

## IMPROVING MANAGEMENT OF INTERNATIONAL SUPPLY CHAINS BASED ON THE CONCEPT OF LOGISTICS

©2019 PYSMAK V. O.

UDC 658.5  
JEL: F10; F19

### Pysmak V. O. Improving Management of International Supply Chains Based on the Concept of Logistics

The article discusses the theoretical principles of the management of supply chains in terms of application of a logistic conception. The concept of the international supply chain is clarified, the basic variants of its building are researched. The publication argues that logistic providers create preconditions for more efficient performance of business processes. It is proved that the organization of multimodal transportations of goods in the international supply chains should include harmonization of the overall characteristics of the cargo units on the basis of logistic accounting and contractual units, simplification of customs formalities and presence of a single person responsible to the owner. Features of the main technologies of cargo transportation in the international cooperation are considered and recommendations on increase of efficiency of each of them on the basis of application of a logistic conception are suggested.

**Keywords:** logistics, supply chain, international operations, transportation, logistic conception.

**Fig.:** 1. **Bibl.:** 9.

**Pysmak Viktoriia O.** – PhD (Economics), Associate Professor, Associate Professor of the Department of Management, Logistics and Economics, Simon Kuznets Kharkiv National University of Economics (9a Nauky Ave., Kharkiv, 61166, Ukraine)

**E-mail:** Viktoriia.pysmak@ukr.net

УДК 658.5  
JEL: F10; F19УДК 658.5  
JEL: F10; F19

### Письмак В. О. Удосконалення управління міжнародними ланцюгами поставок на основі логістичної концепції

У статті розглядаються теоретичні засади управління ланцюгами поставок у міжнародному сполученні із застосуванням логістичної концепції. Уточнюється поняття міжнародного ланцюга поставок, досліджуються базові варіанти його побудови. У роботі аргументовано, що логістичні провайдери створюють передумови для більш ефективного виконання бізнес-процесів. В доведено, що організація змішаних перевезень вантажів у міжнародних ланцюгах поставок повинна передбачувати гармонізацію габаритних характеристик вантажних одиниць на основі логістичних обліково-договірних одиниць, спрощення митних формальностей і наявності єдиної відповідальної перед власником особи. Розглянуто особливості основних технологій вантажоперевезень у міжнародному сполученні та запропоновано рекомендації, засновані на застосуванні логістичної концепції, щодо підвищення ефективності кожної з них.

**Ключові слова:** логістика, ланцюг поставок, міжнародна діяльність, перевезення, логістична концепція.

**Рис.:** 1. **Бібл.:** 9.

**Письмак Вікторія Олександрівна** – кандидат економічних наук, доцент, доцент кафедри менеджменту, логістики та економіки, Харківський національний економічний університет ім. С. Кузнеця (просп. Науки, 9а, Харків, 61166, Україна)

**E-mail:** Viktoriia.pysmak@ukr.net

### Письмак В. А. Усовершенствование управления международными цепями поставок на основе логистической концепции

В статье рассматриваются теоретические принципы управления цепями поставок в международных контактах на основе применения логистической концепции. Уточняется понятие международной цепи поставок, исследуются базовые варианты её построения. В работе аргументировано, что логистические провайдеры создают предпосылки для более эффективного выполнения бизнес-процессов. Доказано, что организация смешанных перевозок грузов в международных цепях поставок должна предусматривать гармонизацию габаритных характеристик грузовых единиц на основе логистических учетно-договорных единиц, упрощения таможенных формальностей и наличия единого ответственного перед владельцем лица. Рассмотрены особенности основных технологий грузоперевозок в международном сотрудничестве и предложены рекомендации относительно повышения эффективности каждой из них на основании применения логистической концепции.

**Ключевые слова:** логистика, цепь поставок, международная деятельность, перевозка, логистическая концепция.

**Рис.:** 1. **Библ.:** 9.

**Письмак Виктория Алексеевна** – кандидат экономических наук, доцент, доцент кафедры менеджмента, логистики и экономики, Харьковский национальный экономический университет им. С. Кузнеця (просп. Науки, 9а, Харьков, 61166, Украина)

**E-mail:** Viktoriia.pysmak@ukr.net

The development of transport and the need to rationalize transportation of goods, passengers and baggage in international traffic require performing transportation services with the participation of several types of transport (mixed transport). Increasing the use of mixed transport of goods is the leading trend in the development of the modern transport system worldwide. But the organization of mixed transport requires resolving a lot of technical and economic problems, such as improving efficiency of using multimodal transport and increasing responsibility of carriers to the freight owner.

