METHODOLOGY TO MEASURE THE EFFECTIVENESS OF INTERACTION OF MESOLOGISTICS SYSTEMS

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ABSTRACT

The development of mesologistics systems in the market of transport and logistics business (TLB) is related to improvement of the activity of their territorial subdivisions. Subsidiaries and affiliates of JSC Russian Railways, presented as a single business unit in this market face regularly problems of acquiring competitive advantages that are seen in the growth of contract logistics segment. Interaction of the companies in this power balance is one of the conditions to enhance their viability and sustainability. However, administrative decisions making in the field of interaction and integration of companies should be based on the methods of assessing the effectiveness of mesologistics systems, which this article is devoted to.

Keywords: logistics, economy, market of transport and logistics business, transport and logistics infrastructure, logistics cluster, transport and logistical services, mesologistics system.

Background. *Development of the market of transport and logistics business is one of the conditions for successful functioning of the national economy, which is reflected in stability, flexibility and reliability of supply chains formed. An important aspect in this case is development of scientific approaches to the consolidation of market forces between enterprises of transport and logistics business unit of JSC Russian Railways and the subjects of territorial markets of transport and logistics services (TLS).*

There is a slowdown in GDP growth with external growth of absolute indicators. So, Russia's GDP growth in 2012 was 12, 11%, in 2013 – 6,16%, and in 2014 and in 2015 9,62 and 3.23%, respectively (calculation is based on data from gks.ru).

Russia's foreign trade turnover decreased by 6,8% in 2014, in 2015 the volume of foreign trade turnover was lower by more than 33% (calculation is based on data from gks.ru). These processes are related not only to political events happening in the country and the world, but also to the level of development and the state of our transport and logistics system.

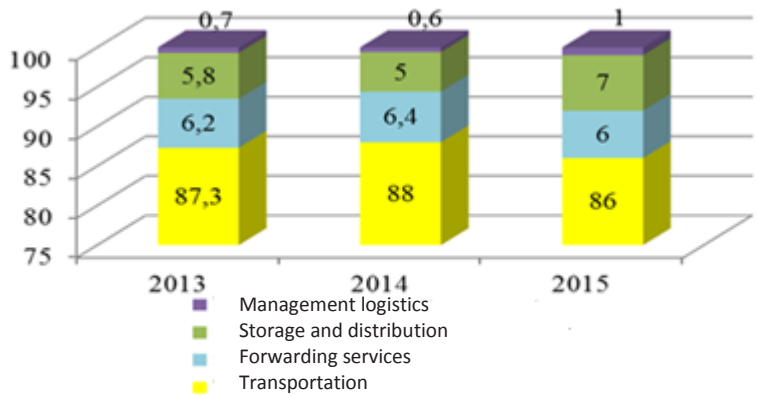
The peculiarity of the current political and economic situation is to shift the geopolitical interests of Russia in the conclusion and implementation of international trade contracts towards the cooperation with the countries of Asia-Pacific region. Proof of this is statistical data on the size and structure of foreign trade turnover of Irkutsk region.

The relative share of export and import in value turnover of Irkutsk region amounted to, respectively: in 2012 – 84% and 16%; 2013 – 89% and 11%, in 2014 – 82% and 18%; 2015 – 85% and 15% (Foreign trade activity: data of statistical reports [Electronic resource] – The Internet portal of Territorial body of Federal State Statistical Service in Irkutsk region. URL: http://irkutskstat.gks.ru). The share of Asia-Pacific countries in foreign trade turnover of Irkutsk region was 53% in 2015, while the number of partner countries was 22 (exporters – 17, importers –19).

While the state of the national economy indicators underscores the need for application of new scientific and methodological approaches to the management of development of transport and logistics infrastructure at the regional and federal levels, transport and logistics services market indicators point to a need to develop new methods to assess the efficiency of interaction of logistics systems and at meso- and macro- levels.

The relevance of scientific and practical developments in the field of interaction management in the TLB market is substantiated with statistical data on its development, as reflected in policy documents of federal and sectoral levels, as well as the results of scientific research [1, 2].

Analysis of the market of transport and logistics services of Irkutsk region, as well as the state and trends of development of transport and logistics infrastructure of the city and the region led to the conclusion about the need to consolidate the efforts of market participants towards improving the management unit, as today, this sector has become a laggard (see Pic. 1).

