

Week 6

Inventory Management

Reasons to hold inventory:

- Cope with fluctuations in customer demand and changes in production processes
- Qualify for quantity discounts
- Avoid future price increases in raw materials
- Avoid the costs of placing numerous small orders

Conventional approaches to managing inventory

Ordering costs

Incremental costs of placing an order

Shortage costs

Out-of-stock costs

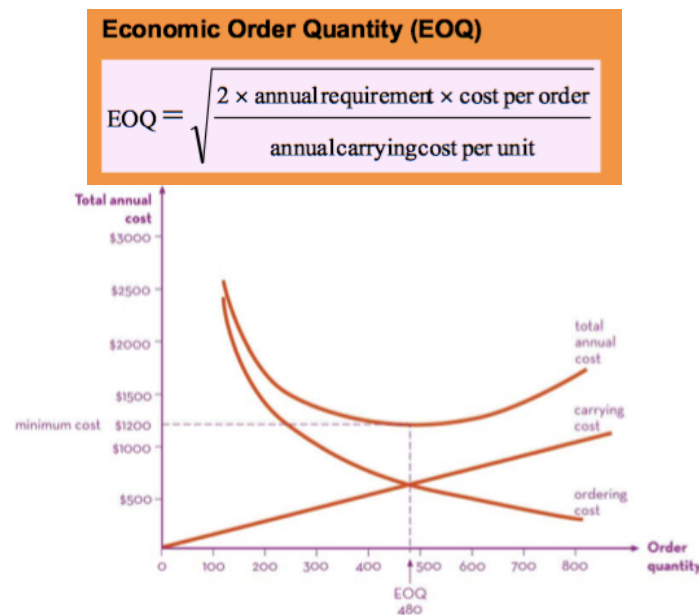
Carrying costs

The costs of carrying inventory stock

Economic Order Quantity (EOQ)

It is important to find the balance between ordering costs and carrying costs.

The aim of EOQ is to minimise the total ordering and carrying costs



EOQ Assumptions

- Demand is known and constant
- Incremental ordering costs are known and constant per order
- Acquisition cost per unit is constant
- Entire order is delivered at one time
- Carrying costs are known and constant per unit

- On average, one-half of order is in stock at any time

$$\text{Total Annual Inventory Cost} = \left[\text{Number of orders} * \text{Cost per order} \right] + \left[\frac{\text{Order quantity}}{2} * \text{Annual carrying cost per unit} \right]$$

Timing of orders under EOQ

Safety Stock

- The extra inventory kept on hand to cover any above-average usage or demand
- May be costly to maintain extra inventory

$$\text{Safety Stock} = \left[\text{Maximum demand per period of time} - \text{Average inventory usage per period of time} \right] * \text{Lead time}$$

Timing of orders under EOQ

Inventory re-order point (ROP)

- The level of inventory on hand that triggers the placement of a new order (or setup)
- Lead time – the length of time between placing an order and receiving the order

$$\text{ROP} = \left[\text{Inventory used per period of time} * \text{Lead time} \right] + \text{Safety Stock}$$

Just-in-Time System (JIT)

JIT inventory and production system

In which processing and movement of materials and goods occur as they are needed, usually in small batches.

JIT can cover all aspects of the production process

- Inventory management is crucial
- Inventory is a major cause of non-value-added activities
- The underlying assumption of this method is the simplifying of the production process by removing non-value-added activities.

Key features of JIT Production

- A pull method of coordinating production processes
- Simplified production processes
- Purchase of materials, and manufacture of sub-assemblies and products in small lots
- Quick and inexpensive setups of production machinery
- High-quality level for raw materials, components and finished products
- Effective preventative maintenance of equipment
- Flexible work teams

JIT Purchasing

- The purchase of materials or goods so they are delivered just as needed for production or sales
- Reduces the number of suppliers
- Long-term contracts with suppliers
- Specifies quality standards in supplier contracts to reduce need for inspection
- Use of e-commerce to place orders, and provide supplier online access to inventory files

Costs and Benefits of JIT

Costs

- Substantial investment to change production facilities to minimise non-value-added activities
- An increase in the risk of inventory shortages and the associated loss of production and sales

Benefits

- Savings in inventory carrying and insurance costs
- Fewer losses due to spoilage, obsolescence and theft
- No opportunity costs of high inventory
- Eliminates non-value-added activities
- Meets customers' needs more effectively