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THE DEVELOPMENT OF "GREEN" LOGISTICS IN THE REPUBLIC OF BELARUS

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The article deals with the issues related to the development of "green" logistics as one of the priority areas of eco-innovation at the present stage of economic development. It clarifies the essence of the concept of "green" logistics, analyzes the "green" technology of production and logistics activities which can reduce the harmful effects on the environment, their advantages and disadvantages. The article discusses the reasons for the use of "green" technologies and barriers to their rapid implementation in the logistics activities of the Republic of Belarus. Examples of foreign companies successfully implementing the principles of "green" logistics are presented.

Modern trends of integration and globalization contribute to the active development of enterprises, but in pursuit of success, many people forget about the environment. Modern logistics, in order to meet the requirements of time and technology development, must meet such an important requirement as environmental friendliness. "Green" logistics can be considered as a promising direction of development in the field of supply chain management.

After analyzing various literary sources, it can be concluded that the direction of "green logistics" appeared in the late 80s-early 90s of the last century. The beginning of the development of "green" logistics was laid by German scientist Erwin Muller. Together with his colleagues, he paid great attention to transport logistics, noting the strong link between logistics, environmental protection and natural resources. Over 20 years of development of this area, scientists have not come to a common and unambiguous interpretation of the term "green logistics". Synonymous with the term "green" logistics is the term "environmental" logistics (ecologistics)". Below are some concepts of "green" logistics (table 1).

Table 1. – The essence of the concept of "green" logistics

Author(s)	The essence of the concept
M. Yu. Grigorak, Y. V. Varenko [1, p. 403]	The system of measures, which provides for the use of energy and resource-saving logistics technologies and modern equipment at all levels of the supply chain of goods in order to minimize the negative impact on the environment and increase the total consumer value of products for consumers
D. Rogers, R. Tibben-Lembke [2]	A set of actions to assess and minimize the environmental impact of logistics activities
J.-P. Rodrigue	Environmentally friendly and efficient transport distribution system
Y. Yang, H. Peng	One of the types of modern logistics aimed at the integration of economic benefits, social and environmental aspects
L. Yanbo, L. Songtian	Planning, design and management system using advanced logistics technologies and environmental design methods in the field of pollution reduction and resource consumption, dictated by environmental principles. The main goal is to coordinate logistics activities and social and environmental impact
Allan Mackeown [3]	Science and a set of measures that ensure the movement of material in the implementation of any production processes up to its transformation into a product and waste products, followed by bringing the waste to disposal or safe storage in the environment, as well as the collection and sorting of waste consumption, their transportation, disposal or safe storage in the environment.

The main "green" technologies in logistics activities include:

– selection of suppliers of raw materials with the lowest cost of non-renewable resources;
– reduction reserves to reduce the need for warehouse space;
– optimization of cargo transportation routes in order to reduce emissions of harmful gases;
– transition to environmentally friendly modes of transport (sea, water, rail) and reduction of road transport;
– exclusion of intermediate storage and transshipment points from the logistics chain;
– reducing paperwork [4, p. 116].

As a rule, the reduction of the harmful impact of production and logistics activities on natural areas is considered at all stages of the product technological cycle and supply chain links, which is consistent with the approaches common in foreign practice. Figure 1.1 shows the stages of the product life cycle from the idea of its creation to disposal, where the concept of "green" logistics technology is used to reduce water and air pollution, process waste production and consumption of goods. This scheme is offered by analysts of the international consulting company Tata Consultancy Services.

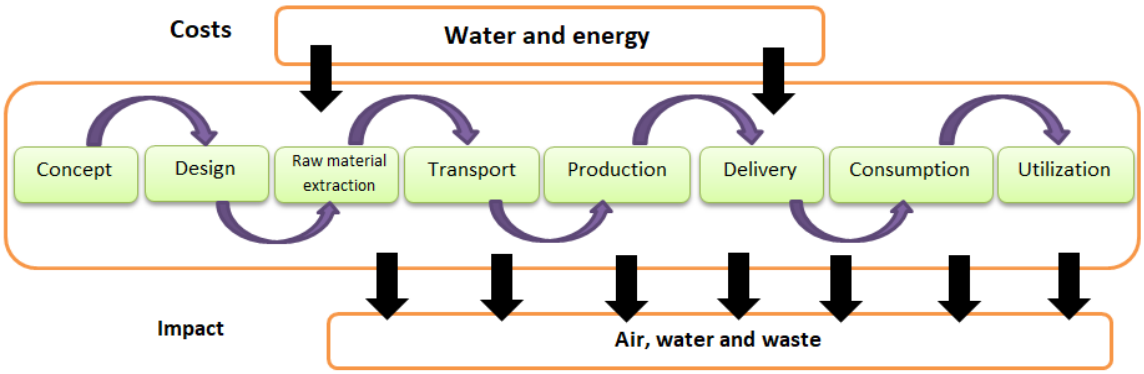

Figure 1. – Product life cycle and its impact on the environment [4, p. 117]

