

However, the automated control system of travel has several disadvantages. The main of them are: the operation of ACST requires significant additional costs; strong slowdown boarding. The latter is due to the limitation of the entrance only the by front door, the necessity to go through the turnstile and purchase tickets from the driver. Small space in front of the turnstile allows the driver to start moving without waiting passengers pass through the turnstile. Long lines to land, especially in bad weather and during peak hours are inconvenient for passengers. People with disabilities and passengers with prams can not cross the turnstile and still enter through the middle door (there is usually a ramp for arrival). Thus, the logic of the "front door" is violated [3].

The introduction of the automated control system will optimize the work of the motor transportation enterprise, improve the quality of services and automate accounting of data and their processing.

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RESEARCH OF MATERIAL FLOW WITHIN THE ECONOMIC ASSESSMENT OF THE SUPPLY CHAIN OF CHEMICAL PRODUCTS IN THE REGION

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In the article we offer the order of material flow research which is carried out within the framework of economic assessment of a supply chain. The offered order is approbated on the example of the supply chain of chemical products in Vitebsk region.

The importance of an effective product flow management is defined by the size and dynamics of the turnover of material and financial resources. It has an essential impact on economic results of business processes. Nowadays scientists-economists and enterprise experts pay much attention to the problems of improvement of a product flow management. However, for all its indisputable importance, the theoretical elaboration of this problem isn't completed. Therefore, the formation and approbation of research-and-development phases of material flow is important today.

The foundation of a supply chain is the material flow. It's formed by transportation, warehousing and other operations with raw materials, semi-processed products and finished products. Therefore, the material flow – material resources, semi-processed products and finished products apply logistics operations such as embarking, unloading, packaging, transportation, consolidation, etc. [1, p. 124].

The material flow can be a stock of material resources, unfinished production, finished products if it isn't in motion. We should notice that each financial and information flow corresponds to its material flow. There is no due attention to the research of material flow in the system of a supply chain management. Experts almost don't study the capacity of flow, analyze the origin of "bottlenecks", and calculate logistical costs. The author offers her own vision of research of material flow processes.

Considering that chemical production in the Republic of Belarus is one of the leading fields of economy, its manufacturing and sale is realized in a complicated supply chain, we choose it as the object for research of flow processes in the region. We propose to pursue research on the following stages:

1. Select products of chemical industry for research. Primarily we select strategically important products for the region, then a large percentage of products in the output, products with marketing difficulties and low-gain products.

2. Analyze material flow according to selected parameters. Considering that the component of the supply chain of chemical products is the manufacturing enterprise, we pursue our research specifically in reference to the manufacturing enterprise.

3. Conclusion.

The performance measures of import and export material flow are demonstrated in the table 1.

Economics

Table 1 – Measures of import and export material flow in reference to manufacturing enterprise

Import flow (raw material)	Export flow (finished product)
Rate of flow (tons per year)	Rate of flow (tons per year)
Functional characteristics	Functional characteristics
Package	Product usage
Type of transportation	Package
Driving directions	Type of transportation
Intensity of delivery	Driving directions
Carrier	Intensity of delivery
Carriage per unit (rub)	Carrier
Warehouse intermediary	Carriage per unit (rub)
Warehouse intermediary's service fee	Warehouse intermediary
Logistical costs (rub)	Logistical costs (rub)

Source: self-formulation.

Performance measures afford to pursue the complex research of the chosen material flow. The selected measures are quantitative (a rate of flow, an intensity of delivery) and qualitative (a type of transportation, a carrier).

The research of material flow of chemical products identifies special aspects of product distribution in chemical industry. It's necessary for building of a logic path.

We should mark that chemical company, as the object of research, is a total system of different complex-functioning chemical-engineering systems. Chemical-engineering systems consume a vast number of raw materials, fuel and energy resources, construction materials, water and air. The calculation and optimization of technology, certain chemical-engineering processes without their influence on other chemical-engineering processes can lead to non-optimum behavior of plants and loss of their productivity. Thus, planning of the supply chain should be started with the sustainable project management of manufacturing. If manufacturing is functioning hard, a lot of waste products will emerge, as a result finished products increase in price and become non-competitive. Consequently, we should examine the production flow in the supply chain as follows: 1) raw material flow for its output and in the sphere of purchasing; 2) product distribution.

Now we analyze the material flows of chemical products in Vitebsk region in more detail. This region was chosen because of the fact that there are over 70 large and small supply and consumer – enterprises there.

We selected major chemical enterprises in Vitebsk region: JSC “Polotsk – Steklovolokno” (glass yarns, rovings, chopped fiber), the plant “Polymir” JSC “Naftan” (polyethylene, acrylicfibers), LLC “Pride” (polymeric composition) and Private Unitary Enterprise “Belintex” (glassware net).

