

INVENTORY MANAGEMENT

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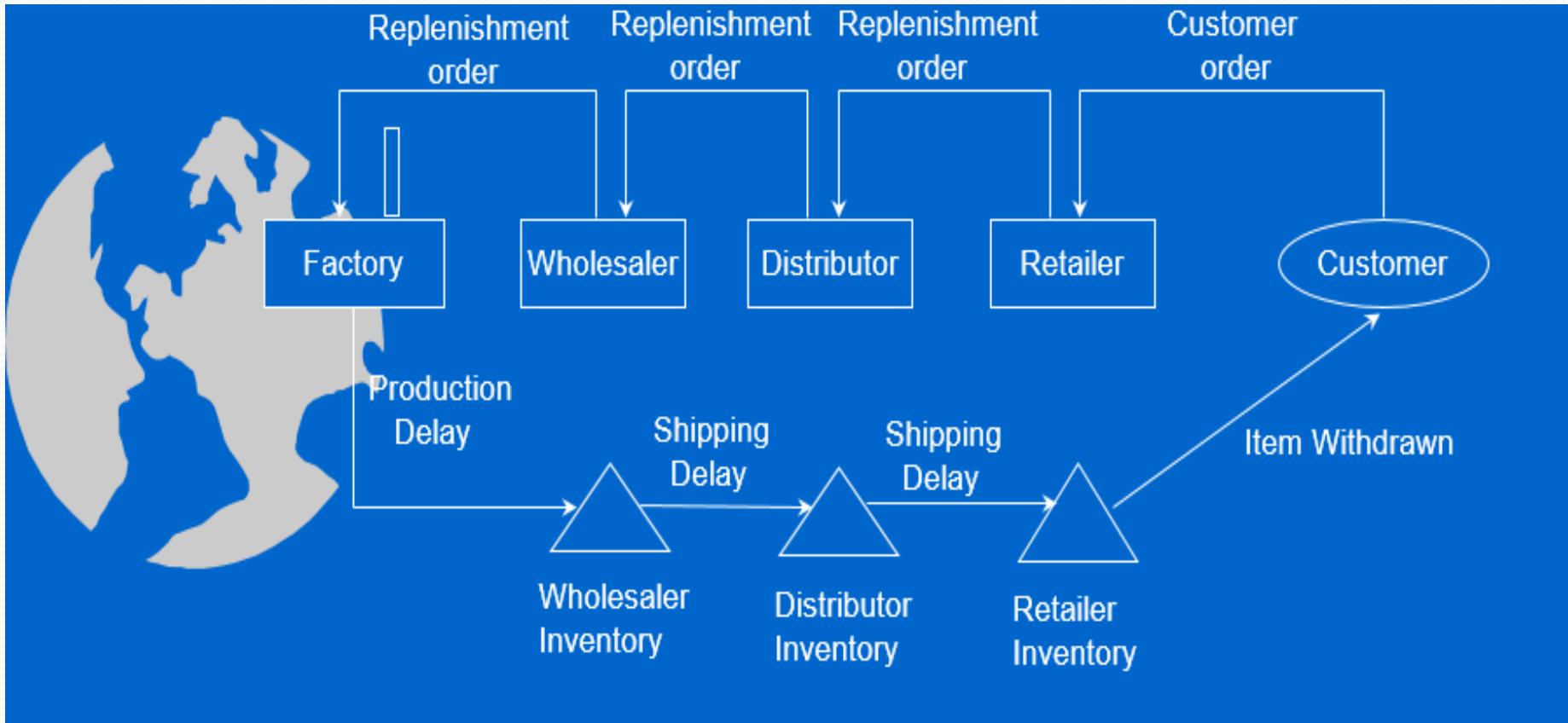
Introduction

