

6. Management of logistics business processes of the enterprise

6.1 Logistics and logistics business process at the enterprise

In the context of globalization, there is an urgent need to increase the competitiveness of domestic enterprises in the domestic and foreign markets, which is caused by the low efficiency of activities in the post-crisis period and the high resource and energy intensity of production. This determines the need to improve resource management, optimize the main, auxiliary and administrative business processes, implement modern production technologies and advanced management methods and models. One of the promising areas is the improvement of logistics services management, as it allows optimizing the mode of operation of enterprises within the material and information flows that determine the content of production activities.

Logistics is the most important tool for competition, profit and sustainable development of enterprises and organizations. The task of logistics is to meet the basic requirements of any operation for a strictly defined product, as well as its quantity, quality, location, time, type, packaging and necessary information [112, p. 49].

Logistics literally means movement. In fact, in the modern world, logistics is knowledge that can be used to control and manage the production and supply of goods and services [129, p. 30]. A broader definition of logistics is associated with the study of planning and managing the movement of material, information and financial resources in various systems [126]. From the point of view of practical application, logistics is the choice of the most effective option for providing goods of the required quality, required quantity, required time, required place with the lowest cost [128].

In military science, logistics is associated with supporting the army's supply lines, while disrupting the enemy's actions, since an armed force without resources and transport is defenseless. Military logistics was already practiced in the ancient world, and since modern militaries had a significant need for logistical solutions, advanced

developments were developed. In military logistics, logistics employees managed how and when to move resources to the necessary places [131, p. 27].

From the perspective of organizational management, logistics can be viewed as the strategic management of material flows in the supply process: procurement, transportation, sale and storage of materials, parts and finished inventory. The concept also includes the management of relevant information flows, and even financial flows. Logistics is aimed at optimizing costs and rationalizing the production, sales and related service process both within a single enterprise and a group of enterprises.

The storage, handling and movement of products and services so that customers can get them at the right time, at the right place and in the right assortment is called logistics and the function associated with such activities is called logistics function. The logistics function or logistics system is designed based on the stated objectives of logistics.

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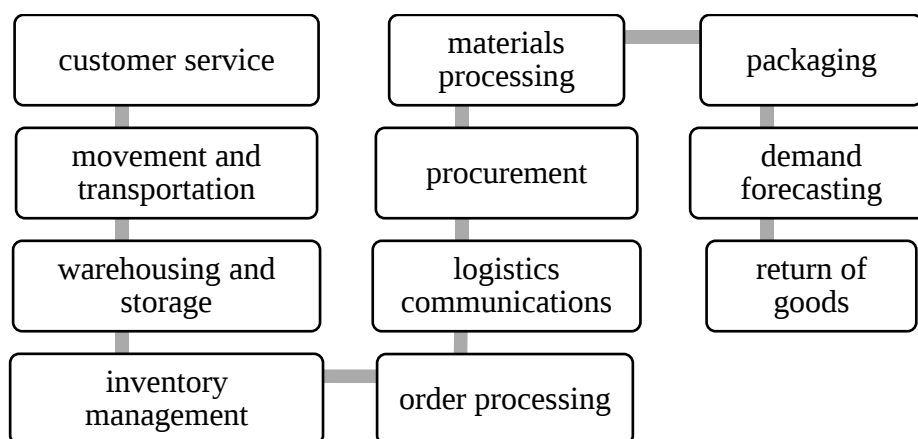


Fig. 1.1. Business processes in logistics

Source: formed by the author based on [114, p. 130].

Functional areas of modern logistics management include: purchasing logistics; production logistics; distribution logistics; transport logistics; inventory logistics; warehousing logistics; service logistics; information logistics (Fig. 1.2.) [115].

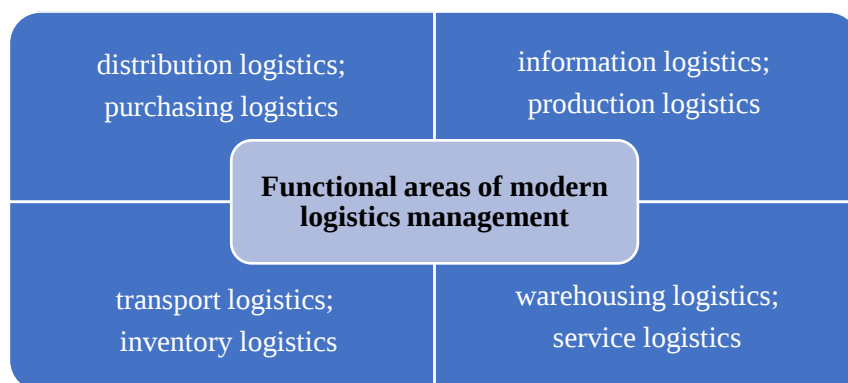


Fig.1.2. Functional areas of modern logistics management

Source: systematized by the author based on [115].

The main goal of logistics management is to achieve and coordinate the economic interests of participants in business processes through the most efficient use of resources in the existing economic conditions. The general goal of each enterprise is specified in sub-goals, which are determined by the need to optimize and rationalize business activities, develop the infrastructure of the logistics system, taking into account current legislation on the creation of a modern material and technical base of production and commodity exchange, as well as the active use of advanced information technologies [122].

Logistics management is carried out taking into account the general principles of management, adapted to the specifics of logistics activities. Among the principles of logistics management, the following are distinguished [114]:

- Systematicity and complexity, which involve the management of all processes in the interaction and coordination of individual stages of business processes in order to optimize the entire logistics system.
- Coordination of criteria for assessing the effectiveness of the functioning of individual parts of the logistics chain at the micro- and macro-logistics levels.
- Organization of accounting for the costs of managing material and related information, financial and service flows along the entire logistics chain.

- More active use of information technologies and modern modeling methods in managing logistics systems, etc.

All logistics processes must be implemented in compliance with the “golden” rule of logistics – “7R” (Fig. 1.3).

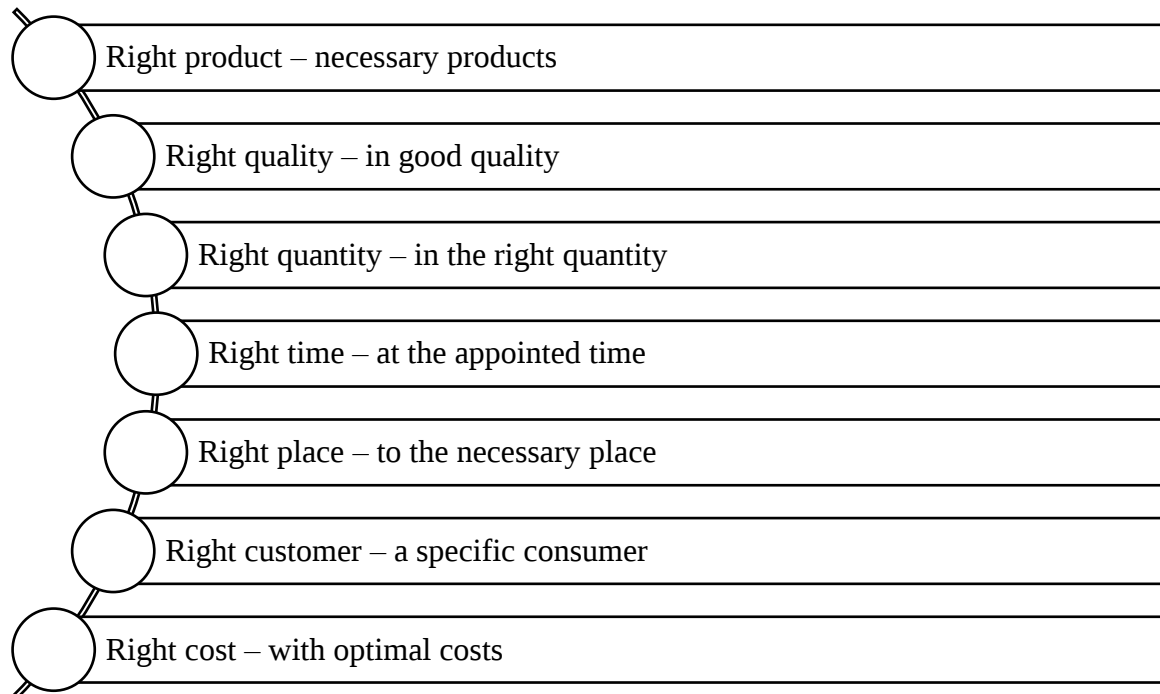


Fig. 1.3. Logistics rules – «7R»

Source: compiled by the author based on [142, p. 5].

So, the rule of “7R” (“logistics mix”) can be formulated as follows: Supply of the necessary products in the right quantity and quality at the right time to the right place of a specific consumer with optimal costs.

When solving logistics problems, companies can rely on their own efforts or engage the services of logistics providers (logistics outsourcing). The following types of logistics providers are distinguished: 1PL, 2PL, 3PL, 4PL.

1PL is a small company that operates locally or in its niche of logistics services;

2PL operates conventionally (traditionally), organizes all transportation of goods from point to point. But 2PL is only an intermediary (all contracts are concluded by the cargo owner);

3PL is the provider not only organizes, but also provides transportation itself;

4PL – 3PL and management logistics 22.

There are different types and levels of logistics business processes, which can be classified depending on the scale of the tasks being solved (Fig. 1.4).

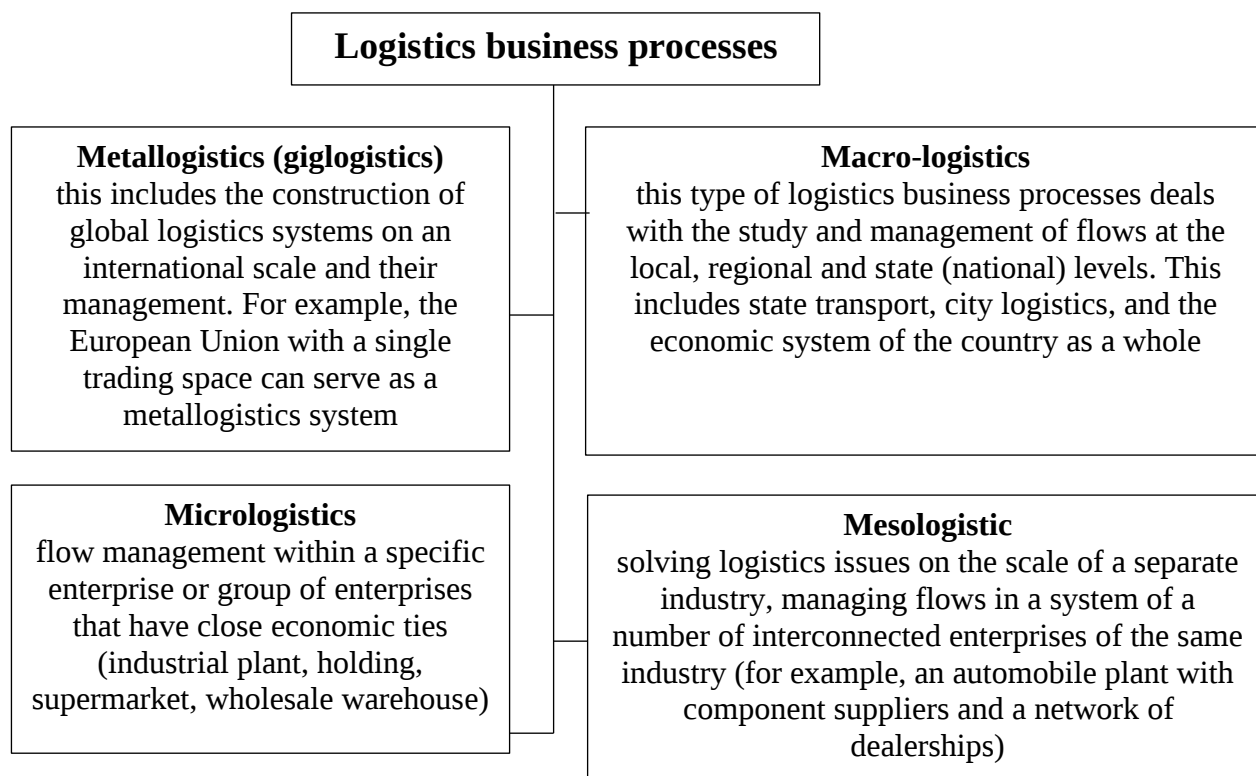


Fig. 1.4. Classification of logistics business processes

Source: compiled by the author based on [150].

