

INVENTORY MANAGEMENT

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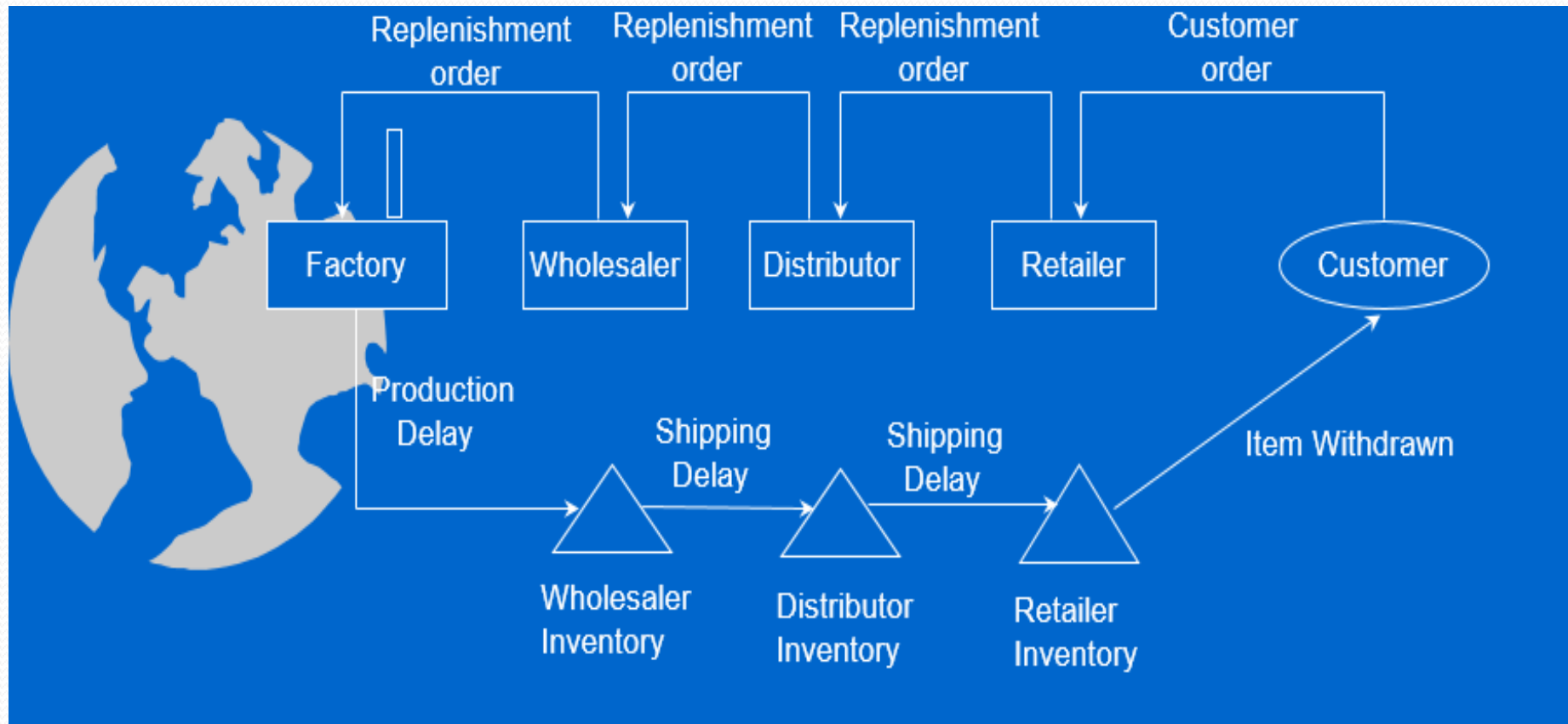
Introduction

Inventory: The value or amount of materials or resource on hand. It includes raw material, work-in-process, finished goods & stores and spares.

The objective of inventory management is to strike a balance between inventory investment and customer service. You can never achieve a low-cost strategy without good inventory management!



Where?



