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**Natalia Liba**

*Doctor of Economics, Associate Professor  
Associate Professor of Accounting and Taxation and Marketing  
Mukachevo State University  
(Mukachevo, Ukraine)*

**Ivan Chuchka**

*Ph.D. in Economic, Associate Professor  
Foreign Member of the Hungarian Academy of Sciences  
Vice-President of the International Agency of regional development «Latorytsia»  
(Mukachevo, Ukraine)*

**Andrash Rakotsi**

*Master of Economics  
Executive Director of the Association of territorial development of «KIUT»  
(Zahon, Hungary)*

## ORGANIZATIONAL AND ECONOMIC MECHANISM OF FORMATION OF BORDER INDUSTRIAL PARK

*An organizational and economic mechanism for the creation of the Mukachevo Industrial Park with elements of logistics, which should become an international operator of export-import and transit flows of Ukraine between East and West has been proposed in the article. For this purpose, the given project determines the relevance of the construction of an industrial park in the city of Mukachevo, peculiarities of its work and services, functions, principles, typical structure of construction and building. The practical experience of implementing an international project within six countries in the context of the formation of digital information-communication systems and technologies of transnational logistics has been presented in the article.*

Key words: Industrial Park, transport logistics, intermodal logistics, transnational logistics, digital technologies, information and communication systems.

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**Statement of the problem in general form and it's connection with important scientific or practical tasks.** In the previous work of the authors [1], the urgency and idea of building a Mukachevo Industrial Park with the elements of logistics has already been presented. However, we consider that it is necessary to elaborate in more details the organizational and economic mechanism of formation of such a park that conditions further exploration of the topic. At the same time, it should be noted that the urgency of the development of the above mentioned mechanism in the boundary area of Transcarpathian region is also due to the fact that a competitive environment is currently being formed on the market of border terminal transport infrastructure, in particular - dynamic investment in construction and re-equipment of reloading terminals is being made at the eastern borders of Poland and Slovakia, and in Hungary the construction of border terminal infrastructure began in the mid-1990s.

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**Analysis of the latest research and publications, which initiated the solution of this problem and on which the author relies.** Studies of transport and logistic infrastructure regarding the border regions of Ukraine in terms of cross-border cooperation have been conducted by Lviv scientists Ye. Krykavskiy [2] and N. Mikula [3], in particular in this context the emphasis is placed on the Polish-Ukrainian component of the problem; A. Balian [4], Ye. Kish [5], N. Nosa [6], and Yu. Sholokh [7] have analyzed the transport and logistic infrastructure in the Ukrainian-Hungarian context by means of eastern EU enlargement. At the same time, the general study on the formation of logistic centers and the economic contours of logistics have been studied by scientists O. Palamarchuk [8], M. Oklander [9], H. Smyrnov, I. Shum [10], O. Skoryk [11].

**Highlighting the previously unresolved parts of the general problem to which the article is devoted.** Notably, the study of the mechanism of forming an industrial park with elements of logistics in the city of Mukachevo (considered the center of Transcarpathia in the context of extensive schemes of transport infrastructure - roads, railways and airways) has not been paid much attention to in the works of Ukrainian and European scientists and practitioners.

**Formulation of the purpose of the article (statement of the problem).** To determine the peculiarities, functions, principles and other components of the organizational and economic mechanism for the construction of an industrial park with elements of logistics in the city of Mukachevo, Transcarpathian region.

**Statement of the main material of the research with full justification of the scientific results obtained.** At the beginning of the 21st century, the western borders of Ukraine became a common border of the European Union, and in the context of Ukraine's further integration into the international transport system, it is the 5th international transport corridor that plays a key role in the development of transport logistics in the border region. The Transcarpathian region (as a kind of western gate of Ukraine between East and West) has a strong potential of transportation of export-import and transit cargoes up to 52 million tons, which, in fact, twice exceeds the present volume of transportations. The issue of international transit through the Transcarpathian region is important not only at the regional but also at the state level, which is reflected in the relevant programs and strategies. One of the most important sections of the international transport corridor is the city of Mukachevo and its available infrastructure.

The necessity to create an industrial park with elements of logistics in the territory of Ukraine in the city of Mukachevo is caused by the following circumstances:

- territorial connection with international transport highways;
- developed and diversified transport network;
- favorable economic and geographical position;
- availability of the necessary infrastructure (transport, warehouse and communication);
- attraction to existing or prospective centers of business cooperation;
- existence of a historically formed system of foreign trade relations with foreign partners and a basis for its development.