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

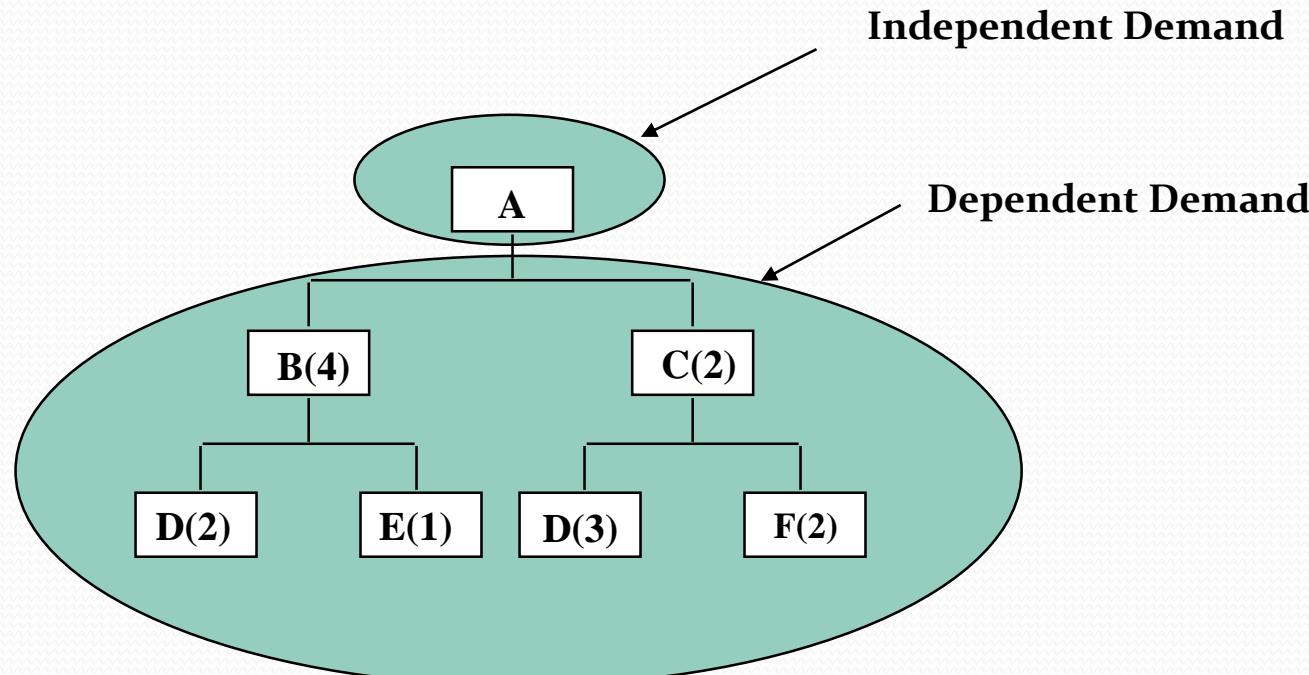


Dependent and Independent Demand

- 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



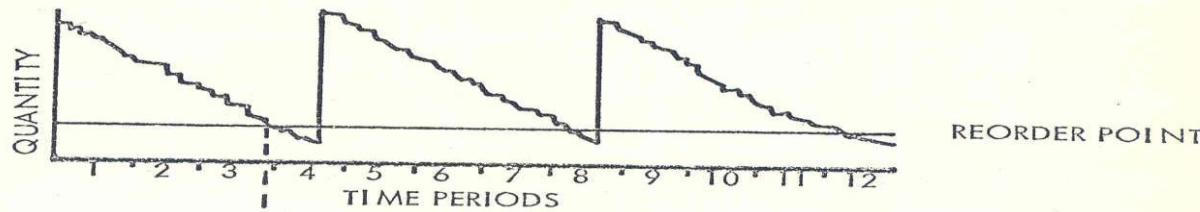
Independent demand is uncertain.
Dependent demand is certain.