Importance of Inventories

Inventory can serve several functions that add flexibility to a firm's operations. The four functions of inventory are:

1. *To provide a selection of goods for anticipated customer demand and to separate the firm from fluctuations in that demand.* Such inventories are typical in retail establishments.
2. *To decouple various parts of the production process.* For example, if a firm's supplies fluctuate, extra inventory may be necessary to decouple the production process from suppliers.
3. *To take advantage of quantity discounts,* because purchases in larger quantities may reduce the cost of goods or their delivery.
4. *To hedge against inflation and upward price changes.*



Inventory Models Balancing

- Finance: keep inventory low to free up investment capital
- Purchasing: order large batches to get volume discounts
- Production: long production runs to avoid time-consuming setups and have an adequate raw material inventory to avoid production stoppages
- Marketing: have a large inventory of finished goods to avoid stock outs



Inventory Management Questions

- How much should be ordered?
- When should an order be placed?
- How much *safety stock* should be maintained in order to minimize the costs and achieve a predefined service level?



Inventory Classification

According to product type:

- Raw material inventory
- Work-in-process inventory
- Maintenance/repair/operating supply (MRO) inventory
- Finished-goods inventory.



Inventory Classification

According to the role that they play:

- Decoupling inventories
- Seasonal inventories
- Speculative inventories
- Cyclical inventories
- In-transit inventories
- Safety stocks.



Inventory Classification

- **According to the type of customer demand:**
 - certainty
 - risk, probability distribution of demand
- **According to the planning time horizon:**
 - single period or multi period
- **According to replenishment Lead Time:**
 - certainty
 - risk, probability distribution of demand
- **Inside or Outside Procurement?**
 - purchased from outside (pure inventory problem)
 - integrated with production smoothing if inside

