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DESIGN PROCEDURE FOR REGIONAL LOGISTICS CENTERS

This research examines challenges in designing logistics centers for the international transit corridors that link Western China and European countries, within the Republic of Kazakhstan. The paper provides information on the potential for logistics centers to improve commercial relationships between Russian Federation, Republic of Kazakhstan and the People's Republic of China. We explain how deficiency in logistical infrastructure constrains the inter-regional supply chain in three cross-border regions.

Keywords: regional logistics; supply chain; regional economy; public-private partnership.

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МЕТОДИКА ПРОЕКТУВАННЯ РЕГІОНАЛЬНИХ
ЛОГІСТИЧНИХ ЦЕНТРІВ

У статті розглянуто проблеми проектування логістичних центрів у Республіці Казахстан, в межах міжнародних транзитних коридорів, що з'єднують Західний Китай та європейські країни. Представлено інформацію щодо потенціалу логістичних центрів в удосконаленні торговельних зв'язків між Російською Федерацією, Республікою Казахстан і Китайською Народною Республікою. Пояснено, як нестача логістичної інфраструктури обмежує розвиток міжрегіональних ланцюгів постачань на суміжних територіях цих трьох країн.

Ключові слова: регіональна логістика; ланцюг постачань; регіональна економіка; державно-приватне партнерство.

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В статье рассмотрены проблемы проектирования логистических центров в Республике Казахстан, в рамках международных транзитных коридоров, соединяющих Западный Китай и европейские страны. Представлена информация о потенциале логистических центров в совершенствовании торговых связей между Российской Федерацией, Республикой Казахстан и Китайской Народной Республикой. Объяснено, как недостаток логистической инфраструктуры ограничивает развитие межрегиональных цепей поставок на сопредельных территориях данных трех стран.

Ключевые слова: региональная логистика; цепь поставок; региональная экономика; государственно-частное партнерство.

Introduction. At present, the potential of Republic of Kazakhstan in international cargo flow needs further developing. In particular, corridors for general international shipping require upgrades and service delivery optimization and the quality of transport routes to meet international standards in cargo flow across the territory of the country (Khairova, 2013; Khairova and Koichubayev, 2012, 2013).

Integration of territories and states in the Eurasian Economic Union (previously – Eurasian Economic Community) creates legal, social, economic, and other binding conditions for improving regional logistics. Thus, the relevance of understanding the issues of regional logistics is vital.

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The distinct advantage of the Eurasian Economic Union is that it regulates the Eurasian Customs Union and therefore facilitates more opportunities for transport transit through its member states. This requires new projects development under public-private partnerships in developing logistics centers within trans-boundary regions.

The most popular approach to designing logistics centers involves a conception phase and a feasibility study for a project (Coordination Logistics Council, 2011).

Singapore, Germany, and Japan rank the highest in the world in terms of designing logistics systems (The World Bank, 2014). Many world experts, including scientists from Russian Federation and Kazakhstan, undertake fundamental and applied research in the area of logistics. These researchers have determined the theoretical and scientific potential for developing logistics systems. Additionally, there exists collaborations of "university-industry-government", regarded as the Triple Helix by H. Etzkowitz and L. Leydesdorff (2000).

This research examines the problems associated with establishing logistics centers, including the lack of arrangements for regional operations, limited institutional cooperation, and inadequate logistics networks. Difficulties in marketing of such projects, in proper understanding of legal frameworks and other restraints, also determine the necessity for more adequate conceptualization of logistics centers (parks) design.

Literature review and research objective. Increasing necessity for efficient commodity exchange between regions substantiates the relevance of a unified operator to coordinate the functions of inter-regional commodity exchange.

Inter-regional and intra-regional logistics centers, or logistics parks, are the modes of interaction between producers, intermediaries, transport and expeditionary companies. They are also areas of work for insurance companies, financial establishments, consumers, state authorities, academic community.

Logistics park is the key unit in contemporary logistics systems and clusters, offering new potential for improving urban and regional economics (Dai and Yang, 2013).

W. Zhenga and Y. Sun (2012) regarded logistics parks as socially important systems, where the flows of "people", "cargo", "information", and "cash" combine in the product of regional economic development.