The links of the logistics flow of an enterprise can be of different sizes, accordingly they can be divided into different levels [150]:

the first-order material flow – the highest level – includes the flow of goods between the company and its suppliers and customers;

the second-order – includes the flow of goods already on the territory of the company itself between its workshops;

the third-order – ensures the flow of goods within one workshop, between its sections;

the fourth-order – is already the level of one workplace.

One of the most popular classifications of logistics business processes is by functional basis. As mentioned earlier, logistics is used in a wide variety of areas of human activity. That is, it performs a different set of functions, depending on specific

goals. Accordingly, the following types of logistics, as well as its business processes, can be distinguished by functional basis (by the field of entrepreneurship) (Fig. 1.5).



Fig. 1.5. Classification of logistics business processes by functional basis

Source: author's own generalizations based on [116, p. 363].

When creating a business process model for an organization, the task of isolating individual business processes is faced. Various approaches are used to solve this problem (Fig. 1.6).

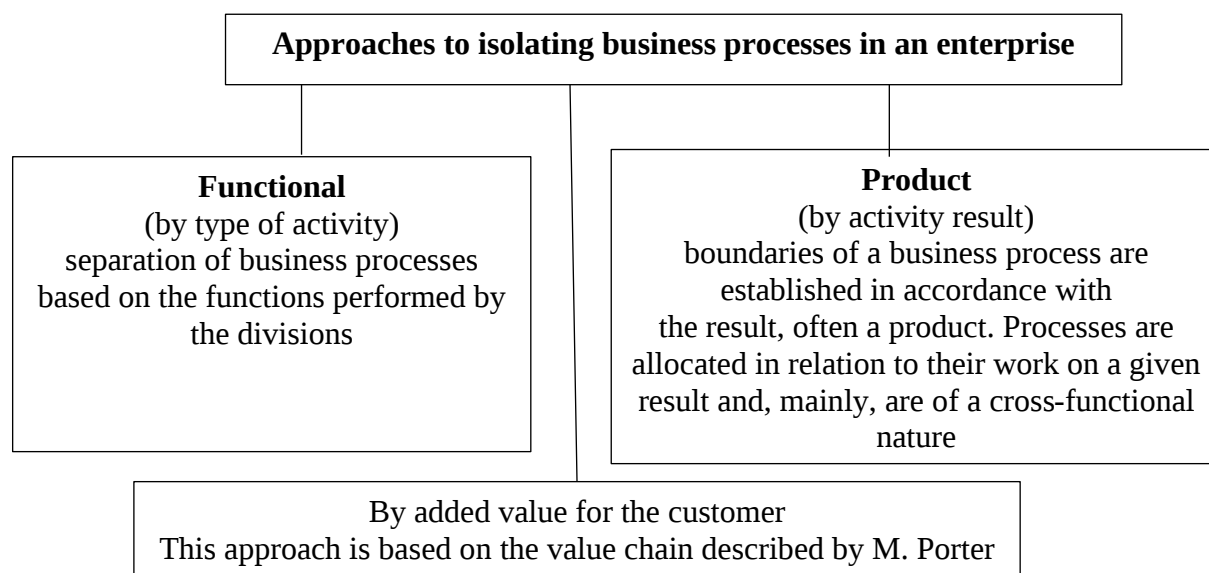


Fig. 1.6. Approaches to the allocation of business processes in the enterprise

Source: author's own generalizations based on [116].

The functional approach to business process modeling is reduced to building a technological process diagram in the form of a sequence of operations, the input and output of which reflect objects of various natures: material and information objects, used resources, organizational units. The methodology of functional modeling (data flow diagrams, structural process diagrams) is focused on displaying a sequence of functions in which it is difficult to distinguish specific process alternatives, and the scheme of interaction of objects is not visible.

The advantage of the functional approach is the clarity and comprehensibility of the presentation of business processes at different levels of abstraction, which is especially important at the stage of implementing the developed business processes in the divisions of the enterprise. The disadvantage of the functional approach is some subjectivity of detailing operations, and as a result, great complexity in the structure of business processes [116, p. 367].

When applying the product approach, it should be borne in mind that since the concept of "result" in itself is not unambiguous, this approach involves many variations on the theme. The greatest danger when applying this approach lies in defining the result, since, skillfully juggling this concept, it is not very difficult to represent each

function as a separate process, as a result of which something is produced, and then combine the resulting "processes" into an already known model "by subject".

The chain highlights the main business processes that ensure the operational cycle of production, are performed sequentially and support business processes that ensure the functioning of the business system and accompany the creation of the product throughout its life cycle. M. Porter noted that buyers do not buy the product as such, but its value for themselves, and therefore, in order for an enterprise to accurately determine its competitive advantages, it is necessary to consider the entire sequence of the process of creating this very value. In other words, the value chain is an infrastructure that shows the importance of business processes.

Thus, the customer value-added approach is the most relevant, because it allows you to distinguish business processes that are directly designed to create the results of the enterprise's activities - value for the client, as well as business processes that play a supporting role, providing the necessary infrastructure and management tools for the implementation of primary business processes, which helps in analyzing processes and optimizing them at the enterprise. There is no standard list of business processes, each enterprise develops its own list of basic business processes, since the product, as a value for the client, is unique for each enterprise. However, key business processes can be identified in each industry.

6.2 Concept and main types of transport in logistics. Main trends in the transport and logistics industry

In general, transport is one of the key elements of the economy, business services and logistics. In this regard, there are important grounds for studying this issue as a key aspect of socio-economic relations in society. Transport has a great impact on micro- and macro-processes of economic activity. The market for motor transport services in our country is particularly active and dynamically developing. The main criteria for the initial choice of carriers are the cost of transportation, reliability of delivery times, and safety of cargo during transportation.

Transport logistics primarily solves the problem of strengthening the coordination of actions of direct participants in the transport process [135, p. 97]

Today, about 50% of all logistics costs fall on transport operations. Therefore, it is important to build a process that allows you to reduce transportation costs as much as possible, increasing the speed of delivery, and also minimizing damage to cargo during transportation (Fig. 2.1).

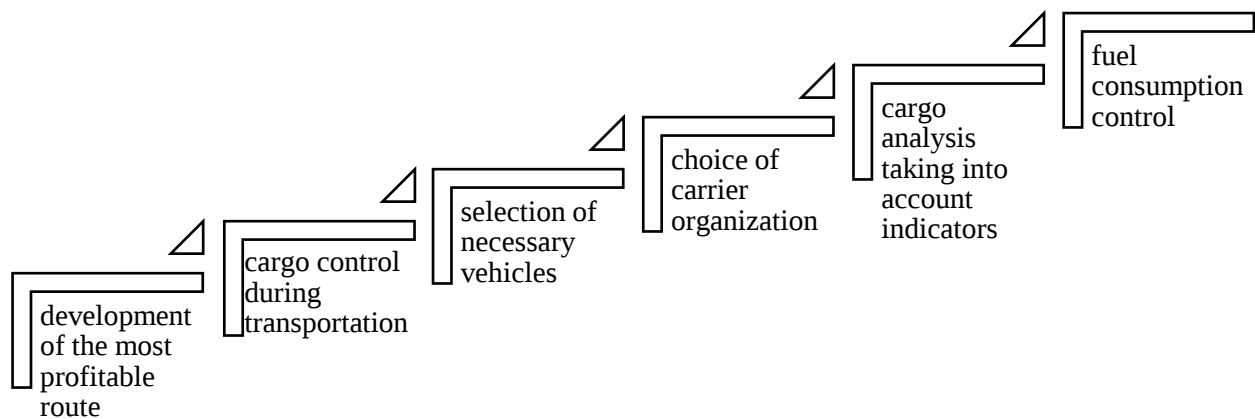


Fig. 2.1. The main tasks solved by transport logistics

Source: compiled by the author based on [111].

The functions of transport logistics encompass a set of actions aimed at ensuring the efficient and economical movement of goods from the manufacturer to the end consumer. They are aimed at reducing costs and increasing the speed and reliability of transportation, which is critically important for meeting customer needs and increasing the company's competitiveness (Fig. 2.2).

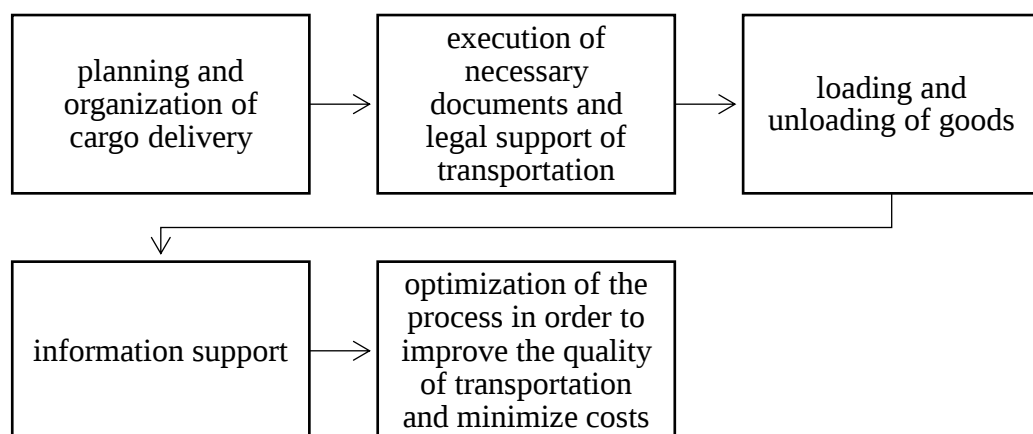


Fig. 2.2. The process of planning and organizing cargo delivery

Source: compiled by the author based on [111].

Transport is a key element of the logistics system, ensuring timely and efficient movement of goods and raw materials between different points. Today, the transport and logistics industry is rapidly developing under the influence of new technologies and market needs, where the main trends are digitalization, automation, sustainable use of resources and the implementation of environmental solutions.

Table 2.1. Advantages and disadvantages of different modes of transport

Type of transport	Advantages	Disadvantages
Road transport	➤ High maneuverability, less stringent requirements for product packaging. ➤ Cargo can be delivered "door to door" with the necessary degree of urgency. ➤ Ensures regularity of supply, as well as the possibility of supplying in small batches	➤ Relatively high cost of transportation, which is usually charged based on the maximum carrying capacity of the vehicle. ➤ Urgency of unloading. ➤ Possibility of cargo theft and vehicle theft. ➤ Relatively low carrying capacity.
Railway transport	➤ Relatively low cost of cargo transportation, availability of discounts. ➤ Possibility of cargo transportation in any weather conditions. ➤ Provides relatively fast delivery of cargo over long distances. ➤ Regular transportation	➤ Limited number of carriers. ➤ Low possibility of delivery to points of consumption, i.e. in the absence of access tracks, rail transport must be supplemented by road transport
Sea transport	Low freight rates and high carrying capacity	➤ Low speed. ➤ Strict requirements for packaging and securing of cargo. ➤ Low frequency of shipments. ➤ Significantly depends on weather and navigation conditions. ➤ Requires the creation of complex port infrastructure.
Inland waterway transport	➤ Low freight rates: when transporting goods weighing more than 100 tons over a distance of more than 250 km. ➤ The cheapest	➤ Low delivery speed ➤ Low geographical accessibility (due to restrictions imposed by the configuration of waterways)
Air transport	➤ Highest speed. ➤ Ability to reach remote areas. ➤ High cargo safety	➤ High freight rates. ➤ Dependence on weather conditions, which reduces the reliability of adhering to the delivery schedule
Pipeline transport	➤ Low cost with high throughput. ➤ High degree of cargo safety	➤ Narrow range of cargoes to be transported (liquids, gases, emulsions)

Source: Compiled by the author based on [111, 116, 121].

The basis for choosing the type of transport optimal for a particular transportation is information about the characteristic features of different types of transport. The main advantages and disadvantages of road, rail, water and air transport, significant from the point of view of logistics, are presented in Table. 2.1.

Market analysis of services provided by various types of transport to cargo owners allows us to establish not only the potential of these services and their quality indicators, but also to compare and evaluate possible transport service options in modern market conditions of the economy. It is important to keep in mind that the choice of the best transport service options is made by cargo owners.

The following main criteria for choosing a form of transport service are distinguished: reliability of delivery time, transportation costs, total delivery time, the carrier's willingness to change the tariff, its financial stability, technical readiness of rolling stock, availability of additional cargo handling equipment, availability of additional services for picking and delivery, cargo safety, forwarding, personnel qualifications, monitoring, the carrier's willingness to change the service, flexibility of routes, ordering procedure, quality of organization of transport service sales, special equipment.

