

## РОЗВИТОК ЛОГІСТИКИ В УКРАЇНІ: ЕКОЛОГІЧНИЙ ВИМІР

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Узагальнено передумови формування інвейронментальної парадигми. Встановлено, що реалізація інвейронментальної парадигми найбільшою мірою відбулася у доктрині стійкого розвитку, яка як економічна теорія стимулювала поступ логістики у напрямку «зелена» логістика. У ретроспективі досліджено еволюцію концепції «зелена» логістика. Ідентифіковано визначальні чинники, які матимуть вплив на її подальший розвиток. Проаналізовано розвиток галузі логістики України. Зосереджено увагу на сегменті транспортування. Встановлено зв'язок між збільшенням вантажопотоків та збільшенням навантаження на природне середовище. Розроблено рекомендації щодо зменшення негативного впливу транспортних логістичних систем на екосистему.

**Ключові слова:** «зелена» логістика, стійкий розвиток, охорона навколишнього середовища, транспорт, шкідливі викиди.

## DEVELOPMENT OF LOGISTICS IN UKRAINE: ENVIRONMENTAL DIMENSION

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The article summarizes the preconditions for the environmental paradigm formation. It has been set up that implementation of the environmental paradigm has been mostly held in sustainable development doctrine that being an economic theory has stimulated the progress of logistics in the direction of "green" logistics. The evolution of the "green" logistics concept has been researched in retrospect. Determinants that will have an impact on its future development have been identified. The development of logistics industry in Ukraine has been analyzed. Particular attention has been concentrated on the transportation segment. The connection between the goods traffic increase and increased pressure on the environment has been set up. Recommendations for reduction of the negative impact of transport logistics systems on the ecosystem have been designed.

**Key words:** "green" logistics, sustainable development, environmental protection, transportation, emissions.

**Problem formulation.** Global environmental challenges of the XXI century actualize creation of the new strategy for the relations development in the "people-economy-nature" system. Preserving the production growth and consumption in absolutely all spheres of life, the increased demand for natural resources, energy, transportation will be created in future, and hence there will be an increased load on the environment. The latter shall be under direct influence of logistics.

Even though the problem of interaction between logistics and the environment has been formed in a separate field called "green logistics" that is supported by governmental programs, businesses throughout the world, particularly in Germany, the USA, Japan, the discussions over this issue are only now being activated in Ukraine. Therefore, it is important to determine the current degree of "green logistics" development and its future prospects, its place and importance in Ukraine.

**Analysis of current research outputs and publications.** The review of national literature on logistics has proved that:

– In the last five editions of the professional Journal "Lohistyka" (Logistics) (№ 749 (2012), № 735 (2012), № 706 (2011), № 690 (2010), № 669 (2010)), which encompasses about 355 articles, there is not so much attention paid to the problem of eco-logistics or "green" logistics, as evidenced by only four publications that are focused on recycling [1];

– There is no article on the topic in analytical and scientific journals such as "Distribution and Logistics" and "Transport and Logistics" in 2012 and in the current 2013;

– As far as textbooks are concerned, these problems are covered only in [2]. There is a chapter, entitled "Environmental Aspects of International Logistics", which is based on the theoretical, methodological and practical methodical principles, which, according to the authors, need further development.

There are far many works of foreign researchers, particularly German. There are publications on practical projects of implementation of the "green logistics" concept almost in all journals in logistics. For example, the results of an analysis of the environmental aspects of logistics operations inside the company are presented in [3] and an example of the alternative energy sources usage (e.g. the sun) in logistics center operation and the results of reducing the harmful emissions into the environment through the implementation of lean strategy are highlighted in [4].

The annual German professional journal «Logistik» covers several publications on the issue of "green logistics". In particular, in [5] the scientific community with intralogistics / transportation and logistics systems (IFL) presents a software that allows to design energy efficient logistic centers. In [6] researchers are exploring the development of "green logistics" similarly to the development of the logistics concept, identifying cause-and-effect relationships and conducting certain analogy; the main stages of the "green logistics" development have been distinguished.

Finding the theoretical grounding for the models and ways of practical implementation of the "green" logistics concept for sustainable development form **the article objectives**.

### **Presentation of main materials.**

#### ***Preconditions of environmental paradigm formation.***

Public awareness of ecology and environmental protection appeared in the second half of the twentieth century, 100 years after the concept of "ecology" had been formulated by the German biologist Ernst Haeckel (1866). Further, in retrospect, chronology of major events that led to the emergence and worldwide support of environmental paradigm of human development will be provided.