Logistics centers (parks) are able to reduce transport costs on the routes that cross or pass near concentrated areas of consumers or producers. Consequently, location of logistics centers is the crucial element for success of a logistics system (Li, Liu and Chen, 2011).

Key research findings.

What is the difference between a logistics park and a logistics center? In our opinion, "logistics park" is an engineering complex of roads and transport, which is public infrastructure for doing business (production, storage, and distribution of goods). Managing company owns a logistics park, and business owners carry out the business activity there. In comparison, "logistics centers" represent a complex, owned by an association of independent persons from the same territory, which is designed for warehousing, handling dispatch, and customs processing of cargo for specific customers.

Regional logistics centers are important for supply chains of large distribution networks. Regional logistics study here involves the following:

- examining regional logistics of the territory;

- analysis and planning of cargo flows within regional economics;
- planning and design of regional logistics infrastructure (Wagner, 2010).

The key challenge is combining centralized services with economic activity of independent members, involved in business relations, including information and maintenance services (Nosov, 2007).

Logistics, transport, distribution areas, and information analysis will be integrated in a hierarchical way in logistics centers that are intra-regional, inter-regional, and international (Wu and Shanguan, 2012).

A regional approach enables an overall and objective estimation of advantages of sites and numbers of transport corridors within certain territories. In designing a transport system, a regional perspective helps revealing disproportions and differences in economic and social status, infrastructure potential, trends in economic development, and labor division between regions.

The notion "region" complicates understanding the subsystems and their positioning at the regional level of the transport system.

For example, "region" in terms of the transport system of Kazakhstan refers to the Northern-Eastern region as well as Eastern-Kazakhstan region. International communities and companies commonly use the term "region". For instance, regional zoning of the world includes the European Union and Asian-Pacific region.

According to A. Marshalov and A. Novoselov (1998), the level of territory's development relates to its importance in terms of economic, geographic, social, national, demographic, and historical roles. These determine the specification of a territory and territorial separation based on certain indicators. Various terms such as enclave, area, zone, district, region, oblast, and province can define the separation of a territory from others.

Hence, the term "region" defines only one way of defining a territory but it is not the only one.

The logistics approach to interpreting "region" suggests a logistics network based on administrative, territorial or economic integration based on a cluster approach.

A regional logistics center (RLC) combines organizational and economic functions into a single system at a designated area. Elements of logistics area are classifiable, based on synergy principles and self-imposed partnership relations. Figure 1 shows a structure of a regional logistics area, based on L.B. Mirotin et al. (2010).

Qualitative and quantitative analyses of available alternatives are part of developing a regional logistics system. Developing logistics systems requires impact assessment on the effectiveness and quality of the proposed service. It is important to determine the expediency of every assignment based on defined aims, to show opportunities and necessary resources. Such assessment determines possible cooperation with other programs and projects (at federal and regional levels).

Research and analysis provide information on regional logistics system projects. This information pertains to the functional structure of objects and subjects for control, functionality of units in a logistics system, subsystem descriptions, preliminary data on quality, and effectiveness indicators of logistics management within a regional logistics center.

The methodology of the system-oriented analysis used in this research becomes the purposive approach to setting a regional logistics system. Thus, the program of

developing a regional logistics system involves scientific research that informs the project on industrial, economic, and ecological arrangements within a functional system.

Regional logistics center			
<p>Transporters:</p> <ul style="list-style-type: none"> - oblast (regional) railway lines; - owners of vessels; - owners of freight transport vehicles; - owners of specific rolling stocks; - airline companies 	<p>Terminal complex:</p> <ul style="list-style-type: none"> - river harbors; - railway stations; - elevators; - storehouse facilities, loading spaces of companies; - airports 	<p>Forwarders:</p> <ul style="list-style-type: none"> - dispatch companies; - transport departments of companies and terminals; - group services 	<p>Regional and public administration: controlling and inspection bodies</p> <p>Service providing bodies: Chamber of Commerce and Industry, trade unions etc.</p>