A convincing reason for this proposal is also that the differences in the standards of the railway track, technologies and administration of the transport sector are still so large that the creation of a logistic center on the basis of an EU Member State will not allow to resolve the issue of moving of foreign trade cargoes quickly and efficiently. At the same time, Ukraine, having acceded to the Convention on International Railway Communications, is ready to provide logistic services to all project participants at the same time. In addition, double-lane railway tracks (of Soviet and European standards), which will provide trains to European cities, have already been laid from Mukachevo to Niredhaza (Hungary) and from Mukachevo to Kosice (Slovakia). In addition, the Mukachevo City United Territorial Community, in

developing the city's strategy until 2027, has chosen a cross-border logistics system as one of its key areas of development.

Therefore, one of the strategic goals of the state is the effective use of reserves, which are in the system of flow of goods between Europe and Asia. For this purpose, urgent measures should be taken to bring the national transport network and vehicles in line with international standards: from simplifying the procedure of crossing the state border of Ukraine to the widespread introduction of advanced technologies during the transportation of foreign trade and transit cargoes.

One of the main directions of the modern European transport policy is the transition to transport logistics and transport-terminal systems of freight transportation, which allow to improve the organization of transportations, to provide complex services for consumers of transport services, to create conditions for the development of combined transport, to reduce the environmental burden on the environment.

Having taken into account the current trends in the market for logistic services, it can be argued that the basic elements of commodity flow management are logistic centers. Such centers play a coordinating and integrating role in the logistics system of cargo handling and transportation.

The introduction of such technologies arises the necessity to create a network of storage industrial parks and distribution logistic centers, which perform the functions of interaction among different modes of transport and organization of material distribution in the economic region. They are the basic fundamentals of material flow management, provide interconnection with senders, consumers, carriers, freight forwarders, ensure timely settlements through banks.

The important geopolitical location of the border crossings of the Transcarpathian region determines the region's special, key role in securing the Eurasian transport and trade links. The availability in the territory of the region, which has a common border with four states – Slovakia, Hungary, Romania, Poland, one of the largest border transport complexes, consisting of 6 international and 4 interstate rail and road crossings, international airport and development opportunities even for river transport objectively defines Transcarpathia as a natural transit bridge between Europe and Asia. The presence and prospects of further development of the transboundary transport infrastructure of the Transcarpathian region have all the objective prerequisites for the creation of an industrial park with elements of logistics in the city of Mukachevo on the basis of effectively operating enterprises and leading enterprises of the countries-operators of freight flows.

The services of an industrial logistics park in the city of Mukachevo should relate to: overloading, sorting, packaging, storage, consignment and other, which will facilitate the activation of the exchange operations between the EU and CIS countries in the direction of the international transport corridor No. 5 at the expense of the economically justified tariff policy of the center; expanding the range of basic and related services; increase of the nomenclature of cargoes (with the possibility of transportation and processing of special and dangerous goods); minimization of terms of cargo handling (with the possibility of transshipment of dangerous goods); implementation of advanced information processing technologies for warehousing and operations and, most importantly, by improving the quality of cargo operations.

The work of an industrial park should be based on the following basic principles:

- offer the most complete list of transport and related services on the basis of contractual relations with each participant of the logistic chain (formation of a database of logistic chains);
- organization of complex transport services on the basis of a single contract for complex services and a single order for all services, formation of tasks for the members of the

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logistic chain based on the order of the user of transport services, centralized control of order execution;

- maximum standardization and unification of transport and other documents required for the transportation, used by the members of the logistic chains, in order to ensure the possibility of creating a single information space;

- unified marketing strategy and tactics of logistic chain participants in the transport service market, joint market research and marketing activities ensuring the promotion of all logistic chain participants in the transport service market and generating the demand for integrated transport services;

- geographical division of the structural subdivisions of the industrial park in order to maximize the coverage of the market of transport services, perform operational management of the work of logistic chains in the places of formation of cargo flows and their intersection;

- organization of cooperation with Ukrainian and international organizations dealing with transport logistics issues;

- organization of work on the basis of world standards and international treaties, agreements, conventions;

- integration with international logistic centers and information exchange with them;

- improving the efficiency of transport services by reducing the share of unjustified schedules (with incomplete loading);

- standardization of information interaction of the industrial park with the participants of logistic chains.

