

## MAIN DIRECTIONS OF TRAFFIC MANAGEMENT IN UKRAINE'S INTERNATIONAL TRANSPORT SYSTEMS

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### INTRODUCTION

Topicality of the research lies in the decision of problems of logistics management related to the transportation of goods, inventory management resources of trucking companies and development of new methods of organization of transport processes based on the principles of logistics that necessitate a constant search of reserves of increase of economic efficiency and require further development and improvement of methodologies, mathematical models, algorithms and appropriate computer software to implement them.

The solution to these problems is subject of many scientific papers in the field of transport systems, logistics, marketing, operations research, inventory management resources. A significant contribution to the development of the theory of transport processes and systems and in addressing the effective management of international cargo transportation was made by scientists: A.I. Vorkuta, G.N. Poor, P.G. Levkowitz, T.A. Vorkuta, G.S. Prokudin, Polishchuk V.P., John. Bowersox, To.L. Geronimus, L. Would. Mrtn, S.A. Panov, George. Shapiro, G.A. Habutdinov, To.M. Chetverukhin and others<sup>1</sup>.

Paying tribute to the scientific achievements in the field of increase of efficiency of functioning of transport logistics, the application of it in this direction in a market environment require further research.

The effective management of the process of international freight transportations, as a rule, not fully take into account the specific features of their performance and as a consequence no single approach to defining the goals and objectives of the management of the logistic system of international freight transport and the processes of its functioning.

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<sup>1</sup> Prokudin G., Chupaylenko O., Dudnik O. Improvement of the methods for determining optimal characteristics of transportation networks. *Eastern-European Journal of Enterprise Technologies*. N. 6/3 (84). 2016. P. 54–61. DOI:10.15587/1729-4061.2016.85211.

The paper presents the main requirements to the process of organization of international cargo transportation. Scientific and practical relevance of this issue led to the choice of the theme, goals, objectives, object and subject of research.

The main task of the development of the transport complex of Ukraine for the medium term period up to 2020 is to identify ways of solving the problems of further development of the transport sector, growth in demand for transport services, enhance the integration of transport-road complex of Ukraine into European and world transport systems.

The main state decisions that deserve to be included in the recent history of road transport in Ukraine are:

- the divestment of auto companies that have become commercial and have started operating in accordance with national rules and rules of business activity in a competitive environment;

- Establishment of the Association of International Road Carriers of Ukraine (ASMAP) as a national Association - a member of the International Union of Road Transport (IRU). The state delegated to this non-governmental organization the function of the organization of international freight traffic on the system of international road transport (TIR) in accordance with the TIR Convention of 1975. This association replaced the previously existing state organization Sovtransavto, but in a new capacity;

- creation of VAAP (All-Ukrainian Association of Carriers of Ukraine);

- public non-profit organization created as a result of voluntary association of persons working in the field of road transport to protect their legal rights and interests, coordination of joint actions aimed at the development of the transport industry of Ukraine in the direction of passenger transportation.

The study was performed in accordance with the "Concept of development of the transport and road complex of Ukraine for the medium term and up to 2020".

*The purpose of the study* is to increase the efficiency of cargo transportation in international traffic by developing and implementing models, methods and software for the rational organization of international cargo transportation.

## **1. Analysis and forecast of the market of international cargo transportation**

Scientific and technical progress in the transport sector is one of the main factors of development of society, improving the welfare of its citizens. The strategic task of scientific-technical policy in the field of transport system (TS) is the state's global reach on technical parameters and quality of services provided by the transport. In this regard, a priority and a priority for the transport sector is the extension of scientific researches on problems of creation of progressive technologies, organization of international cargo transportation and technical equipment of new generations, formation and effective functioning of the customs Union, the development of fundamentally new control systems using advanced information technologies.