The low level of development of mixed transport in Ukraine is, above all, due to the lack of a modern national logistics infrastructure, as well as the insufficiently rapid pace of logistic progress in the sphere of rendering customs and transportation services. Presently, the interests of exporters are much more important for countries than those of industries competing with foreign imports. Today, more than half of international trade is not in final goods but in raw materials and components for their production. Considering the trend towards a sharp increase in the international turnover of commodity, raw

materials, materials and parts, we should agree with the majority of specialists in logistics that at the current stage of the development of the global economy there is a transition from competition of individual business entities to competition of supply chains [1–3].

The problem of the use of mixed transport in international supply chains was considered by the following scientists: S. A. Kyrychenko, R. A. Kosohliad, P. V. Kurenkov, A. V. Kurbatova, N. S. Uskov, O. V. Akimov, O. O. Karpenko, V. G. Galaburda. The improvement of the organizational and technological functioning of intermodal transport with the aim of increasing their economic efficiency is considered in the works of A. N. Afanasieva, Donald J. Bowersox and David J. Closs, V. V. Bokov, A. M. Gadzhinskiy, M. P. Gordon, J. Johnson, V. V. Dybska, A. F. Yepifanov, K. V. Zakharov, S. B. Karnoukhov, V. A. Koroleva, V. V. Lesin, L. B. Mirotin, V. I. Serheev. However, despite a large number of scientific papers on issues of mixed transport, an urgent task is to identify the latest trends in the development of this type of transport and factors that are certain to cause changes in these trends as well as to improve efficiency of mixed transport based on the concept of logistics.

The main modern trend in the global transportation system is the development of mixed transport of goods based on a logistic approach and electronic data interchange to ensure computer integration of all subjects of transportation systems. Production and technological, trade chains can link business entities from two or more countries, including those located on different continents, and create the basis for the formation of global integration structures. It is precisely the fact that globalization and transnationalization of supply chains are gaining momentum that has determined the need for a theoretical understanding and scientific study of the mechanism for managing their flow processes.

Based on the analysis of modern scientific literature, one can conclude that an international supply chain of a global type is a technologically or organizationally and economically determined sequence of suppliers and consumers of goods and services located in different countries and within different customs territories, the movement of goods between them is organized on the basis of technologies of mixed freight transport [1–9]. The efficiency of supply in the international chain is determined by the factors outlined in Fig. 1. Thus, the efficiency of the operation of the international supply chain is inextricably linked with the organization of transport and logistics infrastructure and the work of the customs service at the national level.

In international supply chains of the global type, the group of intermediaries providing movement in space and in time, first of all, inventory items, most often include forwarders, carriers, customs agents, owners of temporary storage warehouses and/or customs warehouses, customs representatives, etc. [2]. The activity of such logistics service providers in the global supply chains is aimed at increasing the efficiency of product distribution, reducing external risks and creating a stable infrastructure.

Thus, international supply chains of the global type should be understood as global supply chains within which the movement of goods is organized using the mixed transport technology [3]. Today, the main problem in the formation of an international supply chain is the optimization of logistics costs in view of high fuel prices, storage costs and customs clearance costs. It should be emphasized that in the case of international supply chains, the reduction of transport costs for Ukrainian participants is fairly considered to be a key factor in increasing their competitiveness, both in the domestic and foreign markets, since a high proportion of transport costs in the final price for goods is objectively inherent in countries with special distribution of economic entities.

