies, printed forms, electric supplies and tools like needles and spanners. The term inventory has been defined in many ways. Some of them are as follows. According to Kholer⁶, the term inventory may be defined as "any class or group of materials or supplies or construction materials". Starr and Miller⁷ defined the term inventory as "a stock of some kind of physical commodity". Greene⁸ defined inventory as "the morable articles of the business, which are eventually expected to go into the flow of trade". Inventory from the viewpoint of financial manger in the aggregate value of raw materials, stores and spares, consumables, work-in-process, finished goods in which the company's funds have been invested⁹. The operational definition of inventory would be the amount of raw materials, fuels and lubricants, spare parts and semi-processed material to be stocked for the smooth running of the plant. Inventory in management parlance is an idle resource of any kind having an economic value¹⁰ so long as the resource is kept in the warehouse, it

is idle. But the material has the economic value, in the sense that is capable of being converted into semi-finished and finished goods and sold to the customers to buy more items. Inventory in a wider sense is defined as any idle resources of an enterprise. It is commonly used to indicate materials-raw, in process, finished, packing, and spares and other-stocked in order to meet the demand or distribution in the future. Even through inventory of materials is an idle resource in the sense it is not meant for immediate use, it is almost a necessity to maintain some inventories for the smooth functioning of an organisation. Inventory is made of all those items ready for sale or of items, which keep the process running¹¹. Inventory as current asset differs from other current assets, because only financial managers are not involved, rather managers of all functional areas, i.e. finance, marketing, production and purchasing are involved. The views concerning the appropriate level of inventory would differ among the different functional areas¹². More over in the words of fred Hanssman an inventory is idle resource of any kind, provided that such resource has economic value¹³.

The Need

Inventories generally occupy the key position in the structure of working capital. Not only large investments involved in inventories, but the cost of inventory also forms a major portion of the cost of production in many manufacturing enterprises. Therefore, it is absolutely imperative to study the need of inventories in any enterprise. The finished products after packaging are first stored and sent to the market as the need arises or orders are received. Also the raw materials needed for the finished product cannot be directly fed to the production department from the market. These have to be stored first after procurement. These things put together give an idea of storing these items. This process of storing is called inventory.

Every business must have some inventory of some kind. In fact no business can exist without inventory. The manufacturing enterprises must have inventory of raw materials, purchased components, in-house fabricated sub-assemblies etc., needed to operate and produce a finished product. It also has to maintain an inventory of finished products in anticipation of demand for them. Thus inventories act as a protective cushion for the continuous operations in any manufacturing enterprise¹⁴.

In practice, almost every manufacturer carries an inventory that is substantially greater than minimum amount, because of the following reasons.

1. Primarily inventory is held for transaction purpose. Today's inventory is tomorrow's consumption. Normally there is a time lag between the recognition of the need and its fulfillment. This period is called lead-time, consequently, greater the lead-time, greater will be the inventory.
2. Inventory is held as a precaution or as a contingency for increase in lead-time or consumption rate.
3. There is a speculative element in the reasons for holding inventory. Price may rise or materials may become scarce during certain period of time.
4. The marketing, sales production departments, all find it more convenient to have supply on hand that is more than ample.
5. Adequate inventories protect a firm against the shortages that would result in production stoppages and considerable losses.
6. Customers desire a prompt fulfillment of orders A firm should have the goods available for sale, other wise the customers are likely to get their orders executed by competitors.
7. Finally the maintenance of inventories facilitate smooth production and sales operations.¹⁵

Inventory Management

The concept of inventory control first came to light when Harris F.W. Published his work on classical order size model. This work is extended by Raymond F.E (1931) and Wilson R.M. (1934). But only after the Second world war, with the development of operational research and computer technology that the theoretical concepts got a practical application. In India inventory control techniques were developed in 1960. The

increased pace of industrialisation in India has highlighted a number of management problems. Among them the most important problem is inventory management. As a professional area of development, the areas of production, marketing and financial management were given greater importance in the first flush of 'managerial revolution'.