1961 – foundation of "WWF".

1962 – publication of the book «Silent spring» by Rachel Carson. This book is considered to be the impetus for the development of environmental movements in the U.S. and other countries.

1968 – UN report "Man and Environment" announced the concerns on global imbalance between desirable but, unfortunately, uncontrolled development of technical civilization and biological resistance of environment to changes that occur in it, in order to meet the demands of everyday life and economy.

1971 – creation of NGO «Greenpeace».

1971 – publication of «Limit strogrowth», the famous work of Donella Meadowsin where she proves that the problems will reach their peak on Earth in the next 100 years.

1972 – creation of Roman Club «Limit strogrowth».

1972 – UN Conference on the Human Environment in Stockholm. This global conference became international and caused awakening of global environmental consciousness for the first time.

However, it took 25 years for the world economy to realize the necessity of sustainable development orientation, in context of limited resources.

1985 – The Vienna Convention for the Protection of the Ozone Layer.

1987 – The Montreal Protocol on Substances that Deplete the Ozone Layer. Brundtland Commission Report "Our Common Future", which can be briefly described as: sustainable development is supposed to meet the current demands without compromising the future generations ability to meet their demands.

1992 – International conference on the environment in Rio de Janeiro. United Nations Framework Convention on Climate Change. Progressive international community, international organizations and

well-known leading scientists launched a new approach towards the global issues solving – the concept of Sustainable Development which is to provide compulsory coordination of economic, environmental and human development so that the safety and quality of life would not be decreased from generation to generation, the environment would not be adversely affected and there would be social progress which recognizes everyone's needs.

Implementation of environmental paradigm has been mostly held within the sustainable development doctrine that has been present for 20 years as economic theory and many scientific papers share its scientific and methodological basis. The very theory has stimulated the progress of logistics in the direction of "green" logistics.

#### ***The evolution of the "green" logistics concept***

The first publications in the field of logistics and environmental protection appeared in the early 1990's [7,8]. The topical covered issues are – recycling, reclamation and recycling, reverse logistics. Functional orientation is the main characteristic for this first wave of "green logistics".

Since the late XX century – early XXI century, the "green logistics" concept is becoming more and more topical. Researches in logistics are characterized with avoidance of negative environmental impacts and resource efficiency improvement. This is due to external factors:

- The Kyoto Protocol (1998) to the UN Framework Convention on Climate Change, which obliged the signatory countries (180) to reduce emissions of greenhouse gases by at least: 30% – for industrialized countries by 2020, 80% – for industrialized countries by 2050, 50% for the whole planet by 2050; Stern report (2005) on the necessity to stabilize the temperature at 2°C and the concentration of CO<sub>2</sub> – at 350 ppm. [9]. Reduction of greenhouse gases emission primarily means a radical reduction in the energy intensity of GDP (replacement of outdated equipment, promotion of resource efficient technologies, etc.) and the development of alternative energy sources;

- Policy and regulation at the state level. For example, in Germany a state funding program for "eco-clean" logistics projects has been designed to stimulate investments in measures to reduce CO<sub>2</sub> and to increase energy efficiency, including 2 – year tax exemption for the Euro-5 and Euro-6 cars, etc.;

- Increase in global prices for resources. In particular, for product groups in processing industries, oil and food from 2003 to 2008; a steady growth – in 2007-2008 the share of change for product groups in processing industries amounted to 6.7%, oil – 36.4% and food – 23.4% [10].

The objects of the regulation of the second wave of "green logistics" are: CO<sub>2</sub>, noise loading, processing and utilization of waste and resource savings.

Current level of public awareness, customer requirements, the nature of competition, political regulation promote the "green logistics" concept (third wave) so that it evolves towards the formation of "green" supply chains, providing integrated transformation of logistics strategies, processes and structures of all members of the supply chain in accordance with the resource-saving, energy efficient and environmental technologies.

The development of the "green" logistics concept is schematically summarized in Figure 1.

#### ***The development of logistics in Ukraine: "Pros & Cons"***

In 2012, the capacity of the national logistics services market is estimated at 16 -18 billion USD, marking an increase of 10-15% as compared to the previous year (2011) [11], and 60-80 % as compared to 2005. According to statistics, the volume of goods traffic including foreign (export, import, transit) and internal (national) is being increased (Table 1).