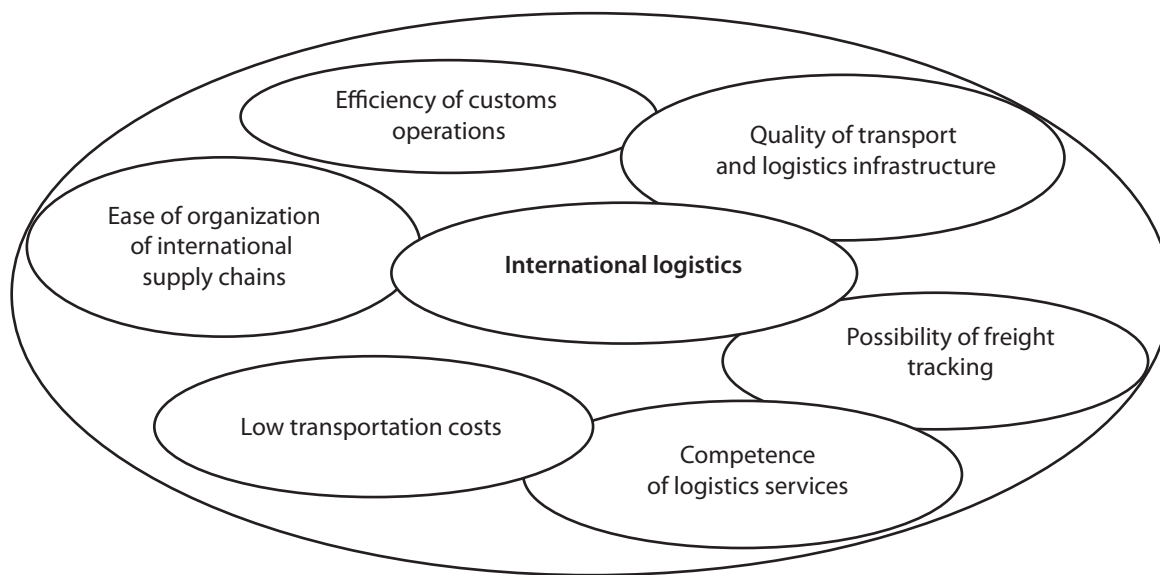


Fig. 1. Criteria affecting efficiency of international logistics

When defining the essence of key concepts of transport logistics, such as carriage and transportation, it is possible to reveal some differences in their interpretation, although in the most general sense they mean physical movement of freight in space and time, changing its location (if the principle of economic feasibility (reduction of financial and time expenditures) is observed)). The main participants in the transportation process are at least three parties: the shipper, the consignee and the carrier, who legalize their relations in the form of a contract for carriage of freight. Moreover, providers of related services can be involved in the transportation process, which to some extent ensure timely delivery of goods, affecting the structure and subject composition of international supply chains. Providers of related services may be customs intermediaries of various types, shipping agents, commercial banks, insurance companies and other contact audiences. In each specific case, relations between the parties are formalized by a special type of contract, e.g., a contract of work and labor, storage contract, insurance contract, etc. [4].

Summarizing all the above, it can be stated that chains for supplying related logistics services are formed in international chains for supplying commodities and materials which ensure their physical movement in space and time, with consideration for the compliance with all basic rules of logistics, delivery of necessary goods in a necessary quantity and at negotiated prices, at the right time and to the right place with optimal routing and at a minimal cost.

It is obvious that the optimization of logistics processes in international supply chains, taking into account their complex spatial and temporal structure, is a very difficult task which requires consideration of many different factors. It is proven by the evolutionary development of technologies for foreign trade transportation as a result of reorganizing the transport infrastructure and integrating transport systems of various modes of transport, which are interdependent and interact in transport operations.

In the most general case, all technologies of freight transport are divided into two large groups: single-mode or unimodal and multiple-mode or multimodal freight transport. The criterion of differentiation in this case is the number of modes of transport which interact during the transportation. The starting point in the evolutionary development of technologies for transport of goods is unimodal transport, the name of which implies that the transportation is carried out by only one mode of transport. This does not exclude the possibility for participation of several carriers in the transportation process, as with multimodal transport. However, in practice, this is not so common, because usually unimodal transport is used when the starting and ending points of transportation are specified in the supply chain without intermediate warehousing and freight handling operations [3; 5].

