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## КОНЦЕПТУАЛЬНІ ПІДХОДИ ДО ВИЗНАЧЕННЯ ПОНЯТТЯ "ЗЕЛЕНА ЛОГІСТИКА"

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Висвітлено теоретико-методологічні засади «зеленої логістики». Узагальнено основні еколого-економічні закони. Досліджено генезис економічної думки відносно втілення нової «середовищної» парадигми в логістиці. Встановлено, що фундаментом для становлення «зеленої» логістики є такі основні категорії, як: екологічні товари та послуги, «зелений» бізнес, чистіше виробництво, екологічний менеджмент, сталий розвиток, «зелена» економіка, соціальна відповідальність бізнесу. На цій основі визначено поняття «зелена логістика».

**Ключові слова:** «зелена логістика», стійкий розвиток, «зелена» економіка, екологічні товари та послуги; чистіше виробництво, соціальна відповідальність бізнесу.

## CONCEPTUAL APPROACH TO DEFINE THE NOTION "GREEN LOGISTICS"

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The article elucidates theoretical and methodological principles of green logistics. The major ecological and economic laws have been generalized. The economic opinion genesis regarding the implementation of new 'environmental' paradigm in logistics has been researched. It has been set up that such major categories which play the role of foundation for 'green' logistics formation are the following: environmental goods and services, 'green' business, cleaner manufacture, ecological management, sustainable development, 'green' economics and social business responsibility. On this basis the notion of the 'green' logistics has been determined.

**Key words:** green logistics, sustainable development, green economics, environmental goods and services; cleaner manufacture, and social business responsibility.

**Problem formulation.** The transition to stable utilization of limited natural resources of the planet and diminishing economics' dependence on conventional unearthed energy sources which have negative influence on the climate change and cause energetic susceptibility of many countries, are the fundamental surviving factors for economic and social systems in XXI century. The integration of sustainable development model into business strategies provide an incentive to the tread of 'green economics', 'green business' and 'green logistics'. The 'green' concept penetration means: ecologically clean products, processes, services and technologies; ensuring the implementation of steady consumption and manufacture practice; assisting the researches and development in sphere of 'green' innovations; making 'green' the chains of supplying.

Since the one of the possible options to enforce the relations between economic growth and ecological improvement is making logistics 'green', creating value chains, thus, the objective need for

further developments of theoretical and methodological approaches for formation and development of 'green' logistics has been arisen.

**Analysis of current research outputs and publications.** Actuality of these issues was determined by Western scholars who proposed the term 'green' logistics relatively long time ago. The literature sources research gave an opportunity to determine some definitions on which the appropriate researchers refer most frequently.

On the opinion of P. Murphy, 'green' logistics is the new method in logistics directing standard logistic requirements to rationalization, efficiency and acceleration of finishing and moving the goods, and take into consideration the measures for environmental protection [1]. The abovementioned definition of 'green logistics' is one of the first mentioned in scientific literature. According to this notion, it is possible to say that the main attention is on operational efficiency, the resource utilization effectiveness and elimination of negative consequences.

J.-P. Rodrige circumscribes the semantic meaning of the category 'green logistics' as quite a wide notion which 'is the ecologically accepted and efficient transporting distribution system' [2, p. 339]. This definition doesn't reveal the whole meaning of 'green logistics' but at the same time mentions the transporting component which has a destructive impact on environment and needs the most ecological direction.

D. Rogers, R. Tibben-Lembke interpret 'green logistics' as the aggregate of actions, directed on minimization of ecological consequences of logistic activities [3, p.130]. Lee Yanbo, Lui Sunsian add to this view, defining 'green logistics' as a new direction providing for the implementation of progressive technological logistics and modern equipment with the aim to minimize the pollution and increasing the effectiveness of logistics resources utilization. [4, p. 291].

