

*Heorhiy Cherevko*<sup>1</sup>, *Volodymyr Kolodiichuk*<sup>2</sup>, *Irina Kolodiichuk*<sup>3</sup>

<sup>1</sup> University of Rzeszow

<sup>2</sup> Stepan Gzhycky National University of Veterinary Medicine  
and Biotechnologies in Lviv

<sup>3</sup> National Academy of Sciences of Ukraine

## **Historical and meritorical genesis of logistics**

### **Historyczno-merytoryczna geneza logistyki**

**Abstract.** The aim of the article is to present the results of the research of the possibilities of explaining the content and evolution of logistics formation, determining periods of its development by examining its most important features. Based on the dialectical method of learning objective reality and using a historical approach the retrospective analysis was carried out and the historical and substantive genesis of the logistics category was examined, various interpretations of it have been identified in which the functional, optimization and target aspects are traced. The authors of the article define the concept of logistics as a branch of the theory of management, the subject of which is the study of forms and means of organizational-economic, structural-functional and institutional impact on the process of material and related information movement, financial and service flows from the primary source of raw materials to consumers of final products in order to optimize the specified process and realize the objective function of the logistics system, consisting in synergistic effect obtaining. The periodization of military and economic stages of logistics development on the basis of motivational features with substantiation of intuitive-philosophical, phase-applied and system-integrated periods of its formation is proposed.

**Key words:** logistics, military and economic sphere, flow, logistics system, logistics periodization

**Synopsis.** Celem artykułu jest przedstawienie wyników badania możliwości wyjaśnienia treści i ewolucji formacji logistyki, ustalenia okresów jej rozwoju poprzez zbadanie jej najważniejszych cech. Na podstawie dialektycznej metody poznania obiektywnej rzeczywistości i przy użyciu podejścia historycznego przeprowadzono analizę retrospektywną oraz zbadano genezę historyczną i merytoryczną kategorii logistyki, zidentyfikowane zostały różne jej interpretacje, w których śledzone są aspekty funkcjonalne, optymalizacyjne i docelowe. Przez autorów artykułu zostało zdefiniowane pojęcie logistyki jako gałęzi teorii zarządzania, której przedmiotem jest badanie form i środków wpływu organizacyjno-gospodarczego, strukturalno-funkcjonalnego i instytucjonalnego na proces przepływu materiałów i powiązanych z nimi informacyjnych, finansowych i usługowych przepływów z pierwotnego

źródła surowców do konsumentów produktów końcowych w celu zoptymalizowania określonego procesu i realizacji docelowej funkcji systemu logistycznego, polegającej na uzyskaniu efektu synergii. Proponuje się periodyzację wojskowych i ekonomicznych etapów rozwoju logistyki na podstawie cech motywacyjnych z uzasadnieniem intuicyjno-filozoficznego, fazowo-stosowanego i systemowo-zintegrowanego okresów jej powstawania.

**Słowa kluczowe:** logistyka, sfera wojskowa i ekonomiczna, przepływ, system logistyczny, periodyzacja logistyki

## **Introduction**

The novelty of the logistics approach to material flow management is conditioned by the practice of logistics using in the economic sphere. A retrospective analysis of the origin of this scientific and practical direction clearly showed the historical momentum and fragmentation of the use of the logistic concept in economic systems. Only in the early 1950s, after the scientific substantiation of the American expert in the field of system analysis O. Morgenstern, logistics activity began to be an integral part of the management of some companies. Pointing to the absolute similarity “between the management of the provision of troops and the management of material resources in industry” [Morgenstern 1951], this scientist actually transferred the theoretical and practical achievements of logistics from the military sphere to the economic.

Significant contribution to the theory of research of logistics problems in a market economy, especially in the field of transportation, has been made by wide bunch of scientists, namely: M.R. Linders and H.E. Firon [1999], A. Gadzhinsky [2000], E. Krykavskyy [2006], M.A. Oklander [2008], Yu. Ponomareva [2005] and others. In scientific definitions of the concept of “logistics” of such scientists as R. Ballou [1987], M. Christofer [2000], J.L. Heskett [1977], J. Magee [1985], R.T. Miles [1987], B.K. Plotkin [1991], A.G. Kalchenko [2006] and others we see some certain pronounced one-sided interpretation of the essence of this definition, related to the fixation of essential features of logistics within a specific professional specialization – management, organizational, financial, technological, etc. Modern economic realities require a comprehensive consideration of logistical activity in the unity of all its content, structural, functional and institutional characteristics, taking into account intermediate tasks and the final goal. Such consideration becomes possible under conditions of systematic approach to logistics applying, within which it is grounded as a system of interconnected concepts and categories, which reflects the essence, meaningful characteristics and principles of organization of logistical activity.