The relative advantages of unimodal transport of goods include a high speed of delivery, the absence of

transshipment operations, simplicity of the organization and forwarding of transportation. As a rule, when organizing unimodal transport, there is no need for coordinated actions of several participants in the process of freight transportation. At the same time, these advantages not always can be realized in practice, especially in international traffic, when using only one mode of transport is either physically impossible or economically impractical. It is the transnationalization and globalization of supply chains that have led to the accelerated development of technologies for transport of goods, the diversity and complexity of which did not allow forming the unified terminology for such related concepts as mixed, intermodal and multimodal transport.

The study and comparative analysis of various points of view, presented in the literature, have made it possible to distinguish the meaning of the mentioned terms. The concept of mixed transport is traditionally interpreted as the movement of goods by more than one mode of transport by several carriers, regardless of the legal, organizational and technological aspects of the transportation process [3; 6]. The class of mixed transport includes two subclasses: separate mixed and direct mixed transport. The difference between them is very significant, however, the general advantage of all types of mixed transport in comparison with unimodal transport is cheaper delivery using different types of transport, which results in low costs and low transport tariffs. In case of separate mixed transport, each carrier makes settlements with the freight owner or their representative individually and at separate tariffs, while bearing material responsibility for the safety of the freight and the fulfillment of the contractual terms only in its part of the transportation route. In case of direct mixed transport, which includes intermodal and multimodal technologies, there observed the intensification of the integration of transport systems, primarily due to the emergence of a single transportation operator responsible for the safety of freight and the fulfillment of contractual terms on the entire transportation route.

The application of such a consistently centralized interaction scheme in the supply chain of related logistics services eliminates one of the main drawbacks of mixed separate shipments/carriages – the need to settle at several tariff rates with each carrier. Moreover, the freight owner can eliminate this disadvantage, as a result of the use of the intermodal and multimodal technology of direct mixed transport, since the payment in both cases is carried out by a single transportation operator at a uniform tariff [7].

When designing international supply chains, other significant disadvantages of separate mixed transport should be taken into account: contractual relations with each of the carriers separately, use of several transport documents, limited liability of each carrier. These disadvantages are eliminated with the use of the multimodal

transport technology, in which maximum integration of transport systems is achieved through the use of a single transport document, which, of course, simplifies the workflow and centralizes responsibility for the freight on the part of a single operator.

It should be noted that with the intermodal technology all modes of transport, coordinated by a single operator, have equal rights and share their responsibility, while with multimodal technology all interacting modes of transport act in relation to a single operator as clients who pay for the services provided imposing the entire responsibility for the final result on the operator [8]. This particular feature allows to place the multimodal technology at the top of the hierarchy of technologies for foreign trade transportation.

Specialized literature quite often mentions another transport logistics technology – combined transport. Considering the terminology developed by the United Nations Economic Commission for Europe, combined transport should be understood as an intermodal transport where the major part of the journey is by rail, inland waterway or sea and any initial and/or final legs carried out by road are as short as possible [5]. A distinctive feature of both combined and non-combined intermodal transport is the movement of freight in the same freight unit (large-tonnage container or swap body and semi-trailer) or in a motor vehicle without transshipping the freight itself when changing the mode of transport. In both cases, it is not the freight that is being transshipped, but the freight unit, which reduces delays in transit from one carrier to another.

Furthermore, specialized literature contains the concept of terminal transportation, which is also a type of mixed transport and implies using in the supply chains freight terminals and terminal complexes [3; 9]. A freight terminal is considered as a special complex of facilities, personnel, technical and technological devices which are organizationally interrelated and designed to perform logistics operations related to receiving, loading, unloading, storing, sorting, handling various consignments, as well as commercial information services for consignees, carriers and other logistics intermediaries. It should be noted that when organizing multimodal transport, the object of transportation is freight in the most general sense of the term, i. e., unlike the three technologies mentioned above, the emphasis is not placed on technological operations performed with the freight.

