Basic of inventory management

Objectives:

1. to discuss inventory management policies and objectives
2. to provide inventory management tools and techniques
3. to review financial analysis of inventory

‘’Inventory is a very expensive asset that can be replaced with a less expensive asset called ‘information’. In order to do this, the information must be timely, accurate, reliable, and consistent. When this happens, you carry less inventory, reduce cost and get products to customers faster.’’ J.David Viale

Regardles of your present skill level, you have the opportunity to increase your knowledge of inventory management.

During this semester you will find:

- Organizing questions at the beginning of each module to orient your thinking
- Learning objectives that aid in measuring and understanding
- The distilled essence of inventory management theory and planning information
- Proven skill-building exercises for adding to your professionalism

MODULE

I

Inventory Objectives and Policies

Learning Objectives

After completing this module, you will be able to

- List the four objectives of inventory management
- Describe the major types of inventory
- List the major functions of inventory

WHAT IS INVENTORY MANAGEMENT?

The objective of inventory management is to replace a very expensive asset called "inventory" with a less-expensive asset called "information." In order to accomplish this objective, the information must be timely, accurate, reliable and consistent.

> Inventory management answers the question of how much inventory is needed to buffer against the fluctuations in forecast, customer demand and supplier deliveries.

Why Management Inventory?

The major reason for managing inventory is to reconcile the following potentially conflicting objectives:

> #1 Maximizing Customer Service
>
> #2 Maximizing Efficiency of Purchasing and Production
>
> #3 Minimizing Inventory Investment
>
> #4 Maximizing Profit

thus increasing return on inventory (ROI) and return on assets (ROA). These financial measures will be discussed in Modules III and IV.

THE FOUR OBJECTIVES OF INVENTORY MANAGEMENT

#1: Maximizing Customer Service

Inaccurate customer forecasts, a multitude of changes to the original customer orders, and an overall lack of account management are the major causes of poor customer-service performance in terms of on-time delivery—not suppliers, not purchasing. The result is excessive inventory, which ultimately leads to inventory write-offs and high product cost and lower profit margins.

In establishing the customer service level, determine how often you want to ship on time. One hundred percent of the time? Maybe yes, maybe no. Is 99.86% of the time good enough? (We will answer this in Module III.) However, let's simply consider the following points:

The more accurate the individual product-sales forecasting is, the smaller the forecast error, and the less inventory needs to be carried to maintain a specified level of customer service. By carrying less inventory, the capacity of machines required to build products is better utilized. Inventory is not built before it is needed, thus avoiding the mistake of committing capacity of machines too early. By carrying less inventory, generally less space is used, and it is not used too early.

There is a basic premise (principle) of this book that states, "the larger the forecast error, the higher the desired customer service level, the more inventory that must be carried." And we are not talking about inventory at the supplier, unless there is willingness to pay expenses such as storage, insurance and other related carrying costs. These costs are some of the major "hidden costs of manufacturing" contributing to the fact that many companies have increasing revenues and decreasing profits (and stock prices).

The solution to managing these costs is the establishment of an inventory model that will be discussed throughout this book.

#2: Maximizing the Efficiency of Purchasing and Production

There are instances when inventories are held due to cost efficiencies in procurement and production.

Goods may be purchased in greater quantities than are needed in order to achieve cost efficiencies in purchasing or transportation. When goods are purchased in this way, some inventory may result. However, agreements called "volume purchase orders" (blanket POs) may be established. These allow for increasing discounts as volumes increase and, at the same time, specify that deliveries take place as needed. This approach supports the Just-in-Time philosophy in Module IV.

In manufacturing, long production runs (large lot sizes) of a single product are usually much more efficient than short runs. Managers are often measured by the amount of product they produce, which acts as an incentive for longer production runs. Long runs result in inventory that sits for long periods of time. Theoretically, this inventory represents miscommitted capacity and a reduction in machine flexibility. Remember, if you can't ship the product, don't build it—no matter what the benefits of long runtime are.