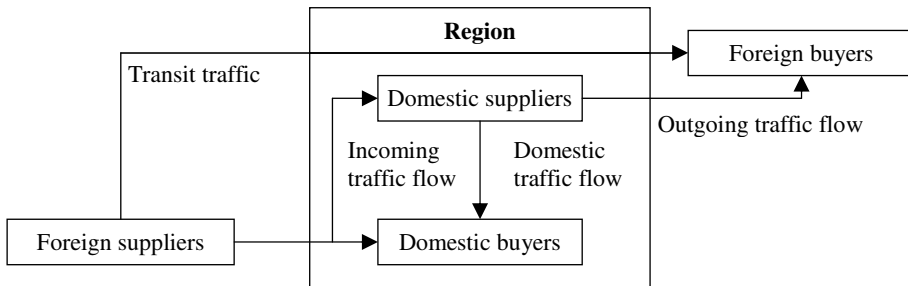


Figure 1. **Structure of a regional logistics area**, compiled by the authors using (Mirotin et al., 2010)

This purposive approach helps creating the regional logistics system, and developing functional programs for each element of a logistics system. Under market conditions, the purposive approach becomes the key instrument in implementing regional policy of the state, enhancing social and economic development, and activating regional economic functions.

Initiating a regional logistics system helps overcoming economic crisis, strengthening infrastructural potential, and developing transport services through providing extensive integration of economic subjects, suitable conditions for developing inter-regional, inter-branch and international connections, and efficient use of regional resource potential.

Setting a regional logistics system requires the following: indepth analysis of regional transport situation; a blueprint of a production complex and its economic potential; establishing tasks and aims of a projected system; documented assignments for effective implementation of the project; work schedules; authorized organizational structures.

A comprehensive approach to developing a logistics project establishes regional logistics system as a link between all the branches and divisions of region’s economy. Thus, the aim of founding a regional logistics system is also related to economic and political strategies, pertaining to social and economic development.

Industrial unions, joint stock companies, foreign and domestic private investors can initiate, develop, and participate in regional programs and projects, according to

both Russian and Kazakh legislation, along with federal (in Russia), republican (in Kazakhstan) and local authorities.

According to legislation, all these participants have equal rights in terms of contractual commitments, and they are not limited the choice of economic activity by state regulation. Ministries and national companies can act as coordinators in developing and implementing regional programs and projects in the field of logistics and transport.

In our view, a regional program to initiate transport and logistics systems should include the following:

- analysis of the current condition, strategic aims and tasks;
- setting tasks for initiating a logistics system project;
- compilation of assignments aimed to achieve the set tasks;
- allocating financial, material (natural) and labor resources;
- assigning stages and duration of a program or a project;
- determining means for attaining goals of the program, its management and control;
- expected social and economic effects for a region, as well as estimation of possible project risks;
- information on project initiators, customers, contractors, and associate contractors.

The methodology of the program aimed at designing, and implementing the regional transport logistics system includes the following features:

- identify a variety of aims for a regional logistics system with limited resources, so that resources of a region are considered according to their importance and the aims of the project;
- evaluate expenses for each sub-system within the logistics system, basing on the importance of project aims;
- select the most appropriate tasks and expenses for project implementation through the aim-oriented analysis;
- use the logistics center (hub) to coordinate inter-regional, inter-branch and international connections within transport and logistics operations;
- prioritize the tasks of regional logistics system by importance;
- synchronize the logistics system with international, federal, and regional development programs;
- identify uncertainties and risks associated with the project aims and develop the options to manage these potential problems arising for the regional logistics system.

Adequate organizational arrangement of a regional logistics system on the macroeconomic level is achievable through economic and mathematic modelling. It enables calculations of structural elements in organizational and functional structure of regional logistics system for a result that is more definitive, although experts recommend the use of several models for a more precise project outcome (Coordination Logistics Council, 2011).

Modelling management processes and their objectives form the basis for mathematical approaches to solving a range of economic tasks related to projecting the regional logistics system under the aim-oriented approach.

Regional logistics network is the key to effective development of commodity exchange. Therefore, logistic centers could serve as a focal company in intra- and inter-regional supply chains.

Integrating logistics for effective outcomes focuses on adapting to competition and minimizing expenses. It establishes control and coordination of commodity and material flows, thus providing high level of reliability and continuity with least cost.