1858 million tons of goods were transported to Ukraine in 2012. As far as the transport types are concerned, the lion share goes to road (68%) and rail (25%) transport, while water and air modes of transportation are not so popular. It should be noted that ports are extremely important element in global logistics chains. In 2012, sea ports handled 153,871 thousand tons of foreign cargo, while in 2000 the figure was 91,943 thousand tons, and in pre-crisis 2008 – 169,595 thousand tons. As to goods traffics, exported goods are characterized with the largest share – 63%, while imported goods accounted for 11%, transit – 25%, other (internal) -1% [12].

The pressure on the environment increases along with goods traffic. In 2011, emissions of pollutants to the atmospheric air amounted to 2502, 7 thousand tons, the vast majority of which (2 255.2 thousand tons or 90.1%) are road transport emissions (Table.2).

Table 1

**Dynamics of goods traffics in Ukraine in 2003-2012. (by modes of transport) mln t**

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Transport	1654	1731	1805	1873	1990	1972	1625	1765	1887	1858
– surfaces	1635	1710	1784	1850	1965,4	1953	1615	1754	1877	1850
• rail	445	462	450	479	514	499	391	433	469	457
• road	973	1027	1121	1167	1255	1267	1069	1168	1253	1265
• pipeline	217	221	213	204	196	187	155	153	155	128
– water	19	21	21	23	24	19	10	11	10	8
• marine	9	9	8	9	9	8	5	4	4	4
• river	10	12	13	14	15	11	5	7	6	4
– air	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

Source: Summary based on: Ukraina v tsyfrakh (Ukraine at a Glance) 2011. Statistical Yearbook. K. 2012 – P.121. and Ukraina v tsyfrakh (Ukraine at a Glance) 2012. Statistical Yearbook. K.: 2013 – P.120.

Table.2

**Emissions of pollutants to the atmospheric air from road transport means by kinds of transport (thousand tons)**

	2000	2005	2008	2009	2010	2011
Total	1949,2	2151,5	2685,4	2514,8	2546,4	2502,7
– Road transport	1949,2	2056,0	2420,3	2285,0	2313,7	2255,2
– Air, rail, water transport and production equipment	-	95,5	265,1	229,8	232,7	247,5

Source: Dovkillya Ukrainy (Environment of Ukraine). Statistical Yearbook. K.: 2012 – P. 19

In 2011 road vehicles in Ukraine produced the following harmful emissions: sulfur dioxide – 20.5 thousand tons, nitrogen dioxide – 208.3 thousand tons, nitrogen oxide – 1.3 thousand tons, carbon monoxide – 1729.5 thousand tons, methane – 7.4 thousand tons, non-methane volatile organic compounds – 262.7 thousand tons, soot – 25,3 thousand tons, carbon dioxide – 254 449, 5 thousand tons [13]. The results of the negative impact of harmful transports on human health, greenhouse effect, acid rain, soil pollution, air pollution, etc. are presented in a number of scientific publications.

The world's leading companies in accordance with the environmental regulations adopted in Sweden provide estimations and control of five major pollutants: carbon dioxide, nitrogen oxide, hydrocarbons compounds, dispersed particles (soot, etc.), sulfur dioxide. (Table 3).

Table 3

**The main types of pollutants from transport and logistics activities and their negative impact on the environment**

Negative impact	Pollutant					
	CO2 carbon dioxide	NOx nitrogen oxides	HC hydrocarbon compounds	Pm dispersed particles	SO2 sulfur dioxide	Pb plumbum and its compounds
Deteriorating health		X	X	X	X	XX
Greenhouse effect, climate changes	XX			X		
Acid rain formation		X			XX	
Soil pollution		X			X	
Air pollution		X	X	X		XX
Corrosion of metals		X			X	

Source: Oliynyk Ya.B., Smirnov I.G. Mizhnarodna Lohistyka (International Logistics) Educational Accessory. – K.: Obriyi, 2011. – P. 90.