On the whole, the study of technologies of mixed freight transport leads to the conclusion that their evolutionary development goes in the direction of multimodal transport technologies and return to direct ones, but at a higher level compared to unimodal transport. The consequence of this is the institutionalization of a single transportation operator in the supply chains of foreign trade transportation and their desire to harmonize the actions of various participants in the transportation process, tak-

ing into account all the basic rules of logistics. Achieving this goal requires the fulfillment and observance of a number of conditions which currently are most fully met by mixed direct, first of all, multimodal transports. Under these circumstances, the following basic principles should be considered:

- ✦ establishment of a unified commercial legal regime;
- ✦ application of a comprehensive approach to solving financial and economic issues in the organization of transportation;
- ✦ use of a unified organizational and technological approach in transportation management and coordination of all logistics intermediaries involved in the transportation;
- ✦ cooperation of logistics intermediaries and the presence among them of an intermediary capable of assuming the functions of a single operator;
- ✦ comprehensive development of infrastructure of transportation by different modes of transport;
- ✦ use of telecommunication networks and electronic document management systems.

It is obvious that a mixed direct transport acquires the status of international only in cases where the place of receipt of the freight by a single operator and the place of delivery of the freight specified in the contract are located in the territories of different countries, including various customs territories. Thus, the distinguishing feature of any international transportation is the movement of goods across state borders.

Today, the most pressing is the issue of improving management of the transportation process in international traffic due to the need for exporting enterprises to new markets. Therefore, it is necessary to consider the basic principles on the organization of mixed transport in international traffic.

The basic logistics principles of the organization and regulation of mixed transport of goods in international supply chains include:

- ✦ application of commercial freight and transport documents of international standard;
- ✦ harmonization of overall characteristics of freight units and vehicles on the basis of logistic accounting and contractual units;
- ✦ simplification of customs formalities and unification of customs procedures.

At the same time, the key logistics principle of the organization and regulation of multimodal freight transport, both in international supply chains within a common customs territory and in global supply chains, is the presence of a single person responsible to freight owners who undertakes to organize and forward all mixed transport, relieving freight owners from interacting with various carriers located in different countries and in different customs territories as to the following issues concerning:



- ✦ legal support for mixed transport by concluding contracts with freight owners, carriers, and other logistics service providers;
- ✦ registration of a single transport document for all mixed transport and charging for delivery of the freight from the place of departure to the destination of a uniform tariff;
- ✦ provision of a complex of related logistics services, including arranging a route for vehicles, handling and storage of goods, customs declaring, etc.

In the context of searching for solutions to improve the efficiency of mixed transport in supply chains, it is necessary to single out a number of principal search directions. First, the efficiency largely depends on the cost of transshipment of freight. The main way to reduce the latter is considered a rational concentration of freight flows in transport hubs, which contributes to the centralized inbound and outbound deliveries, improves the productivity of road transport several times. The basis of the advantages of the scheme is the possibility of consolidating shipments. Management of mixed transport in supply chains should be based on the principles of technological, economic, organizational and informational unity and interaction of all participants in these logistics structures. Of course, the problem of ensuring the organizational unity should be solved not only by identifying participants in a mixed transport but also by assessing the interdependencies of the relations between them. In this regard, the proposed multiplicative complex model [3] which characterizes the structure of the freight delivery system is of scientific interest. However, the use of this model only confirms the difficulty of accounting logistics interactions, since the organizational and economic details inherent in it are hidden. Objective prerequisites for ensuring technological unity should be created by the use of logistics accounting and contractual units, including:

- ✦ freight;
- ✦ warehousing and freight handling operations;
- ✦ transport;
- ✦ order management, etc.

Moreover, it is advisable to pay attention to existing approaches to ensuring the technological unity of mixed transport in supply chains. The analysis of the works considering this problem shows that the achievement of this goal is carried out by designing network schedules. Compensation of information uncertainty is made through the use of scenario and probabilistic approaches, as well as the development of a comprehensive plan of mixed transports. In our opinion, in this context, forecasting security boundaries of the supply chain within the framework of which mixed transports are carried out as well as possible logistical risks are of particular importance. It should be noted that network schedules for these transports practically do not include the detailing

of the processes. However, the issue of assessing the economic feasibility of freight warehousing in transshipment sites remains open.

One of the conditions for ensuring effectiveness of mixed transports in supply chains should be considered logistic compatibility among its participants. Achieving this goal will allow, first of all, reducing transaction costs brought about by training the parties logistics interactions with each other and changes in the configuration of the supply chain as well as transportation routes. Objective prerequisites for such compatibility are created by a wide application by logistics partners of:

- ✦ ISO standards;
- ✦ interactive communication;
- ✦ logistic accounting and contractual units;
- ✦ logistic performance metrics.