The objective regularities of functioning of the transport system are the following:

- the normal functioning of the transport system due to the debugged work of all types of transport included in the system;
- mandatory proportional to the development of transportation and processing opportunities in the interactive areas of the transportation network of various modes of transport;
  - determine the quality of transport service of economy of national economy and population of state quality standards of transportation and the appropriate fees;
  - optimal organization of traffic on the transport network with the introduction of the method of analytic mappings, covering the whole logistic route of goods;
  - higher productivity of transport on outcome based on the theory of integrated exploitation modes of transport, is the system form their use.

Despite a good geopolitical location, Ukraine has a ramified system of transport and communication reports and is significantly behind in creating its own transport corridors, which negatively affects the formation of the competitiveness of both the state and domestic enterprises. The direction of expansion of international transport corridors is a priority of the state transport policy of the country in the way of its integration into the international economic system.

Today Ukraine different from other countries that a significant number of its cities are located on traditional transportation and communication routes of the Eurasian continent. The question of the creation of Ukraine's international transport corridors will accelerate not

only the strategic goals of integration into the European community, but also addressing such tasks as attraction of additional investments into development of transport infrastructure, acceleration of the rate of output from the decline of domestic producers, improving foreign exchange earnings through transit, the growth of exported products.

Transport of Ukraine is a powerful communication system, which includes all its types (water, road, rail, pipeline, air). Transport's major production assets make up about 20% of the country's production assets.

All types of transport are developed in Ukraine. The road network, combined with transport centers and nodes, together with rolling stock, ports, warehouses and other farms, forms the transport complex of the state. There are 372 km of railway tracks, 78 km of inland waterways and 2,800 km of paved roads per 100 thousand km<sup>2</sup> of territory. Most of the freight and passengers are rail and road transport<sup>2</sup>.

Road transport is a short distance away from competition. Its great advantage is that it is almost independent of natural conditions and can deliver cargo on a door-to-door technology. On the density of highways (280 km per 1000 km<sup>2</sup>) with a hard surface, Ukraine ranks first among the CIS countries.

The main stage in the implementation of high-quality and efficient international freight transportation is the stage of choosing a carrier, which depends on the end result of the transport delivery process. It should be noted that under difficult crisis conditions, many carriers were forced to leave the market, but the largest and the strongest, accounting for almost 60% of all freight and passenger transportation, remain afloat (see Table 1)<sup>3</sup>.

Road transport holds first place in passenger transportation and second in cargo turnover. The length of the roads is almost 170 thousand km (155 thousand km of roads has a hard surface), but their quality by European standards is unsatisfactory. Imperfect fleet, lack of necessary service on the roads, high prices for gasoline make motor transport one of the most expensive modes of transport.

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<sup>2</sup> Prokudin, G. *Optimization of traffic on a road networkin. Economy and management. № 3(4).* 2006. P. 54–59.

<sup>3</sup> Transit freight for the period 2008-2019 years State service statystyky Ukrayiny. URL : <http://www.ukrstat.gov.ua>.

Table 1

### Leading trucking companies in Ukraine

Company name	Type of international activity licensed	Number of vehicles, pcs.
“Transalt” Ltd	cargo and passenger	75
“Agrotep” Ltd	cargo and passenger	63
“BM-Trans” Ltd	cargo	55
“West-Group-Trans” Ltd	cargo	49
“Orlan-Trans-Group” Ltd	cargo and passenger	61
“Car Company Ukrtrans” Ltd	cargo and passenger	72
“Rapid” Ltd	cargo and passenger	87
“Eurotrans” Ltd	cargo and passenger	78
“Epicenter” Ltd	cargo and passenger	117

It is appropriate to emphasize that Ukraine has all the prerequisites for creating a strong transit system at the international level and, as a consequence, increasing the volume of cargo transit. Yes, our country has a number of advantages over other European countries, since Ukraine has the shortest land, sea and air routes connecting Europe and the countries of the Asia-Pacific region. Interstate transit through Ukrainian territory is a large but not yet realized national resource.

