Chapter 7

Supply Management

Learning objectives

- Concepts and Methods of Analyzing Supply Selection.
- Procurement Management.
- Inventory and Distribution Management.
- Fixed Order Quantity System.

1. Concepts and Methods of Analyzing Supply Selection

Concept of Supply

- Supply includes two departmental functions, such as *purchase* and *inventory management*.

❖ ***Purchase***

- That is, the commercial action originates from the expression of demand and is expressed through placing an order with the selected supplier.
- To operate, each enterprise uses means of production (machinery, materials, and other equipment), moreover:
  - Industrial enterprises must be provided with energy and raw materials that are transformed into final products.
  - The commercial enterprise must buy the goods and it will resell them.

Source: quanlydoanhnghiep.edu.vn

Concept of Supply (Cont.)

- Supply includes two departmental functions, such as purchase and inventory management.

❖ ***Inventory management***

- Reserves are all goods or items accumulated and waiting for later use, and they allow users to be supplied gradually according to their needs, without imposing their deadlines and malfunction.
- It can be said that an enterprise runs out of business when it does not have raw materials, finished products, or goods in the necessary quantities at the appropriate time.

Functions of Inventory

- ***Connective/link function***
  - ❖ As the most important function, it links the production and supply processes. Inventory is necessary to ensure continuous production at peak times, especially when the supply and demand of a certain product are unstable.
- ***Function to prevent the impact of inflation:***
  - ❖ Inventory helps enterprises save a significant amount of costs when raw materials or goods increase in price under the impact of inflation. In this case, inventory will be a good investment, but it is necessary to carefully calculate possible costs and risks.

Source: quanlydoanhnghiep.edu.vn

Functions of Inventory (Cont.)

- ***Deduction function by quantity***
  - ❖ Many suppliers are willing to offer discounts for large-volume orders. This can reduce the purchase price of goods and raw materials but will lead to an increase in inventory costs.
  - ❖ Administrators need to determine the optimal quantity of goods to be able to have discounts and at the same time increase storage costs insignificantly.

The Role of Supply Function

- At the desired time
  - ❖ Goods need to be ready when people need them.
- In the desired amount
  - ❖ Not too much, not too little.
- With desired quality
  - ❖ Capable of meeting exact needs.
- With the least cost
  - ❖ Purchase price is a major part of the price that the customer must bear.

Source: quanlydoanhnghiep.edu.vn

Analytical Method of Supply Selection

- All raw materials and goods purchased by an enterprise do not have the same importance.
  - ❖ The lack of some of them will paralyze the business.
  - ❖ Others are too expensive.
  - ❖ Others are difficult to obtain (production and delivery deadlines, limited number of suppliers).
- As a result, supply management needs to be selected.
- Enterprises need to pay close attention to important products, so it is necessary to organize inventory to determine the most effective management methods.

Source: quanlydoanhnghiep.edu.vn

Analytical Method of Supply Selection (Cont.)

- ***Method of 20/80 Analysis***
  - ❖ In most cases, an enterprise makes about 80% of its sales with only 20% of its customers. Conversely, 80% of its customers contribute to only 20% of its sales.
  - ❖ In the matter of reserves, it is examined and found that 20% of the number of items creates 80% of the investment value for reserves, either 80% of consumption in value or 80% of purchase value.
  - ❖ Of course, these figures are averages, the ratio could be 15/85 or 25/75.

Analytical Method of Supply Selection (Cont.)

- ***Method of A.B.C Analysis***
  - ❖ A.B.C analysis is a smooth method of 20/80 analysis. It divides materials and goods into 3 groups:
    - ➢ ***Group A:*** Includes goods whose annual value accounts for 60-70% of the value total of inventory, when the quantity only accounts for about 10% - 20% of the inventory.
    - ➢ ***Group B:*** Includes inventories with an average annual value of 20-30%, corresponding to an amount of about 25-30% of the inventory total.
    - ➢ ***Group C:*** Includes goods with small annual value accounting for 5-15% but quantity accounting for about 50-60% of inventory total.

Analytical Method of Supply Selection (Cont.)

- ***Method of A.B.C Analysis***
  - ❖ Classify material inventory according to ABC

Types of Material	Annual Demand	Price Per Unit	Annual Value Total	Groups
1	1000	4300	4300000	A
2	5000	720	3600000	A
3	1900	500	950000	B
4	1000	710	710000	B
5	2500	250	625000	B
6	2500	192	480000	B
7	400	200	80000	C
8	500	100	50000	C
9	200	210	42000	C
10	1000	35	35000	C
11	3000	10	30000	C
12	9000	3	27000	C

Analytical Method of Supply Selection (Cont.)