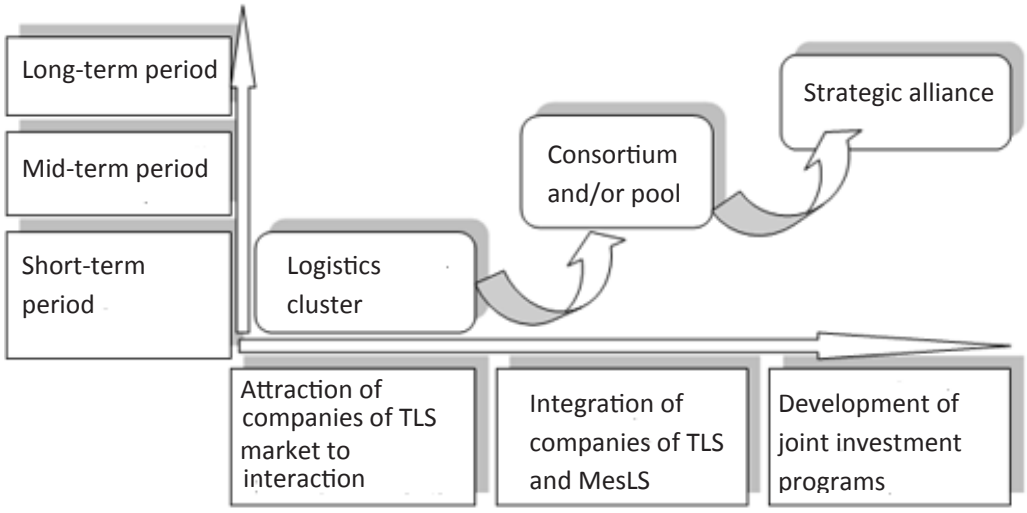


Pic. 1. Structure of transport and logistics services market of Russia for the period of 2013–2015 (Based on RBK data).

Table 1

Vision of measuring the synergies in the works of modern scientists

Author	Types of synergies	Research area
Ansoff I. [4]	Effect of shared use of financial and industrial capacities, distribution system; effect of shared use of managers' experience.	Management systems
Brigham, Yu., Gapensky, L. [4]	Effect of operational savings. Effect of financial savings. Effect of differentiation of participants' functions.	Company management systems
Vesnin [4]	Operational, financial commercial synergy.	Management systems
Gunina [4]	Marketing synergy, investment synergy, management synergy, industrial synergy, development synergy.	Company management systems
Yuldasheva, O. A., Gorid, A.	Effect of reduction of unit costs (scale effect); Effect of income increase; Effect of growth of investment capacities of integrated system. Effect of complementarily of material and non-material resources.	Logistics chains of industrial companies
Zhurova, L.I. [4]	Procurement, manufacturing, service and sales, innovation, organizational- managerial, financial- investment efficiency	Chains of creation of valuables in the industry
Krasnov, G. A., Vinogradov, V. V.	The effect of enlargement (extension synergy), effect of interaction (connectivity synergy).	Management systems
Korodyuk, I. S.	Effects of interaction between transport companies in the association, as in a contractual association	Regional transport-logistics system
Kuzmenko, Yu. G.	Effects, arising at different levels of systems: micro-, meso- and macrologistics.	Integration of logistics systems



Pic. 2. The concept of development of mesologistics system of JSC Russian Railways system in terms of integration in TLB market.

The solution of the task to consolidate efforts between the actors of the territorial market of TLS and territorial divisions of subsidiaries and affiliates of RZD holding is seen in the development of strategies for their cooperation and integration, which would be of a multi-level character, and in the long term should lead to the creation of strategic alliance at the international level (see Pic. 2).

Objective. *The objective of the author is to offer a methodology to measure the effectiveness of interaction of mesologistics systems.*

Methods. *The author uses general scientific methods, economic evaluation, comparative method, analytical method.*

Results. *One of the central issues of management of interaction of mesoligistics systems of transport and logistics business unit in the territorial markets of TLS is to assess the efficiency of the administrative decision, which within the cluster form of partnership is seen as a manifestation of synergy effect.*

Thus, one of the tasks of methodology of management of mesologistics systems is to study the

Table 2

Calculation model of the synergies in case of cluster form of a partnership in the market of transport and logistics businesses (on types of effects)