It follows from figure 1.1 that the key technologies for reducing the anthropogenic impact on the environment are: reducing the distance when transporting goods at all stages of the supply chain; increasing the use of local resources (reducing fuel costs and harmful emissions into the atmosphere); the use of modern environmentally friendly energy-saving vehicles. Optimization of the transport network can bring triple benefits to the company: reducing the environmental burden, improving the image and reducing costs throughout the supply chain. The sphere of "green" logistics can include environmental projects for the construction of warehouses using energy-saving technologies and environmentally friendly building materials; minimizing the cost of thermal energy while ensuring the safety and loading and unloading of goods; the use of multi-turn containers and packaging; increasing the carrying capacity of vehicles; ensuring the utilization processes in the form of reverse supply chains (collection and sorting of waste, their delivery to distribution warehouses, delivery of finished products derived from waste to the trading network, etc.)

Companies are beginning to perceive measures to reduce the harmful effects on the environment not as "requirements from outside", but as a way to improve efficiency, competitiveness and openness to society. According to the results of the survey "the green Trends Survey", conducted among commercial companies and their customers in the world's leading markets of Asia (India, China), Europe (UK, Germany) and America (USA, Brazil), the role of "green" logistics is regarded by them as one of the key factors of sustainable development and functioning of economic entities and environmental conservation. The majority of respondents noted that the use of "green" technologies for the company is not a marketing ploy, but a vital need to reduce costs and has an impact on the reputation of the company, its corporate responsibility. More than 3.6 thousand shippers and consignees took part in this survey. The importance of the "green" approach was noted by 77% of respondents working in large companies (numbering at least 500 people), and only 41% of individual entrepreneurs (or self-employed); 51% of the consignees and 57% of the senders surveyed indicated a willingness to use green technologies, and two thirds of the consignees would prefer to receive green logistics services at the price of conventional services.

Among international companies that successfully implement the concept of "green" logistics, there are the following:

– Nord Stream AG (Germany) – has built the world's most environmentally friendly Nord stream gas pipeline with minimal CO2 emissions into the atmosphere;

– DHL (Germany) - introduced GoGreen service and keeps records of CO2 emissions during transportation of all cargoes;

– UPS Air Cargo, the operator of Express delivery (USA) – uses a machine with a hybrid engine;

– Deutsche Bahn Schenker Rail (Germany) – implements the Eco Plus project and receives electricity for its electric locomotives from renewable energy sources;

– Green Cargo Road & Logistics AB (Sweden) – uses energy-efficient locomotives;

– Toyota (Japan) – widely uses wind turbines and solar panels for power generation;

– K Line, a shipping company (Japan) - has developed an innovative computer system to optimize the operation of engines based on monitoring of weather and hydrographic conditions, which leads to a reduction of harmful emissions into the atmosphere by 1%;

– Heineken (Germany) has been selected to analyze the implementation of green technologies in logistics as one of the world's leaders in socially responsible and sustainable business development. Since 2010, the concern HEINEKEN N.V. implements the Brewing a Better Future business development program, one of the goals of this program is to become the most socially responsible beer producer in the world by 2020. This goal is achieved by ensuring efficiency in terms of caring for the environment at all stages of the production chain, from the purchase of raw materials to delivery to the end user. Choosing suppliers, the advantage is given to those that meet the highest categories of environmental safety standards [5].

Logistics has significant potential for environmental control of transport systems, product recycling processes, minimization of environmental pollution, energy and resource saving. In addition, the management of material and related flows, based on the principles of logistics, initially involves reducing the environmental burden on the environment. At the same time, a number of researchers point to the existence of contradictions between traditional logistics, the purpose of which is to minimize costs, and its "green" component, aimed at reducing the harmful impact on the environment. It should be emphasized that the logistics principles sometimes come into conflict with measures to mitigate environmental damage. Ideally, each manufacturer of goods or services wants to build its logistics system so as to deliver the goods to the end user on the principle of "Just-in-time" and "Door-to-door". The efficiency of the distribution system should be increased by reducing the time management of a commodity flow. However, it is necessary to pay attention to reliability, that is, the desire for one hundred percent probability of the planned delivery and complete safety of the delivered goods, because this factor will serve as the basis for a fruitful and long-term relationship with the client. To solve only these two problems, the transport and logistics Department has to resort to the use of the most flexible and reliable modes of transport, which, as a rule, have the greatest negative impact on the environment.