Polish scholars offered the ecological direction for logistics called ecologistics. Particularly, Z. Korzen and J. Kuształ think that from the view of outer environment of enterprise the ecological orientation of the logistic conception have to provide the minimization of dangerous emissions and sewage, noise and vibration. Such an orientation ensures the formation and management of logistics processes so that to reduce the negative impact on the environment. Other Polish scientists A. Korzeniowski and M. Skrzypek claim that ecologistics is the realization of optimal solutions in the sphere of selection, accumulation, and distribution to utilization or liquidation of different waste not burdensome for the environment and society [5]. From these definitions, it is possible to conclude that the representatives of Polish scientific circles of logistics, there is a notion that ecologistics aims to create territorial and integrated ecologicistic system implementing reversible logistics.

German scientists not focusing on definition of terminology but more filling it with the cases of the activities of leading worldwide companies draw a parallel between the development of logistics at the different integration levels and the development of green logistics. Diagrammatically, it is shown in fig. 1.

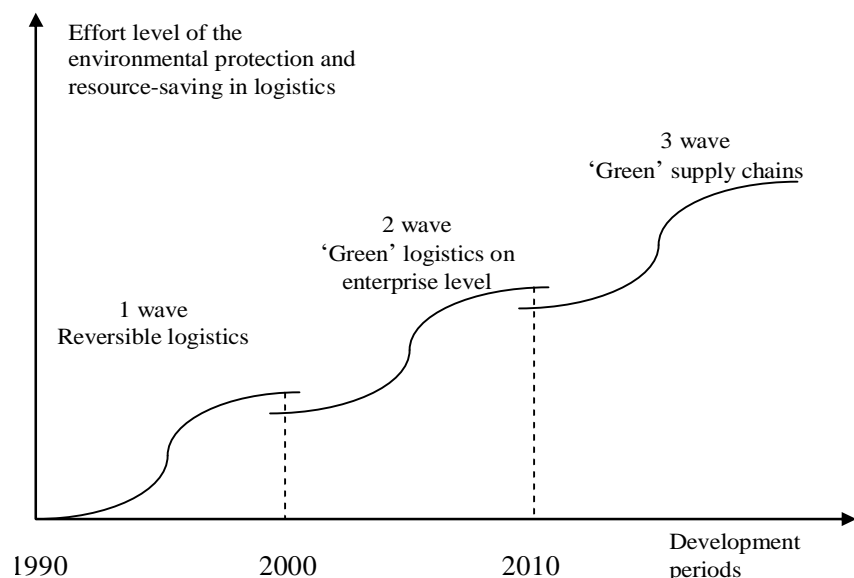


Fig. 1. 'Green' logistics evolution

Source: [7]

As we can see, by the green logistics they mean something more than reversible logistics.

The meaning 'green' logistics is used by the companies first of all those for whom logistics is their main domain. Famous logistic operator Schenker within pilot project "Green logistics" has determined the key factors for success – moments guaranteeing project success for all its participants: green network of logistic infrastructure; green routes and technologies of goods delivery; green products, and green terminals.

To the author's mind, even though all mentioned definitions expose the nature of green logistics don't prove the definite definition and, thus, demand some corrections.

**Article objectives.** Presentation of theoretical and methodological principles of 'green' logistics, and on this basis the formulation of the notion 'green' logistics is the aim of the research.

**Presentation of main materials.** To the opinion of outstanding specialist in ecological and economic range of problems E. Y. Weizcacker [7], the humanity is entering the Century of Surrounding Environment, when the important short-term economic goals cannot be reached unless they obey ecological imperative. In other words, modern society and entrepreneurship have to take into consideration defined by forerunners universal, cosmopolitan ecological and economic laws aggregated in table 1.

Table 1

**Characteristics of main ecological and economic laws**

Law name	Authors	Gist characteristics
Law of decreasing fertility	A. Turgo, T. Maltus	With growing demand of products the land usage, natural capabilities of fertile lands are diminishing
Law of demographic (technical, social, economic) saturation	P. Erlich, T. Maltus	The amount of population always correlate with the capabilities of its vital activity maintenance
Law of feedback	P. Dansero, B. Comenar	Intrusion into natural systems triggers side changes, as a rule, undesirable and unpredictable.
Law exhaustiveness of natural systems	V. Vernadskyi	Geological and biological evolution received new impulse and, accordingly, are changing its structure because of accumulating action of 'human factor', activities of homo sapiens
Law of cumulative action and complementation of natural forces	E. Mitcherlih, B. Baule	Amount of harvest depends not on the only one factor, but on the whole ecological factors simultaneously.
Complex law of ecology of Comenar	B. Comenar	1) everything is linked; 2) everything must go somewhere; 3) nature knows the best; 4) nothing come for free

Source: generalized from [8]

Awareness of these laws and facing their consequences led to the appearance and support of new environmental paradigm encouraging the popping up of new vectors in logistics development.

