Inventory Management

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The term ‘inventory’ is nothing but a stock of goods that is maintained to facilitate the continuous production of goods and services. S.E. Bolten observes, “The term ‘inventory’ refers to the stockpile of the product a firm is offering for sale and the components that make up the products.”¹ In other words, it can be said that inventory is composed of assets that will be sold in future in the normal course of the business operations.

**Meaning and Definition of Inventory**

The dictionary meaning of the word ‘inventory’ is a “detailed list of goods, furniture, etc.” Many understand the word “inventory” as a stock of goods, but the generally accepted meaning of the word ‘goods’ in the accounting language, is the stock of finished goods only. In a manufacturing organization, however, in addition to the stocks of finished goods, there will be a stock of partly finished goods, raw materials and stores. The collective name of all these items is inventory.

The assets which firms store as inventory in anticipation of need are (1) raw materials, (2) work-in-process (semi-finished goods), and (3) finished goods. The raw material inventory contains in terms that are purchased by the firms from others and are converted into finished goods through the manufacturing process. The work-in-process inventory consists of items currently
being used in the production process. Finished goods represent final or completed products that are available for sale. The inventory of such goods consists of items that have been produced but are yet to be sold. To expand the definitions of inventory to fit manufacturing companies, it can be said that inventory means, “The aggregate of those items of tangible personal property which (1) are held for the ordinary course of business; (2) are in process of production for such sales; and (3) they are to be currently consumed in the production of goods or services to be available for sale.”

Black, Champion U. Miller, have given a detailed meaning and definition of inventory. It would be of interest to reproduce the language in terms of which they have explained the term ‘inventory’. According to them, “Inventories are expandable physical articles held for resale, for use in manufacturing a product or for consumption in carrying on business activity. Examples are merchandise, goods purchased by the business which are ready for sale:

**Finished goods** being manufactured for sale by the businesses that are ready goods;

**Materials** articles such as raw materials, semi-finished products, or finished parts, which the business plans to incorporate physically into the finished products;

**Supplies** articles which will be consumed by the business in its operations but will not be physically as they are a part of the product.”
In short, inventory may be defined as the materials which are either in market or usable directly or indirectly in the manufacturing process and it also includes the items which are ready for making finished products by some other process or by comparing them either by the concern itself and/or by outside parties. In other words, the term ‘inventory’ means the materials having any one of the following characteristics, It may be

(a) saleable in the market;
(b) directly useable in the manufacturing process of the undertaking;
(c) useable indirectly in the manufacturing process of the undertaking; and
(d) ready to send it to the outside parties for making useable or saleable products out of it.

In the present study raw materials, stores and spare parts, finished goods and work-in-process have been included in the inventories.

**Meaning and Definition of Inventory Management**

Inventory is called the “Graveyard of business” because it has been a basic cause of the failure of many organizations. Inventories constitute the most significant part of current assets of a large majority of companies. Because of the large size of inventories maintained by the firms, a considerable amount of funds is required to be allowed to them. It is, therefore, absolutely imperative to manage inventories effectively and efficiently in order to avoid unnecessary investment. A firm neglecting the
management of inventories will be jeopardizing its long run profitability and may fail ultimately. So, in order to manage the inventory properly, a need for inventory management arises.

Inventory management is concerned with the determination of the optimal level of investment for each component for each component of inventory and the inventory as a whole, the efficient use of the components and the operation of an effective control and review mechanism. The management of inventory requires careful planning so that both the excess and the scarcity of inventory in relation to the operational requirement of an undertaking may be avoided. Therefore, it is essential to have a sufficient level of investment in inventories.

Inventory management may be defined as the sum total of those activities, which are necessary for the acquisition, storage, sale and disposal, source of material, D. Schall Lawrence and W. Haley Charles observe, “Managing the level of investment in inventory is like maintaining the level of water in a bath-tub with an open drain. The water is flowing out continuously. If the water is let in too slowly, the tub soon gets empty. If the water is let in too fast, the tub overflows. Like the water in the tub, the particular items of the inventories keep on changing, but the level may remain the same. The basic financial problems are to determine the proper level of investment in inventories and to decide how much inventory must be acquired during each period to maintain that level.”4
L.R. Howard observes: “The proper management and control of inventory not only solves the acute problem of liquidity but also increases the annual profits and causes substantial reduction in the working capital of the firm.”

It is a subject which merits the attention of the top level management and influences the decision of the planning and the executive personnel. It is a matter of deep concern to those dealing with production, sales, forecasting, inventory planning, marketing, material handling, finance, product designing, etc.

Inventory management helps to manage stock in such a manner that there are no excessive and inadequate levels of inventories and a sufficient inventory is maintained for the smooth production and sales operation. Thus, the objective of inventory management is to determine the optimum level of inventory.

