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ESTIMATION OF EXPORT-IMPORT AND TRANSIT POTENTIAL OF RAILWAY TRANSPORT OF UKRAINE AND OTHER MEMBER STATES OF THE ORGANIZATION FOR COOPERATION OF RAILWAYS (OSJD)

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ОЦІНКА ЕКСПОРТНО-ІМПОРТНОГО ТА ТРАНЗИТНОГО ПОТЕНЦІАЛУ ЗАЛІЗНИЧНОГО ТРАНСПОРТУ УКРАЇНИ ТА ІНШИХ КРАЇН-ЧЛЕНІВ ОРГАНІЗАЦІЇ СПІВРОБІТНИЦТВА ЗАЛІЗНИЧНИХ ДОРІГ (ОСЗД)

The article is devoted to the estimation of export-import and transit potential of railway transport. The dynamics and structure of the cargoes export, import and transit volumes are analyzed. The estimation of export-import and transit potential of freight transport by railways of Ukraine and other OSJD member states is conducted.

The application of SWOT analysis of strengths and weaknesses made it possible to identify the potential threats and possibilities of Ukraine's railway transport in the sphere of export-import and transit transportation.

To assess the export-import and transit potential, one of the methods of multidimensional average - taxonomic level of system development was applied. The main indicators that affect the development of export-import and transit potential, in particular: customs, infrastructure, international shipments, logistics, quality and competence, tracking and tracing, timeliness, rail transport export, rail import, transit by rail, openness of the economy, share of rail transport services imports, direct investments was identify to calculate taxonomic indicators of the level of development of the system of export-import and transit transportation by rail. As a result, this made it possible to rate of OSJD member states for export-import and transit transportation.

Стаття присвячена оцінці експортно-імпортного та транзитного потенціалу залізничного транспорту. Проаналізовано динаміку та структуру обсягів експортних, імпортних і транзитних вантажопотоків. Проведено оцінку експортно-імпортного та транзитного потенціалу вантажних перевезень залізничним транспортом України та інших країн-членів ОСЗД.

Застосування SWOT-аналізу сильних та слабких сторін дало змогу визначити потенційні загрози та можливості залізничного транспорту України в сфері експортно-імпортних та транзитних перевезень.

Для оцінки експортно-імпортного та транзитного потенціалу було застосовано один з методів багатомірної середньої – таксономічного рівня розвитку системи. Запропоновано основні показники, що впливають на розвиток експортно-імпортного та транзитного потенціалу, зокрема: ефективність митних та прикордонних процедур очищення вантажів, інфраструктура, міжнародні перевезення, якість обслуговування логістичної

інфраструктури, відслідковування руху вантажів за маршрутами перевезень, своєчасність доставки вантажів, експорт залізничним транспортом, імпорт залізничним транспортом, транзит залізничним транспортом, відкритість економіки, частка експорту послуг залізничного транспорту, частка імпорту послуг залізничного транспорту, прямі інвестиції для розрахунку таксономічних показників рівня розвитку системи експортно-імпортних та транзитних перевезень залізничним транспортом. Відтак, це дало змогу скласти рейтинг країн-членів ОСЗД щодо експортно-імпортних та транзитних перевезень.

Keywords: *export-import potential, transit transportation, transit potential, railway transport, member states of the Organization for Cooperation of Railways (OSJD).*

Ключові слова: *експортно-імпортний потенціал, транзитні перевезення, транзитний потенціал, залізничний транспорт, країни-члени організації співробітництва залізничних доріг (ОСЗД).*

Formulation of the problem. The current unstable economic situation in the world has led to a decrease in the volume of export-import and transit transportation of Ukraine by railway. The trend of recent years from 2012 to 2015 shows a steady drop in transit volume from 9.02% to 6.9%. It is known that the devaluation of hryvnia (UAH) and the escalation of the military conflict has negatively affected the volume of foreign trade of Ukraine by railway. In the last year, there is a negative trend in key commodity goods and service markets in Ukraine. A similar situation concerns the volumes of transit cargos transported by rail passing through the territory of Ukraine. Today there is a real threat of Ukraine being excluded from the global market for transnational flows of goods, thus losing the status of an international transit carrier. That is why it is necessary to study the export-import and transit potential through the assessment of export-import and transit transportation by rail.

