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## **Green Logistics in Russia: The Phenomenon of Progress, Economic and Environmental Security**

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***Abstract:***

*The article considers the prospects for the development of green logistics in Russia and in the world, revealing the role and importance of the introduction of hi-tech energy-efficient technologies in logistics and production processes.*

*The authors analyze the possibilities of implementing environmental safety mechanisms, introducing green technologies and applying global environmental standards to the problematic industries, coming to the conclusion that the timeliness and the need to develop "green" logistics confirms its effectiveness at a new stage of innovative science-based economic growth.*

***Key Words:*** *Ecology, logistics, service, import substitution*

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## **1. Introduction**

Following the desire to use the environment wisely and effectively, so as to ensure the stability of consumption for future generations, it is currently necessary to create all the conditions for its preservation and protection. Exploring the conceptual organization and functional richness of modern logistics systems, it is necessary to highlight their general involvement and broad scope of trade and transport arteries as well as socio-economic mechanisms in global and domestic format. Indeed, logistics is involved in virtually all the phases of the creation and distribution of demand in the markets for goods and services, forming the basis of their life cycle and economic value.

Thus, no economic doctrine is capable of such a deep insight into the production and distribution processes as logistics, and therefore environmental safety mechanisms also need to be implemented using green logistics. Timing of changes in the implementation of science-based theoretical and applied tools in green logistics must happen without delay, which is determined by both external and internal motives of the Russian economy. A significant share of the costs of production and circulation is occupied by the logistical costs of bringing the product to the final consumer. Therefore, logistics - as a science becomes particularly important in the current conditions, while focusing on import substitution of national products.

## **2. Theoretical, Informational, Empirical, and Methodological Grounds of the Research**

Despite the fact that logistics is widespread amongst Russian business, not all companies understand the priorities of the management of logistics and the importance of development of information and communication supply chain management technology, comprehensive services, strategic development, so in the difficult period of another peak of the crisis, trade and economic constraints, sanctions and political actions that have serious economic background, the Russian market of logistics services is transforms, feeling not only innovative trends, but destabilizing effects as well (Frank *et al.*, 2016; Epifanova *et al.*, 2015; Ryzhkova and Prosvirkin, 2015; Dasanayaka and Sardana, 2015; Sibirskaya *et al.*, 2015).

Annually there is 350 million tons of carbon dioxide released into the atmosphere from the vehicles used in logistics, more than 50 million tons of various hydrocarbons and 150 million tons of sulfur oxide. In the atmosphere, carbone dioxide accumulats, decreasing the oxygen levels. Emissions fall as residue on the plants and soil, are inhaled by people, and are consumed with food. Transport operating on the territory of the Russian Federation, burns approximately 110-115 million tons of fuel and 1.2-1.5 million tons of lubricant annually. Other pollutants include crankcase gases, battery acid, lubricants and coolants, as well as other operational materials [1].

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The theoretical and methodological basis of logistics is the general theory of systems and control theory (cybernetics), the fundamental principles and methods of system analysis, some elements of operations research, different sections of systems engineering and systemology, which together with a variety of conceptual and applied aspects of the theoretical and practical logistics form a definite and conceptual current device, capable after certain adaptations to specific conditions, to be used effectively in various fields and areas of production and commercial activities [2]. This is why logistics mechanisms, used to ensure strategic support to the environmental component can be involved at in the organizational functional management of socio-economic systems most effectively.

A good starting point is to use it as marketing moves of local solutions or projects with "green tint" - for instance, route optimization to reduce the mileage, the use of more environmentally friendly equipment, use of solar energy for technological needs, etc. Leaders of the logistics market have moved further, to develop a coherent development strategy, in which the idea of "green logistics" is central. This activity is largely based on the use of ISO 14000 - international family of standards to create an environmental management system. ISO 14000 helps market participants to reduce the negative impact of their activities on environment to minimum, as well as to correctly apply the relevant rules and regulations, and continuously improve the environmental activities. The matter of certification according to ISO 14000 increases ones market image and competitiveness. [3]

The Russian Federation is one of the global leaders in terms of ratio of public consumption to the natural resources reserves, and has a great potential eliminating the need to purchase raw materials from foreign countries. However in the recent years Russia is facing a new challenge with reduction in energy sources. Thus, in the recent past, an abundance of relatively cheap sources of energy has led our country's national product to become highly energy weighted. The value of energy as a share of finished products in general, began to exceed the 10% threshold. Experts rightly point out that 2% of the cost of the project spent on forecasting provides 50-fold return on the real, well-time application of predictive assessments for decision-making in science and technology production and logistics systems [4].

The development of international integration processes became much more complicated with the introduction of economic and trade sanctions. The saturation of the Russian market by the imported products had to be replaced by policies aimed at revitalization of domestic production, with the desire to increase the impact of organizational and functional processes in the sectors of the national economy and implement economic effect on domestic support. Moreover, greening of logistics service develops at quickening pace globally, confirming the scientific view that a successful business - it is not only cost-effective mechanism nominally, but also eco-efficient technology.

