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## LOGISTICS

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Logistics as an integrated management of material and information flows within a system should be based on the following principles:

- Considering the movement of material resources from the primary source to the final consumer as a single material flow, which involves performing processes such as transportation, loading, unloading, moving, warehousing, and storing materials.
- Implementing organizational and managerial mechanisms to coordinate the actions of specialists from various departments involved in material flow management.
- The result depends on how successfully it is possible to link into a system the implementation of a complex of measures regarding the rationalization of packaging, unification of cargo units, improvement of warehousing, optimization of order sizes and inventory levels, selection of the most profitable routes for moving materials, etc.

Material flow is understood as a collection of raw materials, supplies, and semi-finished products that come from suppliers in the form of objects of labor to production units and, transforming there into finished products of labor, reach consumers through

distribution channels.

The circulation of material resources covers their movement to the enterprise warehouse, into the workshops, transportation of work-in-progress products within a workshop, between workshops, and, finally, the movement of finished goods outside the enterprise into the sphere of their consumption.

Considering these formally diverse, yet inherently unified processes as an integrated complex is of great importance. Obviously, the functions associated with the formation of the material flow of an industrial enterprise are technologically linked, and the costs of their execution are economically interdependent. This means that changes in one type of activity affect others, and attempts to reduce individual costs without taking others into account can cause an increase in total costs.

Insufficiently prompt actions of supply departments can negatively affect the functioning of the production and dispatch department, cause interruptions in its operation, and, consequently, disorganize the activities of the sales department. Optimization of the functioning of production units can lead to overcrowding of warehouses with some types of products and a shortage of others.

Reducing transportation costs by decreasing the speed and reliability of supply or refusing special expensive packaging can cost the enterprise dearly and, in particular, cause an increase in inventory storage costs. The larger the batch size of parts launched into production, the lower the equipment setup costs; however, the costs of storing work-in-progress products increase. Conversely, with a decrease in batch size, storage costs decrease, while equipment setup costs increase. Transportation costs depend on the location of production facilities, warehouses, and technical control points.

Just a few years ago, the main problems for the creators of logistics systems were related to the physical flows of goods and raw materials. Information support for the physical logistics process of goods movement from supplier to consumer was understood only as accompanying information. As logistics systems developed and spread across enterprises and firms, the need to develop and implement logistics information systems in practice became increasingly felt, allowing for the organic combination of all logistics subsystems into a single whole.

The formation of an information system is a complex and multifaceted process that utilizes all achievements of modern information technology and the latest computer systems, each of which enables successful management of production processes through the use of adequate information technology, methods, and forms of information support for the logistics system as a whole. New tasks set before production organizers and managers regarding the implementation of logistics principles require them to create an information infrastructure that would allow for the collection, organization, and transmission of information in accordance with established tasks.

A successful production process is impossible without the identification and standardization of information sources, its processing, and transmission, that is, without creating a production computer network. The capabilities of such a network are evidenced by the achievements of the communication networks of Western European branches of IBM. For example, all production units of IBM in Germany are connected for information support through a computer network, which forms the basis of the PROFS (Professional Office) communication system. This system allows anyone connected to it to communicate with any department of the firm. Today, more than 26,000 out of 30,000 workers of the German branch of IBM are integrated into this system. Along with the PROFS system, the production network creates an infrastructure for the entire information flow of the firm. Furthermore, this network serves as an integral foundation for another promising network that unites over 300,000 IBM employees in Western Europe.

Information support for logistics also requires corresponding software support, thanks to which the entire logistics system, starting from the subsystems, would work as a single whole. The main goal here is to unite all departments through the created infrastructure (communication and information systems). This will allow each subject of the general production process to connect with any other subject. The communication system must encompass all suppliers and customers of the given enterprise.

Information logistics provides new opportunities for organizing the necessary information according to the principles developed by logistics into a clear system, the main function of which is to receive, process, and transmit information in accordance

with the tasks set before this system. According to authoritative specialists from some Western companies, the information infrastructure created both within individual production units and across the entire firm based on modern high-speed computers and appropriate software transforms information from a supporting (service) factor into an independent productive force. Unlike other factors, it can constantly and in a short time increase labor productivity and minimize production costs.

However, despite the already proven effectiveness of information logistics in practice, it is only one of the elements of the general logistics system, and its successful functioning is possible only if the entire production transitions to logistics principles. In turn, an integrated logistics approach in the areas of procurement, transportation, warehousing, production, sales, and distribution is absolutely impossible without an information system.

The main provisions of commercial logistics are:

**1. Implementation of the system approach principle**, meaning the optimization of material flow both within the enterprise and its subdivisions. However, the maximum effect is possible only when optimizing either the aggregate material flow from the primary source of raw materials to the final consumer, or major segments of it. At the same time, all links of the material chain, i.e., all elements of macro- and micro-logistics systems, must work as a single, coordinated mechanism.

**2. Rejection of the manufacture of universal technological and hoisting-transport equipment**, and the use of equipment that corresponds to specific conditions. Optimization of flows through the use of equipment matching specific working conditions is possible only in the case of manufacturing and mass use of a wide nomenclature of various means of production. That is, the application of a logistics approach to material flow management is possible only at a high level of scientific and technological development.

**3. Humanization of technological processes** and provision of modern working conditions. One of the elements of logistics systems is personnel, i.e., staff who responsibly perform their functions. The logistics approach strengthens the social significance of activities in the field of material flow management and creates objective

prerequisites for attracting personnel with higher labor potential to the industry. Along with this, working conditions must be adequately improved.