**Objectives of Inventory Management**

A fundamental objective of a good inventory management is to place an order at the right time from the right source to acquire the right quantity at the right place and quality. While developing an appropriate level of inventory the following objectives should be kept in mind:

- Investment in inventory should be kept minimum so that undue amount is not locked up in it as investment in inventories involves costs.
- A firm should make effective efforts in buying quantity of raw materials in accordance to its needs.
- Continuous efforts should be made to shorten the production cycle. The longer production cycle runs heavy costs and the risk of the extra inventory investment.

- A firm should maintain inventory to such a level that smooth and unhampered production is ensured without any obstruction.

- A firm should maintain sufficient amount of finished goods to meet the demand of customers regularly because if it is not done then the customers may shift to the competitors, which will amount to a permanent loss to the firm.

- To the extent possible, a firm should try to minimize the possibility of the risk of loss through obsolescence or shrinkage in the market value between the time of purchase of manufacture on the one hand and the time of sale, on the other.

- To serve as a means for the location and disposition of inactive and obsolete items of store.

- To keep all the expenditures within the budget authorization.

Inventory management, therefore, should strike a balance between too much inventory and too little inventory. The efficient management and effective control of inventories help in achieving better operational results and reducing investment in working capital. It has a significant influence on the profitability of a concern.
Motives for Holding Inventory

The question of managing inventories arises when the concern holds inventories. Holding up of inventories involves tying up of the concern’s funds and carrying costs. If it is expensive to hold inventories, why do concerns hold inventories? There are three motives for holding inventories.6

(a) Transaction motive;
(b) Precautionary motive; and
(c) Speculative motives.

Inventories are held merely for the purpose of carrying on transactions smoothly, and at the same time, ensuring that the cost of ordering is kept minimal. Such a motive is called transaction motive. Sometimes, inventories are increased as a hedge or protection against stock-out when it becomes clear to the management that the lead-time for any particular item is likely to increase or there is a possibility of short supply. This increasing of the safety stock arises from purely a precautionary motive. Lastly, a situation may arise when an all-round price increase is expected due to market demand or due to changes in cost. In such a situation, the company management is keen to hold on to the inventories or increase them in order to get a better price for the finished goods. Such a motive is known as the speculative motive.

Inventory Control

Inventory control refers to a system, which ensures the supply of required quantity and quality of inventory at the required time and at the same time prevents unnecessary
investment in inventories. According to P.K. Ghosh and G.S. Gupta, “Inventory control is concerned with the acquisition, storage, handling and use of inventories so as to ensure the availability of inventory whenever needed, providing adequate cushion for the contingencies, deriving maximum economy and minimizing wastage and losses.”

Designing a sound inventory control system is in a large measure of a balancing operation. It is the focal point of many seemingly conflicting interests and considerations, both short-range and long-range.

Inventory control is concerned with keeping the desired inventory level and maintaining it. Its basic objective is to keep an adequate inventory level and maintaining it at the minimum inventory carrying cost. The aim of inventory management, thus, should be to avoid excessive and inadequate levels of inventories. Efforts should be made to place an order at the right time with the right source to acquire the right quantity at the right price and quality.

The efficiency of inventory control affects the flexibility of the firm. Inefficient procedures may result in an unbalanced inventory, sometimes out of stock or overstocked, necessitating excessive investment. These inefficiencies ultimately will have an adverse effect on profits. Turning the situation around, differences in the efficiency of the inventory control for a given level of flexibility affect the level of investment required in inventories. The less efficient is the inventory control, the greater is the
investment required. Excessive investment in inventories increases costs and reduces profits. Thus, the effects of inventory control on flexibility and on the level of investment required in inventories represent two sides of the same coin.8

In managing inventories, the firm’s objective should be in consonance with the wealth maximization principle. Various types of businesses control inventory for the following purposes to

• ensure a continuous supply of raw materials to facilitate uninterrupted production.
• maintain sufficient stocks of raw materials in periods of short supply and anticipate price changes.
• maintain sufficient goods inventory or smooth sales operations and efficient customer service.
• minimize the carrying cost and time.
• control investment in inventories and keep it at an optimum level
• minimize costs and maximize profits
• control capital investment
• take advantage of favourable raw material price, and
• protection against strikes and work stoppages and acts of God.

to achieve all these the firm should determine the optimum level of inventory and it can be done through the following inventory management techniques:
1. **ABC Analysis:**

This technique is based on selective control of inventory. Where there are many items in the inventory, it becomes essential to have a value-item analysis (known as ABC analysis) that attempts to relate how the inventory value is concentrated among the individual items and it is also known as Control by Importance and Exception (CIE). As the items are classified according to the importance of their relative value, this approach is also known as Proportional Value Analysis (PVA).