- ***Method of A.B.C Analysis***
  - ❖ ***Related to reserves***
    - ➢ The method of A.B.C analysis allows making important decisions.
      - ❑ Products of Group A will be subject to more careful planning and serious investment in terms of demand; Products of Group B can be managed by continuous inventory, while products of Group C are only subject to periodic inventory.
      - ❑ All interventions to limit stockpiling in the first products of Group A.

Analytical Method of Supply Selection (Cont.)

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Analytical Method of Supply Selection (Cont.)

- ***Method of A.B.C Analysis***
  - ❖ ***Related to purchasing***
    - ➢ A.B.C analysis of purchase sales by product types.
      - ❑ Group A products are subject to careful search and evaluation about suppliers and must be analyzed in terms of commodity value.
      - ❑ Group A products must be assigned to experienced people, while Group C products should be assigned to newcomers.
      - ❑ In some cases, products of Group A are subject to centralized purchasing, while purchasing of other types is decentralized.
      - ❑ Products of Group A may be subject to the entire market with regular deliveries to limit stockpiling.

Analytical Method of Supply Selection (Cont.)

- ***Method of A.B.C Analysis***
  - ❖ ***Related to supplier***
    - ➢ A.B.C analysis of supplier sales.
      - ❑ Suppliers of Group A are subject to special monitoring, such as analysis of financial situation, transfer of key positions, technical innovation, etc.
      - ❑ The comparison of A.B.C analysis of customers and suppliers allows enterprises to have useful information about interactive relationships.

Analytical Method of Supply Selection (Cont.)

- ***Requirements for recording inventory***
  - ❖ Decisions about inventory policies as well as their implementation must be based on inventory data.
  - ❖ The more accurate these data are, the better decision-making and implementation will be ensured.
  - ❖ Only by determining what is actually on hand, managers make accurate decisions about orders, production schedules, and shipping.

Analytical Method of Supply Selection (Cont.)

- ***Requirements for recording inventory***
  - ❖ To check inventory well, inventory reports must be accurately verified in each calculation cycle for each Group A, B, and C.
  - ❖ This cycle varies depending on the product group, such as Group A: one time per month; Group B: one time per quarter; Group C: one time per year.
  - ❖ Regularly checking inventory also helps enterprises reduce production downtime and interruptions, detect shortcomings and their causes, and make timely adjustments.

Just in time (J.I.T) supply

- To satisfy requirements at the lowest cost, some businesses have succeeded in using the J.I.T. According to this method, the reserve level tends to decrease to zero.
- In a “just-in-time” production system, also known as a “stockless production system”, inventory is controlled to always be at a minimum level and tends to approach the unit level.
- Just-in-time systems cover purchasing, inventory management, and production management.
  - ❖ Produce and deliver final components on time and they are marketed at the right time.

Source: quanlydoanhnghiep.edu.vn

Just in time (J.I.T) supply (Cont.)

- Just-in-time systems cover purchasing, inventory management, and production management.
  - ❖ At each stage of the production process, parts or assemblies of parts must be provided to the required location at the right time:
    - ➢ Detailed spare parts assemblies: at the right time they are assembled into complete products.
    - ➢ Individual details: assemble them into detailed assemblies at the right time.
    - ➢ Raw materials: at the right time to create details.

Just in time (J.I.T) supply (Cont.)

- ***Advantages of J.I.T***
  - ❖ Raw materials, semi-finished products, and finished products are delivered regularly in small quantities, so it can reduce storage costs.
  - ❖ Establish long-term relationships with suppliers, so it is not necessary to look for new suppliers.
- ***Defect of J.I.T***
  - ❖ The schedule for receiving and distributing raw materials and finished products is very complicated.
  - ❖ The control and operating system is difficult to operate.

2. Procurement Management

Procurement Management

- The effectiveness of purchasing activities depends on basic management principles, such as forecasting, organizing, coordinating, implementing, and monitoring.
  - ❖ Demand forecasting.
  - ❖ Demand analysis.
  - ❖ Draft a procurement plan.