The size of these indicators is different for each type of transport. It largely depends on the capacity and structure of the cargo flow, the distance of transportation, the type of cargo, the size of the shipment, the type of rolling stock, the ratio of cargo and empty runs, the material and technical base of transport enterprises, etc.

Therefore, when choosing a transport service option, it is first necessary to study information about the characteristic features of different types of transport. Then the cargo owner chooses a type of transport or their combination, taking into account the following factors: conditions for the supply of goods; cargo characteristics; number of cargo batches; transportation distance; cargo delivery times; proximity of the cargo destination to railways, highways, sea or river ports, cargo airports; the need to protect the cargo in transit; the ability to control the location of the cargo along its route.

The last mile component is one of the key options for the development of the logistics industry, accordingly, the active development of additional services and the construction of supporting processes continues.

New opportunities are emerging for all parties – products are being created for the client that allow combining delivery services in a specific interval, receiving different types of goods with variability in payment, delivery methods, receiving notifications about delivery and arrival of the courier, and for online stores, customers of the service – differentiation of methods of preparation and movement of cargo, from turnkey fulfillment to direct delivery of individual orders from the seller to the buyer. Among the many opportunities for the development of technologies, it is worth highlighting several key trends [148].

Key trends in technology development in logistics	Resources
	Communications
	Processing Automation
	Flexibility and Support for Different Products
	Eco-Friendly Delivery Methods
	Providing Comprehensive Services from Logistics Companies
	Mobile Robots (AMR) in Warehouses
	Accelerating Last Mile Delivery
	Artificial Intelligence, Smart Logistics

Fig. 2.3. Key trends in technology development in logistics

Source: Compiled by the author based on [148].

The delivery services market is affected by seasonality, which requires flexibility in personnel management. Accordingly, standard methods of recruiting personnel, outsourcing are not effective enough during short seasonal peaks, individual overloaded time slots of the working day. Servicing additional volume of orders can be implemented through a crowd platform, which allows you to give a share of simple operations to third-party crowd performers who do not require constant presence in the staff, but are effective in maintaining delivery times to customers, and these can be both crowd couriers and warehouse employees.

The standard practice of voice contact with the client has long been a thing of the past, but replacing it with one updated tool, chat bot or messenger, does not give a sufficient effect. The application of the cascading principle of communication, the consistent use of all options from robocall to operator connection, the development of artificial intelligence will allow to ensure contact with all types of audience, to notify about the arrival of cargo at the point of order delivery or the arrival of a courier.

The growth of cargo volume, processing costs require the modernization of warehouses, therefore the installation of sorting lines, robotization of various types is a prerequisite for reducing the time between receipt, cargo processing and subsequent dispatch of a courier for delivery.

Most logistics partners have different groups of orders that require variability in service, so it is important for logistics operators to support both "Fast delivery" orders, with short service intervals, the use of hyperlocal delivery in small macrozones around order pick-up points, involving foot couriers, bicycle couriers, and large-sized orders for LTL tasks, marketplaces, furniture, involving large-tonnage transport, the availability of loading and unloading operations, etc.

The number of consumers concerned about the environmental friendliness of cargo delivery is rapidly growing around the world. In this regard, there is an increase in the number of companies that seek to reduce the "carbon footprint" of their activities, use electric vehicles, electric aircraft or boards with reduced emissions into the atmosphere, biodegradable packaging, etc. This has practically no effect on the speed and quality of cargo delivery, but has a positive effect on the image of transport companies.

5PL logistics is a progressive service system that uses the capabilities of the global information and technology space. 5PL providers are aggregators that implement the entire chain of delivery and cargo management using Internet technologies and offer the ability to choose a tariff and delivery method. 5PL is an innovative IT product that allows you to build delivery routes as profitably as possible. This approach makes logistics more advanced. This is the format of the near future.

For example, the European Union is already investing in the creation of a single logistics space.

The use of autonomous mobile robots for real-time route planning with space analysis and obstacle avoidance has been very relevant recently. Such robots, when properly configured, guarantee that all cargo within the warehouse is moved from point A to point B in the shortest possible time, completely eliminating collisions and "traffic jams".

The "last mile" in logistics is the final stage of delivering an order to the end customer. Recently, companies have been making every effort to accelerate and optimize this stage. At the same time, the demand for express delivery "day to day" is actively increasing - often customers are even willing to pay more to receive their order as soon as possible. That is why companies today pay special attention to accelerating last-mile delivery.

Managing significant volumes of cargo flows and resources requires minimizing risks in the decision-making process for building transport schemes, warehouse processes and last-mile delivery, so the future of the industry lies in the ability to calculate trends, model development, and manage a variety of linear operations using artificial intelligence. Accordingly, large last-mile operators are transforming into logistics IT companies, which allows them to effectively support all of the above-mentioned development blocks and find new ways and means of organizing production.

Making accurate forecasts for the development of transport logistics in Ukraine in the near future is quite difficult, given the geopolitical situation in the world and economic difficulties. Ukrainian logistics in 2025 will continue to struggle with the challenges caused by the war, but at the same time the use of technological solutions will increase. Thus, companies will work on automating and optimizing logistics processes using artificial intelligence and machine learning for route planning, demand forecasting and inventory optimization. Another trend will be the integration of digital technologies to increase transparency and security, as well as promoting Ukraine as an accession to the European Union. Ukrainian companies are trying to enter international

markets and use the advantages of their location to increase exports and attract foreign investment.

One way or another, high-quality and fast freight transportation has always been and will be needed at all times. This means that the field of transport logistics will continue to develop despite everything. And those companies that develop competently with the use of modern technologies will always remain at the forefront.

6.3 Supply chain management system in the enterprise

Supply Chain Management (SCM) system at the enterprise is a comprehensive approach that ensures effective management of all stages of the movement of goods from the supplier of raw materials to the end consumer. This system includes the integration and optimization of the processes of procurement, production, transportation, storage and sale of products, which helps to reduce costs, increase productivity and improve customer service. The term "supply chain management" originated in the 80s, but there is still no exact understanding of its content. Some consider it with integrated logistics, others consider logistics as part of the supply chain management process.

The main factors for ensuring competitiveness and profitability of activities today are not optimization of the main functions of enterprise management, but the study and consideration of the entire value chain, all its inter-organizational sections and the points of connection of various stages of the value chain. In this regard, the application of the concept of supply chain management has become widespread as one of the tools for increasing competitiveness.

From the above definitions, according to the authors, supply chain management should be understood as a process that combines the main business processes both within the company and between partner companies participating in flow processes, starting from suppliers of raw materials and ending with the end consumer.

Having studied the concepts of logistics and supply chain management, let's find out what their difference is and present them in the form of Table. 3.1.

Table 3.1. Distinctive features of logistics and supply chain management

Basis for comparison	Logistics	Supply Chain Management
Subject of research	Formation and implementation of flows within, local nodes of the supply chain	Management of deliveries between its elements along the entire value chain
Organizations involved in the work	Applied in a single organization, because there is no need to interact with other companies	Interaction with several companies daily (suppliers, consumers, etc.)
Goals and objectives	Maximum customer satisfaction	Ensuring competitiveness and comparative advantages for the enterprise
Direction of activity	Aimed at managing material flows	Controls the entire process of product movement from creation to delivery to the consumer

Source: compiled by the author based on [143].

From Table 3.2, we can conclude that supply chain management is the largest concept that includes logistics. SCM covers the entire cycle of raw material procurement, production and distribution of goods. There are six main indicators that SCM is aimed at: production, supply, location, inventory, transportation and information. As part of SCM systems, they usually form two large blocks, such as [120, p. 265]:

- supply chain planning (SCP) – drawing up an operational plan, determining the order portfolio and range of manufactured products that will allow moving in a given tactical and strategic direction, determining detailed steps in terms of terms and resources, taking into account the risk factor and uncertainty situations, diagnosing the execution of operations;

- supply chain execution (SCE) – monitoring and controlling the execution of logistics operations.

SCM class systems automate these processes, which leads to a reduction in costs for supply, production, delivery of finished products, service and communication information from the submission of an application to the consumer, that is, to the full fulfillment of all client requirements. These systems serve for automated management of all stages of supply, production and turnover of the enterprise, the SCM system is based on six main areas of enterprise development (Fig. 3.1).

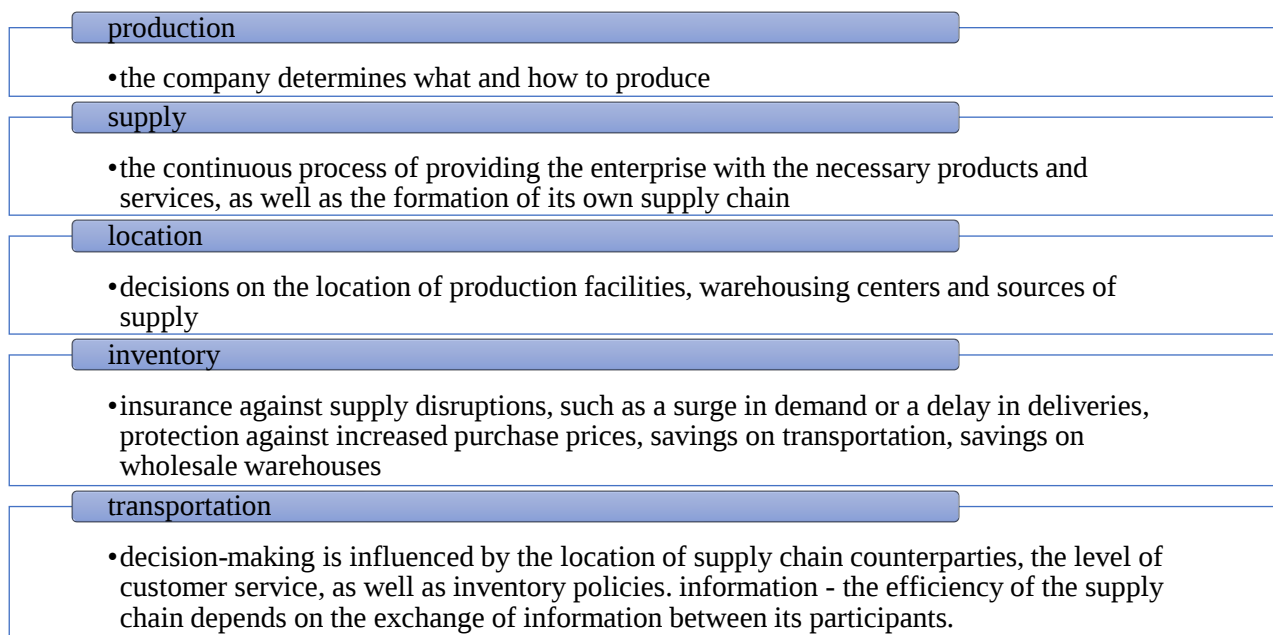


Fig. 3.1. The main areas of enterprise development for the functioning of the SCM system

Source: compiled by the author based on [127].

With proper and effective transportation management, supply costs are reduced. And this is about 30% of total supply costs. More than 70% of errors in the distribution of goods are directly related to delays in product delivery.

Regarding supply chain management, a systematic approach is implemented in the SCOR model. The classic SCOR model is based on five key processes: planning, sourcing, production, delivery, return [135]. The SCOR model (Supply Chain Operations Reference Model) was created by the International Organization "Supply Chain Council" for the purpose of more effective analysis, planning and design of supply chains. It translates as "Recommended Model of Operations in Supply Chains". This model provides a classification of supply chain management processes with their brief description, key performance indicators (KPI), data sets and previous experience.

The current trend of the SCOR model is based on 7 processes: planning, sourcing, production, delivery, return, transportation and provisioning, which are analyzed and then actions are planned to optimize them. The SCOR model allows you to model typical processes within the supply chain, evaluate their effectiveness using established criteria, determine the relationship between participants and determine the

terms of cooperation [118, 129]. By using the SCOR model, you can link strategic business goals to performance indicators of individual management processes in the supply chain.