The ABC inventory control technique is based on the principle that a small portion of items in inventory may typically represent the bulk of money value of the total inventory used in the production process, while a relatively large number of items may form a small part of the money value of stores. The money value is ascertained by multiplying the quantity of materials of each item by its unit’s price. According to this approach to inventory control, high value items are more closely controlled than low value items. Each item of inventory is given A, B or C denomination depending upon the amount spent for that particular item. ‘A’ or the highest value items should be under the tight control and under responsibility of the most experienced personnel, while ‘C’ or the lowest value item may be under simple physical control.

This concept may be made clear with the help of the following:
“A” Category – It consists of items that have a high velocity or speed in usage and have a high unit value. The items included in group A involve the largest investment i.e. 70 to 75 per cent of the total value of stock and represent 10 per cent of the total number of items. This category of items requires rigorous control.

“B” Category – It consists of items that include relatively small investment i.e. 15 to 20 per cent of the total costs of inventory and 20 per cent to 25 per cent of the total number of items. Hence, slightly lesser time and efforts should be devoted to the control of such items.

“C” Category – It includes those items which are of meagre unit value i.e. 5 to 10 per cent of total value of inventories, having a low frequency in usage. These inventories represent 70 to 75 per cent of the total number of items.

The task of inventory management is the proper classification of all the inventory items into one of the above three categories. In brief, it can be prepared as follows:

Inventory reach down between number of items and inventory value under ABC analysis.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>“A” Items</th>
<th>“B” Items</th>
<th>“C” Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Tight</td>
<td>Moderate</td>
<td>Loose</td>
</tr>
<tr>
<td>Requirements</td>
<td>Exact</td>
<td>Exact</td>
<td>Estimated</td>
</tr>
<tr>
<td>Postings</td>
<td>Individual</td>
<td>Individual</td>
<td>Group or none</td>
</tr>
<tr>
<td>Check</td>
<td>Close</td>
<td>Some</td>
<td>Little</td>
</tr>
<tr>
<td>Control</td>
<td>Exact</td>
<td>Exact</td>
<td>Approximate</td>
</tr>
<tr>
<td>Expediting</td>
<td>Regular</td>
<td>Some</td>
<td>No</td>
</tr>
<tr>
<td>Safety stock</td>
<td>Low</td>
<td>Medium</td>
<td>Large</td>
</tr>
</tbody>
</table>
It is clear from the above diagram that group-A consists of 10 per cent of total items but the total value percentage is 75 per cent. Hence, effective control should be implemented on it. Group-B includes 20 per cent of total items and 20 per cent of total value. So, general or routine control is necessary for it. Under group-C, the number of times is 70 per cent of total items but their total value percentage is only 10 per cent. Hence, there is no need of effective control but such items can be taken care of by traditional methods of inventory management.

2. **Fixation of Norms of Inventory Holdings**

   The norms of inventories could be set by either the top management, or by the materials department. The top management usually sets monetary limits for investment in inventories. The materials department then has to allocate this investment to the various items and ensure the smooth operations of the concern. It would be worthwhile if norms of inventories were set by the ‘Management by Objectives’ concept. This concept expects the top management to set the inventory norms in consultation with the materials department.  

   A number of factors enter into consideration in the determination of stock level for individual items for the purpose of control and economy. Some of them are:

   1. The rate of consumption;
   2. Lead time for deliveries;
   3. Requirements of funds;
4. Storage costs;
5. Availability of space;
6. Price fluctuations;
7. Insurance costs;
8. Obsolescence risks;
9. Seasonal consideration of price and availability;
and
10. Economic order quantity.

Any decision involving procurement, storage, and usage of items will have to be based on an overall appreciation of the influence of the critical ones among them.

Carrying too much or too little of the inventory is detrimental to the company. If too little inventories are maintained, the company will have to face frequent stock-outs and incur heavy ordering costs. Very large inventories subject the company to heavy inventory carrying costs in addition to unnecessary tie-up of capital. An efficient inventory management, therefore, requires the company to maintain inventories at an optimum level where inventory costs are minimum and at the same time there is no stock-out that may result in loss of sale or stoppage of production. This necessitates the determination of the minimum and the maximum level of inventories.

1. **Determination of Minimum Level of Inventory**

   The minimum level of inventories for their reorder point may be determined on the following basis:
   - Consumption during lead time;
- Consumption during lead time plus safety stocks;
- Stock-out costs;
- Customer irritation and loss of goodwill; and
- Production holds out.

The company which intends to have stock requires sometime processing the order. Time is also required by the supplying firm to execute the order. This period is called ‘Lead Time.’ To continue production during this period, it is essential to maintain some inventories.