The genesis of economic thought concerning the implementation of this paradigm in logistics can be introduced in the form of table 2.

The bases for formation of 'green' logistics are the following main categories:

- Environmental goods and services;
- Green business;
- Cleaner manufacture;
- Ecological management
- Sustainable development;
- Green economics;
- Social business responsibility.

The experts of the Organization of Economic collaboration and development with the professionals from Eurostate provide the following definition: *Environmental goods and services* (EGS) are technologies, goods and services for measuring, prevention, restriction, minimization or neutralization of harmful ecological impact on water, air or land resources. To EGS the following can be related: clean technologies, goods and services, which eliminate the risk to harm environment and resource usage [9]. The example of

EGS can be logistic technologies. In [10] the author mentions the role of environmental logistic technologies in implementation of the sustainable development principles, particularly:

- ⇒ "lean production" – less demand in resources, less stocks, elimination of wastefulness, lack, waste; shorter manufacturing cycles;
- ⇒ "just-in-time" – maximum synchronized supply, manufacture and selling goods and their coordination with demand; minimization of stocks, reduction of logistics cycles;
- ⇒ sustainable supply chain – designing the products in such a way so that it would be easy to dissolve and recreate them; goods manufacture with the longest possible life cycles; allocation of chain supply participants in close proximity; length of supply chain optimization.

Table 2

**Priority evolution in scientific researches of the interaction issue of the logistics on the environment**

Term	Main scientific approaches
until 1990	The orientation on consuming development is casted doubt on. The solution problems of controversies between economic and ecological rationalization are dominating.
1990–2000	The fundamental change in policy is undergoing. The importance of balancing the ecological and economic aspects gives an incentive to the reversible logistics and ecologistics development, where the main object is reverse flows as well as realization of optimal solutions in the sphere of selection, accumulation, distribution and recycling or utilization of different kind of waste.
2000–2010	Researches in the logistics sphere are inherent to avoidance of negative ecological consequences and increasing the efficiency in resource usage. The conception of 'green' logistics is implementing in resource-saving, energy efficient and nature protecting technologies which are involved into servicing of logistic processes of the enterprise with the aim to offer 'clean' produce/services (zero waste, zero pollution) to the consumers.
2010 till now	The development of "Green Supply Chain Management". The object of regulation of "Green Supply Chain Management" is: CO <sub>2</sub> and prevention of climate change, struggling with air pollution, prevention of land silting, noise strain, waste recycling and utilization, and resource-saving. The conception of responsible management of supplying chains – ecological, economic and social influence management and encouraging the suppliers to implement practices of responsible management the whole life cycle of goods and services.

Source: own elaboration

Ukrainian scientists define 'green' business as a commercial activity, directed to gain income from selling of ecological goods and services, manufacturing and providing of which providing for implementation of methods and technologies, which minimize integral eco-destructive impact on environment, but their usage encourage maximum ecologically beneficial conditions of life for consumers both for short-term and long-term periods [11].