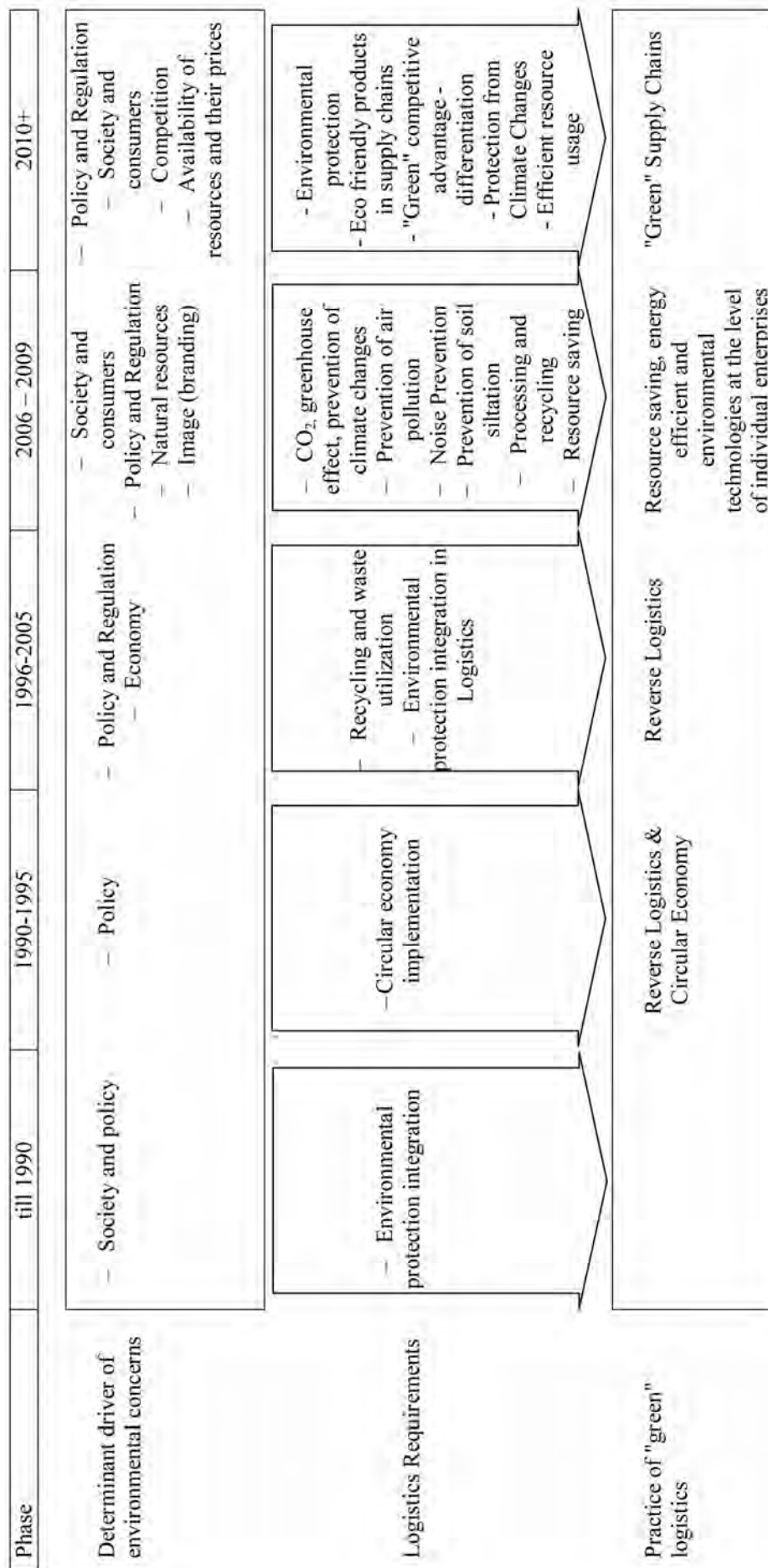


Fig. 1. "Green" Logistics Evolution  
Source: Personal elaboration based on [6]

This elaboration belongs to the company «Schenker-BTL» within the program "Green Logistics", which is a pioneer in the world logistics practice.

With regard to the impact of logistics, particularly of transport, to the ecosystem, one may formulate the following recommendations for the greening of logistics in Ukraine:

Firstly, stabilization and gradual decrease in road transportation. This can be achieved by the usage of combined transportation. It has been proved that the transportation of the same goods by means of road transport uses 6.5 times more fuel than rail transport, and 5 times more than water transport. More than 1 million trucks have been operating in Ukraine (1337.9 thousand items in 2011, 38% more as compared to 2000). In order to enhance their environmental performance one should pay attention to the choice of the right means of transportation, full download, routes optimization, reduction of empty trips, proper professional training for drivers, usage of high-quality fuel and its economy.