### **3. Results**

Most of the world's leading companies in recent years pay proper attention to eco-parameters using "green" standards in the industry, which are often not directly associated with protection of the environment. Traditionally, the "green" logistics technology is applied within production (development of product design and production planning), packaging, storage, transportation, material handling, however nowadays green information systems are even more appealing.

Leading international and Russian scientists have reached the conclusion that environmental mechanisms are applicable everywhere, as protection of the environment - is our contribution to the future new generations, however from an economic point of view, the benefits are not always on the surface. At the present stage of development of our country, the determined strategic prospects of import substitution and the introduction of environmental standards for the future are the most important ones.

A recent study «SMART 2020», conducted by the non-profit organization «The Climate Group», says that with the support of new information and communication technologies up to 2020, it is possible to reduce carbon dioxide emissions worldwide by 15 percent and save 600 billion euros worth of energy. Industry association BITKOM says the secondary effects, due to which "smart" IT will save five times more carbon dioxide than is required for the implementation of these technologies. However, this does not mean that software becomes "green". The concept of "green IT" is increasingly devalued, as important goals more and more often lead to nothing. Therefore today it is necessary to specify this definition: it represents such IT solutions that allow businesses to save energy and resources by optimizing their use in industrial processes. The software cannot be green, but it allows performing «eco-decisions». «Green through IT», or green solutions using IT-. is a mission of intelligent, long-term logistics software. In the rain ecological thinking amazing flowers can blossom. In all the countries with a developed attribute of a "green" industry, criteria of quality and factors of competitive advantage for businesses of all industries are becoming increasingly important. Many market participants rely on this factor. However, in addition to thoughtful, forward-looking solutions and development that fully justifies the epithet of "green" in this area, there are also a lot of "accidental fellow-travelers" and strange symbols, one of the strangest specimens of this kind - "Green IT" [5].

As part of the development of "green" technologies, the following can be offered in logistics. Thus, a significant decrease of pollutants in the exhaust gases is achieved by using a diesel injection nozzles with fuel flame opening angle 150 degrees, 140 instead of the introduction of the intermediate cooling charge air, EGR and on/off system in the cylinder at low power. Furthermore quality of fuels and lubricants largely influence the composition of the exhaust gases. A radical solution to the problem could be the use of new, non-toxic fuels, the searches of which are

conducted intensively. Thus, when used in road transport instead of diesel or gasoline, fuel gas (compressed natural gas) reduces exhaust emissions by more than twice, and when the engine is running on natural gas, which consists in the 96-99% of the methane emissions of toxic components are reduced by 4 times. Reducing emissions is due to a more complete combustion of LNG compared to gasoline blend [1].

#### **4. Conclusions and recommendations**

In connection with the relevance of this problem, the development of state programs to support Russian companies with the implementation of import substitution, the Rostov region and Krasnodar region should be recognized as the most promising ones in SFD, as they dominate in the development of logistics business processes and are the most promising for the introduction of Environmental Technology. As a result of the Sochi 2014 Olympics and the FIFA World Cup 2018 in the city of Rostov-on-Don and other cities in the Southern Federal District, the economic potential of the region is changing significantly, integrating the construction of large infrastructure projects and the development of tourism and recreation business, transport communication and trade and economic system of the region as a whole.

One of the features that influences the development specifics appears to be the fact that the constructions for the 2018 World Cup and the «Southern Hub» airport in Rostov-on-Don (construction is currently going ahead of the planned deadline), significantly increase the attractiveness of the region for investment and future development, based on competitive principles. As a result, the state may exercise the necessary policy of import substitution and greening at a smaller risk, certainly guided by "green" technologies, which are able to be effective in the long term and will allow Russian players to take their rightful place on the world stage.

The development of "green" technologies in logistics should be rely on compliance of Russian transport vehicles with modern international standards and follow the path of comprehensive development and application of design, performance and other activities. For example, in 2020 the efficiency of internal combustion engines will increase by 54% - less fuel is required "average" car. It can be assumed that decline in emissions from road transport would be a similar figure. "Green" technologies in logistics should be aimed at: improving the working process of internal combustion engines; improved fuel properties, lubricants and technical liquids; neutralization of exhaust gases; application of modern technologies of diagnosing the technical condition of the road transport; expansion of environmental safety monitoring network [1] .

As part of the reconstruction of the ecological balance, great deal of attention should be paid to the process of recycling, which is not only able to give second life to the material that are being recycled, thereby ensuring their rational use, but also drastically reduce the technical and technological production processes, which are

being transformed in the domestic industry at the moment. Logistic system of secondary material flows objectively provides two infrastructure components: input and output. Input infrastructure performs all functions related to the transformation of secondary material resources from residual to the maximum possible (reduced) utility, and so in reality - a network of procurement and processing enterprises of any organizational-legal form.

An important place in the output infrastructure should be taken by institutional activities: advertising, information services of actual and potential customers, cataloging secondary material resources, market research, marketing support, development stimulation of secondary material resources systems, relationship with authorities and environmental protection, participation in the development of new processing technologies and the use of secondary material resources, as well as provision of a wide range of service to distributors and consumers of secondary resources. Furthermore input and output infrastructure can sometimes be combined within one enterprise - such enterprise becomes a logistics center in the environmental market of secondary material resources.