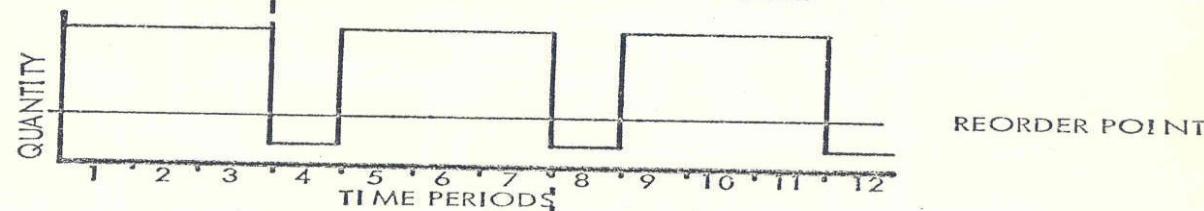
Dependent and Independent Demand

A Comparison of Independent versus Dependent Inventory Demand Patterns

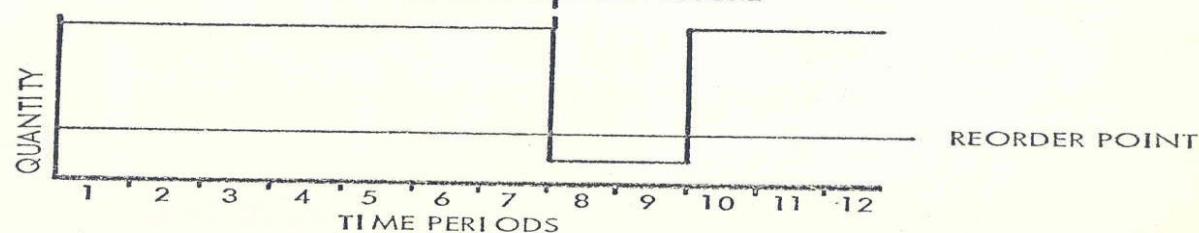
FINISHED PRODUCT ITEM - MANY SMALL INDEPENDENT DEMANDS FROM CUSTOMERS



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



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

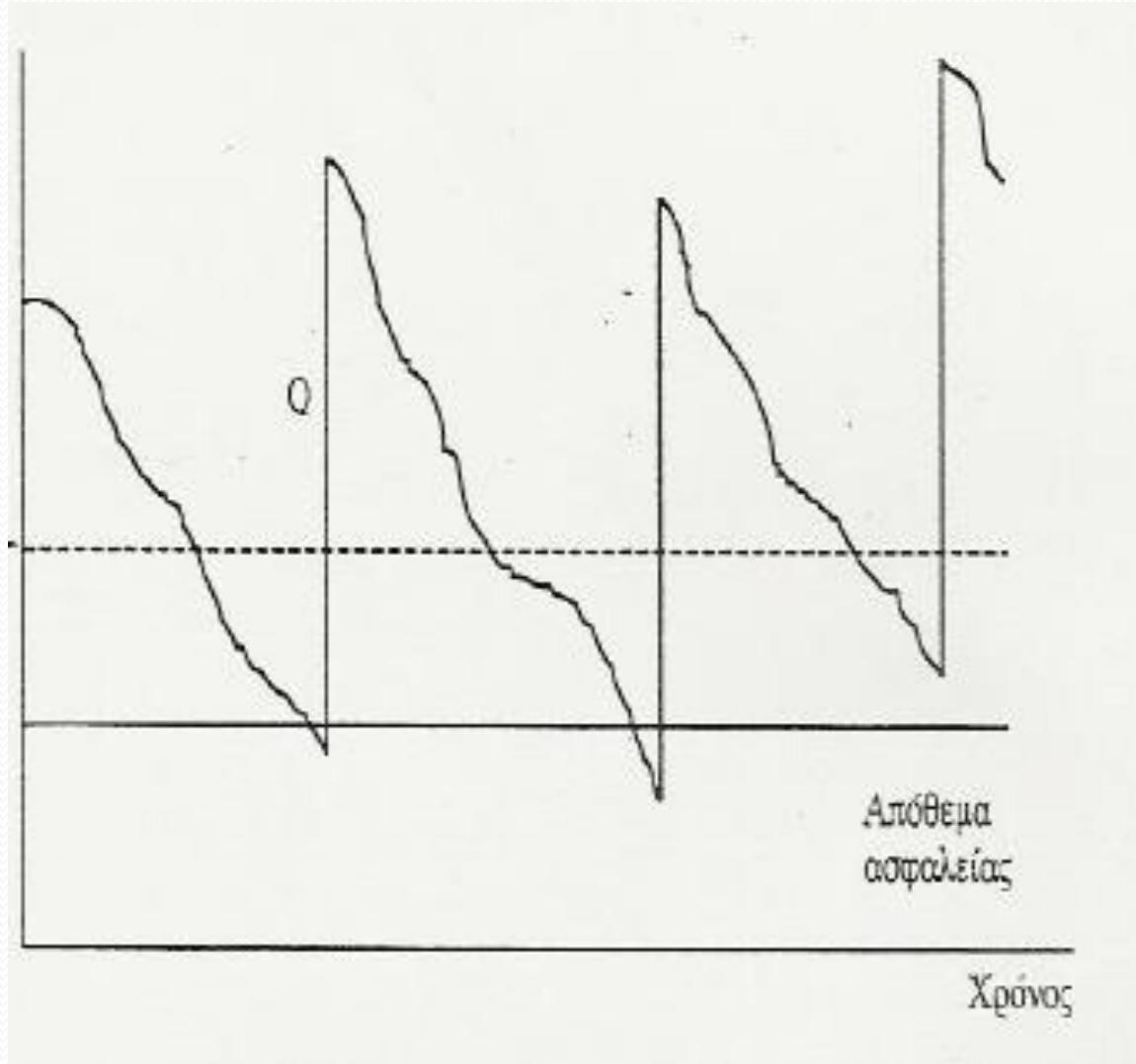


Inventory Management Systems (multi-period)