The main functions of the Mukachevo Industrial Bank with the elements of logistics should be as follows: ensuring the implementation of new types of services and satisfaction in the increased requirements for basic transport services; complexity and quality of service, taking into account the principles of "all services in one place"; delivery of "door-to-door cargo"; "Just in time" and with "minimal cost."

Logistic Park accomplishes its tasks through partners - members of the logistics chain. Partners of the logistic park can be transport organizations, customs, terminals, insurance companies, banks and other enterprises of transport and related services. This park should organize and perform at the most modern level all the necessary basic operations for processing and transportation of goods with the provision of the following types of services: warehouse, freight forwarding, customs brokerage, insurance of vehicles and personnel, banking, consignment trading, maintenance of motor vehicles, servicing of technical personnel and drivers and other related services.

A prerequisite for the establishment and operation of an industrial park with logistic elements is the organization of information and digital support, which should fully ensure the interaction of customers and partners of the logistic park, as well as the calculation of the optimal route of transportation and control of the delivery schedule, calculations with all involved transportation and performance of other transportation participants.

First of all, it is necessary to install in the industrial park modern equipment with software information and communication server software, which has regular communication with similar servers of transport enterprises of the countries involved in international freight transportation.

In this case, the transport information service in the territory of each country will be able to provide marketing and information research services, and the subscriber points of interested organizations and firms that can be directly connected to the communication server of the logistics fleet of management of the freight forwarding process.

Considering that the market relations place high demands on transport to accelerate cargo delivery while minimizing transportation costs, improving the quality and reliability of

transportation and, in general, reducing the transport component in the cost of production, one of the new trends in improving the efficiency and competitiveness of transport is the implementation of innovative digital technologies by using an information system for the organization of cargo transportation by auction, which can be integrated with trade, transport information systems, freight exchanges and which is able to simplify and minimize the cost of time and material resources on organization and performance of the whole complex of works.

Logistics through “Cloud Computing and Innovative Cooperative Business Mode” is an interesting project to study for the development of digital cross-border logistics. The project is being implemented by six Central European regions - Záhony (Hungary), Leipzig (Germany), Wrocław (Poland), Usti nad Labem (Czech Republic), Bologna (Italy) and Koper (Slovenia). The main objective of the project was to improve cooperation among logistic companies in selected logistic sites and among established logistic regions in Europe. In order to complete this, it was necessary to develop an innovative information and communication platform for the logistic industry based on a cloud computing approach.

The prerequisites for the implementation of this project have become the active technological development and applied researches, demonstrating that only cloud computing can be the right solution to this problem. Namely, all logistics small and medium-sized enterprises connected to the server station of this project, have been able to post important information about their activities and the tasks that the firm's data deal with the relevant contacts. After that, the whole complex of companies and their operations in the online space have been “conditionally” broadcasted in such a way that any customer firm could have seen what routes, transport and in what city their goods have been transported. As the access to advanced IT tools has been identified as a key driver of competitiveness, a highly innovative IT tool has the potential to enhance the strategic importance of Central Europe for North-South freight, old and new EU members and the development of Eastern European markets.

At the same time, cloud computing can help to overcome the lack of interoperability among logistical network members on a single node, and, in addition, a multi-cloud concept facilitates their transnational collaboration. The cloud solution now allows you to connect small and medium businesses with different logistical sectors and locations, such as from an airport, cargo settlement or container harbor. This project has already generated a lot of awareness in the regional logistical companies and suggested to watch the process closely and follow it by joining this network. The results of the project have been disseminated in various ways, including presentations at conferences and congresses, scientific articles and press releases, as well as presentations at recognized logistical fairs.

The main results of the project are:

- universal cloud computing standards in logistics;
- documentation of long-term testing of logistical clouds on 6 different logistic hubs;
- fully functional transnational “Logistics Cloud Portal” [12];
- an online platform for displaying services and capabilities of logistic companies;
- business plans and contracts to support long-term availability and financing of the developed IT solutions [13-14].