Table 3.2. Basic blocks of a supply chain management system

Subsystem (block)		Functions and tools
SCP (Supply Chain Planning)	Supply Chain Planning	Advanced planning and calendar generation
		Joint development of forecasts
		Strategic planning of the supply chain structure: drawing up plans for the entire supply network, forecasting models of various production situations, assessing the quality of operations, controlling indicators and achieving goals
CE (Supply Chain)	Supply Chain Planning	Transportation Management Systems (TMS) - forming an optimal cargo transportation plan; preparing an adequate economic mode of loading transport; tracking cargo in transit
		Warehousing Management Systems (WMS) - monitoring warehouse occupancy, determining cargo sorting schemes, their packaging and warehousing, assessing the state of inventory in real time
		Order Management Systems (OMS) - forming a buyer's order taking into account individual specifics, evaluating options and offering alternatives

Джерело: сформовано на основі [114].

The multi-approach approach includes six components: greenfield investment analysis, network minimization method, simulation modeling, risk analysis, network minimization based on simulation modeling, and what-if analysis, with the last four components being implemented exclusively by simulation modeling [116].

Supply chain management systems are used in organizations to manage all stages of the organization's supply and their automation, as well as to control the entire process of goods movement, which involves the allocation of SCP and SCE blocks (Table 3.2). In reality, effective supply chain management requires the simultaneous use of various concepts, methods and modeling tools (Table 3.3).

Table 3.3. Modern concepts, methods and tools of supply chain management

Model, method, concept	Characteristics
Efficient Consumer Response (ECR)	A model for improving customer service through collaboration between retailers, wholesalers and manufacturers
Vendor Managed Inventory (VMI)	A method in which the supplier of materials is responsible for maintaining the required volume of inventory at the consumer
Continuous Replenishment Planning (CRP)	A concept for maintaining a continuous flow of goods between the supplier and trading partners
Forecasting methods	Supply forecasting using various models: trends, the least squares method, interval forecast
Select Vendors	Choosing the optimal supplier based on certain criteria: reliability, delivery times, price, quality and risks
Game Theory	A tool for modeling consumer behavior and reaction under conditions of demand uncertainty
Make or Buy model	Solving the problem of the feasibility of transferring individual operations to an external organization in order to optimize costs
Queuing systems models, Markov stochastic processes, simulation models	Establishing the relationship between the trading format and flow parameters; assessing the intensity of the flow of buyers; determining the optimal number of service channels; assessing the probability of the system state; calculating the system's throughput; planning the frequency and sequence of deliveries
Just-in-time model (JIT)	Attracting the necessary resources and providing services "just in time" under the condition of optimal costs
ABC method (ABC analysis ABC-costing)	Functional-cost management; ranking of types of resources by degree of importance
CRM concept (Customer Relations Management)	Based on the use of advanced management and information technologies by building an information base of buyers
Situation analysis	Situational analysis and assessment of possible flow options
QR concept (Quick Response)	Rapid response to changes in supply conditions thanks to monitoring technologies, e-commerce and document management
TQM concept (Total Quality Management)	Comprehensive targeted and coordinated application of quality management systems and methods with rational use of technical capabilities at all levels
SCOR models	Integration of reengineering and improvement of business processes. Allows you to build strategic and operational management of material flows, including coordination of actions with services that coordinate processes in supply, production and sales both at the enterprise and its partners
Inventory Management Models	Determination of the size of the stock based on accounting for the interval between orders and the volume of the batch being ordered

Source: compiled by the author based on [115].

Analytical methods are used to find approximate solutions based on minimal input information. The main application of the methods is to create an exemplary result in a short time, which can be used as simplified analytical data for a simulation model. Analytical methods use various formulas, equations, and appropriate techniques to achieve quick results. However, taking into account all the assumptions and generalizations of most details, it turns out that the resulting analytical models are created under ideal conditions and cannot be applied without errors. The simulation modeling method allows you to consider all the details and specifics of each element of the supply chain. Using this method, you can not only visualize the network of operations, but also consider each process from the inside. Simulation modeling allows you to take into account much more details than analytical methods. However, to meet all the requirements for modern supply chain management, the simulation model must be quite cumbersome.

Given the trend towards widespread digitalization and innovation, we note that a technological breakthrough in logistics is the use of blockchain technology, which ensures the creation of a transparent system of interaction between all market participants. The participants of the supply chain, during the movement of the product, are the supplier, manufacturer, distributor, retailer, and, finally, the consumer. Each of the participants adds the characteristics of the product (information about the current status of the product) to its profile in the blockchain. Each product is assigned a unique digital code and is recorded in a profile that contains information entered at different stages of the product life cycle [126, p. 176]. A digital code is a unique cryptographic identifier that links a physical product to its virtual copy in the blockchain network. Digital profiles of supply chain participants obtained during registration on the network contain information: a description of the participant, his location, certificates and the type of products with which the participant works. The confidentiality of data in the profile is established for each participant in the supply chain, also, a participant can be completely anonymous if he has a certificate confirming the reliability of his activities [130]. The e-ECD project (European electronic certificate of cleaning) is another direction of the digitalization of logistics tools, market globalization, technical progress

and increasing requirements for the quality of container cleaning. In the specified project, cooperation is carried out between all parties involved in the tank cleaning process (including cargo owners, logistics service providers and cleaning stations). Reducing the number of blacklists of unscrupulous carriers will allow to increase the availability of logistics assets, which will reduce costs and increase efficiency. The availability of data and the high level of trust in the information of the eECD certificate opens up opportunities for a selective control process, in which companies with a positive reputation and complete data can benefit from access to fast lanes [136].

Another example of the digitalization of sustainable logistics is the independent Cargo Stream platform, which works as a logistics aggregator and provides horizontal connection of supply chains between shippers by combining and coordinating their transport needs. This platform helps shippers reduce transportation distances by optimizing delivery routes, increase the efficiency of loading rolling stock by combining and accumulating shipments, and expand the possibilities of using multimodal transportation.

Within the framework of digitalization of sustainable logistics, enterprises have to significantly restructure the existing internal production system and their functions. It is necessary to carry out the so-called “green” logistics reengineering, which has a major impact on the company’s supply chains. “Green” supply chains are no longer exclusively an environmental issue, they increase the efficiency of business processes and reduce costs. This is expressed, for example, in the fact that it has become possible to reduce disposal costs by creating a program for the use of reusable containers when working with suppliers, to implement so-called “zero waste” initiatives, which allows saving various types of raw materials, materials, fuel and other types of resources. The first place in the list of “green” initiatives in supply chain management is taken by increasing the efficiency of transportation, logistics operations, the system for selecting raw materials and packaging materials. However, despite the significant potential for successful activities, in Ukraine, most supply chain management managers still do not pay attention to the use of environmental technologies in their activities [144, p. 221].

Thus, the modern development of the economy, its globalization and digitalization, and the expansion of trade relations lead to the need to create new approaches to the development of supply chains, the use of modern multi-approach methods of analytical and simulation modeling and digital tools in logistics. It is necessary to select, apply and adapt more advanced methods for both supply chain planning and their implementation and tracking in real time.

6.4 Modern approaches to optimizing the logistics activities of an enterprise

Logistics plays a key role in ensuring the effective functioning of modern enterprises. In the world of globalization, rapid technological development and increasing competition, effective logistics has become not only a management tool, but also an important strategic asset. Optimization of logistics processes helps to reduce costs, increase delivery speed, minimize risks and, ultimately, ensure competitive advantages.

Today, enterprises are implementing innovative approaches to logistics management, in particular, digitalization, process automation, the use of Big Data and the application of artificial intelligence. At the same time, more and more attention is paid to the environmental component of logistics, which is becoming part of the concept of sustainable development.

In modern market conditions, it is difficult to imagine the successful functioning of companies without an effectively working logistics system. It is known that the competitiveness of an enterprise directly depends on the organization and management of logistics. Possession of knowledge and skills in this area can help an enterprise become a market leader.

Considering logistics systems and their work, it is necessary to focus on the functions of logistics (Fig. 4.1). All actions and processes in logistics are aimed at optimizing the movement of material flows, and the functions of logistics have the same goal.

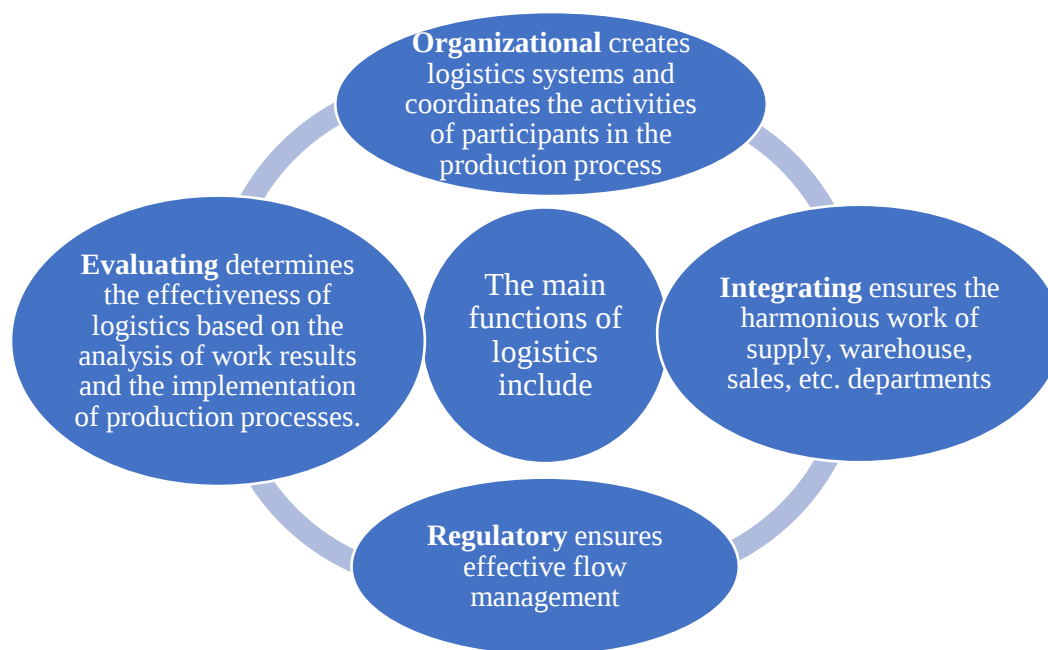


Fig. 4.1. Logistics functions

Source: systematized by the author based on [121, 124].

At each level of channel distribution, a certain set of logistics functions is performed. For example, at the operational level, these functions are aimed at managing the movement of resources from supply to production and further distribution. In the supply sector, these functions are focused on managing the movement of resources from the supplier to the enterprise or directly to production. In the production process, functions manage the movement of raw materials between production stages and manage the flow of finished products.

Practice shows that the development of logistics systems at enterprises is at different stages and levels of maturity. The introduction of logistics into economic activity and its further improvement requires considerable time. Therefore, the study of logistics activities and its features is important, especially since this area is still being formed in Ukraine. Many managers do not have a clear idea of the role of logistics in the structure of the enterprise.

At many enterprises, logistics is not structured, and certain departments are responsible only for a narrow range of tasks or processes. Often, enterprises do not have a clearly developed and implemented logistics strategy, which requires in-depth analysis and research of this issue.

Since transportation costs, warehousing costs and the cost of logistics services are key components of the selling price of products, enterprises strive to reduce the time of delivery of products to consumers with minimal costs. An effective logistics management and monitoring system, as well as modern IT technologies for tracking the movement of goods, ensure the minimization of logistics costs [120].

Companies that have logistics departments at their enterprises should evaluate the effectiveness of their activities. This assessment is carried out through a feedback loop, which includes tasks for management departments, decision-making in the logistics department, the implementation of these decisions and the assessment of the results of the activities of management departments.

It is important to note that domestic and foreign scientists still do not have a consistent definition of the concept of "logistics system". This is due to the variety of directions and methodological approaches used by modern researchers [144].

The logistics system is a complex organizationally complete (structured) economic system, which consists of interconnected elements-links in a single process of managing material, information and financial flows. Its goal is to achieve the set goals and adapt to internal and external influences by optimizing flow processes [114].

The functioning of the production system of an enterprise can be characterized as a constantly repeating process, therefore logistics management should also be considered as a closed management cycle that is constantly repeating. As a cyclical process, the logistics mechanism should be considered from the standpoint of structural, systemic and functional approaches that are interconnected.

The logistics system is a set of processes that cover the entire chain of activities of the enterprise in the "supplier-producer-consumer" system, including production using the necessary resources, as well as planning and management of this entire process [119].

The logistics system of the enterprise plays a key role in optimizing information, material and financial flows, combining them into a single system of interaction. The use of logistics approaches in making management decisions allows you to speed up

document flow, reduce the time for the production process and product delivery, as well as reduce costs by saving on transportation, storage and sale of finished products.