Adaptation of logistics systems under market conditions requires the following:

1) the focus on market strategies rather than on reducing expenses on developing the system as a whole;

2) evaluation of logistics management solutions efficiency, not only according by separate indicators, but also by the results of the overall activity (including growth of profits, economic gains for participants, productivity gains, synergy effect etc.).

The main condition for effective functioning of transport and logistics systems is involvement of all participants: producers, consumers, expeditors, warehouse-keepers, transporters, distributors, wholesalers, and other logistics intermediaries; followed by financial stability, market position, quality of services, and availability of profitable and permanent orders.

According to J.F. Rudkovskiy (2011), managing logistics projects comprises the methods of project management while designing logistic systems, making changes (reformation) or solving the problems with resources flow management.

Effective logistic project creates the basis for successful development of logistics centers and further integration of inter-regional and global supply chains, as stated (Casson, 2013; O'Connor, 2010; Wang and Cheng, 2010; van den Heuvel, 2013).

Management of projects in logistics is related to a range of stages connected to the life of a project, including conception, selection, development, implementation and completion.

Advantages of such projects include:

- ensuring completion of all procedures within a logistics complex;
- better decisions-making in the allocated area of activity;
- project results are available for further activity planning (e.g., statistical data on dynamics of commodity flow, the developed model of supply management etc.);
- all technical documentation necessary for cooperation with state authorities and building companies is prepared during project implementation;

- similar schemes has already proved their efficiency in recognized projects:

a) new road-transport corridor Baltics-China, through the territory of the Republic of Tatarstan (Kazan State University, 2008);

b) Program of European Union TRACECA for Central Asia (SAFECE Consulting Engineers, 2009);

c) the international center of cross-border cooperation Khorgos' and the logistics hub Khorgos-Eastern Gates (Decision of the Government of the Republic of Kazakhstan, 2006).

These arrangement schemes have been efficient in the start-up stage of logistics centers. However, during project development, it is advisable to follow the criteria of public and private partnerships, since considerable financial investments are oriented on commercial involvement of potential participants of the project.

The studied methods provide the basis for projecting a regional transport and logistics center (Figure 2), which result in two main conceptual programs:

- first, it is necessary to define the concept of a logistics center in general documentation for approval by regional regulatory body and the government;
- second, based on the approved concept, the feasibility study progresses including a detailed execution plan on project implementation.

Initiation of the regional transport and logistics center, Ertis, in the Eastern-Kazakhstan region of Kazakhstan provides necessary conditions for a national transport and logistics system development and further integration with the international logistics system.

Availability of trade turnover with foreign countries such as Russia and China, mainly necessitates setting a logistics center in the Eastern-Kazakhstan Oblast. In 2014 the foreign trade turnover between the Eastern-Kazakhstan Oblast and Russia was 1773.9 mln USD (34.6% of the total foreign trade turnover) (Ministry of National Economy of the Republic of Kazakhstan, Committee on Statistics, 2014). Overall export and import of Kazakhstan with the countries of the Customs Union in 2014 was 5122.2 mln USD (Ministry of National Economy of the Republic of Kazakhstan, Committee on Statistics, 2014). China is the second largest foreign trade partner for the Eastern-Kazakhstan Oblast, the all-republican share of foreign trade turnover of China is 14.2% (Ministry of National Economy of the Republic of Kazakhstan, Committee on Statistics, 2014).

While there is quite a developed transport infrastructure in sound condition for large logistics projects, there are still no logistics centers on the territory of Eastern-Kazakhstan oblast.

Conclusion. Intensive development and transit availability could result in Eastern-Kazakhstan oblast becoming the key transport and logistics "hub station".

Within this research, the following measures are recommended in order to promote the implementation of logistics projects in the region under study:

- 1) to develop programs and aim-oriented transport infrastructure for regional logistics clusters;
- 2) to increase the positioning of national logistics projects and their regional, republican, and international classification to attract more investments into regional-level projects rather than international programs;
- 3) to integrate possibilities for transport and distribution centers with the functions of trade, industrial, and service logistics center to develop transit and "logistication" of regional products and services;
- 4) to motivate public and private partnerships for development of regional logistics centers.

