**Topic 1.3. Main tasks of circuit management**

**Logistics chain management in modern economyfile**

**Models and methods for managing logistics processes**

The models and methods used in logistics can be conditionally divided into general scientific (modeling tools) and special (models and methods of managing logistics infrastructure facilities, logistics flows, and processes).

The objects of supply chain management are infrastructure facilities that provide their resources for supplies from the initial supplier (through all stages of the production process) to the final consumer.

Logistics flows are divided into:

1. Inventory flows (material flow)

2. Information flows (information flow)

3. Financial flows (financial flow)

Logistics processes in supply chains are determined by the stages of promotion of inventory and related information and financial flows from the initial supplier to the final consumer.

**The structure of models and methods used in supply chains**

It can be divided into two blocks:

1. Planning supply chains that perform the following functions: scheduling in the CRM system, production plan, inclusion of forecast items in the production plan (ordering components with a long delivery time), a system for monitoring the completion of tasks on time, evaluation of the quality of completed tasks;

2. Current supply chain execution. The block includes a transportation management system (choosing the optimal type of transportation, drawing up an economically advantageous route, tracking goods), a warehousing management system (monitoring the fullness of warehouses, inventory assessment, inventory, packaging and labeling of products), an order management system (availability of an internal ERP system, formation of orders for incoming products).

In practice, a combination of methods and models is used.

**1. ECR (Efficient Consumer Response)- the main focus is on customer service, all supply chain counterparties act in the best interests of the consumer;**

ECR Logistics Concept

• ECR is a comprehensive logistics management strategy to optimize the supply chain and ensure efficiency, service and time for end users.

• ECR includes the QR (Quick Response) method to save money on product distribution, promotion, and sale.

• ECR offers new approaches to organizing wholesale trade and working with distribution channels.

• ECR automates order processing and improves the accuracy of order fulfillment.

• ECR technology allows you to organize the business processes of an enterprise, taking into account its overall strategy.

• ECR increases sales by selling related products and simplifies end-user service.

• ECR reduces uncertainty in supply chains and the cost of maintaining warehouse space.

• ECR combines products into product categories to improve the efficiency of inventory management.

• ECR is widely used in the grocery industry and other mass-market industries.

**2. VMI (Vendor Managed Inventory) – the supplier (manufacturer of products) is required to maintain insurance inventory in its own warehouse and at the consumer;**

VMI (Vendor-managed inventory) is a technology for joint inventory management in supply chains. It is also known as "supplier-managed inventory".

The bottom line: the supplier takes over the inventory management of its materials from the consumer (distributor), and the consumer promptly provides information about the availability of materials, the production plan, inventory standards and their changes.

The concept is applicable not only when interacting in a supplier-manufacturer pair, but also in other business models (distributor-seller, etc.).

• The customer (retailer, distributor) regularly (usually daily) provides the supplier with data on inventory, product receipt and sales.

• The supplier determines the optimal delivery volume and issues a shipment order. The volume of supply can be calculated using one of three methods: if the inventory level falls below the minimum, they are replenished with a certain amount, if the goods are sold, the stocks are replenished by a certain amount (up to the maximum level), or if the goods are sold, the supplier independently calculates the optimal level of replenishment.

• The customer sets inventory thresholds for the supplier for each item, within which the quantity of goods in warehouses must be kept.

**3. CRP (Continuous Replenishment Planning) –the turnover between the supplier and the sales representative must be continuously functioning on an ongoing basis;**

Continuous Replenishment Planning (CRP) is a logistics concept that ensures the continuous flow of products through the supply chain.

The essence of the CRP is that the program automatically initiates the production and movement of goods when the end user purchases the same product. For example, after the cashier scans the product, the system understands that it needs to be replenished. This triggers a series of actions that ensure that the product is manufactured and delivered to the store on time.

Some advantages of CRP:

Lower inventory costs. Closely matching production and delivery to customer demand allows companies to avoid excessive inventory.