The main areas of assessment include the optimization of logistics costs and the determination of complex indicators that include quality criteria and costs. Although these methods allow for a systematic analysis, their disadvantage is the need to develop standards for assessment, which can slow down the response to changes in the external environment.

Improving the methodology for assessing the effectiveness of the logistics system, especially at motor transport enterprises, is an urgent task [126]. It includes taking into account the specifics of logistics systems at such enterprises, using an integrated approach to assessing their functioning, determining the efficiency indicators of individual logistics processes, and clarifying the criteria that affect the overall efficiency of the logistics system. The main indicators for assessing the effectiveness of the enterprise's logistics system include (Fig. 4.2).

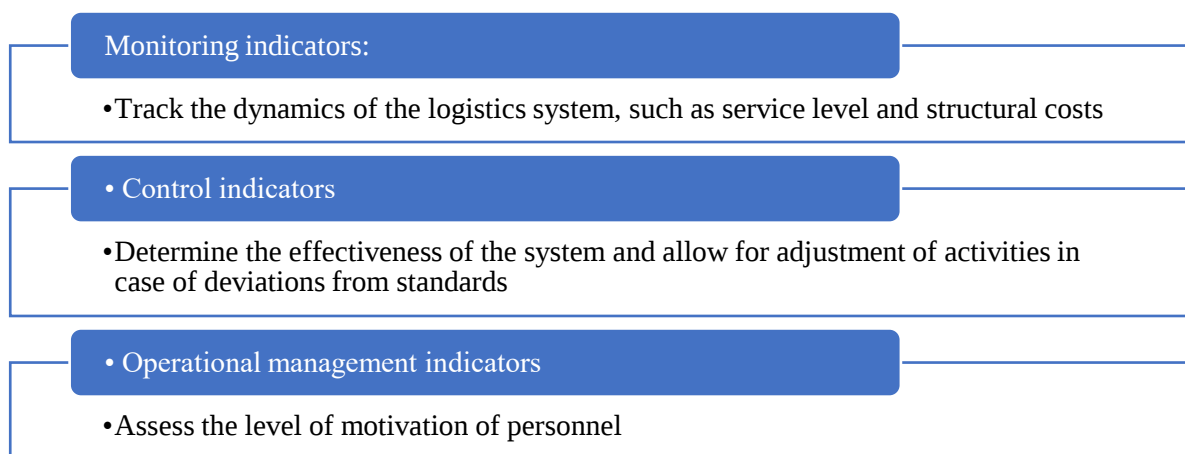


Fig. 4.2. The main indicators for assessing the effectiveness of the enterprise's logistics system

Source: systematized by the author based on [115, 117].

It is also important to pay attention to logistics assets, such as inventory turnover, investment payback period, size and capacity of warehouses, throughput, volume of finished products, etc. These indicators reflect the efficiency, productivity, reliability and flexibility of the logistics system.

When considering assessment methodologies, it is worth applying the Balanced Scorecard (BSC) method for a comprehensive analysis of the logistics system of the enterprise. This method allows you to assess the degree of achievement of goals, the efficiency of logistics flows and the work of the logistics unit, as well as individual employees participating in the logistics system, using key performance indicators.

The use of the BSC method in the field of logistics of the enterprise should cover:

- The level of implementation of the logistics strategy.
- Assessment of logistics activities by shareholders and company managers.
- Assessment of logistics of the enterprise by internal employees and customers.
- Ways to optimize the functioning of the logistics system through innovations or employee training.

The development and implementation of the BSC system should be entrusted to a project team consisting of logistics department specialists, heads of other departments and consultants. The Balanced Scorecard (BSC) system for the logistics department is divided into two types of indicators: indicators for evaluating interaction with external market participants and indicators for evaluating the internal work of the enterprise [126].

The work of the project team is aimed at creating an optimal set of key indicators for a particular enterprise. After that, the team continues to improve and configure the BSC system, determining the sequence in which it will be implemented. It is also necessary to develop a plan for informing employees about the new strategy and ensuring staff motivation to prevent a negative reaction to changes.

During the implementation of the system, there may be a need for detailed work on the enterprise's strategic plan to determine the necessary indicators for assessing logistics efficiency. In the current conditions, several main directions of logistics development can be identified ((Fig. 4.3).

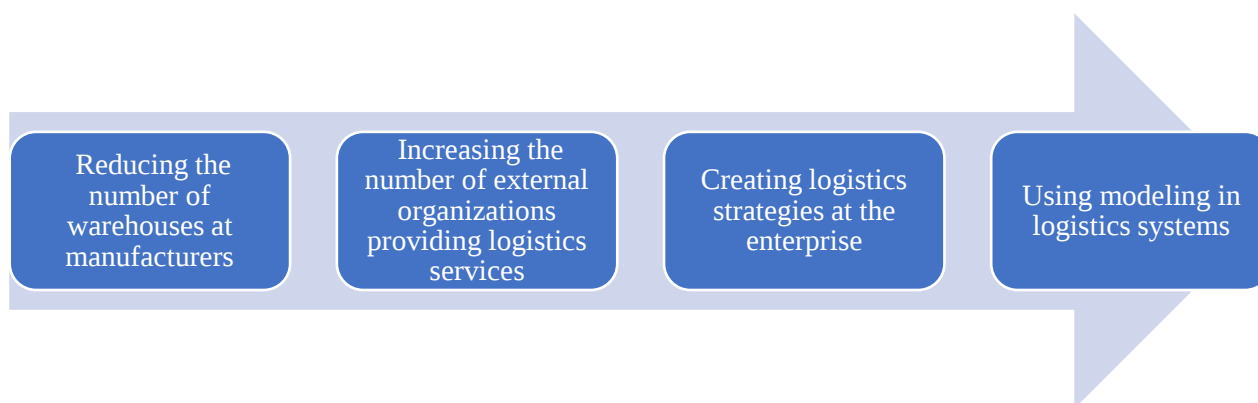


Fig. 4.3. Main directions of logistics development

Source: systematized by the author based on [128].

Realities force managers to focus on strategic planning, especially in conditions of uncertainty about future changes in external factors, which involves the development of a logistics strategy. The development of strategic alternatives for improving the logistics system of an enterprise largely depends on the ability to predict the reactions of competitors. Since the goals of the enterprise may change, the management of the logistics potential must be continuous and take into account all the resources of the enterprise. The experience and knowledge of managers are decisive factors for the effective management of the logistics system [129].

Only new approaches to the organization of management can provide long-term advantages and a significant advantage over competitors. The introduction of strategic management methods will allow for the formation of effective solutions in the field of logistics based on strategic analysis.

Optimization of logistics processes allows you to minimize costs and risks, reduce costs and improve the quality of work. After optimizing logistics processes, you can expect an acceleration of solving typical problems, reducing production costs, increasing production speed and improving product quality. Optimization of logistics processes frees up time and resources to solve strategic issues. The basic principles of optimization include (Fig. 4.4).

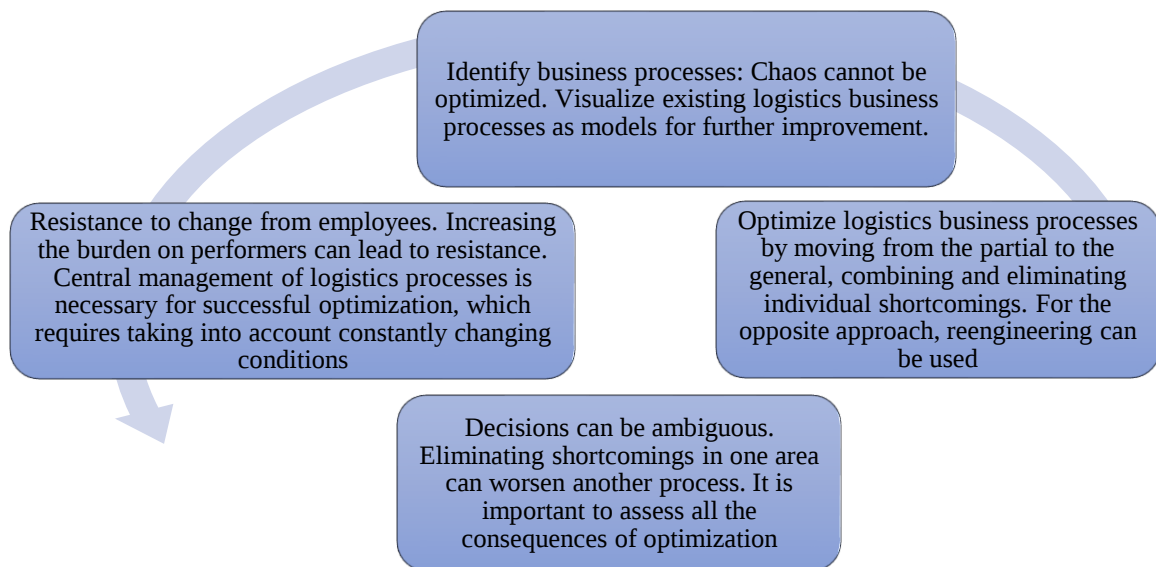


Fig. 4.4. Basic principles of logistics process optimization

Source: systematized by the author based on [146].

Optimization of logistics systems requires predicting the interaction between the design of logistics operations, enterprise activities and information technologies. The main optimization tasks include control, assessment and reduction of costs. The development of logistics as a scientific discipline should provide an optimal level of logistics service, which guarantees compliance with modern market requirements for service quality.

Modern approaches to optimizing the logistics activities of enterprises open up wide opportunities for increasing business efficiency, reducing costs and ensuring competitive advantages. Digitalization, automation, the use of Big Data, artificial intelligence and Internet of Things technologies create the prerequisites for the implementation of innovative solutions that allow for a prompt response to market challenges and ensure flexibility of logistics processes. Particular attention is paid to the environmental component of logistics, which is becoming an important element of the sustainable development of enterprises. Outsourcing of logistics services and adaptability of supply chains allow enterprises to focus on their core competencies and at the same time provide a high-quality level of customer service. Thus, the integration of innovative approaches into logistics activities is not only a necessity, but also a strategic tool that forms the basis for the long-term success of the enterprise.

6.5 Diagnostics of the logistics business process management system at a transport enterprise

Diagnostics of the logistics business process management system at a transport enterprise involves evaluating its efficiency, reliability, and ability to achieve operational and strategic objectives. First, the objectives of the diagnostics are defined: cost optimization, delivery time improvement, increasing operational reliability, enhancing customer satisfaction, and ensuring compliance with standards. Next, data on processes is collected: transportation data (fleet utilization, schedules, fuel consumption), warehousing data (inventory levels, storage costs), key performance indicators (delivery accuracy, order fulfillment), and the effectiveness of technologies (logistics software, tracking systems).

Key aspects of the system are analyzed: transportation management (route planning, fleet condition, driver management), supply chain coordination (integration with suppliers and partners, responsiveness to changes), warehouse logistics (layout planning, picking and shipping processes, inventory accuracy), and cost efficiency (cost drivers, route profitability, industry benchmark comparisons). Management tools such as TMS, WMS, GPS, and analytics platforms are evaluated. Bottlenecks are identified: inefficient route planning, inventory management issues, delays due to communication gaps.

Results are compared against benchmarks: cost per kilometer, delivery time, warehouse cycle, and environmental compliance. Feedback is gathered from employees, drivers, and customers to identify practical challenges. Based on the findings, recommendations are developed: implementing route optimization software, modernizing the fleet, automating warehouses, and improving staff training. A monitoring system is established to track improvements using dashboards, periodic audits, and strategy adjustments. A diagnostic report is prepared with results, detailed analysis, data visualization, and an implementation roadmap.

For example, a diagnostics of the business process management system in the logistics of the transport company Stellar LLC was carried out, which successfully and

progressively develops its professional activity in the transportation of goods by freight and specialized vehicles. Its main principle is to provide transport services at the highest professional level. Taking into account the needs of customers, the company does everything to ensure that they can minimize the costs of freight transportation. In other words, mutual benefit and high quality of services are the main tasks of Stellar LLC. The company specializes in the following types of freight transportation (Fig. 5.1).