Source: quanlydoanhnghiep.edu.vn

Demand Forecasting

- ***Factors determine the needs of a business***
  - ❖ Marketing goals are often controlled by distribution and sales management issues.
  - ❖ The needs of the consumer market have been established and selected (sales forecast).
  - ❖ Social demands for acceptable prices come with limited purchasing power of consumers.
  - ❖ Distribution on a very wide scale requires logistics (warehousing) facilities, such as transportation and loading.
  - ❖ The enterprise's theoretical and practical production capabilities which include technical, commercial, and administrative capabilities of its staff, financial status, and ability to borrow capital.

Demand Forecasting (Cont.)

- ***Contingent factors***
  - ❖ In determining the needs of an enterprise, it is necessary to take into account the influence of external factors.
  - ❖ External factors are not directly related to operations but can impact normal direction and management, including business factors; national and administrative economics; technical factors; social factors; geographical factors; and international economic factors.

Demand Analysis

- ***Preliminary explanation***
  - ❖ Requirements and feasibility studies must be carried out before any investment or procurement which begins.
- ***Analysis of functional value***
  - ❖ Evaluate the long-term economic, environmental, and social impact of purchasing equipment or consumer goods.
  - ❖ Critical analysis of cost-effectiveness.
  - ❖ Should the item be purchased or produced yourself? Are the financial and technical capabilities ready? Has the break-even point of a factory been calculated?
  - ❖ Manufacturing method, manufacturing technical level, economic and technical limitations in use.
  - ❖ Evaluate relevant costs, etc.

Draft A Procurement Plan

- Procurement plans are often based on pre-determined and selected needs.
  - ❖ Establish supply targets from domestic and foreign sources.
  - ❖ Schedule orders to meet user needs, noting the needed time to collect historical data and estimates of production inputs and sales.
  - ❖ Determine existing capital sources and estimate required capital sources.
  - ❖ Properly organize the receipt and management of goods.
- The wisdom of the manager, a typical procurement plan is an annual plan, that sets out the details of current procurement targets, such as price, delivery period, payment conditions, service after sale, etc.

3. Inventory and Distribution Management

3.1. Inventory Management

Opposing Views on Inventory

- Inventory policy is so important that production managers, marketing managers, and financial managers must work together to achieve consistency.
- There are many different views on inventory policy, to balance different goals, such as reducing production costs, reducing inventory costs, and increasing the ability to meet customer needs.
- There are many reasons to explain why you want to keep inventory and why you don't want to keep inventory.

Source: quanlydoanhnghiep.edu.vn

Why do we keep inventory?

- Inventory is necessary, but the important issue is how much inventory is kept to suit production and business conditions.

- ***Finished products***

  ❖ Prepare goods before delivery.

  ❖ Limited production capacity.

  ❖ Products can be displayed to customers.

Why do we keep inventory? (Cont.)

- ***Semi-finished products***
  - ❖ Because of management, it is not possible to combine the two production stages
  - ❖ Producing and transporting large batches of goods causes more inventory, but it can reduce production costs and raw material transportation costs.
- ***Raw materials***
  - ❖ Because some suppliers produce and ship some raw materials in batches.
  - ❖ Large orders cause more inventory but can be deducted according to the purchase quantity, reducing purchasing costs.

Why don't we keep inventory?

- ***Storage costs***
  - ❖ These are the costs incurred related to storage, such as housing or warehouse costs (i.e., rent, depreciation, tax, and insurance); equipment and facilities (i.e., fuel, depreciation, and equipment operating); human resource for management; investing in inventory (i.e., buy goods and interest cost, insurance for goods in warehouse); other costs.
- ***Cost of satisfying customers***
  - ❖ If the inventory of semi-finished products is too large, it hinders the production system.
  - ❖ The time it takes to produce and deliver customer orders increases, and the ability to respond to changes in customer orders weakens.

Why don't we keep inventory? (Cont.)

- ***Costs for production coordination***
  - ❖ Because too much inventory hinders the production process, many workers are needed to relieve congestion and solve production-related bottlenecks, output, and coordinated schedules.
- ***Quality costs of large batches***
  - ❖ When producing large batches, a large inventory will be created.
  - ❖ In some cases, some will be damaged, and some parts of the production batch will have defects. If the batch size is smaller, the quantity of poor quality can be reduced.