Analysis of recent researches and publications. The issue of development and formation of export-import and transit potential of the transport system of Ukraine is the subject of research of many domestic scientists, among them: Luchnikova T.P. [1] Pasichnyk A.M. [2, 3], Begma V.M. [4], Golinei S.V. [5], Dudchenko M.A. [6], Kalyuzhnaya N.G. [7] and others.

Setting objective. The main objectives of the article is to assess the export-import and transit potential of freight transportation by rail in Ukraine and other OSJD countries; to carry out a structural and dynamic analysis of the export-import and transit potential of railways of OSJD member states in 2016; to apply the potential of the multidimensional method for determining and assessing the level of development of the system of export-import and transit transportation by rail; to carry out the rating of OSJD member states regarding export-import and transit traffic by means of taxonomic analysis.

Presenting main material. In a modern international economy, progressive globalization makes all countries dependent on world markets for goods, capital and services. It is known that both pace and nature of development of the most countries depend on success or failure in development of foreign economic relations.

Before the annexation of the Crimean Peninsula by the neighboring Russia and the commencement of hostilities in the East of Ukraine, its territory was considered a trans-territorial zone with a high transit rate. Thus, before 2015 Ukraine was ranked as first in Europe with a transit coefficient of 3.75 [8].

The deterioration of the material and technical base of the industry was accompanied by a reduction in transportation volumes. Thus, the railway electric locomotives transportation dropped by 57%, freight cars transportation - by 44%, passenger transportation - by 25%, heavy container transportation - by 32%. From the total number of ships, 55% have been operated for more than 15 years, as a result of which they can not access foreign ports. The rates of renewal of fixed assets in transport are several times lower than in other industries, while specific fuel and energy costs are 30 - 50% higher than for the best foreign transport brands [8]. Such statistics testify to the negative tendencies that cause a sharp drop of the country's transit coefficient.

However, in 2016 several ambitious transit projects started in Ukraine [9]. Firstly, Ukraine, Georgia, Kazakhstan, Azerbaijan have successfully signed a cooperation agreement, have developed a route that trains will follow from the Chinese border to the port of Batumi, and then - by sea, the cargo will be transported to Ukraine, which acts as a transit state on the way to the European Union. Secondly, one of the few optimistic attempts to use the transport potential of the country is the Viking train, which runs along the route, from the Black Sea to the Baltic States through Belarus with a maximum traffic volume of up to one million tons. The direction appeared to be promising thanks to Azerbaijan: Viking transports oil supplied by Azerbaijani tankers to oil refineries in Belarus; quality and speed of delivery is acceptable to all participants, at the time the question of starting an additional turn of the train is being solved.

Consequently, the above shows the real possibilities for raising the level of transit potential of Ukraine at least to the 2014 figure.

Export potential is the most important characteristic of the economic power of any country, including Ukraine. Export-import potential is the ability of a particular country to export and import goods and services under the given conditions of economic development and market conditions. The main factors that affect the indicators of export-import trade relations at present are the following: 1) changes in market conditions on world commodity markets, fluctuations of the world prices level; 2) the decline of domestic production, the deformation of domestic commodity and financial markets; 3) growing competition on the world stage; 4) increasing the scale and pace of the modern scientific and technological revolution, which requires the mobile reorientation of foreign trade, taking into account the latest achievements, etc.

In accordance with Ukrainian legislation, the term "transit" is defined as the transport of goods under customs control through the territory of Ukraine between two points or within one entry point across the state border of Ukraine [10] and as the transportation of goods produced outside Ukraine through the territory Ukraine without any use of these goods in the specified territory [11].

Accordingly, the main function of transit potential is the servicing of transit transportation of passengers and cargo, providing the whole spectrum of transport and logistics services.

Transit potential is a complex, dynamic, adaptive and stochastic system of interconnected elements that perform various functions in the process of ensuring the traffic flows of other countries through our territory and achieving the goals of comprehensive development of the country as a whole. This system has two main components: regional and sectoral, and functions within the market of transport services, without which there is no transportation in any part of the world [12].