The raw material flow analysis demonstrated that chemical manufacturers and raw products suppliers work in close cooperation. These measures help to optimize logistical costs and organize a flexible process of raw material flow. Thus, “Naftan” is the major raw products supplier for the plant “Polymir”; enterprises are located in close proximity to each other and can use railway transportation for delivery raw materials. We should notice that transportation is low-price because of the huge rate of flow (over 100000 tons at a time). It reduces the cost of warehousing and enables to respond to changing customer demands quicker.

Small chemical producers have to cooperate with wholesale intermediaries. Small chemical producers purchase products in a small bulk so manufacturing enterprises do not cooperate with them. The only exception is small domestic enterprises such as LLC “Pride”. It purchases necessary raw products on the domestic and Russian market.

Due to the analysis of finished chemical products in Vitebsk region we concluded that about 60 % of products are exported to the near-abroad and far-abroad countries. One of the main partners of the Republic of Belarus in this field is the Russian Federation. Within the country the leading directions of products and their quantity is defined by the description of production. For example, acrylic fiber is exported to Brest region because of a great number of carpet manufacturers there.

We should notice that basic mass of enterprise production in the region is for industrial consumption, not for private consumption. For that reason there is no necessity in promotion by retail intermediaries. Besides, the participation of wholesale intermediaries in delivery isn't necessary.

Truck shipment, maintenance by air and shipping can be used for delivery. The choice can be made according to the following criteria: a scope of delivery and convenience of communications arrangement. Multimodal transportation is preferred when its logistical cost is lower than the other certain form of transportation. Besides, multimodal transportation is irreplaceable when transportation is impossible to realize due to difficulties with locations of destination.

The party which accomplishes transportation of a material flow is defined by the minimum logistical cost and ability to conduct it. We should mark that manufacturers, as a matter of fact, deliver their products on the territory of Belarus and the nearest regions of the Russian Federation.

In the summary of the research of the supply chain of chemical products the following aspects are shown:

- the rate of the material flow of chemical products is defined by a large chemical enterprise, which dictates its terms on the market;
- in the process of the motion of the material flow of chemical products there are organizations “bottlenecks”, which have the rate lower than the capacity of the flow, this factor leads to the loss of their productivity;
- the chemical enterprises in Vitebsk region are located in close proximity to each other, as they are suppliers and consumers of the chemical flow, so it helps to reduce logistical costs;
- the promotion of the material flow of chemical products is performed according to complex logistic schemes, however it tends to lead to minimization of intermediaries in its structure.

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THE AUTHOR'S METHOD OF THE ENSURING THE ECONOMIC SECURITY FOR THE SUPPLY CHAIN FUNCTIONING

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In the article it is determined that the economic security for the supply chains functioning in the long term comes from the necessity of constant enhancement of law-enforcement measures. It also reveals the necessity of constant supervision of the supply chain security through the state effort consolidation and private or public institutions on the basis of the standard ISO 28000 principles. The article contains the analysis and generalization of the researches on the theoretical approaches to supply chain management, which has allowed to develop the author's own methodology of the ensuring the economic security for the supply chain functioning.

The ensuring of the economic security for the supply chains functioning in the long term comes from the necessity of constant enhancement of law-enforcement measures to identify, prevent, intercept and disclose any encroachments on the property.

The application of the methodology for the ensuring the economic security for the supply chains functioning is especially actual in the developed countries, where there is an impressive industrial potential and high level of competition. For example, there exist many actively issued decrees, aimed at achieving the security of the society in the Russian Federation, including the economics, such as, the Decree of the Russian Federation President N537 from may the 12th, 2009 "National Security Strategy of the Russian Federation until 2020".

The situation is slightly different in the Republic of Belarus: there is not much competition between manufacturers, but still the country decrees, aiming at ensuring global security.

In the modern conditions fundamentally new relationship participants in the field of accessory cost creation are raised, chains and networks of the foodstuff deliveries are formed, as well as medical products and other things, which are all considered as separate systems, quality of which starts from raw production, finished products, transportation, consumption and up to recycling.

On the one hand there is a severe competition of manufacturers in the Republic of Belarus and as consequence, one can observe the insufficient efficiency of the ensuring the security of supply chains, while realizing the task "strategy of national security", and on the other hand, the organization (enterprise) should take measures to ensure security of their product more actively, owing to constantly changing market conditions.

In 2007, a new international standard on the security management of supply chains ISO 28000 was adopted, the use of its concept could strengthen the ensuring security of material flows. ISO 28001 discloses the best practice of concerning the security management of supply chains. In the modern conditions, when one can see the transition of the economy from the capitalization concept to the concept of stability, the conformation requirements of this standard for normal functioning of the organizations (enterprises) is extremely important. It is possible to say that the standard ISO 28000 is the integrating standard on management in the conditions of turbulent environment where the key purpose is stability [1].