According to the State Statistics Committee of Ukraine, we will compile a turnover table for all modes of transport for 2012–2018 (see Table 2).

Table 2

### Volumes of cargo transportation by different modes of transport

Years	Cargo transported by all means of transport (million tons)				
	Railway	Automobile	Cars	Pipeline	Air
2012	299,5	107,5	5,2	101,3	0,1
2013	303,1	114,1	6,4	104,6	0,12
2014	433,3	160,2	11,3	151,3	0,12
2015	395,6	158,3	10,9	154,2	0,1
2016	499,1	187,4	20,1	187,1	0,14
2017	505,4	200,3	21,3	202,6	0,13
2018	525,7	225,6	24,4	219,7	0,14

The location of Ukraine in the center of Europe, at the crossroads of the main transport destinations of the continent, necessitated the passage through its territory of international transport corridors, the direction of which coincides with the ancient East-West and South-North transit routes.

Ukraine's location is promising from the point of view of international transport and economic links, firstly, due to its favorable geographical position, and secondly, Ukraine is located at the crossroads of railway, road, air, pipeline routes connecting the eastern regions of Russia, Kazakhstan, the countries of Central Asia and the Caucasus with the countries of Central and Southern Europe, as well as the northern and central regions of Russia, Finland, Poland, the Baltic countries with the countries of the Black Sea basin. The main European countries exporters-importers of Ukraine in recent years – Italy, Germany and Poland<sup>4</sup>.

Not only east-west but also north-south links are expanding, and a network of so-called transit corridors is beginning to emerge. The most important highways are: Kyiv – Zhytomyr – Exactly Lviv – Uzhgorod; Kiev – Poltava – Kharkiv; Kiev – Uman – Odessa; Kharkiv – Zaporozhye – Simferopol.

The motorway road between remote from each other settlements or districts, which is designed for high-speed traffic large number of vehicles in two opposite directions. Highways – the major (main) on the transport routes and lines with high bandwidth or involving major traffic flows (passenger or freight flows). Vary the load (of stream size), functions (monofunctional and polyfunctional), hierarchy, modes of transport.

Extended multi-species transport routes passing through the territory of several economic regions or countries, referred to as transport corridors. To polimerstroy include, for example, rail-road Kiev – Ternopil – Lviv, road-rail-river Kiev – Dnepropetrovsk – Zaporozhye, etc.

The length of motorways Ukraine is behind many European countries. Low quality of roads and service stations creates problems in the integration of Ukrainian transport network into the European.

Major transport hubs are Kyiv, Kharkiv, Dnepropetrovsk, Donetsk, Kiev, Uman, Lviv. The role of road transport in long-distance traffic and international traffic. Main road “exits” from Ukraine road from Kovel, Lviv, Uzhgorod, Chernivtsi, Odessa, Izmail, Mariupol, Kharkiv, Sumy, Glukhov, Chernigov.

The development of transit opportunities of Ukraine is one of the main sources for replenishing the national budget and strengthening economic ties with neighboring countries. In particular, the building of

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<sup>4</sup> Prokudin G., Olskevich M., Chupaylenko O., Dudnik O. Development of vehicle speed forecasting method for intelligent highway transport system. *Eastern-European Journal of Enterprise Technologies*. 2019. 4/3(100). P. 6–15. DOI: 10.15587/1729-4061. 2019. 174255.

the TRANS-European motorway Kyiv – Madrid. Important for freight transport are “international transport corridors (ITC). On the territory of Ukraine pass four international transport corridors, namely: the pan-European No. 3; pan-European No. 5; pan-European № 7 the Danube (water); pan-European № 9 (Fig. 1–4)<sup>5</sup>.



**Figure 1. Pan-European № 3 (Berlin (Dresden) – Wrocław – Lviv – Kiev)**



**Figure 2. Pan-European № 5 (Trieste – Ljubljana – Budapest – Bratislava – Uzhhorod – Lviv)**

<sup>5</sup> Kunda N.T. Organization of international road transport. Kyiv : Word, 2010. 464 p.