Nature of Inventory

- Two important issues in inventory planning are as follows:
  - ❖ How much do I need to order for each type of material?
  - ❖ When will I place an order again?
- Inventory can include both dependent material needs and independent material needs.
- Purchased raw materials and goods have been inspected before being put into reserve warehouses.
- In turn, it is necessary to manage them, the management of reserves covers three aspects: *Physical Management of Reserves, Accounting Management, and Economic Management of Reserves.*

Source: quanlydoanhnghiep.edu.vn

Physical Management of Reserves

- Good physical management of reserves ensures a firm's customers a “good level of service” and can create an advantage over competitors.
- Physical management of reserves relies on optimizing product storage.
  - ❖ What area and quantity is needed?
  - ❖ What means of transport are there in the warehouse?
  - ❖ What means of transport are there?
  - ❖ How do we buy them?

Source: quanlydoanhnghiep.edu.vn

Physical Management of Reserves – Basic principles of warehouse

- In industrial enterprises, people divide them into finished product warehouses, raw materials warehouses, parts warehouses, tool warehouses, etc.
- In wholesale or retail commercial enterprises, goods are stored in temporary warehouses or warehouses, but also in sales areas.
- These warehouses are necessary because the stocks must be protected against theft, bad weather, heat, moisture deformations, etc.

Physical Management of Reserves – Basic principles of warehouse (Cont.)

- Storage facilities need to be closed and suitable for each type of product, goods, and supplies that need to be protected.
- The warehouse location needs to be arranged to minimize transportation and facilitate the import and export of goods.

Physical Management of Reserves – Coding and Placement Methods of Stored Products

- There are many methods for arranging products which can be combined.
  - ***Method***: "One thing in each place, each thing in its place" is to give each type of product a designated place.
    - The *advantage* is that it is easy to locate products and supplies in the warehouse and determine excess or insufficient reserves quickly.
    - However, the *disadvantage* is that it cannot take advantage of the warehouse area.

Physical Management of Reserves – Coding and Placement Methods of Stored Products (Cont.)

- There are many methods for arranging products which can be combined.
  - ***The multi-location method:*** "anything, any place" is to use any available location when putting goods into the warehouse, a product has many addresses.
    - Its advantage is that it can take advantage of the warehouse area, but it is difficult in terms of information to locate space when warehousing and find product addresses when leaving the warehouse.

Physical Management of Reserves – Coding and Placement Methods of Stored Products (Cont.)

- There are many methods for arranging products which can be combined.
  - ***Rotation frequency method***: The type of goods that come in and out the most which is placed in the most convenient place.
  - ***Two-warehouse method***: The warehouse is divided into two parts: The reserve warehouse is supplied by goods receipt and supplies small quantities to the distribution warehouse, thereby establishing orders.
  - ***First in, first out method (FI FO)***

Reserve Accounting Management

- ***Grasp the reserve quantity***
  - ❖ Enterprises use warehouse notes to record the movement of goods (receive and delivery) and calculate the amount of inventory

    Final Reserve = Initial reserve + Receive – Delivery
  - ❖ Inventory: The warehouse notes allow for a physical understanding of inventory, but they cannot account for loss or damage of all types.
    - ➢ To overcome this, enterprises are required to conduct inventory regularly (accounting), or intermittently (non-accounting).

Source: quanlydoanhnghiep.edu.vn

Reserve Accounting Management (Cont.)

- ***Capture reserve value***
  - ❖ Understanding stocks in terms of value is difficult because received items have different purchase prices.
  - ❖ The problem needs to be priced at what price when they are released from a warehouse? Regarding methods that can be used as follows:
    - ➢ Identification method.
    - ➢ Weighted average price method.
    - ➢ FIFO method.
    - ➢ LIFO method.
  - ❖ All four methods above are accepted accounting methods. However, each method can impact on the enterprise's summary of assets and P/L statement.

Economic Management of Reserves

- The reserve function must implement two contradictory goals:
  - ❖ Safety goal: have reserves to avoid any disruption.
  - ❖ Financial goal: reduce to the lowest possible level of reserves to reduce inventory costs.
- To solve that, reserve management needs to answer two questions:
  - ❖ When to order?
  - ❖ How much is each order?

Source: quanlydoanhnghiep.edu.vn

Economic Management of Reserves – Costs Related to Reserves (Cont.)

- When making reserves, businesses need to calculate following types of costs.
  - ***Storage costs***
    - Warehouse costs (i.e., rent or annual depreciation of warehouse; salaries and social insurance for warehouse employees; maintenance costs; etc.)
    - Cost of devaluation of goods during storage in a warehouse.
      - Price decline due to obsolescence related to fashionable items or rapidly evolving technology.
      - Depreciation due to damage, such as accidents during transportation, evaporation, theft, etc.