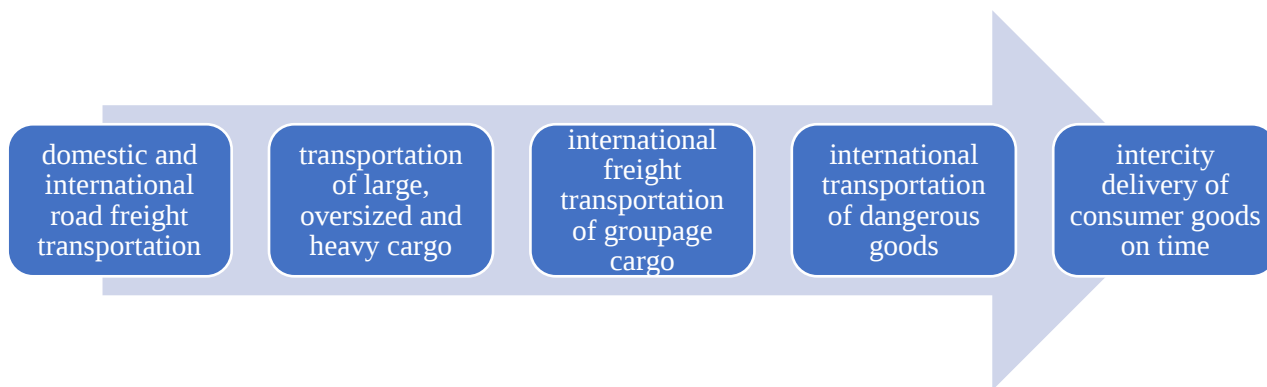


Fig. 5.1. Types of cargo transportation of Stellar LLC

Source: compiled based on company materials.

Freight transportation is carried out by highly qualified drivers. All transport flights of Stellar LLC are tracked and controlled. During its operation, the company has expanded significantly and has established itself as a reliable and responsible partner. Freight transportation now performs a basic function in flow processes. Improving the freight transportation system by introducing the achievements of modern logistics is one of the ways to increase the efficiency of the modern economy.

Stellar LLC, like most motor transport enterprises, uses imported rolling stock - Scania, VOLVO, DAF. The company also uses rolling stock designed for the transportation of perishable goods - Schmitz, LATRE, Berger refrigerated semi-trailers. The reasons for this are the following - compliance with EURO-2 and EURO-3 standards, high maximum speed, a longer service life before write-off, which sometimes exceeds the indicators of modern domestic rolling stock by 3-4 times.

When choosing rolling stock, the main indicators are: maximum speed, specific fuel consumption, load capacity, tank capacity. Below are tables with a list of rolling stock and trailers used by Stellar LLC.

When replenishing the car fleet, the head of Stellar LLC faced the problem of choosing: to purchase domestically produced tractors or to give preference to imported cars. Having weighed all the pros and cons, the management of Stellar LLC preferred foreign cars. The management explained this choice as follows: “There are more problems with domestic equipment, and in some cases its use is not as effective as more advanced foreign analogues. The specific power of European cars is higher than that of cars of Russian, Belarusian and Ukrainian manufacturers. The useful carrying capacity of foreign tractors is in most cases higher than that of domestic ones, and with comparable fuel consumption, the “foreigner” carries more cargo, which entails real economic benefits. The bodies of foreign cars are more spacious, and are almost always equipped with heating, which eliminates some of the problems with cargo preservation. Western-made cars are more acceptable due to a wide range of additional equipment. This creates the most comfortable conditions for the driver.

Based on the specifics of freight transportation services and the fact that any vehicle is a source of increased danger, the entire transportation procedure is insured. The movement of transport is insured against road accidents in the territory of the Schengen countries, Poland and the Baltic countries.

The main factors on which the amount of payment for the transportation of goods by road depends are piece rates, tariffs for the transportation of goods on the terms of paid ton-hours, tariffs for the temporary use of trucks or cars, tariffs for transportation on a per-kilometer basis, tariffs for the passage of rolling stock, contractual tariffs. In modern conditions, freight tariffs for road transport are formed on a market basis (Fig. 5.2).

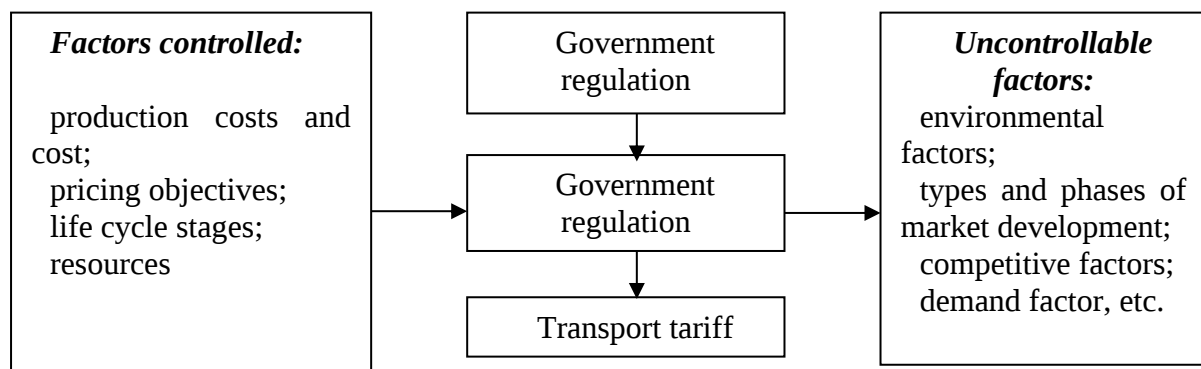


Fig. 5.2. General scheme of factors affecting transport tariffs

Source: compiled based on company materials.

In all cases, the amount of the fee for using a vehicle is influenced by the region in which the transportation is carried out. This is explained by persistent differences in the cost of freight transportation across regions. The following factors influence the amount of road transport fares (Fig. 5.3).

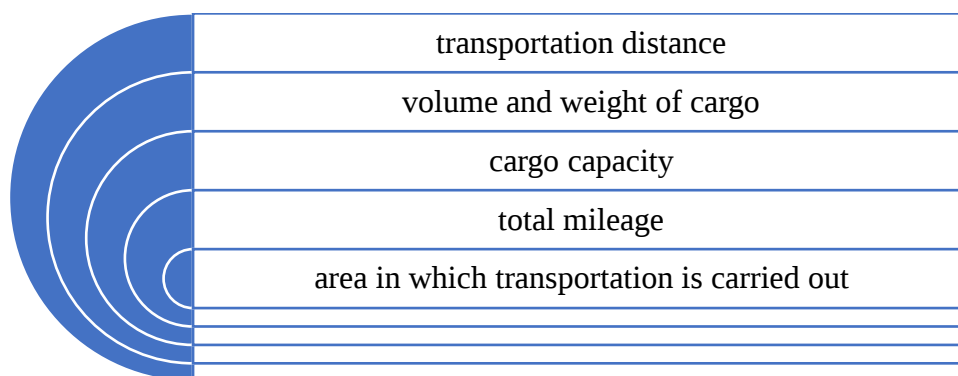


Fig. 5.3. Factors affecting the size of the road transport tariff

Source: author's own generalizations.

One of the main advantages of road transport is high maneuverability. With the help of road transport, cargo can be delivered “from door to door” with the necessary degree of urgency. This type of transport ensures regularity of supply, as well as the possibility of supplying in small batches. Here, in comparison with other types, less stringent requirements are imposed on the packaging of goods.

The main disadvantage of road transport is the relatively high cost of transportation, the fee for which is usually charged according to the maximum carrying capacity of the vehicle. Other disadvantages of this type of transport also include the urgency of unloading, the possibility of cargo theft and vehicle theft, and a relatively small carrying capacity. Road transport is environmentally unfriendly, which also hinders its use.

Basic principles of activity Stellar LLC	careful selection of Clients and Partners;
	long-term cooperation with Clients and Partners;
	Client orientation – striving to meet their needs as much as possible when providing product;
	professionalism in relations with Clients;
	professionalism and pragmatism in relations with Partners;
	coordination of actions of companies in meeting the needs of the Corporate Client;
	coordination of actions of companies to solve corporate tasks and create favorable conditions for the main activity;
	constant innovations in the field of products;
	constant investments in the development of business processes;
	risk management in the provision of transport and logistics services;
	recognition of the importance of human resources in the activities, implementation of socially-oriented personnel development programs.

Fig. 5.4. Basic principles of Stellar LLC

Source: compiled based on company materials.

Stellar LLC provides a full range of services in the field of foreign economic activity, namely:

- search for a foreign partner, provision of a dossier on a foreign partner, conducting a pre-contractual negotiation process, ensuring the conclusion of a foreign trade contract on terms favorable to the Client;
- assistance in obtaining preferential loans by the Client for the purposes of foreign economic activity;

- assistance in the currency and financial registration of a foreign trade contract (opening accounts in the currency of the counterparty's country, registration of an import / export transaction passport, etc.);
- assistance in the registration of the necessary permits and licenses for the import / export of goods.
- organization of cargo transportation insurance;
- preparation and registration of shipping and commercial documentation for the transported cargo;
- selection of TN foreign economic activity codes, calculation of customs payments;
- organization of cargo transportation, assistance in completing customs formalities in the counterparty's country;
- provision of agency services at the borders of transit countries and at the border of Ukraine;
- organization of customs and commercial support throughout the territory of Ukraine;
- obtaining permits for internal customs transit (ICT) and international customs transit (ICT);
- organization of cargo transshipment;
- organization of cargo transportation by a customs carrier;
- consulting on customs clearance and customs payments;
- selection of a customs broker;
- organization of customs clearance of goods of all categories in the shortest possible time on favorable terms, assistance with customs clearance;
- provision of temporary storage warehouse services during customs clearance;
- delivery of cargo from a temporary storage warehouse to the recipient's warehouse;
- provision of cargo warehousing and warehouse processing services.

Thus, freight transport currently performs a basic function in flow processes. Improving the freight transport system by introducing the achievements of modern logistics is one of the ways to increase the efficiency of the modern economy.

Logistics process management at the transport enterprise Stellar LLC is a set of measures aimed at optimizing all stages of cargo delivery and customer service. Properly organized logistics processes allow you to reduce costs, increase transportation efficiency, and ensure timely delivery of goods. Table 5.1 presents the main logistics processes of a transport company.

Table 5.1. Logistics processes of Stellar LLC

Input	Logistics business process	Output
Call from the client	1. Formation of an application for transport forwarding	Application for transport forwarding
Application for transport forwarding	2. Planning of material flow movement	Shipping bill
Shipping bill	3. Acceptance of products for transportation	Accepted products
Accepted products	4. Delivery of products	Delivered products
Delivered products	5. Issuance of products to customers	Issued products
Accompanying documents	6. Coordination of material and information flow movement	Reporting documents
Documentation	7. Formation of reporting documentation	Financial result

Source: compiled based on company materials.

Dedicated business processes of the company ensure its activities related to the provision of freight forwarding services, which begins with an incoming request from the client for freight forwarding services and ends with the generated financial result.

Each business process has an executor who directly performs operations, and a manager who coordinates the execution of these operations. The roles of executors and managers of Stellar LLC are given in Table. 5.2.

Table 5.2. Responsibility Matrix

Subject Process	General Director	Sales Director	Accountant	Sales Manager	Lawyer	Loading Manager	Forwarder	Storekeeper	Truck Driver
Contract formation	M	M		E	E				
Flow planning	M	M		E					
Formation of accompanying documents	M	M	E	E					
Product reception	M			M		M			E
Coordination	M			E					
Delivery	M			M		M	E		
Storage	M					M		E	
Product transfer to customers	M			M		M		E	E
Returns processing	M	M	E	E	E	E			E
Receipt of payment from customers	M	M		E					
Formation of summary information	M		E						

Source: compiled based on company materials.

Explanation to the table:

E – process executor;

M – process manager.