There are sometimes fluctuations in the lead-time and/or in the consumption rate. If no provision is made for these variations, stock-outs may take place causing disruption in the production schedule of the company. The stock, which takes care of the fluctuation in demand in the wake of the variation in the lead-time and the consumption rate, is known as safety stock. It can be determined on the basis of the past experience of the delays in receiving supplies, fluctuations in the consumption rate, plus other relevant factors such as transport bottlenecks, strikes or shutdowns. In the case of uncertainty, the probabilistic approach may be applied to determine the safety main. To avoid stock-outs out of such eventualities, companies always carry some minimum level of inventories including safety stock. Safety stock provides cushion against expected increased usage or delay in delivery time. Safety stock may not be static for all the times. A change in the circumstances and the nature of industry demand an adjustment in its level.
The study has revealed that most of the companies covered under study determine their minimum level of inventory on the basis of consumption during the lead period, while some of them do so on the basis of consumption during the lead period plus safety stock.

The companies under study maintain safety stock for the variation in the consumption rate for the supply conditions in the goods and for variation in the lead period and variation in the consumption rate. The companies keep the level of safety stock throughout the year.

2. Determination of Maximum Level of Inventory

The study group on bank credit observed that “It is not the function of industry to carry stock in excess of what is required for current operations, as otherwise the industry will be taking over the functions of the traders.” In practice in spite of the consciousness towards this fact, some of the companies carry inventory much more than their current requirements. According to Van Horne, “Inventories should be allowed to increase the resulting savings exceed the total cost of holding the added inventory. The balance finally reached depends upon the estimates of the actual savings, the cost of carrying additional inventory and the efficiency of inventory control.”\textsuperscript{10} Other things remaining the same, the firm will go on increasing its inventory, till the opportunity cost of funds is less than the estimated return from investing funds in inventory. Supply of goods also influences the inventory level.\textsuperscript{11}
Generally, any one or more of the following factors may be a primary or secondary consideration for the firm while accumulating more and more of the inventories:

- Future production plans;
- Opportunity cost of funds employed
- Supply conditions of goods;
- Price changes;
- Carrying cost of inventories, such as insurance, interest and rent etc.
- Build discount;
- Bulk transportation costs;
- Import consideration;
- Storage space available.

3. **Ordering System of Inventories**

In managing inventories, the business enterprise’s objective should be in consonance with the wealth maximization principle. To achieve this, the enterprise should determine the optimum level of inventory; sufficient inventories should be maintained, neither excessive nor inadequate.

To manage inventories efficiently and effectively the answer should be sought to the following two questions:

1. How much should be ordered?
2. When should it be ordered?

The first question, how much to order? relates to the problem of determining Economic Order Quantity (EOQ) and is answered with an analysis of the costs of maintaining certain level
of inventories. The second question, when to order? rises because of uncertainty and is a problem of determining the reorder point.

Harvery M. Wagner\textsuperscript{12} suggested that one basic problem of inventory control is How much to order? To solve this problem many formulae and models have been developed. All inventory models no matter how complex, address themselves to the problems of timing and magnitude of replenishment. Decisions regarding the problems relating to ordering of inventory are very much affected by ordering and carrying costs. The expenses, which are incurred by the company to acquire inventories, are known as ordering costs. Carrying of inventories includes the following:

- Cost of interest of the money invested in inventories:
- Salaries and wages of staff assigned the duty to look after the receipt, issue and the proper storage of inventories;
- The rent or depreciation of godowns;
- Expenses for the insurance of inventories;
- Loss on account of deterioration and obsolescence;
- Repairs and maintenance charges for equipment used in handling of inventories; and
- Other miscellaneous expenses.\textsuperscript{13}

The inventory ordering and carrying costs are inversely related to each other. The ordering system must strike a balance between these two costs so that the total inventory costs (ordering costs plus carrying costs) may be the minimum. There are three important systems of ordering materials; they are:
- Fixed order quantity system, popularly known as Economic Order Quantity (EOQ) system.
- Fixed period order system or periodic recording system or replenishment system.
- Single order and scheduled part deliveries system.

**Economic Order Quantity**

One of the major inventory management problems to be resolved is how much inventory should be added when inventory is replenished. If the firm is buying raw materials, it has to decide the lots in which it has to be purchased on replenished. If the firm is planning a production run, the issue is how much production to schedule (or how much to take). These problems are called order quantity problems, and the task of the firm is to determine the optimum or economic order quantity (or economic lot size). Determining an optimum inventory level involves two types of costs (a) Ordering Costs, and (b) Carrying Costs. The economic order quantity is that inventory level, which minimizes the total of ordering and carrying, costs.