#3: Minimizing Inventory Investment

Inventories tie up cash that the company could use elsewhere in the business. Excess inventory can create a negative cash flow, something that must be avoided. This is why the Financial people work to keep inventories as low as possible.

#4: Maximizing Profit

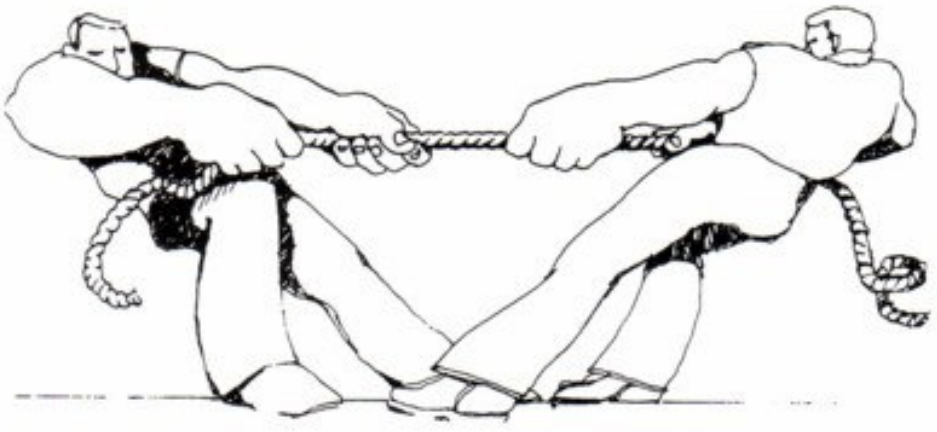
Profit can be maximized by increasing revenue or decreasing cost. One of the best ways to do this is by proper management of inventory.

HANDLING CONFLICTING OBJECTIVES

Meeting the objectives just discussed requires balancing short-term as well as the long-term objectives. Whether used to provide customer service or to achieve efficiencies in procurement or production, the need to carry inventories conflicts with management's desire to minimize inventory investment. Long production runs tend to create inventories; marketing people want stocks of a larger variety of products and options to serve a broad customer demand. High levels of inventory also take up space in factories and distribution centers, thus incurring additional cost of storage, insurance, etc.

Manufacturing, retailers, wholesalers, and even banks and hospitals are faced with balancing these objectives.

Reconciling these conflicting objectives is a primary goal of inventory management and the material presented in this book.



INVENTORY CATEGORIES

There are five basic types of inventory: *raw material, work-in-process, finished goods, distribution inventory* and *maintenance, repair, and operating (MRO) supplies.*

- **Raw Material**

  This includes all the purchased parts and direct materials that go into the end product. This type of inventory has value added to it as it flows together as subassemblies, assemblies and finally into the shippable product.

- **Work-in-Process**

  This is inventory in the process of being assembled into final products. Raw materials are released from inventory and moved to a work center. People (direct labor) and/or machines are used to add value by putting the parts together as subassemblies, assemblies and then into final products. These parts may be restocked temporarily until withdrawn for use later in the production process. While they are in this state, they may be referred to as *semifinished assemblies.*

- **Finished Goods**

  These are shippable inventories ready to be delivered to distribution centers, retailers, wholesalers or directly to customers.

- **Distribution Inventory**

  This is inventory held at points as close to the customer as possible. Distribution points, such as warehouses or stores, may be owned and operated by the manufacturer or may be independently owned and operated. However, managing inventories is necessary regardless of ownership, so the term "distribution centers" is used throughout this book to indicate intermediate storage locations, pending delivery to the final customer.

- **Maintenance, Repair and Operating (MRO) Supplies**

  These items are held by most companies. These inventories are often low cost, and include office and operating supplies and services.

It is obvious, therefore, that all organizations—whether manufacturers, wholesalers, retailers, banks, hospitals or even the Federal Reserve—have some inventory concerns.

TYPES OF INVENTORY

Theoretically, there are two components of any inventory—*cycle stock* and *safety stock.*

1. *Cycle stock* is made up of the most "active" parts contained in the inventories (the high runners).