Federal development program should provide measures that can significantly change the state of the infrastructure of southern Russia from an environmental point of view, as well as correct the legal base. Necessary changes in legal support are required amongst the development of logistics technology, introduction of standards for the protection of the environment and environmental audits, mandatory introduction eco-certificates in the production and promotion of goods and services, expansion of the range and increase the complexity of the "green" services, as well as the terms of «use of nature». But such measures can only be effective if objects that influence the ecology of are clearly defined, introducing them everywhere in every enterprise and monitoring the further organizational and administrative functionality.

The utility of secondary material resources combines subjective (commercial) and objective factors (environmental) factors. From this position, it follows that the objective component of the utility is implemented with the help of subjective factors that is the fact that, the use of secondary material resources should be commercially profitable for market actors - this mechanism lies in the field of commerce and trade logistics. Logistics as a traffic management concept - is, above all, the management and organization of the concentration process. Sources of secondary material resources are dispersed, hence the first stage of concentration process - collection. At this stage, the secondary material flows are directed from many places of origination to a limited number of collection sites. This stage is considered to be the most complex in the organizational sense, which increases the costs significantly. The main requirement is to ensure the unity of the logistics flow throughout its trajectory following intensity. Therefore, each stage must have equal productivity. Therefore in this example the stage of secondary material collection is the most problematic one [6].

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Logistics of secondary material resources - is a set actions related to changes in the internal state of these resources and their outward movement from the site to be used in manufacture. In this definition, it is fundamentally important that the use of secondary material resources is carried out through the use of commercial practices. Commercialization of the use of secondary material resources - is an environmental problem, and therefore is a global problem. Experience suggests that administrative measures and teams cannot achieve the necessary and sufficient level of utilization of secondary resources. Their reuse and recycle is subjectively disadvantageous.

However, it is possible to change this situation and make the use of secondary material resources profitable, and more specifically, commercially viable. However this benefit is only possible under the conditions of market economy. After all, for independent producers, commercial profit is the only incentive to enter production using certain material resources, including secondary. In countries with developed market economies, there are specialized firms that perform various operations on the transformation of secondary material resources, and this kind of business is rightly considered to be commercially viable, and is encouraged by the state. The feasibility of creating such conditions due to the specifics of origination and special commodity-type properties of waste, which is confirmed by the experience of developed countries in the world and Europe, that reuse around 50 to 70% of production and consumption waste, planning to run a complete cessation of landfill [7].

There are many ways to optimize eco-destructive consequences of logistics towards the environment. The modern consumer is different from the standard representations of the past; one attaches to the good's "green image" in the future, with this perception becoming increasingly important. Thanks to strict compliance to environmental parameters, the good or service may even gain the status of a premium product.

In order to ensure sustainable development in the future, logistics planning and optimization of transport and logistics networks will gain the form of message communication. PSI global is an integrated planning and management system designed for display, analysis, control and optimization of multi-stage, multi-modal logistics networks. PSI global - the premium class software, designed for continuous monitoring and analysis of the logistics processes of value creation, which expressly provides features to optimize environmental parameters. With the function determining the costs as well as emissions and its ability to optimize multimodal logistic chains, aspects of costs and servicing can be compared to environmental criteria (such as persistence and reducing emissions); in order to achieve optimal proportions depending on the desired conditions and parameters. However, software is not green. It only offers solutions to solve economic problems within the framework of modern business strategies. «Green through IT» [5].

Within the framework of scientific and methodological understanding of the prospects for the development of branding, environmental technology will ensure the leading position only to those products that provide consumers with health and environmental protection. A change in distribution strategies in a timely manner is required to form a "green" supply chain, which will be seen as a phenomenon of the progress of technology and environmental safety, integrating science, government and business in a common mechanism of greening. Traditionally, the risks of scientific understanding of the application converge to the loss of quality or higher prices for manufactured goods, but in today's world, market tends to create new risks - in the form of loss of eco-parameters and environmental damage. The European consumer is considerably demanding of eco-standards, however the economic laws of production, suggest that highest environmental standards correspond to a much greater cost of production. Next trend is the self-regulation of the cost of organic food, which will provide information, technical and technological, organizational and administrative provisions for the formation of a balanced logistics ecosystem.

The Russian consumer doesn't always expect this kind of protection and care about while consuming these goods or services, but such feeling increases satisfaction. Therefore, the timeliness and the need to develop "green" logistics confirms its effectiveness at a new stage of innovative science-based economic growth and would be most effective if the consumer is directly involved in the greening process.

We are talking not only about managing the "green" supply chain, but also the chain of requirements to the image of life of consumers. First of all it is necessary to bring the legal framework closer to the separate collection of waste, which implies a real enrichment of the Russian logistics processes dealing with recycling of material resources, since in spite of the increased attention to the development of eco-logistics and supply chain management, there remains a real imbalance between the level of infrastructure security and the deficit of currently available environmental hi-tech technology.

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