

## Seminar 12

### Topic: Inventory Logistics

Questions on the topic of the lesson:

1. Category of inventory in logistics
2. Classification features of reserves
3. Inventory management system in the company
4. Basic Inventory Management Methods
5. Additional inventory management techniques

Stock is a mandatory element of any economic system, designed to smooth out the unevenness of production, exchange, distribution and consumption of material goods. The presence of stock can be considered both as a positive and as a negative moment in the economy of an enterprise. Excess stocks distract significant financial resources, therefore, investing in stocks of financial resources is very ineffective, since this share of finances has no turnover.

There are many reasons why firms hold inventory.

1. *Continuity of the consumption process.* Sales of goods in the store are continuous, therefore, stocks are created in the sphere of commodity circulation.

2. *Seasonality of production.* Many types of products are produced seasonally (for example, agricultural products), but are required by consumers constantly throughout the year. 3. *Seasonality of demand.* For certain types of goods, there is a "peak demand" in certain periods of the year, therefore, stocks should be created for this. For example, alcoholic beverages and confectionery for the holidays.

4. *Long transportation time.* Transportation of goods requires a certain amount of time, so it is necessary to create a reserve in the period between the order and the arrival of goods at the warehouse.

5. *Batch production.* Enterprises produce products in large batches, and consumers consume goods individually. In this case, the stock smooths out the unevenness of production, distribution and consumption of goods.

6. *Uneven demand.* The seller does not know exactly how much of each product item will be purchased, so he is forced to create stocks.

7. *Fluctuations in delivery times for goods.* Occurs due to delays in shipment or failure to meet transportation deadlines.

All stocks can be classified by natural and material characteristics (types of raw materials, finished products), their location, the functions they perform, the time of accounting, and the volumes and needs.

1. According to location, reserves are divided into:

a) *production stocks* are raw materials, semi-finished products, work in progress stocks and finished products. They are a source of long-term risk for the company, especially in conditions of changing demand. They are located in warehouses and production areas of industrial enterprises;

b) *commodity stocks* are finished products of industrial enterprises that have entered the sphere of commodity circulation and are in transit or in warehouses of wholesale and retail trade enterprises. They are necessary for the uninterrupted supply of consumers;

c) *household stocks*. They are created by consumers in the form of purchases of goods for current needs or in the form of reserve stocks.

d) *stock in transit*. This is the product that has been ordered from the supplier and paid for. That is, from the moment the product is paid for until it arrives at the warehouse.

2. According to the functions performed, stocks are divided into:

a) *current stocks*. This is the amount of goods that are in the warehouse. They ensure the possibility of continuous sale of goods between deliveries. Their size is constantly changing as a result of spending during sales or when new batches arrive;

b) *preparatory or buffer stocks* are created if goods require additional preparation before use. For example, some canned fish must undergo a period of maturation in a warehouse before being sold;

c) *warranty (insurance and reserve) stocks*. Safety stocks are intended for continuous sale of goods to consumers in case of unforeseen situations. For example, untimely shipment of goods by the supplier, delay in the delivery of a batch of goods or an unexpected increase in demand between deliveries. Under normal operating conditions, this stock is inviolable. Reserve stocks are strategic and are created for a long-term period, for example, state reserves;

d) *seasonal stocks*. They are formed due to the seasonal nature of production, consumption or transportation of goods. They ensure the normal operation of a trading enterprise during the period of seasonal demand;

d) *advertising stocks*. They are created in trade for a quick response to the demand of buyers that arises after advertising;

e) *speculative stocks*. They are created with the purpose of protecting against possible price increases or to obtain additional profit from the price difference.

3. According to the time of accounting, stocks are divided into:

a) *threshold stock level* or order point. Used to determine the time of the next order of goods. Means that when it is reached, the next order must be made;

b) *maximum desirable stock* is the stock level that is economically feasible in a store.

c) *carry-over stock* – the balance of products (goods) at the end of the reporting period and the beginning of the planning period. Must be taken into account when planning deliveries for the following year;

d) *illiquid stock* – long-term unused stock. They are formed due to deterioration of the quality of goods during storage or obsolescence.

4. By volume and need:

a) *standard reserves* – equal to the pre-established standard;

b) *excess reserves* – exceed the established standard;

c) *excess stocks* – there is no need for them at all.

## **2. Inventory management system in the company**

Formation of commodity stocks allows the enterprise to ensure the stability of the product range, implement a certain pricing policy, and improve the level of customer service. All this requires maintaining an optimal level of stocks for each commodity item at each enterprise.

The commodity stocks of trade enterprises are in constant motion and renewal. The final stage of their motion is consumption. The main purpose of commodity stocks in wholesale trade is to serve wholesale buyers (retail trade enterprise), and in retail trade – to ensure the stability of the supply of goods to consumers. To maintain commodity stocks at an optimal level, a well-established inventory management system is necessary. The optimal level of stocks means a situation when there is no surplus of stocks or their deficit.

Inventory management involves the following operations:

1. *Standardization of stocks means the development of economically justified standards.*

For example, the volume of safety stock. Standards are calculated separately for the current stock, safety stock, seasonal storage.

2. *Operational accounting and control.* It is carried out using special software. For example, 1C Trade and warehouse. The balances of goods at the beginning and end of the month are analyzed and adjusted.

3. *Regulation.* Consists of maintaining them at a certain level and changing their size depending on demand and periods of delivery of goods. Both excess and shortage of stocks have a negative effect on the results of the commercial activity of the enterprise.