Economic Management of Reserves – Costs Related to Reserves (Cont.)

- When making reserves, businesses need to calculate following types of costs.

❖ ***Ordering costs***

➢ They include costs such as costs of processing orders, mail, telephone, travel, salaries, and social insurance of purchasing staff (finding suppliers, negotiating, drafting orders, urging, reminding...), of accounting staff (taking notes, paying bills, etc.), etc.

❖ ***Purchase costs***

➢ This type of cost depends on the annual needs of the enterprise and the purchase price. When purchasing raw materials in large batch sizes, storage costs will increase, but purchasing costs are lower due to quantity discounts, and shipping costs are also reduced.

Economic Management of Reserves – Costs Related to Reserves (Cont.)

- When making reserves, businesses need to calculate following types of costs.
  - ***Shortage costs***
    - They are losses due to insufficient inventory.
    - This type of cost includes
      - Revenue is lost due to a lack of goods; enterprises cannot satisfy the demand for materials and goods.
      - Damage due to production interruption due to lack of raw materials.
    - Business administrators who want to control supplies must pay attention to the following two issues:
      - The first is to determine the level at which inventory needs to be replenished, that is, to determine when to place orders.
      - The second is to determine the quantity for each order.

Economic Management of Reserves – Determine Re-order Level

- How much inventory does an enterprise need in order to supplement?
  - ❖ Waiting time is the number of days from the order date until the order is received.
  - ❖ Safety stock level is the quantity (or value) of reserve inventory in cases where ordered goods arrive late or are used more than expected.
  - ❖ Expected daily usage is the average usage over 1 year.

Economic Management of Reserves – Determine Re-order Level (Cont.)

- For example, an enterprise is determining the re-order level for item A with the following documents.
  - ❖ Waiting time: 20 days.
  - ❖ Expected daily usage: 50 units.
  - ❖ Safety reserve level: 400 units.

➔The re-order level of item A is 400 + (50 x 20) = 1,400 units.

- This result means that when there are 400 units of item A, that remain in stock, it is most reasonable for an enterprise to order additional items.
- If the order is not delayed and daily usage is as expected, then there is no need for a safety stock in the next order.
- The re-order level is 50 x 20 = 1,000 units.

3.2. Distribution Management

Concept of Distribution Management

- Distribution Management refers to the process of overseeing the movement of goods from the supplier or manufacturer to the point of sale.
- It covers many activities and processes, such as packaging, inventory, warehousing, supply chain, and logistics.
- Distribution channel management is an important part of the business cycle of distributors and wholesalers.

Source: sureerp.com

Concept of Distribution Management (Cont.)

- The profit margin of enterprises depends on how quickly they can ship goods. Because the more they sell, the more money they make.
- Having a successful distribution channel management system is also important for enterprises to remain competitive and maintain customer satisfaction.

Source: sureerp.com

Characteristics of Distribution Management

- Distribution channel management is important to the financial success and longevity of a company.
- Implementing successful distribution channel management requires effective management of the entire process of distribution.
- The larger the company or the greater the number of supply points a company has, the more it needs to rely on automation to effectively manage its distribution process.
- Most progressive companies today use their distribution workforce to obtain market information, which is crucial in assessing their competitive position.

Characteristics of Distribution Management (Cont.)

- There are two types of distribution: sales distribution and logistics distribution.
- Distribution includes diverse functions, such as customer service, transportation, warehousing, inventory control, private truck fleet operations, packaging, receiving, and material handling, along with factory, warehouse, store location planning, and information integration.
- The goal of distribution channel management is to achieve ultimate efficiency in delivering raw materials, individual parts, or finished products to the right address in an accurate time.
- The logistics distribution plan must be aligned with the overall distribution channel strategy.

Advantages of Distribution Channel Management Strategy

- Besides increasing profits, there are many reasons a company which wants to use a distribution channel management strategy.
  - ❖ A distribution channel management strategy keeps things organized. Without proper management systems, retailers will be forced to store goods at their locations, but if sellers have not adequate storage space, they will be in bigger trouble.
  - ❖ Distribution channel management systems also make things easier for consumers. It allows them to go to one location but access many different products.
  - ❖ Having a suitable distribution channel management system also helps reduce the possibility of errors during the delivery process, as well as delivery time.