The term Inventory Management has been defined in many ways and most of the definitions stress the importance of achieving cost control and cost reduction. Inventory management is concerned with the determination of optimum level of investment for each component of inventory and also the efficient use of such components of inventory¹⁶. It involves the process of planning and control of assets being produced with a view to selling in the normal course of operations of the enterprise¹⁷.

It may also be defined as the sum total of those activities, which are necessary for acquisition, storage, sale and disposal, or use of materials. It is a subject, which merits the attention of top-level management and influences the decisions of the planning and executive personnel. It is a matter of deep concern to those dealing with, production, sales forecasting, inventory planning, marketing, materials handling, finance, product designing and engineering¹⁸. The Committee On Public Undertaking (COPU) defines inventory management as "acquisition, storage, sales disposal or use of materials, explains the function of planning and programming of materials, purchasing, warehousing, disposal of scrap and surplus material and utilization of by products by the management¹⁹. Inventory management is thus, a vital area of management covering the sum total activities necessary for acquisition, storage and use of materials. Its objective is to a) meet a high percentage of demand without creating excess stocks. b) Provide re-order points and order quantities for items scientific basis. c) Decide what to stock and what to procure on demand; and 4) Utilise storage space economically.²⁰

Objectives of Inventory Management

Scientific inventory management is considered to be an important factor influencing the industrial prosperity of a nation. It has been rightly pointed out that the great scope for cost control and cost reduction lies in efficiency of material management for the reason that the outlay on materials accounts for a major share in the total cost of production. Thus, scientific inventory management is not only sine-qua-non for cost control and cost reduction, but also a key to industrial prosperity.²¹

In any organisation inventory management must try to spell out its objectives. Some of the common objectives of inventory management are as follows.

1. To have stocks available as and when they are required.
2. To utilise available storage space, but prevent stock levels from exceeding space availability.
3. To meet a higher percentage of demand without creating excess stock levels, in other words; neither to over stock nor to run out' is the policy.
4. To decide which items to stock and which items to procure on demand.
5. To ensure adequate supply of materials, stores. Spares etc., and minimise stock out and shortages and also to avoid costly interruption in production and sales operation.
6. To keep down investment in inventories, inventory carrying costs and obsolescence losses to the minimum.
7. To facilitate purchasing economics in purchasing.
8. To provide a check against losses of materials through carelessness or pilferage.
9. To serve as a means for the location and disposition of inactive and obsolete items of stores.
10. To provide a perpetual inventory values and a consistent and reliable basis for preparation of financial statements.
11. To contribute to profitability finally.
12. To enable the management to make costs and consumption comparisons between operations and periods²².

Functions

Inventory management is an area of material management, which is an all-embracing concept, covering the entire spectrum of business activity. Inventory management covers the entire range from materials planning to the final delivery of the product to the customers. The basic functions of inventory management are:

- a. Inventory planning and programming;
- b. Purchasing;
- c. Store-keeping and ware housing;
- d. Inventory control, handling and transportation;
- e. Codification and standardisation;
- f. Value analysis, disposal of obsolete and scrap material

Inventory management has two broad functions.²³ Inventory accounting and inventory control;

Inventory accounting is concerned with book keeping aspect of inventory management. This function deals with the entry, processing and distribution of inventory stock, which in turn provides a history for all inventory transactions. This accounting will also provide information for the comparison of book inventory to the actual physical count of inventory stocked. Inventory control may be defined as "a system of internal check and control to ensure that inventories of stores, raw-materials, finished good, work-in-process are protected against irregularities and that the information related to inventories which is required in the preparation of operating and financial statements is authentic and reliable²⁴". Inventory control consists of planning, ordering and scheduling the release of materials used in manufacturing process. The efficient management and effective control of inventories help in achieving better operational results and reduce investment in total current assets. The principal objective of inventory control is to reduce investment in inventories and simultaneously to improve the profitability of firms²⁵. The other objectives of inventory control are:

- a. to minimise idle time caused by raw-material shortages and breakdown caused by non-availability of critical spare-parts.
- b. To keep down the capital investment and the cost of carrying inventory²⁶. Although, the broader concept of inventory management includes inventory control as a whole it is usual for the material department to be, primarily concerned with stock control of stores, inventory control of regular stock items. Inventory control is the most important function of the inventory management and it forms the nerve centre in any material management organisation. It also determines the time and quality of items to be procured. Thus, the objectives of inventory control²⁷ are as follows:
 - i. Economy or provisioning at minimum investment and cost without jeopardizing essential production; and
 - ii. Insurance against due to stock outs of materials.