## **The purpose and methodology of the study**

The purpose of the article is to clarify the content and evolutionary process of logistics formation, outlining the periods of its development through its most essential features identification. The subject of the study is the motivational prerequisites of historical events in the development of logistics and in the evolution of its content. In order to

achieve this goal, we have solved the following tasks: basing on the dialectical method of knowledge of objective reality and using the historical approach, to conduct a retrospective analysis and to investigate the historical and meaningful genesis of the logistics category. To substantiate the definition of “logistics” we used the terminological approach, and to periodize the historical stages of the development of logistics on the basis of established features – the method of grouping.

## **The main results of the study**

Objectively evaluating the scientific and practical achievements in the study of the origin of the term “logistics”, we can say that the etymology of this concept is not fully understood. Two versions of origin are common: from the Greek word *logistikos* – the art of calculating, of thinking, mastery of counting [Kalchenko 2006]; from the French word *loger* [Ponomaryova 2005, Krykavskyy 2006] – to supply, to house. However, there are other variants, such as the Old German *laubja* – warehouse, storage [Ponomaryova 2005].

The semantics of the concept of logistics are also ambiguous. Applied mathematics was called as logistics in ancient Greece; in the Roman Empire – the activities of providing troops with food and housing; in Byzantium – the process of complex addressing the various problems associated with the transportation and with the army rear supplying [Oklander 2008].

The Roman Empire borrowed much from Ancient Greece, including the term “logistics”. Rome used this term to describe the rules for the distribution of food. Accordingly, the employees involved in such distribution were called “logistics” or “logisticians”. This term was later used in the military lexicon.

The Byzantine emperor Leon (Leontos) VI (865–912 AD) called strategy, tactics and logistics three categories of military arts [Oklander 2008]. That is, it was going about the ability to coordinate the process of managing material flows in space and time. The position “logistician” in the Byzantine army was an official military specialty.

A significant contribution to the development of military logistics was made by military theorist and historian A-H. Jomini (1779–1869), who believed that the logistics interests included a wide range of issues, including the planning of activities, the technical and food supplying of the armed forces and, based on the results of the generalization of the experience of the Napoleonic wars, defined logistics as “...the bridge between the economy of the nation and the active army” [Oklander 2008]. The dilemma concerning the provision of troops revealed two fundamental problems, namely: redundant provisions and weapons reduced troop mobility; the shortage of provisions and weapons reduced the combat capability of the soldiers.

Published at the end of the 19th century. in the US, Jomini’s works were practically embodied in World War II. His theoretical heritage made it possible to organize a steady supply of the army as a result of the coordinated action of the enterprises of the military-industrial complex, trade, and transport in the framework of the implementation of the Law on Lend-Lease, adopted by the US Congress on March 11, 1941.

The pinnacle of military logistics reasonably is considered operations that ensured the supply of the US Army during its landing in Normandy and the subsequent offensive

into Europe. Operation “Red Ball” is still being studied at military schools as a successful example of military logistics. To address the issues of uninterrupted cargo transportation, progressive container shipping methods have been tested for the first time.

It should be noted that the scale of hostilities in the USSR was much larger. Also, it is worth mentioning the evacuation of industrial enterprises, conducted by specialists of the People’s Commissariat of Railways in cooperation with other profile agencies. The magnitude of the task was striking as hundreds of industrial enterprises, as well as their workers and family members, were displaced as a result of the threat of the Nazi troops’ rapid onset of the thousands of kilometers, including the Urals and Siberia, at the beginning of the war. Perhaps these were too costly logistics processes, but under combat conditions cost optimization was sidelined and the cost of many logistics solutions became too high.

The term “logistics” on the territory of modern Ukraine began to be widely used by specialists only from the late 80’s of the 20th century. The realities of a planned economy still required progressive approaches to the organization and management of production, and the best practices of the time involved the use of integrated concepts of supply, production and marketing as the only single material flow. Although, the term “logistics” was consciously (or not consciously) not used. Let’s call such a period the existence of latent logistics. The development of the consumer market in Western Europe and North America has led to the use of new methods of optimizing the delivery of products from producer to consumer. As noted above, an employee of the American company RAND Corporation, a specialist in systems analysis, professor O. Morgenstern, for the first time, pointed to the possibility of using the provisions of military logistics in the economy. As noted by M. Oklander [2008], synonymous with the definition of “logistics” (in its meaning as economic science) in literary sources and in practice during its formation were the terms “material resources management”, “material and technical supply”, “material flow management” and others.