In market conditions, there is a need to assess the factors affecting the transport potential. Such indicators include exogenous, geo-economic, geopolitical, infrastructural and endogenous factors.

Based on official statistical information from the statistical collection "Export, Import and Transit" [13] on the dynamics of goods export, import and transit volumes of Ukraine during the period of 2010-2015, presented in Fig. 1, we analyzed its structure for 6 years from 2010 to 2015.

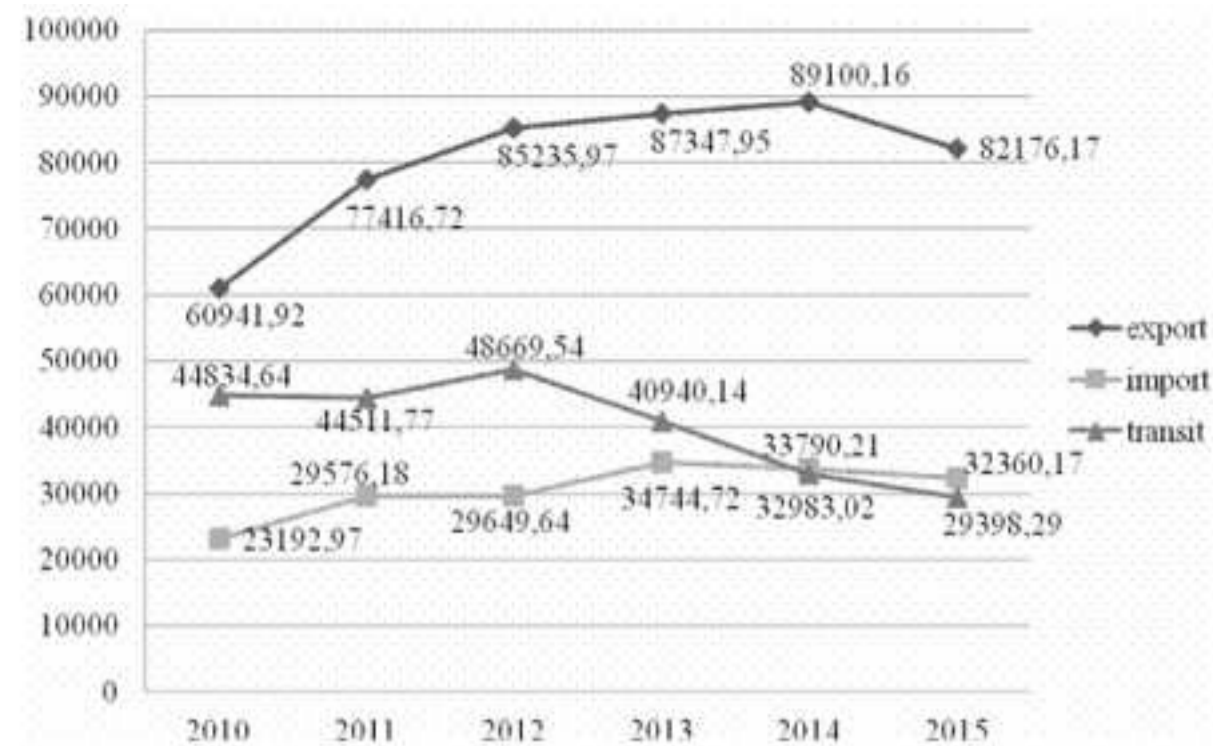


Fig. 1. Dynamics of the cargoes export, import and transit volumes of Ukraine, thousand tons, 2010-2015

Note: formed by the authors on the basis of statistical information of the State Statistics Service of Ukraine

It should be noted that since 2010 there has been a non-uniform trend of these three indicators. Stable for them was the year of 2015, in which export, import and transit indicators had declining values. In particular, in comparison with 2014, the volume of export of goods decreased by 7.77%, imports by 10.87%, and transit by 4.23%.

As can be seen from Fig. 1, a marked drop in transit has been observed since 2012. While exports and imports began to fall in 2014, this could be explained by the closure of freight flows in the Ukraine-Russia direction, due to the introduction of economic (including trade) sanctions against the latter.