Secondly, assets renovation, rolling stock for all modes of transport and roads, and accordance of technical level with future requirements. According to the recent data [14] most trucks in Ukraine are outdated: more than 55% of trucks have been operating for more than 10 years, and about 26% – from 5 to 10 years, and only around 9% of trucks have been used up to 3 years. Ecological indicators of the Ukrainian transport companies park are also very low. Out of 27,000 cars only 833 meet Euro 5 standard, 437 – Euro 4 standard, and 7946 – Euro-3 standard. The most common standard is Euro 2 (12800 cars), another 1327 cars belong to the Euro 1 standard and 35485 cars – to Euro 0 standard.

Thirdly, improvement of the state mechanism of industry regulation. Germany is characterized with a specific experience in this field. Despite the forecast of 80% growth in long-distance transportation by 2050, Germany agrees to complete all requirements on climate and environment protection that are outlined in the "Freight and Logistics Action Plan" [15].

Ukraine, as well as Germany, has its own commitments to the international community among signatory countries of The Kyoto Protocol, but unfortunately, Ukraine is far behind the EU countries. For example, the new "Euro" standards have been implemented in Ukraine with great delay, moreover, implementation deadlines have been postponed for various reasons. Thus, since January 1, 2012 a new standard of environmental safety of cars "Euro-4" should have been introduced in Ukraine. However, our country has not even accepted the norms of "Euro-3" standard, the implementation of which is being again postponed. Ukraine in 2012, as in previous years, continued to import cars that comply with environmental standard not lower than "Euro-2". Only on July 5, 2012, the Parliament of Ukraine adopted the Law of Ukraine № 10708 "On Amending the Law of Ukraine "On some issues of import to the customs territory of Ukraine and registration of vehicles". The main objective of this law is to reduce harmful emissions from vehicles and to improve the air in the cities and other settlements of Ukraine, as well as the gradual introduction of the environmental safety requirements in the country that meet modern international environmental regulations for wheeled vehicles. According to the law, from January 1, 2013 it is forbidden to import in Ukraine the cars with environmental standards lower than "Euro-3"; from January 1, 2014 – lower than "Euro-4" standard, and thereafter in two years, the transition to standards "Euro-5" and "Euro 6" standards has been planned. Thus, for all the delays, Ukraine is finally on the road, followed by civilized countries.

**Conclusions and perspectives for further research.** "Green Logistics" can be considered as a factor of sustainable development, even in Ukraine. Its importance will be constantly increasing. Environmental protection, resource and energy savings along with costs, service and quality of logistics services are becoming more and more topical.

Economic growth of logistics in Ukraine is not a determining factor for sustainable development. Balanced environmental policy and enforcement of environmental regulation are of the same importance. In this respect, Ukraine is far lacking behind as compared to other countries. EU Member States have been gaining an immense and invaluable management experience in the field of environmental protection for many decades. Environmental quality standards have been created and implemented in practice of everyday life that has helped to minimize negative human impact on the environment. This experience should be carefully studied and strongly promoted.

The problem of "green logistics" at the macro level has been dwelled upon in the research. Given that the implementation of the "green logistics" concept at the enterprise level provides significant benefits

in terms of reducing logistics costs, image improvement, increased competitive advantage, the research of the problem at the micro level is considered to be a great perspective for further research.

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М. Шайт  
Ченстоховська політехніка, Польща

## ЧИННИКИ РОЗВИТКУ РИНКУ БІОПРОДУКТІВ ДЛЯ МОЛОДИХ ПОЛЬСЬКИХ СПОЖИВАЧІВ

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Досліджено шляхи і напрями визначення змін в організації виробництва і збуту для ринку біопродуктів. Показано високу чутливість 20–25-вікової групи для визначеного асортименту продуктів. Результати повинні забезпечити можливість для виявлення основних чинників, що визначають розвиток ринку біопродуктів.

**Ключові слова:** біопродукти, екологічні продукти харчування, бар’єр зростання.

## DETERMINANTS OF DEVELOPMENT OF THE MARKET FOR BIO-PRODUCTS AMONG YOUNG POLISH CONSUMERS

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Presented studies identify ways and directions of changes in the organization of production and sales for bio-products market. Previous author's studies have indicated the high sensitivity of 20-25 age group to the specified assortment. The results should enable the identification of the main determinants of development of the market for bio-based products.

**Key words:** bio-products, ecological foods, growth barrier.

**Problem formulation.** The specificity of consumer products which are bio-products depends on their connection with the wider aspect of health care. Colloquially, it is assumed that these are drugs,