Improving the efficiency of the supply chain. Automating the replenishment process allows you to optimize operations and reduce delivery time.

Improving cooperation between suppliers and retailers. Through the use of real-time data, suppliers can understand patterns of customer demand and adjust production and delivery schedules.

CRP is commonly used in the shipping and logistics industry to enable manufacturers or suppliers to meet their customers' needs in a timely and efficient manner.

**4. FM (Forecasting Methods) – this method focuses on the use of predictive models: trends, interval forecasting and fashion;**

FM (Forecasting Methods) is a term that means a forecasting method. It involves analyzing historical data and identifying patterns to predict future values. Such methods are used in various fields, for example:

Finance is used to forecast income, expenses, and resource needs.

Retail and logistics — to determine the optimal stock level, taking into account seasonality and trends, and to predict demand for new products based on analogues.

The manufacturing sector is used to predict equipment failures as part of predictive maintenance programs, optimize production processes, and reduce waste.

Examples

Budget forecasting — based on historical data, sales growth rates are determined, and then future revenues are predicted by multiplying the previous year's figure by the growth rate.

Demand forecasting is, for example, an exponential smoothing method that takes into account sales in the previous period and a demand forecast based on some method for this period.

**5. SV (Select Vendors) – special attention is paid to the choice of supplier, criteria such as reliability, quality, price and delivery time are considered.;**

SV (Select Vendors) is a supply chain management method that pays special attention to the selection of a supplier.

When using this method, criteria such as reliability, quality, price and delivery time are considered.

**6. GT (Game Theory) – possible consumer behavior options are modeled in conditions of uncertain demand;**

Game Theory is a tool for analyzing situations in which the decisions of several participants affect the winnings of each of them.

In logistics, game theory is used to develop or revise logistics strategies for supply chains (networks). Some applications:

Optimization of logistics costs. They model the interaction between participants in a single-channel, two-way supply chain, focusing on information exchange and demand forecasting.

Planning of production processes. They are looking for a balance point to minimize production and transportation costs.

Analysis of the behavior of supply chain participants. They consider the possibility of coordination through incentives due to conflicts and non-participation of players in the network design process.

**7.MBM (Make or Buy Model) focuses on minimizing costs, therefore, based on the analysis, operations that can be Outsourced are identified;**

MBM (Make or Buy Model) in the context of logistics is a "Make or buy" model, which involves making a decision on the independent production of components, parts, etc., or purchasing them from another manufacturer.

The model focuses on minimizing costs. To do this, the analysis identifies operations that can be outsourced.

Some situations where a decision is made in favor of procurement:

the need for a complete product is low;

there are no capacities necessary for the production of components;

there are no staff with the necessary qualifications.

The decision in favor of own production is made when:

the need for components is stable and large enough;

The component product can be manufactured using existing equipment.

**8.JIT (Just in Time) – to implement the principle of "just in time" delivery, all costs are optimized with the possibility of using third-party resources;**

JIT (Just-in-Time) is a production process and logistics management system based on minimizing inventory and creating efficient supply chains.

The main idea of JIT is to deliver materials and components exactly at the moment when they are needed for production, and not in advance. This approach eliminates the need to store large stocks and optimizes the production cycle.

Some principles of JIT:

Inventory Minimization — avoiding excessive inventory in favor of timely delivery of necessary components.

Reduction of production cycle time — optimization of processes for fast order fulfillment, which allows you to quickly respond to changes in demand and avoid delays.

Production flexibility — the ability to quickly reconfigure equipment and switch between different types of products without significant time costs.

Quality improvement is the introduction of quality control principles at all stages of production, preventing the release of defective products.

Identification and elimination of losses is a systematic analysis of all processes in order to identify redundant actions, downtime, and inefficient use of resources.

Reliable supplier partnerships are long—term arrangements with trusted suppliers who are able to ensure stable and accurate deliveries at the right time and volume.