The approach to logistics project implementation involves the following stages:

- 1) formulating the model and the concept of regional integrated procedures based on the investigation of production and trade potential within cross-border regions;
- 2) carrying out the feasibility study;
- 3) positioning and marketing the project at the appropriate level of administration.

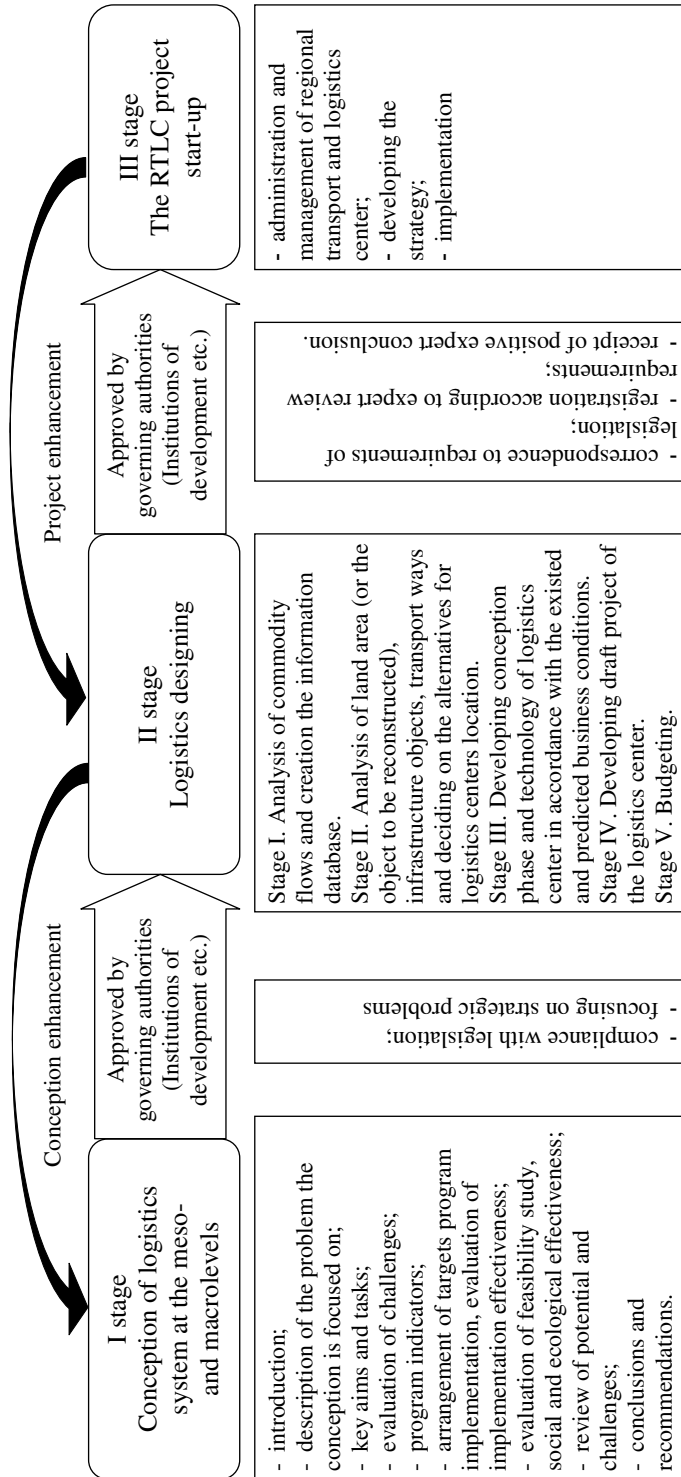


Figure 2. Projection algorithm for public and private partnership project (RTL), compiled by the authors

Institutional support for developing national logistics systems includes the following mechanisms:

- availability of legislative framework in this field of business;
- knowledge base and investment resources for institutions development;
- state programs on developing transport and logistics infrastructure (national and regional programs);
- strategic programs coverage ("Kazakhstan-2050" etc.).

Thus, the available potential of Kazakhstan requires sound investments into effective logistics projects in compliance with current legislation, knowledge base with logistical information, and project management opportunities.

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