By developing and implementing highly innovative logistics IT solutions, the project helps to improve interoperability among multimodal logistic players in Central European logistic hubs. There are different goals to be followed:

- 1) strengthening the logistic industry through better penetration of modern IT solutions;
- 2) increasing the cost efficiency in logistics by reducing transaction costs with B2B collaboration;
- 3) improving intermodal cooperation on the basis of a single logistic cloud system;

- 4) promoting internal integration in Central Europe through the development and implementation of a universal approach to cooperation for (central) European logistic centers;
- 5) promoting logistical cooperation among logistic operators along the TEN-T corridors.

This project aims at enhancing the competitiveness of the logistics industry in Central Europe, especially small and medium-sized logistic companies. By deploying cloud computing, they will be able to launch powerful, cost-effective logistical management systems with very low implementation costs.

In addition, the attractiveness of logistic centers (involved in this project) will allow the increasing of the relevant investment projects in the territories for companies in various industries depending on efficient logistic services. The local logistic cloud portal can bring different benefits in time, cost and efficiency for manufacturers, investors, and other startup companies.

At the same time, the methodology of this project includes an innovative process aimed at developing local logistic cloud portals in partner regions (multi-cloud approach) that are practically interconnected. Thanks to ready-made components of the logistic software, the cloud platform can be used by other regional logistic entities, both locally and transnationally. However, to achieve this, it is necessary for the local logistic cloud platform to be consistent with the architecture of its transnational project. This provides the further “connection” of additional logistic clouds from other regions whose components are based on the same architecture.

Returning to the purpose of the article on the peculiarities of the construction of the organizational and economic mechanism of an industrial park with logistic elements in the city of Mukachevo, Transcarpathian region, it is important to note that the typical structure of the international variety involves the construction of a powerful terminal and warehouse transport complex with an area of not less than 140 hectares and less than 140 hectares which is 1435 mm and 1520 mm rail track, convenient internal roads, open and closed storage facilities and structures such as PVC, concrete container platforms, ROLA trailer unloading platforms, open and closed ramp for handling rail goods. The complex should have its own locomotive and train control system at the terminal. The terminal must also be equipped with a dumping machine with a belt-type conveyor system, transshipment cranes, a screening machine and portable outfit, a chipping machine, road and rail scales (1435 mm / 1520 mm). The terminal complex must have modern equipment for reloading of bulky goods and metallurgical products (lifting trucks, excavators, cranes, etc.), palletized freight, bins, as well as bulk chemical products transported in tanks, including those requiring heating.

The area should also have a repair area for reloading machines and equipment, which will ensure the normal working conditions of service personnel in winter and in adverse weather conditions. Fabricated steel modular structures may be used to arrange additional storage facilities and repair areas. Office rooms for the management apparatus can also be placed in similar modular fabricated structures. The operating mode of the logistic center is provided around the clock in the mode of carrying out cargo handling and processing of accompanying goods shipping documents.

The level of logistic services is closely linked to the expeditious execution of customs operations, due to the insufficient level of which logistic operators and consignees often suffer significant losses. In order to reduce the negative impact of this factor, it is necessary to have a round-the-clock clearance customs control station and registration facility operating within the logistics center, providing it with the status of maximum assistance in customs operations. It would be the most expedient to establish in the industrial park a special customs regime of the customs control zone at the checkpoint its synchronization with the "Porto-Franco" regime,

which has been operating on the territory of the port of Trieste since 1719, which is the beginning of the 5th (Cretan) corridor.

However, it is important to note that, in overall; the country's transport system still does not meet the standards and requirements of the European Union and has been marked by a significant gap in infrastructure, equipment and standards. Therefore, in order to ensure foreign trade relations and gradual integration of Ukraine into European and world transport systems, it is necessary to:

- to expand and strengthen the cooperation within international transport organizations and in the implementation of interstate agreements in the field of transport;
- to create an effective state system of control over the activity of transport enterprises and entrepreneurs in the sphere of international transportation in the territory of Ukraine;
- to take the necessary measures to protect and support the activity of transport enterprises and entrepreneur-citizens at the foreign markets in case of imposition of strict economic, technical and other requirements on transport activity by international organizations and governments of individual countries;
- to correct the strategy of development of international transport communications within Ukraine in accordance with changes in the international transport and economic environment;
- to harmonize the legal framework in the field of transport with the relevant international legal norms;
- to develop and implement measures to ensure technical and technological approximation of the rolling stock and transport network of Ukraine with the European transport system;
- to converge technical, technological and environmental standards and requirements in the field of transport to European standards and gradually introduce them in the domestic market.

