

# BASICS OF INVENTORY MANAGEMENT

From Warehouse to Distribution Center

J. David Viale

## ***A Crisp Fifty-Minute™ Series Book***

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**ISBN 10:** 1-56052-361-1

**ISBN 13:** 978-1-56052-361-1

Library of Congress Catalog Card Number 96-83618

Printed in the United States of America

11 12 13 14 09 08

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# LEARNING OBJECTIVES FOR:

## ***BASICS OF INVENTORY MANAGEMENT***

The objectives for *Basics of Inventory Management* are listed below. They have been developed to guide the user to the core issues covered in this book.

**The objectives of this book are to help the user:**

- 1) Learn about inventory management policies and objectives**
- 2) Use inventory management tools and techniques**
- 3) Review financial analysis of inventory management**

### **Assessing Progress**

A Crisp Series **assessment** is available for this book. The 25-item, multiple-choice and true/false questionnaire allows the reader to evaluate his or her comprehension of the subject matter.

To download the assessment and answer key, go to [www.axzopress.com](http://www.axzopress.com) and search on the book title.

*Assessments should not be used in any employee selection process.*

## ABOUT THE AUTHOR

J. David Viale is the founder and president of The Center for Manufacturing Education, an international education and training company.

Dave's career in education started as a high-school teacher; then he went on to teach at various colleges and universities.

His background includes management positions at Arthur Andersen, Hewlett-Packard, and Fairchild Semiconductor. He was a practicing CPA and is certified in production and inventory management (CPIM).

His diverse business and teaching background gives him a unique blend of theory, practicality and financial impact. With this diverse experience, he brings a cross-functional perspective to his classes, speeches, seminars and key executive presentations, which he delivers across the United States, Canada, Europe and the Far East.

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# TO THE READERS

Developing a cross-functional understanding will become a global competitive issue for “Information Age” workers.

As organizations continue to flatten and decision making is assumed by individuals and team-based groups, “cross-functional smartness” will play a vital competitive role.

Cross-functional smartness is defined as the ability to quickly grasp new information and data regarding different functional areas and use it effectively in decision-making situations.

The level of cross-functional smartness will be impacted primarily by how quickly you, your peers, suppliers and customers can acquire an understanding of other functional areas.

This book is intended to give you an in-depth understanding of one of the major business issues facing companies today—inventory management.

With the mastery of this material, you will be well on your way to contributing to the globalization of inventory management concepts and subsequent waste reduction.

J. David Viale

## WHAT'S IN IT FOR YOU PERSONALLY?

No matter how process oriented your organization is, there is always room for improvement. By using the information and tools presented in this book, you will

- Recognize potential conflicts among these areas. Although you may not have the expertise in each area to resolve differences or make decisions, you will know what key choices must be made in working out solutions.
- Develop a business perspective of inventory management and control.
- Enhance your professional portfolio of technical skills by mastering the major concepts, terms, definitions, tools and techniques that make up an inventory system.
- Understand how inventory management is applied in various manufacturing environments as well as distribution, wholesale and retail.
- Prepare for the nationally sponsored American Production and Inventory Control Society (APICS) examination.

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# INTRODUCTION

*"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."*

*"This book is intended to cover the tools and techniques in order to accomplish the above statement."*

—J. David Viale

The world of business continues to change rapidly and dramatically. No longer will we see the stability of the past; reorganization is fast becoming standard. Business organizations are having to reinvent and reorganize themselves continually in order to meet demands of the global marketplace.

Everyone is faced with the challenge of developing the most highly educated and diverse workforce ever known. Because requirements for skill levels continue to increase, less-educated workers are struggling to find jobs. The competition for goods will only become more intense.

More important, this book challenges you to upgrade your existing skills and acquire new ones. Regardless of your present skill level, you have the opportunity to increase your knowledge of inventory management. Within these pages you will find

- An organizing question at the beginning of each module to orient your thinking—all content that follows provides the answer to the question
- 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

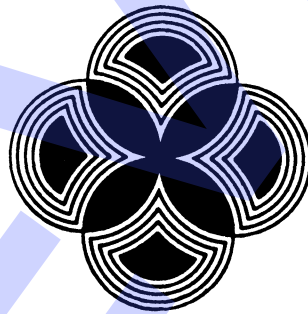
PREVIEW

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# M O D U L E

## *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

PREVIEW

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# 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.

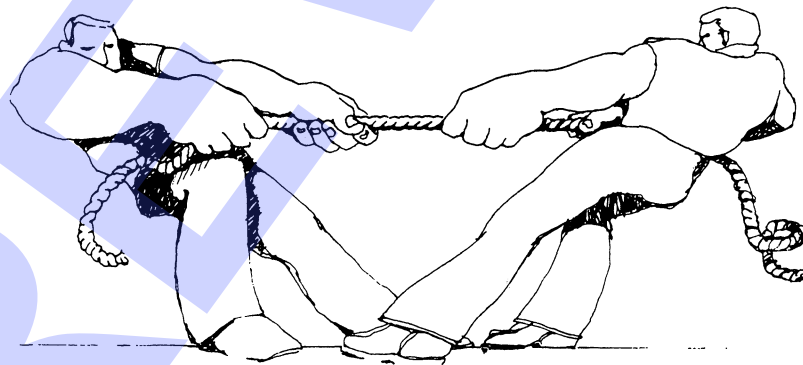


# HANDLING CONFLICTING OBJECTIVES

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 customer's 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