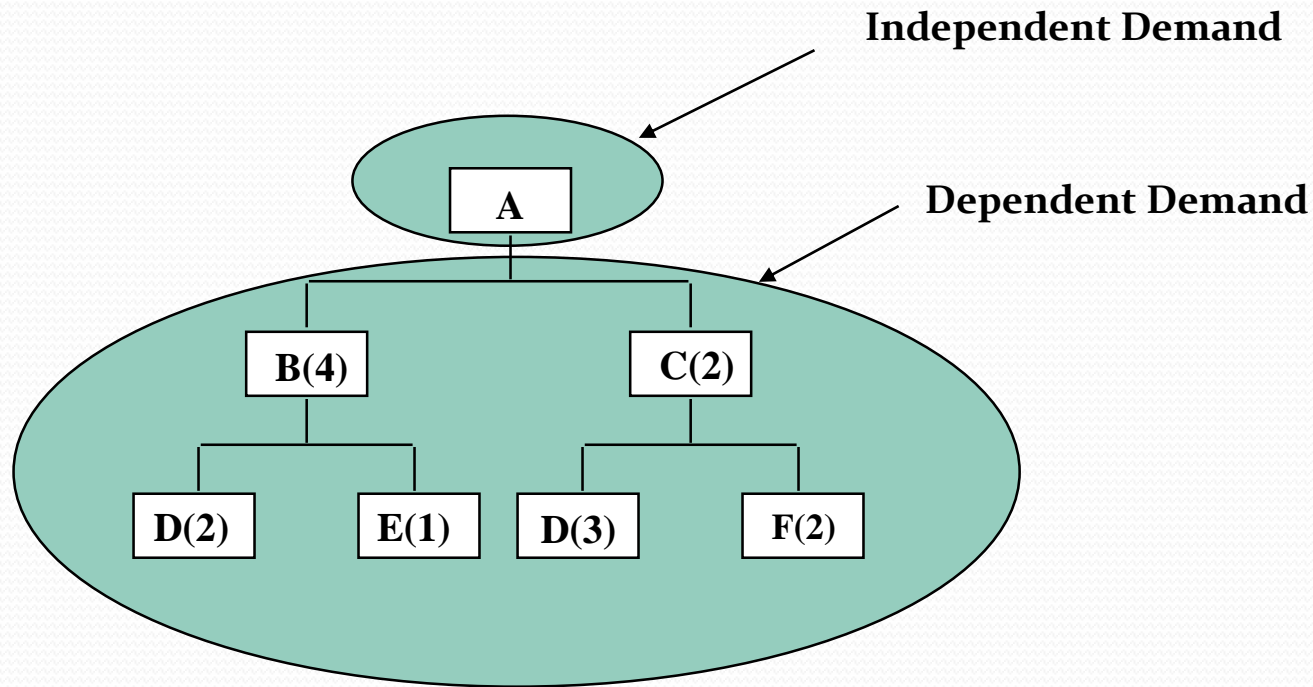


Dependent and Independent Demand

- Dependent demand: Demand for a product is linked with demand for another product, such as components, subassemblies, etc.
- Independent demand: Demand for a product/ service occurs independently of the demand for any other product or service, such as finished products, service parts, lubricants, cutting oil, greases, preservatives, etc.