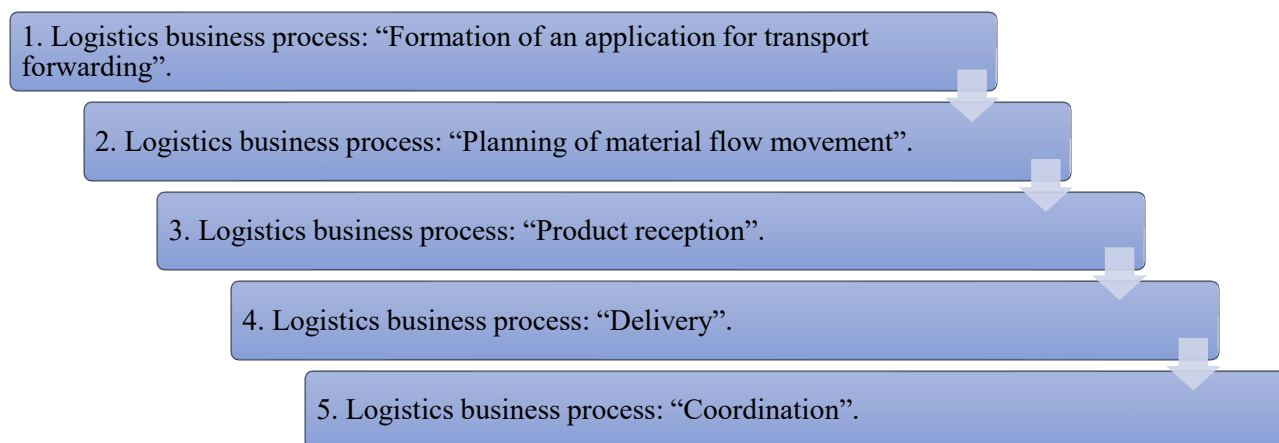


Fig. 5.5. Logistics business processes of Stellar LLC

Source: compiled based on company materials.

Thus, the selected business processes of Stellar LLC (Fig. 5.5) ensure its activities related to the provision of freight forwarding services, which begins with a

request from the client for freight forwarding services and ends with the formed financial result.

1. Logistics business process: “Formation of a request for freight forwarding”.

The provision of freight forwarding services begins with an incoming call to the sales manager from a potential client, with whom the parameters and cost of cargo transportation are discussed, and if the potential client is satisfied with all the parameters of the services offered, the sales manager concludes a freight forwarding service agreement with the client in two copies, which is signed by the company director, and a scan of the document is sent to the client for signing. The agreement signed by the client is sent to the legal department. After the director signs the contract, the sales manager draws up an application for freight forwarding, which indicates the conditions of transportation of each consignment of cargo, the point of departure and destination, the name of the consignor, the consignee (Table 5.3).

Table 5.3. Operations of the first logistics business process

Operation	Execution time	Performer
Connection with the sales manager	2 min	Sales manager
Discussion of parameters and cost of cargo transportation	65 min	Sales manager
Formation of a contract for freight forwarding services	16 min	Sales manager
Signing a contract	360 min	Sales manager, Director
Preparation of an application for freight forwarding	22 min	Sales manager, Director
Duration of the business process	465 min	

Source: compiled based on company materials.

2. Logistics business process: “Planning of material flow movement”.

After the application is formed, the sales manager draws up a consignment note in four copies. The first copy of the waybill remains with the consignor, the second and third remain with the forwarder’s representative at the point of departure and the point of destination of the cargo, respectively, the fourth is transferred with the cargo and handed over to the consignee. An invoice and an application for the export of goods are also formed. Having drawn up the accompanying documents, the sales manager determines the type of tank, container for loading the goods, draws up the optimal routing and forms a shipping bill. The sales manager sends all the compiled

documentation to the head of cargo operations at the point of departure of the goods. The operations of the second logistics business process are presented in Table. 5.4.

Table. 5.4. Operations of the second logistics business process

Operation	Execution time	Performer
Preparation of accompanying documents	31 min	Manager
Determination of tank/container for loading goods	6 min	Manager
Routing preparation	25 min	Manager
Formation of shipping bill	7 min	Manager
Duration of the business process	71 min	

Source: compiled based on company materials.

3. Logistics business process: “Product reception”.

After the cargo manager at the departure point receives the accompanying documentation, he accepts the cargo for transportation from the client. He checks it for the presence of packaging, if the cargo packaging is missing, then under his leadership the loaders properly pack the transported products, and if the cargo is packed by the consignor himself, then they immediately proceed to its measurement, weighing, and labeling. Then they distribute the cargo, draw a layout diagram.

The cargo manager and the client sign the waybill and the forwarding receipt, as well as other accompanying documents, including a power of attorney for freight forwarding services.

Then part of the signed documents is transferred together with the cargo to the driver-forwarder for the consignee, and the rest of the signed documents are sent to the sales manager. The operations of the third logistics business process are presented in the form of Table. 5.5.

4. Logistics business process: “Delivery”.

The package of documentation intended for the recipient of the cargo, as well as the signed order for the freight forwarding service, is transferred to the driver-forwarder. After the tanks/containers are loaded for shipment, the driver sorts the latter by destination, transports the cargo, delivers the cargo to the destination and notifies the sales manager of its arrival.

Table. 5.5. Operations of the third logistics business process

Operation	Execution time	Performer
Receiving cargo from the client	75 min	Cargo Manager
Checking the cargo for the presence of packaging	2 min	Cargo Manager
Packing the cargo	40 min	Truck Driver
Weighing, measuring the cargo	24 min	Truck Driver
Distributing the cargo in the car	120 min	Cargo Manager
Drawing the cargo layout scheme	15 min	Cargo Manager
Signing the documentation, power of attorney by the client	3 min	Client
Sending the signed documents	2 min	Cargo Manager
Duration of the business process	279 min	

Source: compiled from company materials.

The operations of the fourth logistics business process are presented in Table. 5.6.

Table. 5.6. Operations of the fourth logistics business process

Operation	Execution time	Performer
Sorting cargo by destination	40 min	Forwarder Driver
Cargo delivery	33 min	Forwarder Driver
Sales manager notification of cargo arrival	5 min	Forwarder Driver
Business process duration	71 min	

Source: compiled from company materials.

5. Logistics business process: “Coordination”.

After the documents signed by the cargo manager and the client arrive at the sales manager, he transfers them to the accounting department and enters the shipment data into Excel, which displays the date, place of departure and arrival of the cargo. Then, using the online service, he tracks the truck’s movement daily, and if a request is received from the client to provide information about the location of the cargo, the sales manager also contacts the online service for tracking transport and transfers the received information to the client.

After the cargo arrives at its destination, the forwarding driver notifies the sales manager of its arrival. The manager records the received information in Excel. All the work of the fifth stage is presented in Table. 5.7.

Table 5.7. Operations of the fifth logistics business process

Operation	Execution time	Performer
Entering shipment data into Excel	7 min	Sales Manager
Fixing the place and date of departure and arrival of the cargo	1 min	Sales Manager
Tracking the movement of the cargo	12 min	Sales Manager
Notifying the client about the location of the cargo	50 min	Sales Manager
Receiving and recording information about the arrival of the cargo	8 min	Sales Manager
Duration of the business process	78 min	

Source: compiled from company materials.

6. Logistics business process: “Product delivery to customers”.

As soon as the sales manager receives information about the arrival of the cargo at the destination, he notifies the customers (calls each customer) about the arrival of the cargo.

Customers are notified in order, according to the location of their goods in the container (according to the layout of the goods). If the recipient of the cargo cannot pick up the cargo immediately, the products are transferred to a warehouse, where free storage of the cargo is provided for three days, then each subsequent day of cargo storage is paid by the customer.

When the customer is ready to pick up the cargo, he meets with the cargo manager, with whom they check the quantity of the delivered cargo, according to the forwarding receipt and the waybill, and also check its safety.

If damage (spoiling) of the cargo is detected, the forwarder is liable in the amount by which the declared value of the goods has decreased, and if it is impossible to restore the damaged cargo in the amount of the declared value.

In this case, the return of the product is issued, the data is entered into the accompanying documentation.

In the absence of damage and shortage of products, the client signs the documentation, makes the payment, after which the cargo manager issues it to the consignee. All documentation is sent to the sales manager. The operations of the sixth logistics business process are presented in Table 5.8.

Table 5.8. Operations of the sixth logistics business process

Operation	Execution time	Performer
Notifying customers of the arrival of the cargo	100 min	Manager
Transferring the cargo to the warehouse	15 min	Loading Manager
Including additional payment for cargo storage in the cost of services	11 min	Manager
Checking the cargo for safety	20 min	Loading Manager, Client
Registering the return	126 min	Loading Manager
Receiving payment from the customer	12 min	Manager
Signing the forwarding receipt	4 min	Loading Manager, Client
Issuing products to customers	25 min	Loading Manager
Sending documentation to the sales manager	7 min	Loading Manager
Duration of the business process	78 min	

Source: compiled from company materials.

7. Logistics business process: “Formation of reporting documentation”.

After the contract concluded and signed by the director and the client, the accompanying documentation is formed, the reporting documentation received upon delivery of the goods to the consignee is received by the accountant, he enters data on the services provided into the statement, forms a consolidated statement, prepares financial statements and at the end of the reporting period provides financial statements to the director of the enterprise. The operations of the seventh logistics business process are presented in Table 5.9.

Table 5.9. Operations of the sixth logistics business process

Operation	Execution time	Performer
Recording data on services provided	45 min	Accountant
Formation of a summary statement	24 min	Accountant
Preparation of financial reports	65 min	Accountant
Provision of financial reports to the director	20 min	Accountant
Duration of the business process	78 min	

Source: compiled from company materials.

Having identified the logistics business processes of Stellar LLC and timed them, an analysis of the effectiveness of the actual business processes was conducted (Table 5.10).

Table 5.10. Analysis of the effectiveness of actual business processes

Business processes	Process time, min	First-order losses, min	Second-order losses, min	Value-adding time	Process efficiency, %
Forming an application	465	330	75	60	12,9
Planning flow movements	71	45	0	26	36,6
Receipt of products	281	135	0	146	52,0
Delivery	78	5	0	73	93,6
Coordination	78	38	30	10	12,8
Issuance of products to customers	334	119	170	45	13,5
Formation of reporting documentation	154	30	0	124	80,5
Together	1461	702	275	484	33

Source: compiled from company materials.

Comments to table 5.10:

- process time is the time that an employee spends on the entire process;
- first-order losses are actions that do not create value, but without which it is impossible to do;
- second-order losses are actions that do not create value at all and can and should be excluded from the process completely;
- work time that adds value is time that does not bring value, is calculated: work execution time – operation time;
- process efficiency is the productivity of resource use in achieving any goal. Calculated: operation time/work execution time.

Based on the current value stream map, we can say that:

- process time is 1461 min.;
- first-order losses time is 702 min. (48%);
- second-order losses time is 275 min. (19%);
- value-adding time is 484 min.;
- the efficiency of the “Service Provision” process is 33%.

Also, having calculated the efficiency of each business process, the least efficient business processes were identified:

- coordination of flow movement – process efficiency is – 12.8%;

- application formation – process efficiency is 12.9%;
- product delivery to the consignee – process efficiency is 13.5%.

Business processes with the least efficiency:

- coordination – 5% of the entire process time;
- application formation – 30% of the entire process time;
- product delivery – 23% of the entire process time.

Thus, these business processes will be objects for optimization.

By modeling business processes, as well as analyzing their efficiency in the processes: “Coordination of flow movement”, “Application formation”, and “Product delivery to the consignee”, the following problems were identified:

Problem No. 1: irrational way of communicating with customers (telephone conversations);

- about 20% of the time of the business process “Formation of an application” is spent on telephone conversations with the client, in which the parameters of the services provided, prices for services, as well as other information on cargo transportation are discussed;

- the client also cannot independently track the location and movement of the cargo, so he learns about this information from the manager through telephone conversations, which takes up more than 60% of the entire business process “Coordination of flow movement”.

- information about the arrival of the cargo at the destination is communicated to each client via telephone calls, which takes up 30% of the manager’s time in the business process “Issuance of products to clients”.

Problem No. 2: Ineffective interaction between employees; The business process “Formation of an application for transport forwarding” includes an operation – signing of the contract by the director, before the execution of which the manager cannot proceed to the formation of an application for cargo forwarding. Only the company director has the right to sign this contract. However, the director is in the office only at the beginning and end of the working day.

Thus, the manager spends more than 50% of the time of the business process "Formation of an application" waiting for the signing of the contract for freight forwarding.

Problem No. 3: Improper method of receiving products.

Stellar LLC provides packaging services, but also accepts already packaged goods from the client, without checking the packaging for compliance with the necessary requirements.

More than 20% of the transported products are damaged during transportation. About 30% of the time of the business process "Issuance of products to customers" is spent on processing the return of damaged products.

Based on the analysis, factors affecting business processes and the causes of these problems were identified (Table 5.10).