Managing Distribution Channels With Marketing Functions

- ***Product***: Not always a tangible object, a product can also refer to an idea, music, or information.

- ***Price:*** It refers to the value of a good or service to both the seller and the buyer, which can involve both tangible and intangible factors, such as list price, discount pricing, financing, and customer and competitor feedback.

Managing Distribution Channels With Marketing Functions (Cont.)

- ***Promotion:*** Sellers communicate with customers to inform, persuade, and/or remind buyers and potential buyers about goods, services, images, ideas, and their impact on society.

- ***Placement:*** It refers to the process of ensuring product availability, accessibility, and visibility to customers in the target distribution channels or locations where they want to purchase.

4. Fixed Order Quantity System

The Meaning of Fixed Order Quantity

- The fixed order quantity, called FOQ for short, shows us the time and quantity to order inventory.
- FOQ refers to a system of controlling inventory that allows for minimum and maximum inventory levels to be fixed. When the inventory level hits the auto-set reorder quantity or the minimum level of stock, the maximum and fixed levels of inventory can be replenished.
- The minimum and maximum stock levels must be established by the company based on storage capacity as well as demand forecasts.

Source: efex.vn

The Meaning of Fixed Order Quantity (Cont.)

- This approach also makes sure that inventory items that are presently being implemented in manufacturing get replenished regularly.
- The fixed-order quantity technique assumes that all the variables are well-known and constant, such as sales, unit costs, holding costs, lead times, stock-out costs, and so on.
- The strategy is often used by enterprises and produces outstanding outcomes, although this assumption could not hold in real-life scenarios.

The Model of FOQ Inventory and Examples

- We need to consider how to calculate the ***order quantity (or Q)*** and the ***reorder point (or ROP)***, which are the two variables that make up the FOQ definition.
- However, we must first examine the presumptions that this system makes. The system, most critically, presupposes that all variables occur at a constant rate and that their values are proven to be true.
- For instance, the system assumes that ***demand, D,*** happens consistently and there is no demand variability.
  - ❖ Additionally, the holding cost, the lead time, the cost of a stockout, and the unit pricing are all predictable and set.

The Model of FOQ Inventory and Examples - The Quantity to Order?

- The order quantity must be chosen as the first choice in the FOQ model.
- There are many expenses associated with inventory, most obviously the holding and order charges.
- The ***EOQ*** indicated earlier is the ***"optimal" order quantity*** that we wish to choose because it reduces these costs.
  - ❖ This is calculated by finding the order quantity that minimizes the yearly inventory cost.

The Model of FOQ Inventory and Examples - The Quantity to Order? (Cont.)

- Evaluate the total annual costs, which are made up of the yearly purchase cost, the yearly ordering cost, and the yearly holding cost:

Total cost = Ordering cost + Purchase cost + Holding cost

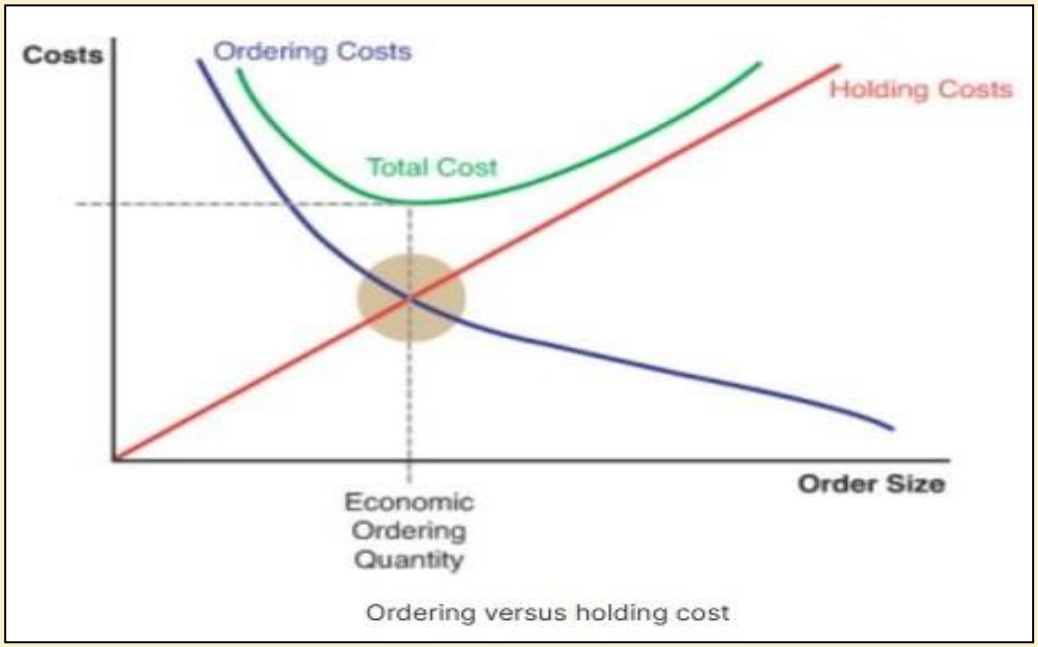
$$TC = (D/Q)\,S + DC + (Q/2)\,H$$

- TC: Total cost
- D: Annual demand
- Q: Order quantity
- C: Unit cost
- H: Holding cost
- S: Ordering cost

- The first term (D/Q) refers to the yearly ordering expense is S. It is calculated by multiplying the total number of orders made every year (D/Q) by the S cost of every order.
- The yearly purchase cost of the goods is represented by the second element in the equation (DC).
- It is calculated by multiplying the unit cost (C) by the yearly demand (D).
- The average inventory retained is represented by (Q/2) in the third element, which is the yearly holding cost.

The Model of FOQ Inventory and Examples - The Quantity to Order? (Cont.)

- Note that once the order is placed, our max inventory is Q units. We have nothing when the inventory is gone. As a result, we typically have ***Q/2 units in stock***. H stands for the inventory holding cost per unit year.



Source: efex.vn

The Model of FOQ Inventory and Examples - The Quantity to Order? (Cont.)

- The goal is to choose an order quantity that has the lowest overall cost, including holding expenses as well as ordering costs, and is represented by the lowest value on the overall cost curve.

The Formula for Economic Order Quantity

The formula for Economic Order Quantity is:

$$EOQ = \sqrt{\frac{2 \times S \times D}{H}}$$

where:

S = Setup costs (per order, generally including shipping and handling)

D = Demand rate (quantity sold per year)

H = Holding costs (per year, per unit)

Source: www.investopedia.com

The Model of FOQ Inventory and Examples - The Quantity to Order? (Cont.)

- **Example of EOQ**
  - ❖ Consider a retail clothing shop that carries a line of men's shirts.
  - ❖ The shop sells 1,000 shirts each year. It costs the company $5 per year to hold a single shirt in inventory, and the fixed cost to place an order is $2.
  - ❖ The EOQ formula is the square root of (2 x 1,000 shirts x $2 order cost) / ($5 holding cost), or 28.3 with rounding.
  - ❖ The ***ideal order size*** to minimize costs and meet customer demand is slightly more than 28 shirts.

The Model of FOQ Inventory and Examples - The Time to Order?

- The EOQ provides an answer to the quantity to order, but it still needs to decide when to place the order.
- Suppose that the lead time (L) and demand rate (D) are uniform and well-known.
- In that situation, the ROP would just be sufficient stock to meet the demand for the duration of the lead time. In this straightforward scenario, the ROP would be calculated as

Demand during Lead Time = ROP

ROP = D L

The Model of FOQ Inventory and Examples - The Time to Order? (Cont.)

- **Example of ROP**

  ❖ Suppose that a product's lead time (L) is 2 weeks and that its demand (D) is 500 units per week.

Reorder Point = ROP

ROP = D x L = 2 weeks x 500 = 1000 units

- ➢ This implies that an order for quantity Q is placed each time inventory hits 500 units.
- ➢ However, D and L are rarely set, and demand is frequently greater than anticipated.
- ➢ We frequently need to carry a little bit more stock (safety stock), as a result, to account for this unpredictability.

The Model of FOQ Inventory and Examples - The Time to Order?

- When calculating the ROP, ***safety stock*** is also calculated as follows:

ROP = safety stock + demand during lead time

ROP = SS + D L

- The variability of demand is another element taken into account while calculating safety stock.
- The bigger the safety stock or the sum added to the ROP's final calculation, the greater the variability and the greater the service level.

In conclusion

- Concepts and Methods of Analyzing Supply Selection.
- Procurement Management.
- Inventory and Distribution Management.
- Fixed Order Quantity System.

THANK YOU
FOR YOUR ATTENTION

Q&A