Importance

The importance of inventory management has been substantially realised of late, all over the world in view of the significant influence on the profitability of an organisation. In majority of the manufacturing enterprises, inventories represent a significant part of the total investment. As such investment in inventories should be subjected to rigorous control to ensure that every rupee of investment in materials has productively been utilised²⁸. Good inventory management is good financial management. An efficient management of inventory will ultimately result in the maximization of owner's wealth. Recent studies have shown that in many manufacturing companies the inventory investment can range from 20 to 35 percent of its total capital. On an average, inventories are approximately 60 to 70 percent of current assets of public limited companies in India. Because of large size inventories maintained by the firms, a considerable amount of funds is required to be committed in them; it is therefore absolutely imperative to manage inventories efficiently and effectively in order to avoid unnecessary investments in them. An undertaking neglecting the management of inventories will be jeopardising its long run profitability and may fail

ultimately. That is why inventories are regarded as graveyard of business and the uncontrolled inventories as the cancer of industries²⁹. It is possible for a company to reduce its levels of inventories to a considerable degree, eg., 10 to 20 percent without any adverse effect on production and sales by using simple inventory planning and control techniques. The reduction in excessive inventories carries a favourable impact on a firm's profitability.

Techniques of Inventory control

An effective management of inventories will ensure adequate supply of materials and avoid the interruption of production process and at the same time minimise the investment on inventories. If the inventory management techniques are used effectively, they will enable to keep inventory levels and unit costs low with a minimum of stock-outs. For this purpose, the techniques of inventory control such as ABC analysis, Economic Order quantity, Re-order point, codification, vital, essential and desirable (VEP) Analysis, fast, slow and non-moving (FSN) analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM) etc., are popularly used by the power stations. The techniques of inventory management are also used to control the inventories. Hence, there is no clear-cut distinction between techniques of inventory management and inventory control. The need for using these techniques in India has been stressed by various committees. For example, the Report of the committee³⁵ on public undertakings mentions, for proper inventory control, it is essential to adopt the scientific practices and techniques that have been developed in this regard.

Control of inventory is exercised by introducing the following measures³⁶.

1. Selective inventory control techniques.
2. Fixation of norms of inventory holdings
3. Review of inventory levels;
4. Inventory report; and
5. Ordering system of inventories.

Selective Inventory control Techniques

Selective control is very simple approach. For the purpose of selective control, a different system of classification is attempted. The chart 5.1 indicates the different classification on methods available for the purpose of inventory control. Selective Inventory control can be broadly divided into eight types.

Chart 1

Different Classification Methods for Inventory Control

Classification	Basis
ABC (Always Better Control)	Value of items consumed
VED (Vital, Essential and Desirable)	The importance of critically
FSN (Fast moving, slow moving, non moving)	The pace at which material moves
HML (High, Medium, low)	Unit price of in material
SDE (Scare, Difficult, Easy to Obtain)	Procurement Difficulties
GOLF (Government, Ordinary, Local foreign) obtained	Source from which material is
SOS (Seasonal, Off Seasonal)	Seasonality, This applies essentially to commodities

1. ABC Analysis

ABC analysis is relatively a very simple technique but at the same time a very useful and powerful technique of management and has multifarious applications. Originally developed for control of inventories, the technique is so versatile that it is applicable not only to inventory control, but in almost every field, where a large number of items or a large number of characteristics are to be watched and controlled by an executive³⁷.

ABC analysis is an important technique of inventory management. It will serve as a very useful weapon of controlling inventories and if properly utilised it contributes significantly to industrial merchandise and other organisations³⁸.