Table 5.10 Factors and causes of inefficiency of the "Provision of transport forwarding services" process

Types of losses	Factors of influence	Causes of occurrence
Improper way of receiving products	Technology and methods	lack of mandatory regulations for inspection of packaged cargo by customers; lack of rules for accepting cargo for transportation
	Personnel	errors when loading/unloading goods
Ineffective employee interaction	Interaction	absence of the director in the office all day; absence of authorized persons, except the director, to sign the documentation
	Personnel	high workload of staff
Irrational way of communicating with customers	Equipment	lack of automation; lack of information transmission channels; lack of a company website
	Personnel	high workload of employees
	Technology and methods	irrational organization of the process; lack of regulations

Source: compiled based on company materials.

Therefore, the management of logistics processes at the transport enterprise Stellar LLC contributes to the efficient and reliable functioning of the company, reducing costs and ensuring a high level of customer service. The integration of modern

technologies and competent organization of logistics processes allow the enterprise to remain competitive in the market.

6.6 Measures to improve the logistics business process management system in a transport enterprise

In modern conditions, effective management of logistics business processes is a key factor in the success of a transport enterprise. High competition, growing customer requirements for service quality, as well as the need to optimize costs require the implementation of modern solutions and approaches. Improving the logistics management system allows not only to increase the efficiency of the enterprise, but also to ensure its long-term stability and development.

Digitalization and Automation

- Implement advanced Transportation Management Systems (TMS) for efficient route planning, load optimization, and real-time tracking.
- Adopt Warehouse Management Systems (WMS) to automate inventory tracking, picking, and packing processes.
- Use telematics and IoT devices to monitor vehicle performance, driver behavior, and cargo conditions in real-time.

Route Optimization

- Utilize AI-driven route optimization tools to reduce fuel consumption, minimize delays, and improve delivery reliability.
- Introduce dynamic scheduling systems to adjust routes based on weather, traffic, or customer requirements.

Fleet Modernization

- Upgrade to fuel-efficient or alternative fuel vehicles (e.g., electric or hybrid) to reduce operational costs and meet environmental standards.
- Establish predictive maintenance schedules using telematics to minimize breakdowns and extend vehicle lifespan.

Supply Chain Integration

- Strengthen collaboration with suppliers, customers, and logistics partners by integrating supply chain management systems.
- Enable real-time visibility into the movement of goods through end-to-end tracking solutions.

Cost Management

- Conduct regular cost analyses to identify and eliminate inefficiencies in transportation and warehousing operations.
- Optimize fuel usage, labor allocation, and warehouse space utilization to lower operational expenses.

Employee Training and Development

- Provide ongoing training programs for drivers, logistics managers, and warehouse staff to improve efficiency and adherence to best practices.
- Implement safety and compliance training to reduce accidents and ensure regulatory compliance.

Customer-Centric Approaches

- Improve customer service by offering accurate delivery time estimates and flexible scheduling options.
- Implement feedback mechanisms to identify areas for improvement and enhance customer satisfaction.

Sustainability Initiatives

- Incorporate green logistics practices, such as route optimization for reduced emissions and sustainable packaging materials.
- Promote eco-friendly alternatives for transportation and storage.

Performance Monitoring and KPIs

- Establish a robust system for monitoring key performance indicators (KPIs), such as delivery accuracy, cost per kilometer, and inventory turnover.
- Use data analytics and dashboards to gain actionable insights and support decision-making.

Risk Management and Contingency Planning

- Develop contingency plans for common disruptions like vehicle breakdowns, supply chain interruptions, or adverse weather conditions.
- Implement risk assessment tools to identify and mitigate potential vulnerabilities in logistics processes.

Fig. 6.1. Measures to Improve the Logistics Business Process Management System in a Transport Enterprise

Source: author's own generalizations.

To improve the logistics business process management system at Stellar LLC, it is worth focusing on the integration of modern technologies, resource optimization, and increasing the level of interaction between all participants in the logistics process. To optimize the business processes of Stellar LLC, measures are proposed to eliminate all identified losses, and specific work and deadlines for their implementation are also described (Table 6.1).

Table 6.1 Schedule for implementation of measures to eliminate identified losses

Event	Job Description	Lead time
Creating a company website	- hiring a programmer; - creating a company website	2 weeks
Optimizing the order of operations of the business process "Formation of an application"	- changing the order of operations in the business process "Formation of an application"	1 day
Creating a regulation of interaction with customers	- creating standards for the use of certain communication channels for each operation of interaction with customers	3 days
Creating a regulation of cargo acceptance	- describing the order of work on accepting cargo from the client; - making changes to the regulations to the Agreement on freight forwarding services	3 days
Conducting personnel training	- creating a training system for interaction with customers regarding the acceptance of cargo for transportation; - training personnel to work according to new standards.	1 week

Source: author's own generalizations.

Thus, having considered the implementation schedule of the proposed measures for the implementation of lean production tools to optimize the process of "Provision of transport forwarding services", it became clear that the proposed measures can be implemented within two weeks.

Let's consider in more detail each measure for optimizing the logistics business processes of Stellar LLC.

Measure 1. The website of Stellar LLC will include all the necessary tools that clients can use to obtain detailed information about the company's work, services, the movement of their cargo, etc. (Table 6.2)

Table 6.2. Website tools of Stellar LLC

Tools	Description
Calculation of freight cost	calculation of the cost of cargo transportation services
Cargo delivery status	tracking the movement of cargo using the order number using the online service "Online Vehicle Tracking"
Payment for services	payment for services through your personal account
Online applications	conclusion of contracts submission of an application for the carriage of goods request of accounting documents
Information about services provided	terminal addresses company information
Online consultant	consultation with the company manager

Source: author's own generalizations.

Activity 2. Changing the order of operations of the business process “Formation of an application”.

The provision of freight forwarding services begins with the acceptance of an application in electronic form from the client. The company manager draws up this application, then forms a contract for freight forwarding services in two copies, which are sent to the client for signing. After that, the company director signs this contract.

The optimized business process “Formation of an application” is presented in Table 6.3.

Table 6.3 Operations of the optimized business process "Formation of application"

Operation	Execution time	Performer
Application review	6 min	Manager
Call to client	10 min	Manager
Formation of application for freight forwarding services	13 min	Manager
Formation of contract	20 min	Manager
Sending contract to client	3 min	Director
Signing contract	12 min	Manager
Duration of business process	64 min	

Source: author's own generalizations.

Measure 3. Amendments to the cargo acceptance regulations.

To ensure the safety of the client's cargo in the process of freight forwarding services, additional cargo packaging services may be provided.

The cargo manager has the right, in agreement with the consignor, to decide on additional cargo packaging in order to ensure the safety of the client's cargo accepted for transportation. In this case, the client undertakes to pay for additional packaging services in accordance with the invoice issued.

If the consignor refuses additional packaging of the cargo accepted for transportation, the forwarder is considered exempt from liability for the quality and safety of the cargo accepted for transportation.

This regulation is designed to reduce the amount of product damage that occurs due to improper cargo packaging, as well as to reduce the number of returns issued due to damaged products.

Thus, by introducing this regulation for the business process "Acceptance of products from the client", the business process "Issuance of products to customers" will change.

The optimized business process "Issuance of products to customers" is presented in Table 6.4.

Table 6.4 Operations of the optimized business process "Product Delivery to Customers"

Operation	Execution time	Contractor
Sending SMS messages to customers about the arrival of the cargo	10 min	Manager
Transferring the cargo to the warehouse	15 min	Loading Manager
Including additional payment for cargo storage in the cost of services	11 min	Manager
Checking the cargo for preservation	20 min	Loading Manager, Client
Registering the return	13 min	Loading Manager
Receiving payment from the customer	12 min	Manager
Signing the forwarding receipt	4 min	Loading Manager, Client
Issuing products to customers	25 min	Loading Manager
Sending documentation to the sales manager	7 min	Loading Manager
Duration of the business process	117 min	

Source: author's own generalizations.

Event 4. Amendments to the regulations for interaction with customers:

Communication with customers regarding the formation of an application is carried out via e-mail, the company's website, where an application for freight forwarding services is submitted, as well as for the conclusion of a contract. The left customer applications are processed electronically by the company manager, if necessary, the data is clarified with the client. Then a contract for the provision of freight forwarding services is formed and sent to the client for signature. Next, the client receives a notification by e-mail, if necessary by phone, which contains data on the conditions, time and place of transfer of cargo for transportation.

Each client also receives information about his order number, with the help of which, through a personal account on the company's website, the client can track the movement of the car/container with his cargo.

Customers are notified of the arrival of cargo at the destination via SMS.

The optimized business process "Coordination of flow movement" is presented in Table 6.5.

Table 6.5 Operations of the optimized business process "Coordination of flow movement"

Operation	Execution time	Performer
Entering shipment data into Excel	7 min	Manager
Fixing the place and date of departure and arrival of the cargo	1 min	Manager
Tracking the movement of the cargo	12 min	Manager
Receiving and recording information about the arrival of the cargo	8 min	Manager
Duration of the business process	117 min	

Source: author's own generalizations.

The proposed measures for Stellar LLC are aimed at improving the operation of logistics business processes, as well as increasing the efficiency of management of all components of the supply chain, including procurement, transportation, warehousing, planning and customer service. The effectiveness of these measures should be assessed both by economic indicators, such as reducing costs and increasing profitability, and by qualitative criteria, including the level of customer satisfaction, staff productivity and environmental sustainability of the company.

Assessing the effectiveness of the proposed measures allows you to obtain an objective picture of the impact of improvements on logistics processes and determine which of them brought the greatest positive result for the company. A comprehensive analysis of the results of the implementation of improvements will help the company identify the most successful strategies, support them in the future and continue to search for new opportunities for process optimization. This approach contributes to the strategic development of the company and ensures its stable functioning in the long term.

The effectiveness assessment is carried out in terms of the proposed measures. To begin with, an assessment of the overall effectiveness of the first three measures was carried out (Fig. 6.2).



Fig. 6.2. Measures to improve the logistics business process management system at Stelar LLC

Source: author's own generalizations.

Analyzing the effectiveness of business processes after optimization allows you to assess the effectiveness of the implemented changes. The first step is to determine key performance indicators (KPIs) that correspond to the optimization goals, such as reducing costs, increasing productivity, or reducing task completion time. Then, the indicators before and after optimization are compared, which allows you to assess progress and identify weaknesses.

Economic efficiency is analyzed through financial indicators, such as return on investment (ROI), as well as cost reduction. It is important to take into account qualitative changes, such as improved communication, simplified processes, or

increased employee satisfaction. It is equally important to assess possible negative consequences, such as new risks or problems in the processes.

Based on the collected data, conclusions and recommendations for further improvements are formed, which allows you to increase business efficiency and better adapt to changes. Table 6.6 presents an analysis of the efficiency of business processes after optimization.

Table 6.6. Analysis of business process efficiency after optimization

Business process name	Process time, min	First-order losses, min	Second-order losses, min	Value-adding time	Process efficiency, %
Formation of application	64	4	0	60	93,6
Planning of flow movement	71	45	0	26	36,6
Product reception	281	435	0	146	52,0
Delivery	78	5	0	73	93,6
Coordination	28	18	0	10	35,7
Issuance of products to customers	117	72	0	45	38,5
Formation of reporting documentation	134	10	0	124	92,5
Total	814	330	0	484	60

Source: author's own generalizations.

- Based on the current value stream map, we can conclude that:
- process time is 814 min;
- first-order loss time is 330 min (40%);
- second-order losses are eliminated;
- value-added time is 484 min;
- efficiency of the "Provision of freight forwarding services" process is 60%.

We will also calculate the efficiency of each logistics business process:

- delivery of products to the client – the efficiency of the process is 38.5%;
- application formation – the efficiency of the process is 93.8%.

Table 6.7 presents an analysis of the efficiency of the proposed measures.

Table 6.7. Analysis of the effectiveness of the proposed measures

Indicator	Before implementing lean production tools	After implementing lean production tools
Process time, min	1461	814
First-order losses, min	702	330
Second-order losses, min	275	0
Efficiency of the business process "Formation of an application", %	12,9	93,6
Efficiency of the business process "Issuance of products to customers", %	13,5	38,5
Efficiency of the business process "Providing services to customers", %	33	60
Number of damaged cargo during transportation, %	30	3

Source: author's own generalizations.

The effectiveness of each of the measures for Stellar LLC can be assessed both in financial indicators and in indicators indicating improved service quality, reduced costs and increased environmental responsibility. Regular monitoring of these indicators allows the company not only to track the achievement of set goals, but also to make timely adjustments to processes to achieve the best results.

Improving the logistics business process management system at Stellar LLC will increase work efficiency, reduce costs, improve the quality of customer service and promote the development of the company in the face of growing competition and changing market conditions.