From an economic point of view, transit potential consists of two components: first, the aggregate capacity of all modes of transport to provide efficient service to international flows of goods; and secondly, the possible volume of demand from foreign shippers for the carriage of goods across the country.

Thus, in order to assess the transit potential, it is first of all necessary to assess the structure of the transit commodity flow, which potentially can be transported by the territory of Ukraine by different modes of transport - fig. 2 [13].

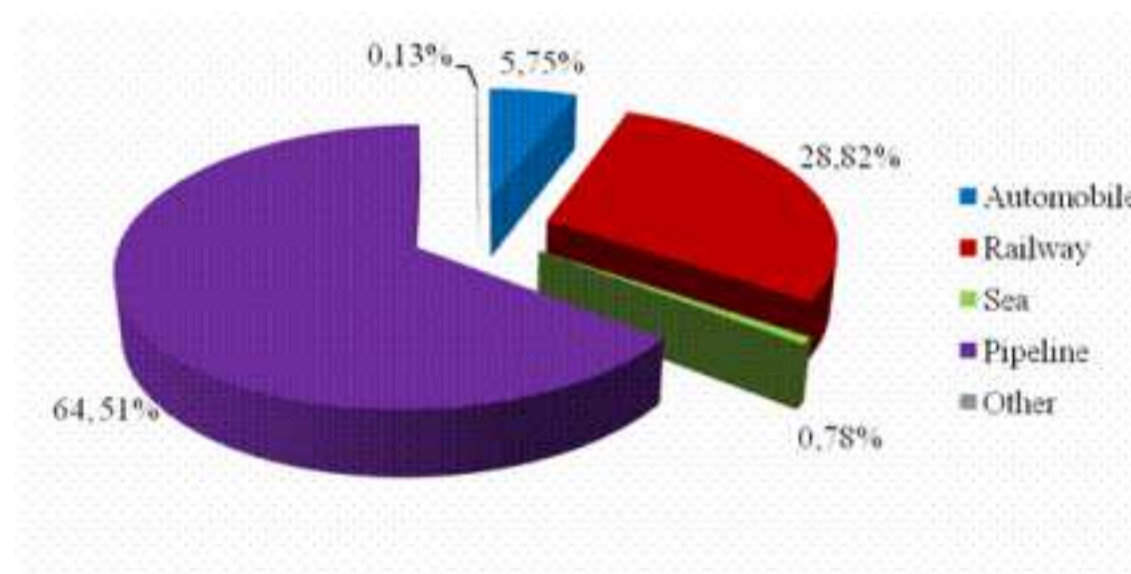


Fig. 2. Cargo transit structure by transport modes

Note: formed by the authors on the basis of statistical information of the State Statistics Service of Ukraine

As can be seen from the diagram presented in Fig. 2, the railway transport takes second place by transit volume after pipeline transport. According to the State Statistics Committee of Ukraine, within the structure of transit cargo railway transport carries almost a third. It means that Ukraine has significant prospects for the development of the transit potential of railway transport. Transit potential of railway transport of Ukraine as a strategic mode of transport, being the main carrier of passengers, industrial and other cargoes inside the state and beyond its borders. Given the large volumes of long-haul transportation, this mode of transport is the most effective [14].

Today, rail transport plays an extremely important role in the development of the economy of any state, because, when carrying cargo in accordance with the needs of production, it ensures the normal functioning and development of all its branches, regions and enterprises.

In order to assess the strategic potential of cargo transit by rail, we used the methodology of SWOT analysis as one of the most common types of analysis in strategic management. Based on the results of this analysis, we compiled a matrix of strengths and weaknesses, opportunities and threats presented in Table 1.

Table 1.