Explaining the conceptual content of logistics revealed a variety of interpretations of the term in a sufficiently unanimous reflection of its essence [Heskett 1977, Magee et al. 1985, Ballou 1987, Miles 1987, Plotkin 1991, Christopher 2000, Kalchenko 2006]. In general, the functional, optimization, and goal aspects in different definitions of logistics can be emphasized. In some of its logistics is positioned as a scientific area of research of structural and functional connections in economic systems, in others – the emphasis is placed on practical issues of managing the flow of materials from their place of origin to consumption.

The graphical method allows us to present our vision (Fig. 1) and the definition of logistics as follows: logistics – it is the branch of management (as science and as kind of practical activity), the object of which is the improvement of forms and means of organizational-economic, structural-functional and institutional influence on the organization of systematically interconnected material and relevant informational, financial and service flows from the primary source of raw materials to consumers of final products for the purpose of optimization of abilities of the specified system and realization of its objective function in synergistic effect obtaining.

Thus, the basic elements of the logistics system are logistics objects (transport, warehouses), logistic entities (buyers, representatives of distribution networks, organizers of

different services), logistics flows (material, information, financial, service) (see Figure 1). The interaction of these elements is ensured through functional interconnections, namely: realization of the organization functions, direct implementation and optimization of logistic activity.

Of course, material flow is the basis of logistics management (see Figure 1). This flow is being modified in its path, passing through the areas of purchase, production, distribution and is delivered to the end consumer in the form of commodity products with relevant consumer parameters. In our definition, the focus is made on functional investigation of this path. But, material flow will not move without information and financial support. Therefore, we attribute information flows to supply flows. The interconnections between the spheres of agri-industrial complex are based on the financial interest of each element, therefore, the incentive for the implementation of logistics functions is the financial flow, which as well as information flows we attribute to supply group.

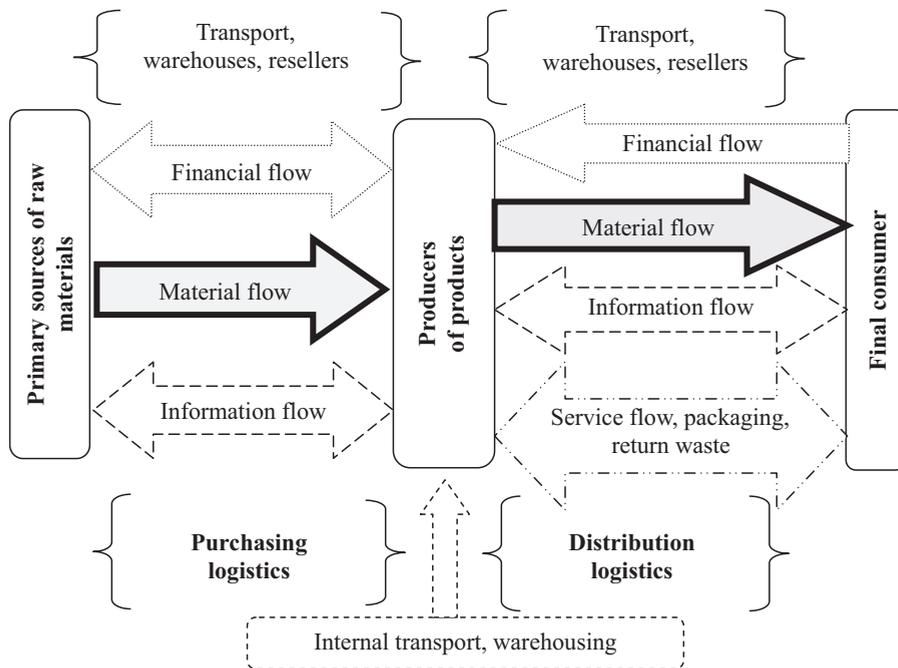


Figure 1. Structural and functional relationships in the logistics system  
 Rysunek 1. Relacje strukturalne i funkcjonalne w systemie logistycznym  
 Source: own elaboration.

We also attributed the service flow to the supply group. Increasing of the role of producers' social responsibility for the consumption of their products causes them to form logistic service flows. Consultative-motivational, service-repair, utilization, bonus-price and other accompaniment of consumption and replacement of goods becomes the basic philosophy of many companies, which forms a certain motivational concept of perception

by its consumers. With this, the process of the chain “primary source of raw materials–final consumer” determining is conditional and depends on the level, positions of evaluation and research objectives [Kalchenko 2006].

A significant impetus for the formation of a logistic model of the relationship of market elements was given by the tendency to individualize consumer demand. Therefore, the execution of an individual order is the formation of a logistic system (subsystem), which ultimately requires an individual approach and specific management decisions.

The economic content of the concept of logistics has been shaped historically. In this context, the systematization of the historical stages and periods of this process is of interest (Table 1).