Dependent and Independent Demand

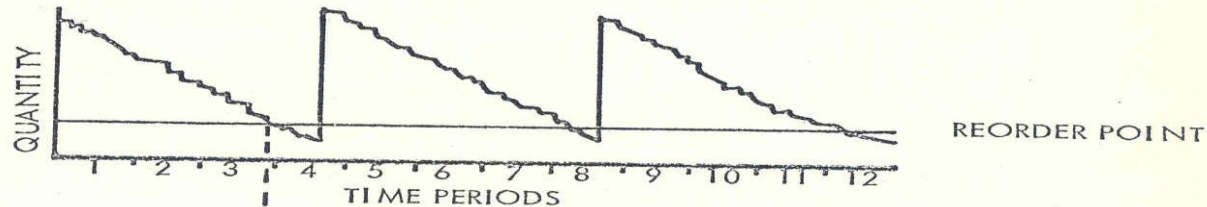


**Independent demand is uncertain.
Dependent demand is certain.**

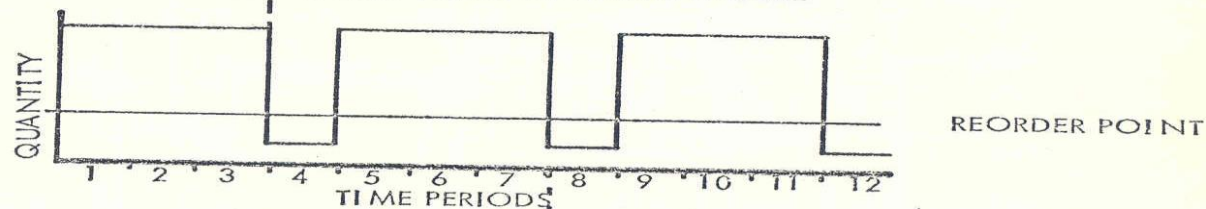
Dependent and Independent Demand

A Comparison of Independent versus Dependent Inventory Demand Patterns

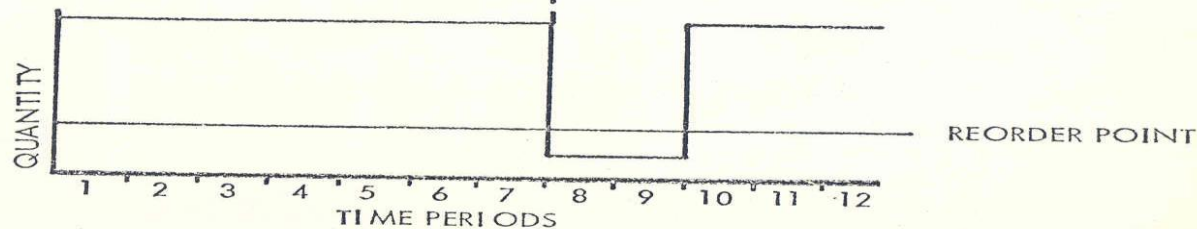
FINISHED PRODUCT ITEM - MANY SMALL INDEPENDENT DEMANDS FROM CUSTOMERS



COMPONENT OF FINISHED PRODUCT - FEW LARGE DEMANDS DEPENDENT ON FINISHED PRODUCT MANUFACTURE



RAW MATERIAL OF COMPONENT - FEW LARGE DEMANDS DEPENDENT ON COMPONENT MANUFACTURE

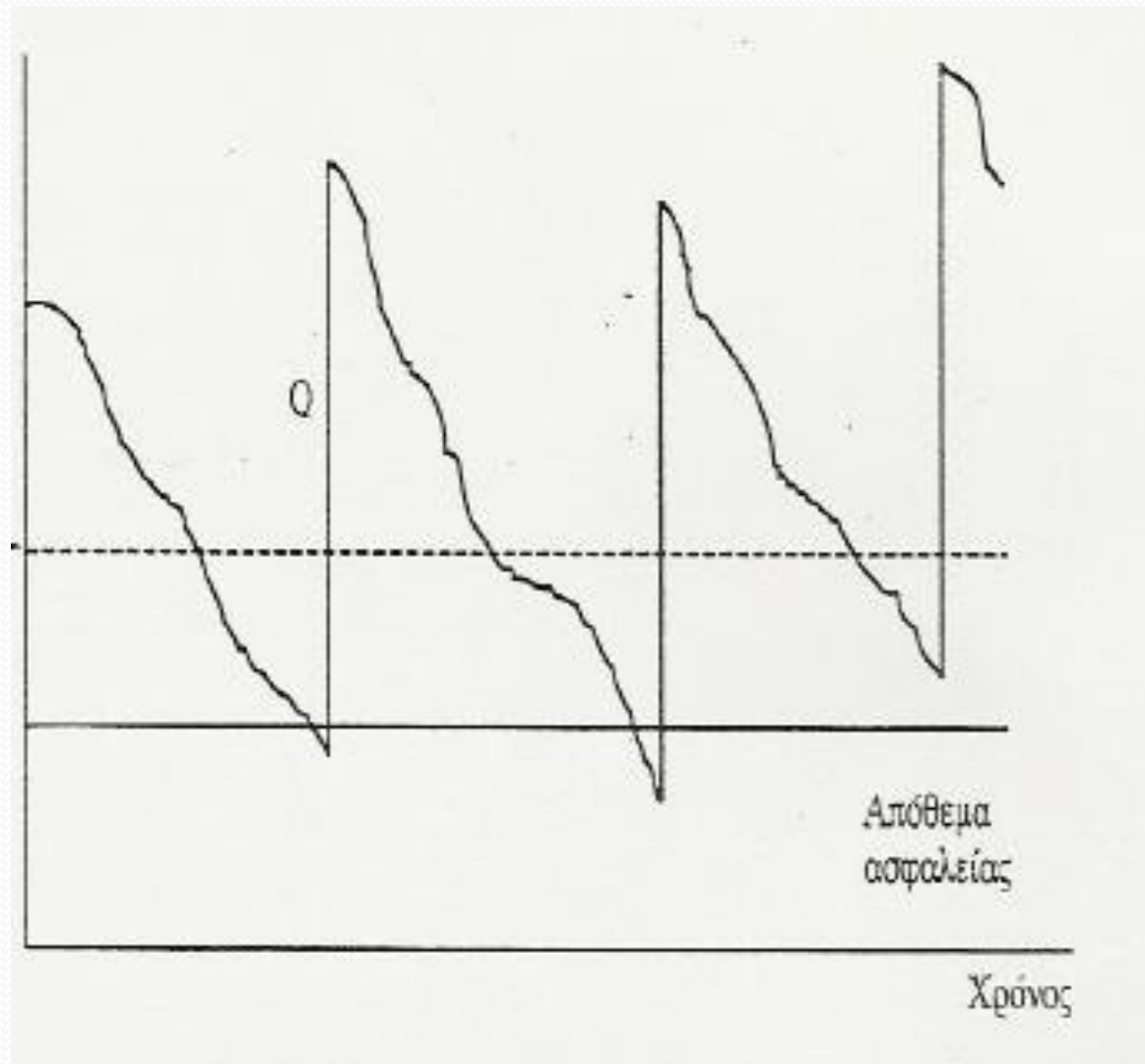


Inventory Management Systems (multi-period)