The first step in the inventory control process is classification of different types of inventories to determine the type and degree of control required for each. The ABC system is a widely used classification technique to identify various items of inventory for the purpose of inventory control. These techniques based on the consumption that a firm should not exercise the same degree of control on all items of inventory. It should rather keep a rigorous control on items that are (a) most costly and/or b) slowest turning while items that are less expensive should be given less control effort.³⁹

The ABC analysis is an analytical management tool for focussing attention and applying effort the area of inventory management ensuring control over inventories. According to this system, inventories are categorised in to three classes Viz., A, B and C on the basis of magnitude of value of components of inventories to the total inventory. The items included in group 'A' involve the largest investment. Therefore, inventory control should be most rigorous and intensive and the most sophisticated inventory control techniques should be applied to these items. 'C' group consists of items of inventory, which involve relatively small investments although the number of items is fairly large. These items deserve minimum attention. 'B' group stands mid-way. It deserves less attention than 'A' but more than 'C'. Employing less sophisticated techniques can control it. The tasks of inventory management are to properly classify all the inventory items into one of these three categories.

The value of items in Class 'A' may be significant as a result of⁴⁰.

- * The usage being sustained, though per unit cost of items may be small.
- * Per unit cost of items being substantial, though the usage may be small.
- * Both per unit cost of items and usage being substantial

VED Classification

VED stands for vital, essential and desirable. It applies largely to spare parts. The demand for spare parts depends on the performance of equipment. The vital spares should be stocked adequately. Essential parts may be stocked rather sparingly, for some risk can be taken stocking such spares. Desirable spares may be dispensed with if the lead-time for their procurement is low. It may be remembered that this classification is done by the technical department of an organisation and that will have to be combined with an earlier classification.

FSN Classification

The letters stand for fast moving, slow moving, non-moving. The FSN classification is mainly attempted on the basis of consumption pattern. It is made on the basis of how the materials have moved during the earlier periods, and is often, combined with XYZ classification, which is based on value of items in storage. The FSN classification helps in timely prevention of obsolescence. When FSN classification is made, all such information stands out prominently enabling the managers to act on the information in the best interests of the organisation.

HML Classification

HML stands for high cost, medium cost, low cost, this classification is made on the basis of the unit value of an item. Some items may be of low value while others may be of high value. The items should be listed out in descending order of unit value and management may fix limits for deciding the three categories. For example, it may decide that all items of the unit value above Rs.5000 will be H items, between Rs 1000 to 5000 will be M items, and below Rs 1000 will be L items. On this basis, the management may delegate the authority to various subordinate officers to purchase petty cash items.

SDE Classification

SDE stands for scarce, difficult and easy. It is made on the basis of scarcity of materials. The materials are classified on the basis of the nature of suppliers, the quality and continuity of supply, the lead-time involved and such other considerations. A scarce item might be an item, which is not easily available in the market, or else it might be an item. Which is very difficult to manufacture for there are only one or two manufactures that have to be given orders several months in advance and soon?

GOLF Classification

This word stands for Government, ordinary local, and foreign. There are many items of import, which are channelized through the State Trading corporation Indian drugs and pharmaceutical limited, and minerals, & metals trading corporation. There are special procedures to be followed for procuring such items. As such ordinary procedures of inventory control may not work in respect of these materials they would require special treatment. Similarly, items, which are available with in the country, could be treated differently, if they were available locally. Imported items would be a special class by themselves and have to be accorded a treatment, which is quite unique.

SOS classification

It stands for seasonal and off-seasonal. Some of the items required are seasonal in nature and require special purchasing and stocking strategies. Many commodities especially of agricultural origin and seasonal in character have to be purchased at the best time; one cannot apply EOQ (Economic Order Quantity) here for example. Inventories at the point of procurement will be extremely high which cannot be helped. A buying and stocking strategy for seasonal items would depend on a large number of factors and a high degree of sophistication will take place in this matter. Operational research techniques have to be used to obtain optimum results.

XYZ Classification

This is attempted on the basis of the value of items in storage. The purpose is to classify inventories and their uses at scheduled interval. X items are whose inventory values are high, while Z items are those inventory values is low. This type of classification helps to identify those items, which are extensively stocked.