If a company buys in large quantities the cost of carrying inventory will be high because of the high investment involved; on the other hand, if purchases are made in small quantities, frequent orders with corresponding high ordering costs will result in high cost. Therefore, the quantity to be ordered at a given time must be determined by balancing two costs, *viz.*, the acquisition cost and the cost of carrying inventories. Buying in large quantities
may decrease the unit cost of ordering but this saving may be more than-off set by the cost of carrying inventory in stock for a longer period of time. Taking into consideration both the points is necessary to ascertain the quantity, called the “Economic Ordering Quantity”, which can be most economical for the company.

The EOQ model attempts to determine quantity to be ordered at a time so as to optimize the cost of carrying and holding inventory and also ensuring availability of that item whenever needed. The most economic size of the order is determined by considering the cost of carrying the inventory, its purchasing, and its ordering costs and usage rate. The EOQ model is based on the following assumptions:

- The usage of a particular item for a given period (usually a year) is known with certainty and that the usage rate is even throughout the period.
- That there is no time gap between placing an order and getting its supply.
- The cost per order of an item is constant and the cost of carrying inventory is also fixed and is given as a percentage of average value of inventory.
- That there are only two costs associated with the inventory, and these are the cost of ordering and the cost of carrying the inventory.
Given the above assumptions, the EOQ model may be presented as follows:

\[
EOQ = \sqrt{\frac{2U \times P}{S}}
\]

where,

- \(EOQ\) = Economic Ordering Quantity.
- \(U\) = Annual Consumption (units) during the year.
- \(P\) = Cost of placing an order
- \(S\) = Annual cost of storage of one unit.

**The graphic presentation:** The economic order quantity can also be shown graphically. Figure 1.1 illustrates the EOQ function.

![Figure 1.1 - Economic Order Quantity Function](image-url)
In the above figure, costs – carrying, ordering and total are plotted on vertical axis and horizontal axis is used to represent the order size. We can analyze that total carrying costs increase as the order size increases and the ordering costs decline with the increase in the order size because the larger order size means the less number of orders. The total costs decline in the first instance, but they start rising when decrease in average ordering costs is more than off-set by the increase in carrying costs. The economic order quantity occurs at the point where the total cost is minimum.

**Periodic Reordering System**

In this system as the name suggests order is placed after a fixed period for the quantity by which the inventory level has come down from a predetermined level called as the periodic reordering system or replenishment level. This system is more popular as Re-Order point. “It is determined on the basis of the requirement of materials during the review period and lead time plus safety stock. The review period is decided keeping in view the terms of the suppliers regarding the minimum quantity, etc., and the average consumption rate of the firm. On the review date, order for the required amount is placed to bring the inventory to the predetermined level.”

**Single Order and Scheduled Part—Deliveries System**
This system as a single order covers an enterprise’s requirements of materials for a longer period, say, for six months or one year, with the instructions to supply material in a number of instalments at a stipulated time or at specified intervals. This system ensures continuous supply of materials. The concern has not to incur high ordering and carrying costs, nor make heavy investment in inventory; it is also spared with the inconvenience of arranging for storage space etc. in fact the concern enjoys the economies of scale from bulk order.

**Evaluation of Inventory Management Performance**

All efforts of the company management to control inventory should aim at keeping various components of inventory at economical levels and in proper proportions. Inventory may be divided into the following categories on the basis of the functions it performs:

- Raw materials,
- Work-in-process,
- Finished goods,
- Stores and Spares.

Some of the above components are prone to a high degree of control whereas others may not be controlled easily. The stock of raw materials and stores and spares can be reduced to a level where it does not hamper the production process. The amount of work-in-process is, generally, determined by the length of the
production cycle. The market forces and the nature of the industry determine the stock of finished goods.

Some of the above components of inventory are fast moving while others are moving slowly. If unduly large funds are blocked in slow moving segments, it will not only place a financial burden but also affect adversely the liquidity of the working capital of an engineering company. Therefore, for efficient control of inventory, company management must try to allocate limited funds to each component of inventory in an optimal manner.

**Significance of Study**

As we have now approached the twenty-first century, inventory management will assume increasing importance in the industrial world. To date, only the most progressive manufacturing firms realize that materials availability, engineering, purchasing, specifications and fabrication costs are all factors which ultimately contribute to total material cost. Progressive firms also realize that all factors which affect material cost should be coordinated and controlled by a system-oriented inventory management approach, if the total materials cost is to be minimized. The factors just mentioned, coupled with the fast increasing use of computer-based information systems, increasing international business activity and growing materials shortages highlight the importance and opportunities for sophisticated management in this area.
Inventory management has a significant role in the Indian economy. In several industries more than 50 per cent of the total cost of the product or the job is generally the cost of materials alone. The shipyard industry is one of them. Unfortunately, the importance of proper materials management has not been fully realize in India and very little attention has so far been paid to the task of controlling investment in materials through the application of various scientific techniques. In contrast, advanced countries of the West and Asian countries like Japan have made gain strides in the successful use of inventory management techniques.