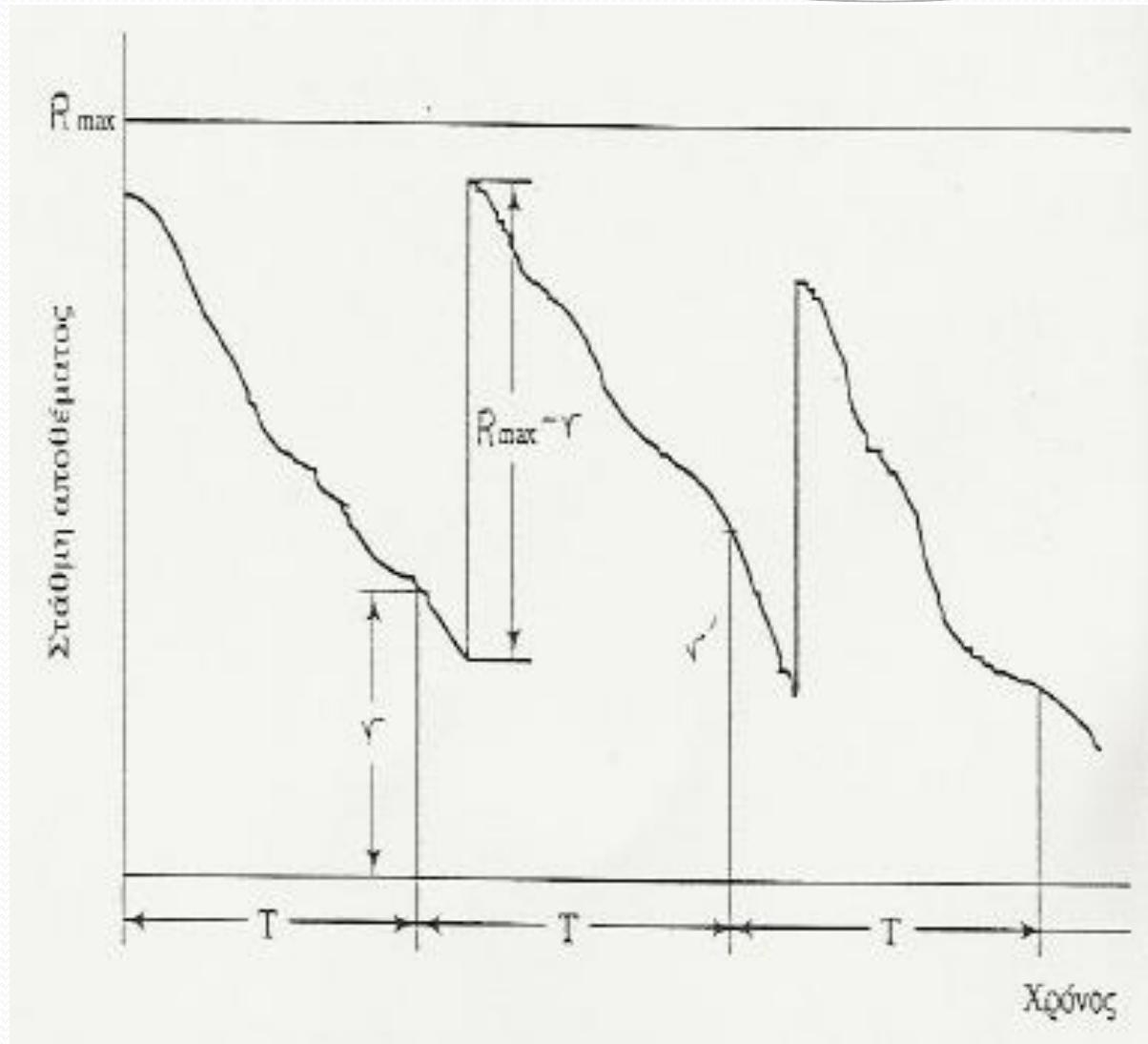
- Fixed Quantity Inventory Reorder System (Continuous Inventory Review System)
- Fixed Interval Inventory Reorder System (Periodic Inventory Review System)
- Mixed Elective Replenishment System
- MRP System.



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