Tabela 1. Okresy rozwoju logistyki  
Table 1. Logistics development periods

Stage	Period	The most significant signs	Countries and companions
Military	Intuitive-philosophical: 5th–4th centuries BC–the end of 17th century	the objective need for organized distribution of food supplies;	Ancient Greece, Roman Empire and others
		rear support of the needs of the army in the period of ancient wars;	
		use in the meaning of mathematical logic;	G. Leibniz
	Phase-applied: the beginning of the 18th century–the middle of the 20th century	scientific substantiation of elements of logistics in military affairs (planning, technical and food supply of military operations, construction of transport connections, fortifications, etc.);	A. Jomini
practical implementation of logistical methods within the framework of the Law on the land lease (March 11, 1941) of the operation “Red Ball” (landing of the US Army in Normandy and the subsequent offensive into Europe), the evacuation of industrial enterprises from the occupied territories of the USSR to the Urals and Siberia);		US, USSR	
Economic	System-integrated: 1951 year–present time	logistical distribution of manufactured products (system: manufacturer’s finished product warehouse – final consumer);	O. Morgenstern
		extension of logistics functions into production and supply areas; systematic approach to the formation of logistics chains; dynamic development of facilities for moving material flows (transport); development of infrastructural support of information, financial and service flows; qualitatively new level of formalization of logistics tasks on the basis of modern communication technologies and hardware.	USA, Europe

Source: own elaboration.

The first stage, of course, contradicts the modern conception of logistics, since it envisaged logistical management in the system “finished goods warehouse – final consumer”. If consumer’s demand does not meet the supply of producers, this approach

can be justified in an economy where there is a shortage of goods. Under conditions of product overproduction, the market approach is based on the study of solvent demand, which forms an appropriate system of production organization with appropriate quantitative and qualitative parameters, which in turn requires appropriate logistics of resources supplying. Accordingly, the modern stage satisfies these conditions, is dynamic and implements in the logistic sphere all the achievements of scientific and technological progress of mankind.

## **Conclusions**

Logistic activity, which is an objective condition for enterprises adapting to the environment, based on practical experience, is in many cases ahead of scientific thought. The practical activity of economic entities creates an analytical basis for scientific research, the results of which should be the criterion levers of influence on economic processes, which will subsequently be of practical use.

Ultimately, as a scientific area, logistics emerged only in the middle of the 19th century and fully realized its practical implementation during the II World War.

The evolutionary process of transition of logistics from the military sphere to the economic one is caused by the development of the consumer market in Western Europe and North America as well as by the development of scientific and technological progress and integration processes in the industry, strengthening the international division of labor and increasing the competitiveness of the economic environment, the development of productive forces of society and the entry into the information era.

Clarifying the conceptual content of the term “logistics”, which was forming during the identified in the study stages and periods of its development, has revealed various interpretations that trace the functional, optimization and purpose aspects, but it is indisputable to recognize and understand the objective existence of this type of activity as “not artificial” and “not contrived”, but quite natural scientific direction that requires research in order to study the features of the relationship of market elements and the development of the necessary tools for the further management of production and marketing processes organization.

In our opinion, logistics is a branch of management (as science and as kind of practical activity), the object of which is the improvement of forms and means of organizational-economic, structural-functional and institutional influence on the organization of systematically interconnected material and relevant informational, financial and service flows from the primary source of raw materials to consumers of final products for the purpose of optimization of abilities of the specified system and realization of its objective function in synergistic effect obtaining.

The results of the study of the basic stages of the development of logistics as the field of activity and the area of science are allowing to form a periodization of this evolutionary development, which, unlike the existing one, is carried out on the basis of motivational specifics with substantiation of intuitive-philosophical, phase-applied and system-integrated periods of its formation.

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Correspondence addresses:

**prof. Heorhiy Cherevko, PhD habil.**  
(<https://orcid.org/0000-0003-4339-0152>)  
University of Rzeszów  
Institute of Economics and Finances  
Ćwiklińskiej St. 2, 35-601 Rzeszów, Poland  
e-mail: [gcherevko@ukr.net](mailto:gcherevko@ukr.net)

**prof. Volodymyr Kolodiichuk, PhD habil.**  
(<https://orcid.org/0000-0003-2757-6299>)  
Stepan Gzhycky National University of Veterinary Medicine  
and Biotechnologies  
Lviv, Ukraine  
e-mail: [v-a-k@ukr.net](mailto:v-a-k@ukr.net)

**Irina Kolodiichuk, PhD**  
(<https://orcid.org/0000-0001-5110-3905>)  
National Institute of Regional Research after M. I. Dolishnii  
National Academy of Sciences of Ukraine  
e-mail: [ira1166@ukr.net](mailto:ira1166@ukr.net)