When setting up an effective inventory management system at an enterprise, it is necessary first of all to balance the two sides of the virtual scale. On one side, the positive aspects of inventory availability should be focused - ensuring greater reliability in operation,

expressed in the continuity of the production process and (or) satisfying customer needs, and on the other side - the negative aspects: expenses for maintaining (storing) inventory and the withdrawal of capital invested in inventory from circulation.

The development of an inventory management system at an enterprise is carried out taking into account the company's strategic priorities. At the same time, a compromise is established between risks and costs or liquidity and turnover.

Five consecutive stages of setting up an inventory management system at an enterprise are recommended:

*Stage 1.* Determining the cost of stocks, their nomenclature and quantitative characteristics, i.e. volumetric, time parameters, location information.

*Stage 2.* Conducting ABC analysis and identifying key reserves of category "A", less important reserves of category "B", and reserves of secondary importance of category "C".

*Stage 3.* Registration of the methods and procedures currently used by the company in inventory management. Selection of criteria for assessing the effectiveness of the existing inventory management system and the establishment of records that allow obtaining all the necessary information for this purpose.

*Stage 4.* Comparison of existing management methods and procedures with those required. Setting up a system of information monitoring of stocks, order fulfillment progress, and stock storage costs.

*Stage 5.* Defining the steps for transition to a new inventory management system. Developing a new or improving the current inventory management system.

### **3. Basic methods of inventory management**

Optimal inventory management requires obtaining a clear answer to two basic questions: when to order a replenishment of stock, and how much material stock to order for the stock.

There are two basic models of inventory control: a system with a fixed quantity or order size, also called the economic order quantity or Q model, and a system with a fixed order frequency, called the periodic model or P model.

The essence of *the Q-model* is that as soon as the stock of any product reaches a predetermined minimum value or order point, that product is ordered. Reaching the minimum level can occur at any time and depends on the intensity of demand.

To explain the essence of this model, we can draw an analogy with a bottle of vegetable oil used in the household. Each time the same volume of oil is bought in the store - 1 liter (fixed

order volume). As soon as the oil level in the bottle reaches a certain level (a level corresponding to about 100 ml), another package is bought.

In inventory management practice, the Q-model is used in the following cases:

- ✓ large losses due to lack of stock;
- ✓ high inventory holding costs;
- ✓ high cost of the ordered goods;
- ✓ high degree of demand uncertainty.

The Q-model requires constant monitoring of inventory balances. This model requires that each time resources are withdrawn from inventory, a check is made to see if the next order point has been reached.

The optimal batch size of the supplied goods and the optimal frequency of delivery depend on the following factors:

- ✓ volume of demand;
- ✓ costs of delivery of goods;
- ✓ inventory storage costs.

The minimum total costs for delivery and storage are chosen as the optimality criterion.

*the R-model* inventory management, the period after which the company sends an order to the supplier remains unchanged. For example, every Monday the company manager reviews the remaining goods and orders them up to a predetermined maximum standard. The size of the ordered batch of goods is determined by the difference between the maximum inventory provided by the standard and the actual inventory. Since the optimal period of time is required to fulfill the order, the size of the ordered batch is increased by the amount of the expected consumption for this period. The inventory control system with a fixed order frequency is used in the following cases:

- ✓ delivery conditions allow us to receive orders in batches of varying sizes;
- ✓ the costs of placing an order and delivery are relatively low;
- ✓ losses from a possible shortage are insignificant.

When using certain inventory management methods, it is necessary to take into account the specifics of demand for the company's products, as well as the specifics of local or system-wide information technologies that provide automated business management.

Making the optimal inventory management decision requires taking into account many factors and should always be based on finding a logistical compromise that ensures, along with reducing costs, full satisfaction of demand for the required products.

In practice, the difficulty in choosing a particular approach depends on the conditions in which the enterprise operates and the ability of the logistics manager to make the right decision. The more complex the conditions, the more complex the inventory management model required. All models share two major challenges: ensuring proper control over each stock item and ensuring accurate tracking of the state of the available stock.

#### **4. Additional inventory management methods**

The most common additional inventory management systems include:

- ✓ a system with a set frequency of replenishment of stocks to a certain level;
- ✓ minimum-maximum system.

In a system with a set frequency of replenishment of stocks to a certain level, as in a system with a fixed time interval between orders, the input parameter is the time period between orders. Unlike the basic system, it is oriented to work with significant fluctuations in consumption. In order to prevent an overestimation of the volumes of stocks contained in the warehouse or their shortage, orders are made not only at set times, but also when the stock reaches a threshold level. The system includes an element of the P-model, i.e. a set frequency of ordering, and an element of the Q-model, i.e. tracking the threshold order level.

A distinctive feature of the system is that orders are divided into two categories - planned and additional. Planned orders are made at specified time intervals, and additional orders - when the consumption rates deviate from the planned ones.

The minimum-maximum system also contains elements of the main management systems. The system is oriented towards a situation where the costs of inventory accounting and order processing costs are so significant that they become commensurate with the losses from inventory shortages. Therefore, in the system under consideration, orders are made not at each specified time interval, but only if the stock in the warehouse at that moment is equal to or less than the established minimum level. In this case, the size is calculated so that the delivery replenishes the stock to the maximum desired level. Thus, the system works with only two stock levels - minimum and maximum.