Symbol	Content of effect	Effect manifestation in cluster partnership form
1. Direct income effect (Marketing)		
E_v	Formed due to increase in the number of orders at the expense of network forms of interaction	Added value that arose at expanding the range of services and attraction of additional customers
2. Operational effect		
E_{tr}	Reduction of costs for empty run	Savings from empty run at full loading of rolling stock
	Reduction of prime cost for cargo transportation	
E_{wp}	Formed due to reduction of costs for rent or maintenance of storage facilities	Savings from provision of spaces for cluster members to each other, increase in the coefficient of storage areas use
3. Organizational and management effect (transactional)		
E_{tran}	Formed by reducing the response time	Saving from the loss of profits arising in the event of failures and as a result of long waiting time
4. Infrastructure effects		
E_w	Formed by cost savings within the boundaries macrologistics system (RTLS savings)	Savings in capital costs for design and construction of transport and logistics infrastructure and its placement (storage system)
C_{tr}	Cluster's costs, effects of RTLS	Savings in the differentiation of the transport system reconstruction costs between the cluster parties within RTLS; is a cost for cluster partners
5. Innovation-investment effect		
E_{inov}	Formed due to joint financing of information and scientific technologies and knowledge exchange	Savings on development and introduction of information technologies, training by cluster partners
E_{total}	Cumulative effect, resulting from interaction	$E_{total} = E_v + E_{tr} + E_{wp} + E_w - C_{tr} + E_{inov}$ (1)

issues of calculating the effect of interaction (or synergy effect).

The existing available scientific and methodical approaches to the evaluation of the synergies of different types of corporate associations, highlighted, in particular, in the works of Russian scientists: Greiz G. M. [3], Zhurova L. I. [4], Ivanov A. E. [5], Katochkov V. M. [6], Korodyuk I. S. [7], Kuzmenko Yu. G. [9], Yuldasheva O. A. [10] are offered for consideration.

Table 1 presents the views of various researchers on the structural content of the synergy effect.

The synergy is considered mostly using the examples of industrial and wholesale and retail companies that are integrated in a corporate structure that enables us to determine or predict the volume of demand and calculate expected returns in a common pricing policy. In other words, we consider the effect of integration. Under the conditions of free contractual relations between the partners, which occur in a cluster form of a partnership, as well as in associations and alliances, the content of effects will be different.

As can be seen from Table 1, development of evaluation synergies of logistics systems are present in the network wholesale and retail companies and industrial enterprises. Synergies of unincorporated structures where competition is maintained between the parties, and the links are less strong than in corporations today is not enough developed and highlighted.

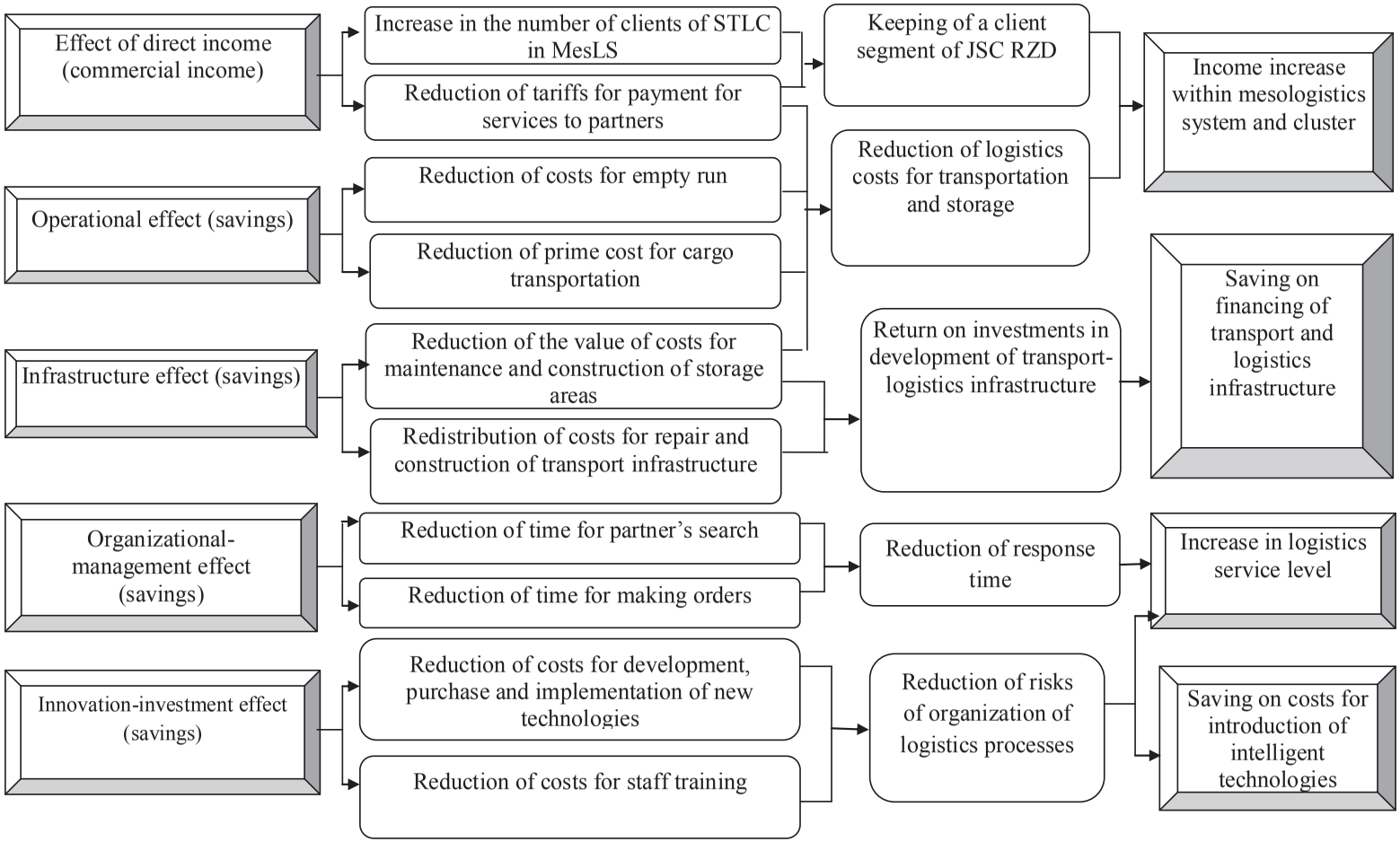
It should be noted there is no sufficient works on evaluation of synergies, or synergies in clusters. The authors, proposing an approach to measurement of synergy, often disagree about the structure of effects and methods of their compilation, which leads to the conclusion about dependence of the measurement method on the form of interaction of logistics systems, the type of integration, industry or market type.