Thus, the main condition for harmonizing the work on managing international supply chains is the choice of a necessary transport technology and cost optimization due to selecting a necessary mode of transport. Within the international supply chain, a prerequisite for effective logistics management is the availability of high-quality transport and logistics infrastructure as well as effective work of the customs services, which contributes to the optimization of the expenditure side as a whole. A prerequisite for organizing an optimal international supply chain is logistical risk planning, which minimizes additional costs during the movement of freight. ■

#### LITERATURE

1. **Декаделюк О. В., Коронівський П. О., Левицька І. В.** Використання транспортних засобів в логістичній системі та основні проблеми транспортної логістики. *Вісник Хмельницького національного університету*. 2011. № 1. С. 186–189.
2. **Дикань В. Л.** Розвиток національної транзитної мережі та її інтеграції в міжнародну транспортну систему. *Вісник економіки транспорту і промисловості*. 2008. № 24. С. 11–13.
3. **Кривошеев А. Ю., Шилова Е. Н.** Организация смешанных перевозок грузов в цепях поставок. СПб.: Политехника-сервис, 2013. 14 с.
4. **Иванов Д. А.** Управление цепями поставок. СПб.: Изд-во Политехн. ун-та, 2010. 660 с.
5. **Larson P. D., Poist R. F., and Halldorsson A.** Perspectives on Logistics vs. SCM: A Survey of SCM Professionals. *Journal of Business Logistics*. 2007. Vol. 28. Issue 1. P. 1–24.
6. Научно-исследовательский центр «Прикладная логистика». URL: <http://cals.ru/>
7. **Beamon B. M.** Supply Chain Design and Analysis: Models and Methods. *International Journal of Production Economics*. 1998. Vol. 55. Issue 3. P. 281–294.
8. **Куренков П. В., Котляренко А. Ф.** Внешнеторговые перевозки в смешанном сообщении. Экономика. Логистика. Управление. Самара: Сам-ГАПС, 2002. 636 с.
9. **Fettke P., Loos P.** Reference Modeling for Business Systems Analysis. IGI Global, 2007. 410 p.

## REFERENCES

Beamon, B. M. "Supply Chain Design and Analysis: Models and Methods". *International Journal of Production Economics*, vol. 55, no. 3 (1998): 281-294.

Dekadeliuk, O. V., Koronivskiy, P. O., and Levytska, I. V. "Vykorystannia transportnykh zasobiv v lohistychnii systemi ta osnovni problemy transportnoi lohistyky" [The use of vehicles in the logistics system and the main problems of transport logistics]. *Visnyk Khmelnytskoho natsionalnoho universytetu*, no. 1 (2011): 186-189.

Dykan, V. L. "Rozvytok natsionalnoi tranzytnoi merezhi ta yii intehratsii v mizhnarodnu transportnu systemu" [Development of the national transit network and its integration into the international transport system]. *Visnyk ekonomiky transportu i promyslovosti*, no. 24 (2008): 11-13.

Fettke, P., and Loos, P. *Reference Modeling for Business Systems Analysis*. IGI Global, 2007.

Ivanov, D. A. *Upravleniye tsepyami postavok* [Supply Chain Management]. St. Petersburg: IZD-VO Politekhn. un-ta, 2010.

Krivoshcheyev, A. Yu., and Shilova, Ye. N. *Organizatsiya smeshannykh perevozok gruzov v tsepyakh postavok* [The organization of mixed transport of goods in the supply chain]. St. Petersburg: Politekhniko-servis, 2013.

Kurenkov, P. V., and Kotlyarenko A. F. *Vneshnetorgovyye perevozki v smeshannom soobshchenii. Ekonomika. Logistika. Upravleniye* [Foreign trade in mixed traffic. Economy. Logistics. Control]. Samara: Sam-GAPS, 2002.

Larson, P. D., Poist, R. F., and Halldorsson, A. "Perspectives on Logistics vs. SCM: A Survey of SCM Professionals". *Journal of Business Logistics*, vol. 28, no. 1 (2007): 1-24.

Nauchno-issledovatel'skiy tsentr «Prikladnaya logistika». <http://cals.ru/>