**4. Accounting for logistics costs throughout the entire logistics chain.** One of the main tasks of logistics is to minimize the costs of bringing the material flow from the primary source to the final consumer. Solving this task is possible only under conditions where the cost accounting system of production and circulation allows for the isolation of logistics costs. Therefore, an important criterion emerges for selecting the optimal variant of a logistics system—the minimum of total costs throughout the entire logistics chain.

**5. Development of service offerings at a modern level.** Today, the possibilities to sharply increase product quality are objectively limited. Therefore, an increasing number of enterprises resort to logistics service as a means of increasing competitiveness. When there are several suppliers of the same product of the same quality on the market, the advantage will go to the one who can provide a higher level of service during the delivery process.

**6. Capability of logistics systems to adapt to market conditions.** The emergence of a large number of diverse goods and services leads to uncertainty in demand for them, causing sharp fluctuations in the qualitative and quantitative characteristics of material flows passing through logistics systems. Under these conditions, the ability of logistics systems to adapt to changes in the external environment is an important factor for a stable market position.

The ultimate goal of activities in the field of logistics is expressed by the "six rules of logistics":

- cargo (the right product);
- quality (of the required quality);
- quantity (in the required quantity);
- time (delivery at the right time);
- place (to the right place);
- costs (with minimal costs).

It is clear that the goal of logistics activity is achieved when these six rules are

fulfilled, that is, when the right product of the required quality in the right quantity and at the right time is delivered to the right place with minimal costs.

The concept of commercial logistics envisions the following directions:

- formation of economic ties;
- determination of the need for product transportation volumes and directions;
- determination of the sequence of product passage through warehousing points;
- operational regulation of supplies and transportation;
- formation and management of inventory balances;
- development of warehouse management;
- provision of commercial and freight-forwarding services.

The above demonstrates significant advantages of the logistics management concept compared to the traditional one (Table 1).

Table 1. Comparative analysis of traditional and logistics management concepts

<b>Features of the traditional management system</b>	<b>Features of the logistics system</b>
Low level of production integration	High level of production integration
Striving for maximum productivity	Ensuring flexibility
Optimization of production functions	Optimization of material flow
High level of production capacity utilization	High throughput capacity
Material balances/surpluses to ensure production	Surpluses in the form of capacities
Extended disposition time cycle	Very shortened disposition cycle, daily and hourly intervals
High level of readiness of manufactured	Low or medium level of product readiness

products	for final consumption
Collective production oriented towards the production program and warehousing	Production oriented towards customer orders, i.e., on demand

*Functions and Goals of Logistics* The primary task of logistics is to achieve the greatest profit for the firm. Unfortunately, logistics is often viewed narrowly through the prism of achieving the firm's strategic goals and optimizing its core operational processes (e.g., transportation and storage of cargo). In this regard, general and subordinate local tasks of logistics are distinguished.

To fulfill the general task, it is necessary to ensure, with the lowest costs, the maximum adaptability of firms to the changing market situation, an increase in their market share, and advantages over competitors. One of the general tasks of logistics is to create an effective integrated system for regulating and controlling material and information flows, which would ensure high quality of product supply.

Closely related to this task are problems such as: ensuring mutual correspondence of material and information flows; controlling material flow and transmitting data to a single center; determining the strategy and technology of physical movement of goods; developing ways to manage their movement operations; establishing forms of standardization for semi-finished products and packaging; and determining production volume, transportation, and warehousing discrepancies between desired and possible purchases and productions.

An example of a local task of logistics is the optimization of production inventories and the maximum reduction of cargo storage and transportation time.

An insufficient link between the logistics concept and an active market strategy often leads to a situation where the procurement of raw materials, semi-finished products, and components itself becomes the motive to start manufacturing a certain product without proper market demand for it. However, in the current market situation, such an approach to product manufacturing can lead to commercial failure. Orientation

towards minimizing costs is undoubtedly necessary, but only at an optimal level of combination of costs and profitability of the main and circulating capital involved within the market strategy.

The goals of modern logistics are:

- the arrival of all materials in the appropriate quantities, quality, and assortment at the place of consumption;
- changes in material inventories in response to information about options for their rapid acquisition;
- changing the policy of selling manufactured goods to a policy of manufacturing goods that are sold;
- reducing the optimal size of the supply and processing batch to a single unit;
- high-quality fulfillment of all orders in minimum timeframes.

Achieving the set combination of goals is an ideal to strive for. And the higher the production and infrastructural potential, the easier it is to reach this ideal. The successful implementation of this logistics concept by individual firms is facilitated by their creation of an operational cargo delivery system. In Germany, for example, orders for materials and products of the corresponding assortment are fulfilled within 24 hours. Orders that take into account individual customer needs are fulfilled within 14 days.

## **TRANSPORT SYSTEMS AND LOGISTICS IN MODERN WORLD**

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Transport systems and logistics are among the most important sectors of the modern economy. They influence industrial production, international trade, business development, and everyday life. Every product that people use - food, clothes, electronics, medicine, furniture, or construction materials - reaches consumers through transport and logistics systems. Without effective transportation and logistics, it would be impossible to maintain stable economic growth and cooperation between countries. Today, logistics is not only about moving cargo from one place to another. It also includes planning, information management, warehousing, route optimization,