*Cleaner manufacture* (CM) is constant usage of integral prevention strategy to save natural resources in the processes, goods and services with the aim to improve the efficiency and decreasing the risk level not only concerning the humans but to the environment. In the manufacturing processes the strategy of cleaner manufacture directed to more efficient usage of raw materials and energy, to exclude toxic and harmful materials, prevention of waste and pollution in their sources. In goods and services the strategy of cleaner manufacturing aimed to eliminate their influence on environment within the whole life cycle – from designing to using. Cleaner manufacturing is based on systematic assessment of manufacturing processes and identification of reasons of inefficient usage or resources and includes:

- Analysis of product life cycle, produced by enterprises, from its creation to expiring of its life;
- Identifying the reasons of inefficient resource usage by elaborating detailed material and energetic balances which are providing quantitative confrontation realized expenses, received primary outcomes (products) and emissions, waste and heat loose etc;
- Providing the recommendation on improving manufacturing processes and managing resources, parameter modification of operation activity, replacement of outdated technologies for more energy- and eco-efficient, redesigning the production to eliminate negative impact on environment [12].

*Ecological management* – focuses on monitoring the waste and emissions of polluting substances, implementing the assessment of pollution influence on environment due to the approach, which is mentioned in international standards ISO 14000. In general, the development of managing standards in ecology domain is happening in parallel with intensive elaboration and implementation of ecological standards in product manufacturing area, directed to ensure efficiency of energy and ban to use certain dangerous for the environment substances, food safety etc. The ecological requirements for marking the products are gaining more popularity, making the ecological footprint on them, which reflects the quantity of energy necessary for manufacture and transportation of products.

According to the materials of UN conference on environment and development, sustainable development is the society development satisfying the needs of modernity, not putting under the threat the ability of next generation to satisfy their own needs. Key objectives of sustainable development are: a) renewal and preservation of the natural ecosystems and their capability to self renewal in the needed amount in the necessary area; b) ensuring forestalling solutions of issues of economic, social, demographic and spiritual development; c) coordination the paces of economic development with supply holding capacity of ecosystems.

*Green economics* due to the report of UNEP is the ‘economics with low emissions of carbonic compounds which efficiently uses the resources and meet the interests of the society as a whole’ [13]. In ‘green’ economics the increase of income and employment are ensured by state and private investments in these activities and projects which encourage elimination of carbonic emissions and pollution, increase the efficiency of using energy and resources, work to prevent losing biodiversity and ecosystem services. These investments are necessary to seep up and maintain by means of target state outlays, subsidies, incentives in order to encourage the development of green sectors, development of markets for green technologies and innovations, improvement of regulatory policy and flows of financial aid, and switching to ‘green’ state purchases.

*Social business responsibility (SBR)* is the responsible attitude of any company to its products or services, to consumers, employees, partners; active social positions of company, which lies in harmonic coexistence, interaction and constant dialogue with the society, taking part in crucial social issues resolutions. SBR contributes to the sustainable development, particularly, to health and welfare of the society; takes into consideration the expectations of involved parties; corresponds with the valid legislation and international norms of behavior; is integrated into the enterprise activity and practices in its relations. Social responsibility is the conception which encourages the enterprises to consider the society interests, taking the responsibility for the impact of the enterprise activity on consumers, stakeholders, employees, community and the environment in all aspects of its activity.

Abovementioned notions relate to the protection of the environment and are integrated into the basis of conceptual categorical apparatus of ‘green’ logistics. So, the author suggests such a definition of ‘green logistics’ as:

*Green logistics* is a management of ecological, economic and social impacts of logistics system providing for the actions within the following directions: reducing the intensity of using the materials, diminishing energetic intensity, dispersion of toxic substances, increasing recycling of resources, maximizing the usage of renewable energy sources, prolongation of the period of using the productions, increasing the intensity of providing services.

**Conclusions and further research prospects.** Concluding the abovementioned, it is worth marking that under the influence of environmental factors; the regulation object of green logistics has been changing and, accordingly, its gist and replenishment which have found the reflection in defining categorical apparatus. It is important for the theory and practice to move together responding to the challenges of time.

Turning supplying chains into green in the future will lead to the changes in every business. There will be branches and sectors of economics which quickly will switch into ‘green’ management of supplying chains, but there will be those which will do it later. However, all the companies which don’t have a desire to jeopardize their images willing to increase their incomes by means of responsible management of supplying chains have to stick to all range of standards as well as to social, economic and ecologic aspects elaborating efficient mechanisms and tools of management, which as a result will determine the perspectives for further author’s investigations.

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