2. *Safety stock* (finished goods), also referred to as buffer stock, is used to protect against the fluctuations in demand or supply. It makes up inventory held to buffer against fluctuations in forecast, changes in a customers order, or late shipments from a supplier. The impact of safety stock in a manufacturing environment is to release an order and bring inventory in before it is really needed. In the master schedule, safety stock is maintained to protect against forecast error.

From a physical standpoint, these two types of inventory are not separated.

In addition to the types of inventory, inventory functions represent another way of looking at inventory. All of the following types of inventory act to buffer fluctuation in supply and demand. They add no value to the process and result in additional cost to carry, store, etc. However, they are necessary in order to ensure high levels of customer service. All types of businesses (retailers, manufacturers, banks) are challenged with the conflicting objectives of minimizing inventory and ensuring high levels of customer service.

Decoupling Inventory

This is a term used sometimes instead of *safety stock* to establish a buffer between product demand and product supply. It is used in work-in-process inventories. As factory work orders pass from machine to machine, queues (stocks) of inventory are often planned to enable each work center (machine) to absorb variations in workload due to such things as product mix changes. These queues of work separate the operations so that each work center can produce somewhat independently from other work centers. The objective is to prevent idle time in the factory of expensive, direct-labor people. Decoupling stock is used most often in build-to-order job shops. Job shops will be discussed in Module II under the discussion of manufacturing environments.

Transportation (Pipeline) Inventory

This can be simply thought of as inventory that is being moved from one location to another. Typically it is from the factory to a stocking-point distribution center as close to the end customer as possible. Pipeline inventories also represent the finished goods of the supplier. The time the inventory spends in the "pipeline" has an impact on the lead times and inventory levels. The components of this transportation time include order entry, shipping, transportation and receiving time at the destination.

Anticipation Stock

This includes finished goods, work-in-process and raw materials, and is usually applied to inventory buildups for a seasonal demand or planned shutdowns of a manufacturing plant.

Hedging Stock

This includes finished goods, work-in-process and raw materials and is similar to anticipation stock. Hedging stock is a form of inventory buildup but is done in anticipation of some event that may not actually come about. This differentiates it from anticipation stock. Hedging stocks may be established because of

- Pending labor strikes in the supplier base
- Predicted price increases for materials
- Political instability in countries where suppliers are located
- Long lead-time items

SUMMARY

This module described five basic types of inventory: raw materials, work-in-process, semifinished assemblies, finished goods, and MRO supplies. Objectives for inventory are identified as minimizing investment while still providing a high level of customer service, maximizing profit and providing for efficiencies in procurement and manufacturing. Certain aggregate concerns regarding inventory center on financial objectives and measures, such as return on investment (ROI) and inventory turnover.

Company strategy often uses inventory where products have seasonal demand or where hedging may be necessary to guard against anticipated supply disruptions.

In the next module we will look at the types of inventory information systems and how each works in the various types of manufacturing environments: build-to-order, build-to-stock, engineer-to-order and assemble-to-order.

EXERCISE 1: Match Game

Match the following descriptions with the appropriate terms. See page 111 in the back of the book for the answers.

____ **1.** These inventories include janitorial supplies and services.

____ **2.** Inventory that is carried to buffer against fluctuations in forecast sales.

____ **3.** Time inventory spends in the "pipeline" that has an impact on the inventory levels, including time spent on order entry, shipping, transportation and receiving.

____ **4.** This is part of the inventory that is actively used to build products.

____ **5.** This inventory separates the operations so work centers can produce independently from each other, which prevents idle time.

____ **6.** This inventory may be established because of pending labor strikes.

____ **7.** Applies to inventory buildups before a seasonal busy period or planned shutdown.

a. decoupling inventory

b. anticipation inventory

c. safety stock

d. transportation inventory

e. maintenance, repair and operating supplies (MRO)

f. hedging stock

g. cycle stock