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The development of green technologies in logistics

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Abstract

Currently, the concept of ecological (green) logistics as a factor of sustainable development in the economic, social and environmental spheres of society is increasingly being discussed in scientific circles. The main objective of the scientific paper is to analyze the main trends of logistics in the concept of sustainable development, following which reduces the negative impacts of the company on the ecosystem, reduces the burden on the environment and reduces costs throughout the supply chain. Green logistics will be one of the most dominant trends in business logistic in forthcoming period.

Aim

The aim of the study is to prove the relevance and importance of the use of "green" technologies in the modern economy.

Tasks

The objectives of this research are to substantiate the essence and basic principles of "green" logistics. To identify the main directions of minimizing the negative impact of logistics activities on the environment.

Materials and methods

comprehensive review of the sustainability literature, summariz(ing) the common elements, contrast(ing) the differences

Results

With the accelerated development of the processes of international division of labor, as well as economic integration, the whole world is paying more and more attention to issues related to environmental conservation. At the same time, any activity of global economic entities is closely connected with logistics processes at the global level, as a result of which new environmental challenges appear in the field of logistics, when solving which logistics becomes "green".

Logistics traditionally refers to the planning, execution and control of the movement and placement of people and/or goods within the economic system to achieve certain goals. Logistics has a significant potential for the implementation of environmental control of transport systems, processes of recycling products, packaging materials, control and minimization of pollution, implementation of energy and resource saving processes.

In the last decade, the logistics business has been increasingly engaged in the impact of the logistics process on the environment, since the concept of sustainable development is replacing market concepts of business development, including transport and logistics. The term sustainable development first appeared in 1987 year's UN report and is currently understood as providing for the modern needs of society without compromising the ability of future generations to meet their needs. There is an understanding of sustainable development as the optimal consumption of limited resources and the use of natural, energy and material-saving technologies at all stages of the product life cycle, including extraction and processing of raw materials, minimization and destruction of waste, the creation of environmentally friendly products. Sustainable development implies the possibility of meeting human needs without extracting resources or producing waste exceeding the regenerative capacity of the environment and thereby switching to a strategy of implementing "green" technologies, including in logistics and supply chain management.

The concept of "green" logistics in the meaning of "environmentally safe" began to take shape in the world since the mid-1980s, when a course for sustainable development was taken in the world and the concept of "social responsibility of business" appeared. Since that time, in countries with developed economies, the "green" attribute has become a factor of competitive advantage in enterprises of various fields of activity. At the same time, it should be noted that even at the stage of formation and further development of the conceptual foundations of the use of green technologies in supply chain management, it began to be identified with the term "green logistics", "eco-oriented" logistics, ecologistics.

The development of the concept of using "green technologies" in supply chain management was initiated by the German scientist Erwin Muller in 1989, within which he paid great attention to transport logistics, noting the strong link between logistics, environmental protection and natural resources. Later, scientists at the Technical University of Dresden continued their research and studied the relationship between business and the environment.

The relevance of the research is due to the fact that "green" logistics is becoming an important factor in attracting customers, and consumers are paying more and more attention to the size of the carbon footprint of transport and logistics companies. According to experts, in the near future the use of "green" technologies in logistics will become as necessary as the introduction of a quality management system.

The analysis of scientific literature has showed that, in general, a predominantly unambiguous understanding of the essence of "green" logistics has been formed, the principles and system of indicators of the environmental effect of logistics activities have been determined, which indicates the formation and development of the concept of "green" logistics.

Green logistics is a system of measures that provides for the use of energy- and resource-saving logistics technologies and modern equipment in all parts 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. The concept of green logistics primarily includes consideration of environmental factors during the passage of material flow through all stages of production in order to reduce damage to nature and optimize total costs. The use of green technologies in logistics involves the implementation of processes taking into account the basic principles and management functions (planning, organization, motivation and control) within the supply chain management system and optimizing the functioning of the entire supply chain in order to reduce the level of negative impact on the environment.

The main and widespread "green" technologies in logistics activities include:

- selection of suppliers of raw materials with the lowest cost of non-renewable resources;
- inventory reduction to reduce the need for storage 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;
- reduction of paper document flow, transition to electronic documents, clouds and applications.

The sphere of "green" logistics includes 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 recycling processes in the form of reverse supply chains (waste collection and sorting, their delivery to distribution warehouses, delivery of finished products obtained from waste to the retail network, etc.).

Today, every national economy strives to apply "green" technologies in the management of logistics supply chains and, in addition to preserving the environment, to obtain an economic effect from their functioning. It is worth noting that the initiator of the introduction of green technologies can and should be the government, stimulating the innovative activity of business. In a number of developed countries, large-scale state plans and programs are being adopted to stimulate the development of environmental technologies and innovations, specialized research centers and foundations are being created. The adopted norms, taxes, subsidies and other state support measures are an important incentive for the development of "green" technologies. Most of the countries apply and develop eco-friendliness tools at their enterprises, as the active environmental orientation of logistics becomes an additional competitive advantage of the supply chain in general, and each of its participants in particular.

With the development of the concept of green logistics, its key principles have been formed:

- working with the personnel of companies in order to educate them in the environmental aspect;
- reducing the destructive impact on nature through the introduction of modern technological solutions into production;
- reduction of the specific share of material resources that are not subject to further processing or environmentally safe disposal;
- accounting of the company's impact on the environment in the organization of transportation and warehousing processes;
- rational approach to the consumption of natural resources;
- concentration of attention on production waste, the desire to use them to the maximum.

It seems to us a constructive approach to classifying "green" technologies according to two criteria:

1. Stages of the technological cycle of the product (concept, design, extraction of raw materials, its transportation, production of the product, delivery to the consumer, consumption and disposal).

2. Areas of environmental impact: saving fuel, saving water, non-renewable natural resources (specific to the production of a certain product), reducing or eliminating air, water and soil pollution (solid and liquid waste).

As a result, a matrix of "green" technologies is formed as a combination of the stages of the product life cycle and the directions of efforts to reduce the anthropogenic load on the environment. The matrix approach makes it possible to implement the principles of sustainable economic development as effectively as possible and to identify priority areas for the phased introduction of "green" technologies in logistics activities.

Conclusion

1. Compliance with the principles of sustainable development is the basis for the success of modern business. An international and national institutional environment is being formed for the introduction of green technologies into production and logistics activities, the system of accounting for harmful effects on natural areas and evaluating the effectiveness of companies' efforts to protect the environment from pollution is being improved.

2. More and more companies in the world are realizing the unique value of non-renewable resources and are looking for an optimal balance between the needs of the organization, society and nature.

3. A matrix approach to classifying "green" technologies according to the stages of the product life cycle and the directions of reducing the harmful effects on nature will allow the most effective way to build a policy of sustainable development of their business.

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