In fact, the proposed scientific and methodical approach to measuring the efficiency of interaction of logistics systems is considered at the level of creation of cluster forms of partnership in the framework of the territorial market of transport and logistics business.

First of all it is necessary to clarify what is meant by the term «synergy» and «synergistic effect».

Synergy is a strategic advantage arising from the combination of two or more companies. A synergistic effect is a cumulative effect arising on combination of companies, expressed in absolute or relative terms.

Classification of the effects arising from the combination of mesologistics system of transport-forming industry in regional TLB markets in the cluster, is assumed to be made by large characteristics groups, namely by the level of the logistics system, where are formed the effects regarding areas of systems' cooperation.



Pic. 3. Concept map of formation of effects of micro-, meso- and macrologistics systems in interaction in the logistics cluster (compiled by the author).

The effects of the interaction of participants in the cluster are formed by such properties of logistics systems as additivity and complementarity. Complementarity allows to bring together partners in the cluster, while the additivity helps to add together partners' efforts and thus to increase their total technological, economic and market power.

In general, the effects resulting from the interaction in the logistics cluster can be differentiated into the following groups:

1) commercial effect arising from sharing of the customer base, its maintenance and growth;

2) operational effect resulting from cooperation of partners in the implementation of logistics operations;

3) organizational management effect resulting from the reduction in cycle time and order response time, through the use of common information base and the method of «one window»;

4) infrastructure effect arising from the joint use of transport, storage, information infrastructure, and joint staff training;

5) innovation-investment effects occurring in co-financing projects to develop transport and logistics infrastructure of RTLS as a macroplatform of cluster formation.

Table 2 provides a description and symbolic designation of effects of interaction of three levels of logistics systems in a cluster partnership.

It should be clarified that the parameter C_{tr} at formation of mesologistics systems and cluster have a form of costs and is included with the sign «–», but is the effect of the interaction of micro-and mesologistics systems in the cluster, and covers a part of the costs of the regional budget as they are directed on realization of priority projects for construction or reconstruction of the regional transport and logistics infrastructure. At the same time, the given value of costs has a return effect, because it contributes to reduce the risks associated with storage and transportation, probabilistic nature of which is not taken into account in the calculation methodology.

Concept map of synergy formation (see Pic. 3) reflects the impact of cluster management processes on achievement of aims of management of macro- and mesologistics systems.

Conclusion. *The proposed model for evaluating the results of interaction of logistics systems, presented as synergy, will allow to draw conclusions about the effectiveness of management practices and develop future scenarios of TLS market development.*

Partnership organization in the framework of the cluster association would allow to achieve these results:

1) to eliminate the problem areas in the field of complexity of transport and logistics services through the implementation of the parallel provision of additional services at the expense of resources of different providers;

2) to expand the geography of rendering services through joint activity of network logistics operators with a high level of adaptability at regional and micromarkets;

3) to maintain and / or to improve the quality of services through the use of technologies of competitive selection of intermediaries in virtualization of management of mesosystem and cluster;

4) to optimize the maintenance costs of transport and logistics infrastructure and its development.

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