But it should be emphasized that the integration processes of the transport complex of Ukraine should not be limited only by its adaptation to the requirements and standards of the EU, and also require the application of methodological approaches to the organization of management of transport systems development based on conceptual principles of logistics.

The development and implementation of a pilot project for the organization of an industrial park with elements of logistics in the city of Mukachevo, covers a wide range of scientific and practical tasks of organizational, information, economic, regulatory, technical, technological, innovation and investment nature, for the solution of which appropriate methods of development and decision-making (systematic approach, integrated approach, complex analysis, software-targeted method of decision-making, etc.) should be used.

The peculiarity of the activity of this border industrial park is its international character, which requires the provision of appropriate functions and appropriate regulatory support. All preparatory work and organization of implementation of the first scientific and practical tasks for the development and implementation of pilot project of the Mukachevo Industrial Park is possible only if the state supports the proposed formation of logistical and economic mechanism. The efforts of the state should be aimed at modernizing the most important communications and objects of the cross-border transport infrastructure at the border of Ukraine with the EU, without mobilizing public funds in the shortest possible time.

**Conclusions from this research and prospects for further developments in this area.** The proposed mechanism for the creation of the Mukachevo Industrial Park with logistic elements should become the operator of export-import and transit flows of goods and, in a single center, on the basis of general information and digital operations to facilitate efficient integrated logistic servicing of the shipping and handling of cargoes, as well as customs – brokerage and

related services. In fact, such industrial placement could become a unifying body for managing intermodal transport on the western border of Ukraine, their offices should be located in the cities of Záhony (Hungary), Čierna nad Tysa (Slovakia), powerful international trade and transport centers for crossing the European traffic flows to Asia and back.

At the same time, the peculiarity of the industrial logistic park, accepted for the experiment, requires the development and implementation of individual projects of its organization with the solution of the following main tasks:

- estimation (assumptions) of marketing factors of the industrial park organization on the basis of territories with special customs and investment regime, or special economic zones formed within them;
- analysis and prediction of transport and trade links (international, import, transit and domestic);
- development of the concept and program of technical equipment of Mukachevo Industrial Park;
- determination of the amount of capital investments in this project;
- development of the budget for project financing;
- evaluation of investment efficiency;
- preparation of an information memorandum;
- tender selection of project consumers and contractors;
- tender selection of investor and conclusion of contracts on financing the investment projects;
- development of technical documentation of the investment project;
- execution of construction and installation works.

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*Н.С. Ліба, доктор економічних наук, доцент, доцент кафедри обліку і оподаткування та маркетингу, Мукачівський державний університет (Мукачево, Україна).*

*І.М. Чучка, кандидат економічних наук, доцент, Закордонний член Угорської академії наук, віце-президент, Міжнародна агенція регіонального розвитку «Латориця» (Мукачево, Україна).*

*А. Ракоці, магістр економіки, виконавчий директор Асоціації територіального розвитку «КІУТ» (Загонь, Угорщина)*

***Організаційно-економічний механізм формування прикордонного індустріального парку.***

*У статті запропонований організаційно-економічний механізм щодо створення Мукачівського індустріального парку з елементами логістики, який повинен стати міжнародним оператором експортно-імпортних і транзитних потоків України між Сходом і Заходом. Для цього, в даній роботі визначено актуальність побудови індустріального парку в місті Мукачеві, особливості його роботи та послуг, функції, принципи, типова структура спорудження і побудови. В роботі також представлено практичний досвід реалізації міжнародного проекту шістьма країнами в контексті формування цифрових інформаційно-комунікаційних систем і технологій транснаціональної логістики.*

**Ключові слова:** індустріальний парк, транспортна логістика, інтермодальна логістика, транснаціональна логістика, цифрові технології, інформаційно-комунікаційні системи.

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# МУКАЧІВСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ

89600, м. Мукачево, вул. Ужгородська, 26

тел./факс +380-3131-21109

Веб-сайт університету: [www.msu.edu.ua](http://www.msu.edu.ua)

E-mail: [info@msu.edu.ua](mailto:info@msu.edu.ua), [pr@mail.msu.edu.ua](mailto:pr@mail.msu.edu.ua)

Веб-сайт Інституційного репозитарію Наукової бібліотеки МДУ: <http://dspace.msu.edu.ua:8080>

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