**Figure 3. Pan-European № 7 Danube (water)**



**Figure 4. Pan-European (Helsinki – Saint Petersburg – Vitebsk – Kiev (Moscow) – Odessa – Chisinau) – Plovdiv – Bucharest – Alexandroupolis**

An important role in the development of freight transport is played by the MTC, because represent a complex of land and water transport routes with appropriate infrastructure in a certain direction, including auxiliary facilities, access roads, border crossings, service points, freight and passenger terminals, equipment for traffic management, organizational-technical measures, legislative and normative acts, which provide for the

carriage of goods and passengers at a level consistent with the requirements of the European community.

Every year the countries of Europe, who are the main partners of Ukraine in the foreign economic sphere toughen requirements to the technical condition of vehicles, due to environmental problems, and the number of registered environmental vehicles that perform road freight transport is constantly growing.

Given this fact, the Government has banned since 1 January 2014 the importation of vehicles that do not meet the Euro-3 standard. At the same time began to operate in the country, the ecological standard Euro-4. In 2016 Ukraine will enter into force on standard Euro-5, and from 2018 in our country can be imported only vehicles that meet the highest environmental standards Euro-6.

Today science has advanced a long way in the development of forecasting technologies. Specialists are well known methods of neural network forecasting, fuzzy logic, and the like. Developed appropriate software packages, but in practice they are, unfortunately, not always available to the average user, and at the same time, many of these problems can be quite successfully solved using methods of operations research, particularly simulation modeling, game theory, regression and trend analysis, implementing these algorithms in a widely known and widespread software package MS Excel.

We are going to implement the algorithm for constructing a predictive model described above. The solution to this problem implemented in MS Excel environment that allows to significantly reduce the number of calculations and time of model building.

Regression analysis is used when the relationship between variables can be expressed quantitatively in the form of some combination of these variables. The resulting combination is used to predict values that can take the target (dependent) variable which is calculated on a given set of values of the input (independent) variables. In the simplest case, for this purpose, standard statistical methods such as linear regression.

The advantages of this regression analysis tool are:

- the relative ease of plotting trend lines without creating a data table for them;
- a fairly broad list of types of proposed trend lines, with the most commonly used regression types;
- ability to predict the behavior of the process under study to an arbitrary (within common sense) number of steps forward and backward;

- possibility to obtain the trend line equation in analytical form;
- the possibility, if necessary, of obtaining an estimate of the reliability of the approximation performed.

We determine the trend that best approximates the actual data. For this purpose it is recommended to use an exponential, linear, logarithmic, polynomial, and power trend, which reduces the error of the forecasting model.

Having carried out a regression analysis of the volumes of international road freight transport and using the obtained equations of the trend lines, we determine the tabulated data on the volumes of international road haulage for each trend line for 2008–2020, we see its gradual growth (Fig. 5).