Another example of the discrepancy between the logistics principles and the principles of environmental protection is the tendency to reduce insurance stocks. In the process of achieving this goal, there is a redistribution of loads from warehouses in the sphere of transport component. The irreversible increase in the use of transport leads to new congestion and an increase in the emission of harmful substances into the atmosphere.

Thus, it can be concluded that the implementation of the functioning of "green" logistics can't be a simple measure, since the very essence of logistics is largely contrary to the requirements for the protection and maintenance of the environment. It can be argued that the paradoxes of green logistics complicate the process of improving the logistics sector because of the focus on the desire to reduce the negative impact on the environment. The internal contradictions between the goal of environmental sustainability and industrial enterprises, which prioritize non-environmental road and air transport when it comes to logistics activities, can be seen as irreconcilable.

As for the Republic of Belarus, our logistics is a developing industry, and this type is new. Currently, there is no institution promoting its implementation. Belarusian companies that intend to become "green" and socially responsible face a number of difficulties, because environmental logistics in our country is just beginning to gain momentum. These difficulties can be attributed:

– high cost level. Minimization of environmental damage is directly related to the cost of research and the need to purchase environmental protection equipment, the cost of which will scare away even the most socially responsible entrepreneurs;

– low level of market supply. In addition, if there are those who wish to make huge sums of money for the sake of environmental care, the domestic market can't in all cases satisfy the demands for certain units and fuel;

– lack of experience in applying the principles of "green" logistics in Belarus. To overcome the lag in the development of logistics, the Republic of Belarus has to go through a phase of catch-up development, i.e. to gain experience from developed countries by borrowing relevant similar technologies, institutions, management methods;

– significant shortage of professionals in this field;

– the lack of desire of many entrepreneurs to make long-term investments in expensive "green" technologies that do not bring instant results;

– the absence of various mechanisms and legal acts regulating and stimulating the application of the principles of environmental friendliness;

– the lack of human interest in economic environmental management, as well as the consequences of human impact [6].

Competitive advantages in the activities of Belarusian enterprises of any industry through the use of "green" logistics, in the opinion of the authors, can be achieved by using the following areas:

– stimulation of the enterprises participating in various programs of ecological modernization of production;

– introducing into the practice of compulsory compensation by organizations for environmental damage;

– the reduction of transportation volumes to the minimum level due to optimal placement of warehouse and production facilities;

– increasing environmental and social responsibility of small and medium-sized businesses through various competitions, forums, tenders, etc.;

– the development of state programs aimed at sustainable development and further involvement of companies in such programs;

– the creation of business unions, clusters, public associations for the purpose of designing and further implementing environmental protection projects.

After analyzing all of the above, a number of ways to minimize the harmful effects on the environment in our country can be proposed:

– use Railways instead of relying entirely on automobiles. However, the problem of implementing this solution is that in Belarus, where the main logistical problems remain unsolved, infrastructure constraints prevent the transition from roads to Railways.

– transportation of goods on optimal routes. The essence of this proposal is to reduce the empty mileage of vehicles, which leads to a reduction in the amount of exhaust emissions into the atmosphere.

– consolidation of consignments in logistics channels, which makes it possible to use more "eco-friendly" modes of transport, such as rail, inland waterway.

– elimination of intermediate warehousing and cargo handling. This will lead to a reduction in the loss of material resources during their delivery from suppliers, which will also reduce the anthropogenic load on the soil.

– creation of a special calculator for informing customers on eco-solutions. The client can simply use this tool, specifying all the parameters of the cargo and the place of dispatch/destination. This easy-to-use tool will quickly calculate greenhouse gas emissions from the customer's shipment. By selecting a mode of transport for each stage of transportation – sea, air, road or rail – the calculator will calculate the amount of greenhouse gases that will be released during delivery.

Nevertheless, in the authors ' opinion, the most urgent problem of the concept of "green" logistics in Belarus is not the lack of mechanisms for the introduction and use of more environmentally friendly modes of transport or the most optimal routes. The difficulty of applying the concept is related to the allocation of responsibility for the harm caused: the state blames transport companies for the catastrophic environmental situation; companies, in turn, believe that environmental issues are within the competence of state structures and expect decisive action from the state. The concept of "green" logistics will work only when all three participants of logistics relations are aware of their responsibility and make decisions that directly or indirectly reduce the impact on the environment.

The above confirms that "green" logistics is one of the main parts of sustainable development of society and indicates the relevance of this topic. At the beginning of the 21st century, the most important factor in the transition to sustainable development is the creation and operation of highly efficient resource-saving technologies that ensure the production of high-quality, environmentally friendly products.

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