In view of the above reasons, it has become all the more important to study inventory management of the Shipyard Industry of India.

Shipyard Industry

The shipbuilding industry in India has a chequered history throughout centuries. It declined almost to the point of extinction during foreign rule and revived after the establishment of national government in India (Sahai. IM, 1971). In India, ships building and shipping industries have had an unbroken tradition exceeding over 6,000 years dating back to Mohonjodara and Harappan period. It takes us to distant past when art of building ships had reached high degree of development, centuries before it had a beginning in other parts of the then known world. The oldest evidence is supplied by the *Rigveda* (1500 B.C.) that contains several references about the construction of ships in India in those
age-old centuries (V.C.S. Sastry, 1962). The Maurya period, which roughly coincides with the Indian campaign of Alexandar the great (327 B.C.) saw considerable development in this industry. The industry was flourishing, its output and employment potential also was very high. According to Strabo (60 B.C. to 19 A.D.) for example, Alexander constructed fleet with the help of Indian artisans, from pine cedar and other trees obtained from the forest in the territory of King Poras.

During the days of Moghalas, the imperial Nowwara (Flotilla) was a sight to be seen. Akbar the great, had a flotilla of 3000 vessels; the boats required to be furnished by the Jageerdars were extra.

There were a number of shipbuilding yards, the most important being at Hoogly, Balasur, Murgangi, Chilmiri, Jessori, and Karibari. Abul Fazal said that in the province of Sindh, the Sarkar thatta alone could provide 40,000 vessels ready for hire. Under Shivaji, the Marathas built a formidable fleets. He established shipbuilding yards first at Kolava, Suvarna Durg, and Vijaya Durg, and later at Bombay in 1735. In addition to these, there were six other managed by Parsi forms, ships built at these yards weighed from 600 tonnes to 1,300 tonnes.

Seven generations of master builders of a single Parsi family of Lowjee and Nassarjee Wadia had been the head builders of ships in Bombay Building Dock continuously from 1736 to 1837. They were the regular suppliers of various types of ships to the English and other nations. The battleship ‘Asia’ built by Nowrojee
and Cursetjee in 1824 was flagship of Admiral Bcordington, in the Battle of Navarian. At this battle, the Anglo-Greek units destroyed the entire Turkish and Egyptian fleets.

In 1829, the first steamship ‘HUGHLINDSAY’ was built in this dock and within a decade, the iron ship the ‘Planet’ was constructed and launched at Bombay. In Calcutta docks, over 35 vessels were built between 1717 and 1800, aggregating 17,020 tonnes.

Simultaneously the construction of typical Indian ships made of various timbers continued as usual. The decline of Indian shipbuilding began after 1840 and no large ships were built since. On one side, the Indian enterprise was struggling to assert itself and on the other, there were vested interest of much mightier forces to curb and crush Indian efforts. The unequal pattern of the struggle and concern over the consequences were reflected in a nationalist press and heard in the parliament house. In the words of Mahatma Gandhi, Indian shipping industry “had to perish so that the British shipping might flourish”. India had been throughout history a ship building nation. Since the days of Indus Valley Civilization to advent of British rule, the Indian seafarers had been known for their spirit of adventure, and Indian ships for their excellence and elegance, Indian shipbuilding and ship repair industry had provided support to the allied powers during the tow world wars. Under foreign domination, the ship building industry suffered a serious set back. At the same time of transfer of power in 1947 ship building in Indian was a languishing
industry. Even during those dark days, some Indian industrialists of vision and will power continued relentless war against vested interest to save the industry from a complete collapse. Indian shipbuilding industry is being resurrected on foundation laid down by those pioneers.

Ship building in India is not a new industry but has long history. Long before the European powers came to India, Indian mariners had carried India’s trade with South-east Asia and established a thriving trade partnership with east and west. The East India Company recognizing the excellence and durability of ships built in India established several shipbuilding yards in India. Between 1800 A.D. and 1840 A.D. a large number of naval crafts and merchants were built in the shipyards. However, the increase of power and entrenched authority of the British rule in India brought about accelerated decline in Indian ship-building and shipping industry to serve the interest of their own relevant industries.