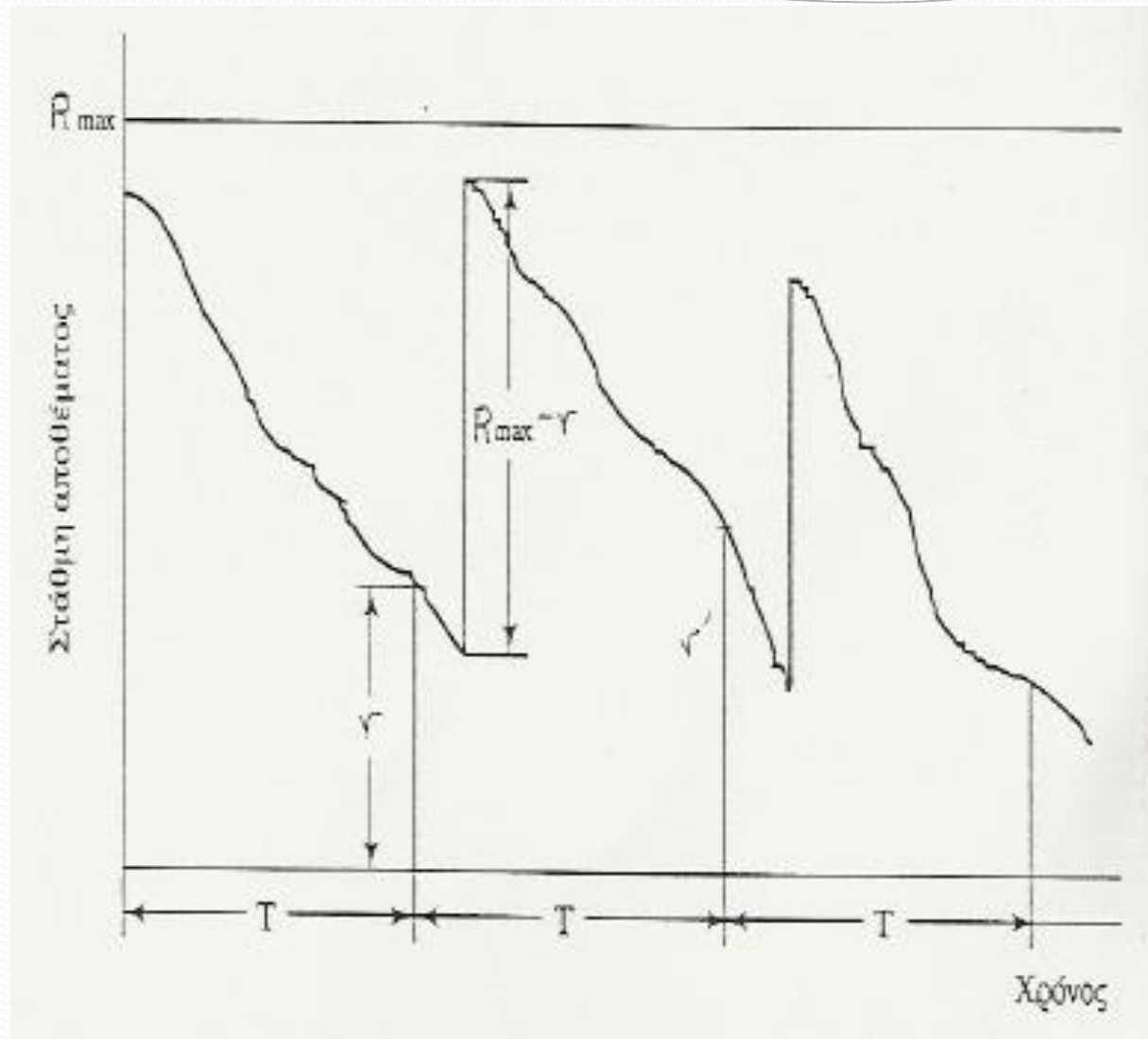
- Fixed Quantity Inventory Reorder System (Continuous Inventory Review System)
- Fixed Interval Inventory Reorder System (Periodic Inventory Review System)
- Mixed Elective Replenishment System
- MRP System.



Fixed Quantity Inventory Reorder System



Fixed Interval Inventory Reorder System



Inventory Models

Inventory Models for Independent Demand:

- Basic economic order quantity (EOQ) model
- Quantity discount model
- Model with shortages
- Model with finite capacity
- Production order quantity model

Probabilistic Inventory Models – Safety Stocks

Single Period Inventory Model