Strengths and weaknesses, opportunities and threats of transit potential of Ukraine

Strengths	Weaknesses

<ol style="list-style-type: none"> 1. Due to economic stagnation/downturn (reduced turnover in foreign trade) the occupancy rate of transport infrastructure is reducing thereby providing more capacities at key transport modes for processing transit cargo. 2. About 30% of transit cargo is transported by rail. 3. National Transport Control System (NTCS) tested to facilitate documentation flows in transport. 4. Good geographical location. 5. Co-operation with all types of transport communications. 6. Co-operation with all types of transport communications. 	<ol style="list-style-type: none"> 1. In 90% of cases transit is served by road. 2. In 2010-2014 transit reduced by 33%. 3. Unfavorable transit terms at Silk Road concerning time, formalities and cost. 4. Limited capacity in passing cargo via the territory of Russian Federation (only 1 border crossing in Belarus operated for processing Ukrainian transit to Central Asian countries), existence of non-physical barriers. 5. Russian Federation to Kazakhstan (2% of UA exports) and Kyrgyzstan (increased the cost of transit by 30%). 6. Rigid tariff rates at sea ports and railway transport; 7. Absent through rates; high disbursement costs at Ukrainian sea ports. 8. The limited speed of transit traffic.
Opportunities	Threats
<ol style="list-style-type: none"> 1. Attracting transit by better marketing Ukraine transport capacity and adoption ICT technologies in transport. 2. Vehicle fleet renewal. 3. Integration into the European transport system. 4. Bringing the regulatory framework for relativity to international standards. 5. Development of transport infrastructure objects. 	<ol style="list-style-type: none"> 1. Strong competition for transit traffic in the region. 2. Slow integration of Ukraine networks into international transport corridors. 3. Socio-political instability in the state. 4. Financial and economic instability. 5. Sharp inflation growth. 6. Exclusion of Ukraine from the global market for transnational flows of services. 7. Loss of status of international transit carrier.

According to the results specified in Table 1, we can draw the following conclusions and recommendations for further management of transit potential. Consequently, the possibilities for the development of export-import and transit potential of Ukraine may be as follows: integration into the European transport system; bringing the regulatory framework for relativity to international standards; development of transport infrastructure objects; attraction of transit through better marketing of transport services and the implementation of modern information systems and technologies in railway transport.

As regards threats, their influence on the export-import and transit potential of rail freight traffic is seen due to the strong competition for transit traffic in the country; slow integration of Ukraine's networks into international transport corridors; socio-political instability in the state; financial and economic instability; a sharp inflation growth; the exclusion of Ukraine from the global market for the maintenance of transnational flows; the loss of international transit carrier status, that pose a very high risk for transit capacity and require immediate and compulsory prevention or, if possible, elimination.

In order to assess the export-import and transit potential, let us apply one of the methods of multidimensional average taxonomic level of system development for further calculations of taxonomic indicators of the level of development of the system of export-import and transit transportation by rail. To study the problem of assessing the export-import and transit potential, it is important to study the main indicators that affect this potential. We have carried out their detailed classification, which is a selection of factors that significantly affect the export-import and transit activity of the railways of the OSJD member states. These include 13 indicators: customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing, timeliness, rail transport exports, rail import, transit by rail, openness of the economy, share of rail transport services exports, share of railway transport services imports, direct investments.

The first 6 indicators are selected from the annual directory [15]. The following 3 indicators, namely the share of exports, imports and transit in general rail freight traffic, were taken from the annual OSJD statistics bulletin for 2015 presented on the official website of this organization [16]. The following indicator (openness of the economy) is presented on the site [17]. Indicators of the share of exports and imports are taken from the statistical yearbook "Transport and Communications of Ukraine", filed on the website of the State Statistics Service of Ukraine for 2015 [13].

The last indicator is direct investments, determined according to the statistical annual "Investments of foreign economic activity of Ukraine", filed on the website of the State Statistics Service of Ukraine for 2015 [13].

These 13 indicators were chosen for further calculations. Using the well-known method of taxonomic analysis by V. Plyuta [18], we applied the potential of this method to calculate the taxonomic values of 17 OSJD states for 2016. This method is used to map multidimensional objects that are characterized by a large number of features. Taxonomic indicator of the development level is a synthetic value that accumulates signs characterizing the investigated economic phenomenon or process. With its help it is possible to assess the average value of the characteristics that characterize the phenomenon studied during a certain period of time. The taxonomic index so constructed synthetically characterizes changes in the characteristics values of the studied groups.