The economic significance of shipbuilding industry lies in the fact that it generates substantial direct employment and also support to a large number of auxiliary industries and too together offer a big economic and employment potential. To the extent, Indian ship owners buy Indian built ships, it saves the country’s large amount of foreign exchange Considering the employment generation potential, along with its impetus on the development of the ancillary industry, the ship building industry has to play a vital role in the overall national economic growth.
Shipbuilding industry in India on modern lines dates back to eighteenth century when Mazagaon Dock Limited (MDL) was established in the then Bombay. The MDL was taken over by the Government of India in 1969.

The second shipyard Garden Reach Shipbuilders and Engineers Limited was setup in 1884 and taken over by the Government of India in 1960. Hooghly Dock and Port Engineers Limited was setup in Calcutta in 1901 and taken over by the government of India in 1984. The Hindustan Shipyards Limited, Visakhapatnam was setup in 1941 by Sri Walchand, Halchand and taken over by Government of India in 1952. Goa Shipyards Limited was established in 1967. Cochin Shipyard Limited the youngest Indian shipyard and which builds largest Indian vessels was set up at Cochin by the government in 1972. Central in land Water Transport Corporation Limited was established at Calcutta in 1967. After independence, Government of India has taken a number of steps for the augmentation of shipbuilding and ship repair industry commensurate with overall national objective and priority. The main thrust of developmental activities during the Ninth Five Year Plan aims at upgradation of technology and productivity, modernization of ship repair facilities, creation of national ship design and research centre, additional thrust on ancillary development and initiating research and development work.

Shipbuilding is a unique industry, which is both capital and labour intensive. Huge amounts of investments are necessary to
setup facilities of shipbuilding. Unlike process industries, shipbuilding involves deployment of sizeable labour force and managerial personnel. The government has invested significant amount of money in this priority sector. In the Indian shipbuilding scenario, public sector occupies a predominate role. The shipbuilding industry has been reserved for the public sector in terms of Industrial Policy Resolutions of 1948 and 1956. However, the private sector is allowed to construct “mechanized sailing vessels” up to 10,000 dwt. The role of private sector is to supplement the efforts of the state in this activity. At the end of 31st March, 1997, there were seven public sector shipbuilding units in the country engaged in manufacturing, selling, repairing of warships, repairing of cargo ships, passenger ships, tugs, barges, trawlers, assault boats, floating docks and dredges etc. The names of the public sector shipbuilding units and their incorporation particulars are given in the following table:

### A brief narration of all the public sector ship building units in India

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Shipyard</th>
<th>Year of establishment</th>
<th>Year of incorporation as public sector unit</th>
<th>Administrative Ministry/ Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Goa Shipyard Limited</td>
<td>1957</td>
<td>1967</td>
<td>Dept. of Defence Production</td>
</tr>
<tr>
<td>2.</td>
<td>Central Inland Water Transport Corporation Limited</td>
<td>1901</td>
<td>1967</td>
<td>Ministry of Surface Transport</td>
</tr>
<tr>
<td>4.</td>
<td>Garden Reach Shipbuilders and Engineers Limited</td>
<td>1884</td>
<td>1967</td>
<td>Dept. of Defence Production</td>
</tr>
<tr>
<td>5.</td>
<td>Hindustan Shipyard Limited</td>
<td>1941</td>
<td>1952</td>
<td>Ministry of Surface Transport</td>
</tr>
<tr>
<td>6.</td>
<td>Hooghly Dock and Port Engineers Limited</td>
<td>1901</td>
<td>1984</td>
<td>Ministry of Surface Transport</td>
</tr>
<tr>
<td>7.</td>
<td>Mazagaon Dock Limited</td>
<td>1934</td>
<td></td>
<td>Dept. of Defence Production</td>
</tr>
</tbody>
</table>
Of these seven shipyards, GRSE Limited, Kolkata, MDL Mumbai, GSL, Goa are under the administrative control of department of defence production, ministry of defence. These shipyards are mainly intended to cater the requirements of the Indian navy, but a part of their capacity is also available for construction of other types of vessels. The remaining four shipyards CSL, Cochin, CIWTC Limited, Kolkata, HDPE Limited, Kolkata, HSL Visakhapatnam are under the administrative control of ministry of surface transport.

**Growth of Public Sector Shipbuilding Industry**

The progress of industrialization over the last four decades has been a striking future of Indian economic development. The process of the industrialization was launched as a conscious and deliberate policy in the early 1950 and in pursuance of this policy, large investments have been made in building up of capacity in a wide spectrum of industries. A significant aspect of industrial development during this period is the predominant role assigned to the public sector in the establishment basic industries like steel, non-ferrous metals, petroleum, power, coal, fertilizer, heavy engineering and shipbuilding. The Ninth Five Year Plan has given emphasis for additional investment infrastructure sector consisting power, petroleum, coal, steel and shipbuilding with a view, especially, to overcome a wide gap between the demand and supply position of the looking to dominant role of the
industry in the Indian economy, the purpose of study becomes justified.