Some advantages of JIT:

lower costs for warehousing, transportation, and procurement;

improve product quality through continuous monitoring and process optimization;

the flexibility of production, allowing you to quickly respond to changes in demand;

improving resource efficiency;

minimizing losses by eliminating redundant operations.

Some disadvantages of JIT:

high dependence on suppliers — supply disruptions can lead to production shutdowns;

the risk of supply chain imbalances, especially in crisis situations;

It requires high discipline and precise planning for successful implementation.;

the difficulty of adaptation in companies with unstable demand.

The JIT concept originated in Japan and was first introduced by Toyota in the middle of the 20th century. Over time, it has spread to various industries, including automotive, retail, warehouse logistics, and even the service sector.

**9. ABC-costing – a matrix is created in the model in which resources are ranked according to the degree of use and importance;**

**10. CRM (Customer Relations Management) – an information system is used that contains customer data; situational analysis – modeling of possible options for the movement of material flows in logistics is used;**

CRM (Customer Relationship Management) in logistics is a digital order management center, interaction with customers, contractors, warehouses and transport. It combines the functions of a control room, sales department, document management and customer support.

Some advantages of using CRM in logistics:

Improving customer interaction. Prompt response to customer requests, transparency in information exchange and feedback. CRM also provides the opportunity to create personalized offers and promotions for customers.

Automation of business processes. CRM allows logistics companies to automate routine operations such as order creation and tracking, warehouse management, and product delivery.

Process analysis and optimization. CRM provides the ability to collect and analyze data related to logistics processes. This helps companies identify bottlenecks in their operations and take measures to optimize them.

Tracking orders and deliveries. CRM allows logistics companies to track each stage of the order and delivery of goods. From order creation to delivery to the customer, CRM provides information about the condition and location of the product.

**11. QR (Quick Response) – this model implies instant response to changes in terms and delivery dates, using electronic document management and monitoring technologies.;**

The essence of the method is to assess demand in real time, as much as possible, and as close as possible to the end user.

The application of the QR concept allows you to:

reduce stocks of finished products to the required level, but not below the value that allows you to quickly meet consumer demand; significantly increase inventory turnover.

**12. TQM (Total Quality Management) – the model is being widely implemented in logistics processes, the quality management system penetrates into all areas of logistics, contributing to the unification and coordination of processes in all instances;**

**13. SCOR models - reengineering is being implemented and business processes are being improved, material flow management is based on improved algorithms with all counterparties and participants in the supply chain;**

We are talking about the SCOR model (Supply Chain Operations Reference model) in the context of supply chain management.

The essence of the SCOR model is that it implements reengineering and improves business processes, and material flow management is based on improved algorithms with all counterparties and supply chain participants.

The model is based on interrelated processes that support the operation of each segment of the supply chain, which ensures its functioning as a whole.

The main processes of the SCOR model:

PLAN planning;

SOURCE — purchases;

MAKE — production;

DELIVER — delivery;

RETURN — return logistics;

ENABLE — auxiliary processes that ensure the functioning of supply chains.

**14. IMM (Inventory Management Models) – the model uses the concept of insurance stock, the system automatically calculates a certain stock of components that are needed for production, taking into account the time of shipment of past orders.**

**Opinions of logistics specialists**

A multimodal approach is the best option for regulating supply chains, helping to reduce costs and optimize the number of participants, and includes:

1. Analysis of the indicator of the break-even point (zero point);

2. The method of network reduction (focusing on the formation of processes at a single point);

3. Modeling possible risks;

4. Market analysis, exchange rates, and economic situations;

It is necessary to apply analytical methods of modeling and designing material flows that are effective when using minimal information for:

1. modeling various market situations and evaluating the possibility of introducing new functions in the short term (mathematical models, formulas, graphs, and auxiliary tools are used to solve the tasks).