The value of the taxonomic development index can vary from 0 to 1 ($0 \leq K \leq 1$). As for the gradation of the values of our calculated indicators, the higher the level of this indicator, the higher the level of development of the system.

Using the taxonomic method, we evaluate the potentials of OSJD member states. The initial data used to calculate developmental indicators (static characteristics of a plurality of elements) were indicators (customs, infrastructure, international shipments, logistics, quality and competence, tracking and tracing, timeliness, rail transport exports, rail import, transit by rail, openness of economy, the share of exports and the share of imports in the total volume of rail transport services) for 2016 for the following 17 OSJD states: Azerbaijan, Belarus, Bulgaria, Vietnam, Georgia, Estonia, Latvia, Lithuania, Moldova, Mongolia, Poland, Russia, Romania, Slovakia, Tajikistan, Ukraine and the Czech Republic.

The taxonomic indices obtained from the calculations for Ukraine and other OSJD member states for 2016 by rating are presented in Table 2.

Table 2.
The rating of OSJD member states for 2016 according to calculated taxonomic indicators of the level of development of the system of their export-import and transit transportation by rail

№	Name of the state	Value of taxonomic indicators
1	Slovakia	0,8428
2	Moldova	0,8217
3	Czech Republic	0,8199
4	Lithuania	0,8043
5	Georgia	0,8031

6	Azerbaijan	0,8030
7	Belarus	0,7962
8	Vietnam	0,7953
9	Latvia	0,7837
10	Estonia	0,7819
11	Ukraine	0,7809
12	Tajikistan	0,7802
13	Bulgaria	0,7722
14	Romania	0,7713
15	Poland	0,7713
16	Mongolia	0,7572
17	Russia	0,7512

Note: formed on the basis of calculations performed by the method [18]

As we see from Table 2, for the year of 2016 Slovakia having the value of 0.8428 ranked first in this rating, the second is Moldova, and the third is the Czech Republic. Russia has the last 17th place with a value of 0.7512. The results of calculations of taxonomic indicators have shown not a high rating of Ukraine among other OSJD member states: Ukraine in 2016 in this rating was ranked with 11th from 17 countries, which indicates that it is necessary to improve the country's transport potential in order to improve the economic situation of the country.

To this end, we have carried out a separate calculation of taxonomic coefficients by 13 indicators (12 of the above indicators are complemented by another 13th indicator, namely: direct investments to the economy) for 2010, 2012, 2014 and 2016, which is systematically presented in Table 3.

Table 3.
Taxonomic indicators of the level of development of the system of export-import and transit transport by rail of Ukraine for 2010, 2012, 2014 and 2016

Years	Value of taxonomic coefficients
2010	0,6652
2012	0,7658
2014	0,7210
2016	0,5635

Note: formed on the basis of calculations performed by the method [18]

As can be seen from the Table 3, the value of taxonomic indices varied from 0.5635 in 2016 to 0.7658 in 2012, indicating that the structure of the export-import and transit transportation system of Ukraine during 4 years studied (2010, 2012, 2014 and 2016) is not uniform. Consequently, the calculations showed a decline of the taxonomic index for 2016, which is confirmed by statistical data of reducing volumes of export-import and transit transportations by the railway transport of Ukraine.

Conclusions. In order to preserve the position of railway transport as a Ukrainian transit carrier, to ensure its competitiveness growth in the international transport services market, the growth of transit traffic, and an increase of cash inflows into Ukraine, a number of measures need to be implemented. Among the main ones we distinguish the following: the choice of priority transport routes; renovation and development of transport infrastructure and transport network; the use of mathematical tools for assessing the export-import and transit potential of Ukrainian railway transport, etc. It was the latter's application that allowed calculating, rate and evaluating the export-import and transit potential of Ukraine and other OSJD states. Also, the application of SWOT analysis of strengths and weaknesses allows timely response to potential threats and realization of the possibilities of Ukraine's rail transport in the field of export-import and transit transportation. And thus, it will allow to ensure the sustainable development of export-import and transit transport by the railway of Ukraine for a long time.

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