Among the components of working capital, inventory occupies the key position. Inventories constitute a major portion of current assets and account for a significant proportion of the total assets of most of the manufacturing organizations.

Among the number of managerial problems one of the most important problems bothering the executives is the problem of inventory management. In a developing economy like ours, capital resources are limited. Hence with the limited capital resources, every company has to increase their production. In this effective inventory management assumes great importance. Reckless management of inventory has wrecked many otherwise prosperous units in any economy. The problem to be investigated in this study comprises grave consequences such as colossal waste of inventory, erosion of profitability and liquidity, decreasing production, problems in the storage, identification and distribution uncertainty about the time when materials are needed and quantity required, problems in converting requirement estimates into provisioning quantities, problem in procurement, inferior quality of materials etc.

**Objectives of the Study**

The objectives of the study are:

1. to find reasons for low capacity utilization and to give practical solutions to overcome this problem.
2. to suggest ways and means to increase the return on investment.
3. to suggest certain techniques to increase the overall efficiency.
4. to suggest scientific inventory management tools and techniques to overcome the present problems in inventory management.
5. to suggest certain techniques to reduce material cost and cost of production.

Scope

The study has covered the major units like Goa Shipyard Limited, Central Inland Water Transport Corporation, Cochin Shipyard Limited, Garden Reach Shipbuilders and Engineers Ltd., Hindustan Shipyard Ltd. and Mazgaon Dock Limited.

A comparative study of the above units has been made to suggest corrective measures.

The study has been mainly concentrated on inventory management. The functioning of stores and purchase departments has also been covered by this study. Wherever necessary, the information has been obtained by other functional heads like factory accountant, planning engineer, production manager etc. The study will also have focused on production and finance department at appropriate places.

Hypothesis
Mismanagement of inventories and the irregular supply of the critical parts when they are needed is being mainly responsible for the unsmooth and irregular production by the various shipyard companies in India. Therefore, proper and efficient management of inventories is of utmost importance. Unfortunately, there are several weaknesses in the existing practices of inventory management which until recently had been left entirely unbridled. The rationale for norms and the need to link inventory management requirements is, thus, clear. Eventually, the entire system of material planning is to be dovetailed, to create better management of inventories.

**Research Design and Methodology**

Methodology includes use of statistical techniques, inventory control techniques included various analysis.

**Tools to be Used in the Collection Data**

**Primary Data** – A questionnaire to be issued to the units covered to elicit relevant data from personal interviewing of executives, Planning commission and other concerning government officers of the related departments, academicians and financial analysis in real life setting.

**Secondary Data** – Annual reports and financial statements of the selected companies, inventory and financial statistics from various journals, periodicals, newspapers and reports, Economic
Survey, Journal of Accounting and Finance, margin, productivity, the Material Management journals. The Economic Times and Financial Express etc., books and various publications of financial institutions and Reserve Bank of India, published and unpublished works of research scholars and available studies.

The problem of inventory management in every company has not so far been subjected to objective and scientific research consequent upon vast changes and new developments in the inventory control techniques witnessed after inventory policy parameters laid down by the Government of India and the set-up of canalizing ageci3s. The policies and the policy instruments formulated by the government have far-reaching impact on the economic activity. In our developing economy, government undertakes multifarious functions which impinge upon industrial activity and are of relevance to inventory management. Through this searching analysis I hope to come up with a whole gamut of insights not hitherto highlighted until now. The study being the first of its kind assumes paramount significance in the existing economic environment where, we have sufficient human and natural resources but our capital resources are extremely limited. In this situation, every company must follow effective and proper inventory management.

**Its likely Contribution to the Knowledge**

The present study is expected to reveal the latest facts regarding the inventory management practices prevailing in units
under the study. To highlight the malpractices which are responsible for the mismanagement of inventories and spare units. To expose the problems confronted in the context of prevent inflation shortage of funds and credit squeeze policies of Reserve Bank of India. To develop feasible solutions to alleviate genuine difficulties experienced by the Inventory Managers in all the plants in the management of inventories, such as uncertainty about the time when spare-parts are needed and quantity required, problem converting requirement estimates into provisioning quantities, problem in procurement, storage identification and distribution. The study aims to find out the solutions of the basic problems arising in the management of inventories. For example, what should be the level of inventory for a particular item that a unit should carry or how much should one procure in a lot. Replacement time is not constant but fluctuates, resulting in stock-out situation. Every company/plant must minimize such a situation. If the spare parts and other items of inventory are to be purchased, when to order and how much to order. Finally, the study aims to develop some new models of inventory management and to try to improve the existing practices in the management of inventories.

References