Disadvantages of analytical methods: the inability to take into account all the factors that affect the economic situation, so it is difficult to achieve ideal results.

The modeling method allows you to take into account the specifics and components of all elements of supply chains. It is used to build visualization models, for the convenience of monitoring the entire supply process and detailing each process. In comparison with the analytical method, the modeling method takes into account many more factors.

The current trend towards informatization allows the introduction of blockchain technologies, which imply the creation of an informational and more transparent model of interaction at all levels of supply. The following counterparties are involved in the supply chains:

1. Supplier;

2. Manufacturer;

3) the consumer;

4) Distributor;

5) Retailers.

All contractors can enter and take notes on the processes that occur with the cargo. The use of blockchain technologies helps to create:

 1. Each product has a unique code in the system and only participants in the supply chain have the right to edit the status of this cargo.

2. Each participant in the supply chain also has a profile that contains information about the counterparty, certificates, permits, and contacts.

Not all profile information is publicly available, and viewing restrictions can be set, but certificates and permissions will always remain visible to all participants in the supply chain.

The e-ECD (European Electronic Cleaning Certificate) project is a new priority in the development of digital logistics processes, which makes it possible to reduce the number of blacklists of carriers that do not fulfill their obligations to counterparties. Accessibility to these certificates makes it easier for suppliers to find a counterparty, and preferences can be allocated for participants with this certificate.

The Cargo Stream platform, which performs the function of an aggregator of logistics operations. This service helps to choose the optimal transportation route, taking into account all the needs of the customer. Goods are also accumulated in warehouses to reduce the cost of logistics services. Multimodal transportation is of great importance for saving money.

A new direction in logistics is "green" logistics reengineering,

 affecting the entire logistics chain of the company. Previously, it was believed that this process deals only with the environmental issue, but the method has proven itself in terms of cost reduction and efficiency of business processes.

For example, the technology of reusable containers has become increasingly used, which has led to lower costs for recycling containers. A "zero waste" program is gradually being implemented, allowing for the future reuse of materials for fuel, packaging and other resources.

The Cargo Stream platform, which performs the function of an aggregator of logistics operations. This service helps you choose the best transportation route, taking into account all the needs of the customer. Goods are also accumulated in warehouses to reduce the cost of logistics services. Multimodal transportation is of great importance for economy.

A new direction in logistics is "green" logistics reengineering,

 affecting the entire logistics chain of the company. Previously, it was believed that this process deals only with the environmental issue, but the method has proven itself in terms of cost reduction and efficiency of business processes.

For example, the technology of reusable containers has become increasingly used, which has led to lower costs for recycling containers. A "zero waste" program is gradually being implemented, allowing for the future reuse of materials for fuel, packaging and other resources.

**Performance indicators of the logistics supply chain management concept**

The following indicators can be used for evaluation::

Quantitative measures can be used to check performance or other parameters, for example,

Non–financial ones - the time it takes for each next cycle to end, the level at which the client is serviced, the level at which stocks are located, and how ready the company is to use resources.;

Financial expenses are fixed and variable expenses. The key calculation chain is minimizing costs and increasing income, for example, by calculating activities, results, or costs, depending on the purpose of the calculation. Special programs can be used for this.

In case of price increases due to increased inventories, raw materials, operations, equipment, and other reasons, ways to reduce costs are being explored, for example:

The cost of raw materials;

The cost of recalculations;

Processing of materials, production of products;

- Payment of fines

Responsible and interested persons of the departments are identified in the results;

The supplier market is being evaluated, its counterparties are being studied, and substitutes are being sought if necessary, if the first ones refuse.;

Existing and potential companies are interviewed for analysis and further changes in the logistics system, as well as to assess customer satisfaction.;

A strategy is being developed to achieve product superiority in terms of quality, price and other characteristics, and a search is underway for substitute products.;

Contacts with new suppliers are being established, communication planning is being organized, and risks and burdens on new participants are being calculated.