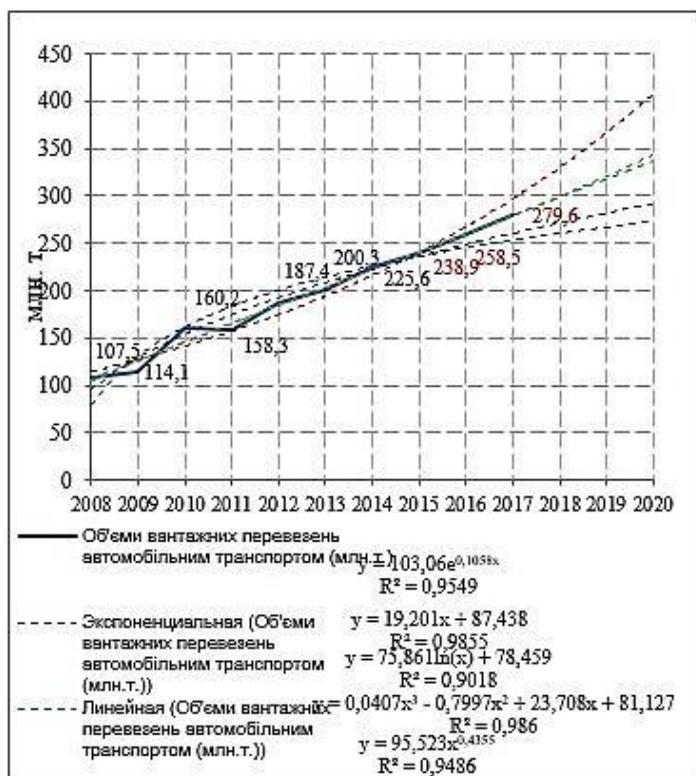


Figure 5. Regression analysis of international road freight transport volumes for 2008–2020

## **2. The main problems and technologies of international cargo transportation**

As evidenced by the analysis of the available data, in the absence of an adequate reaction from the Ukrainian state expected in the next 3-4 years, changes in the functioning of the market of transport services and access thereto, to a large extent can be reduced, the share of domestic motor carriers for domestic and international transport markets, which in turn will negatively affect the situation with the loss of transit potential of the country and could lead to a significant reduction in the national gross domestic product of the state.

On the introduction of more stringent norms and standards of functioning of the market of transport services and access are now working for international organizations, which operate in the transport sector (European economic Commission of the UN, the European Commission, the Organization for security and cooperation in Europe and international transport forum). The effect of the new norms and standards will apply to Central European countries and the countries of Eastern and South-Eastern Europe, Caucasus and Central Asia, will cover all modes of inland transport (road, rail, water transport and multimodal transport).

In the context of ensuring the realization of transit potential for the last 8 years has significantly increased the role of international road carriers (private companies, United by the Association of international road carriers of Ukraine). If during the period from 2005 to 2013, the transit cargo traffic through Ukraine pipeline and railway transport decreased significantly (respectively by 39,8% and 44%), then transit road transport of goods on the territory of Ukraine increased by 7,6 times. On the other hand, the tendency to diversion of transit cargo transportations through the territory of Ukraine from rail to road transport: the share of rail transportation in this period decreased by 8,66%, while the share of transit traffic by road transport the territory of Ukraine increased by 9,3%<sup>6</sup>. Ukraine has not been sufficiently prepared for the introduction of new, more stringent norms and standards:

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<sup>6</sup> Prokudin G.S. Prospects of cross-border cooperation of Ukraine in transport sphere. International Scientific Conference Innovative Economy: Processes, Strategies, Technologies / Conference Proceedings. Part II. Kielce. Poland: The Baltic Publishing. P. 53–55.

– the system of organization of international freight transportation, road transport is imperfect, and there is no systematic approach to ensuring the functioning of road transport;

– the rolling stock of the road transport fleet is technically obsolete and its updating is slow (only 11% of vehicles used in international transport meet the environmental standards of transport admission planned by 2016 under the European Conference of Ministers of Transport (no lower than “Euro-4”);

– the level of traffic safety is low, the road accident rates are much worse than in the EU countries (our country ranks fifth in Europe in terms of road accident);

The operational characteristics of the national transport infrastructure do not allow the implementation of the “European Agreement on the Operation of Crews of Vehicles Performing International Road Transport (ETP)” (practically no properly equipped parking and resting places for drivers).

Tougher rules and standards should be in place by 2020 in terms of the functioning of domestic and international market of transport services and access to it. To a large extent they will determine the further development and the formation of a transport space as the Central European countries and countries of Eastern and South-Eastern Europe, Caucasus and Central Asia. According to experts, the new rules and standards may significantly change the configuration of freight traffic. And in the absence of adequate state response on the part of Ukraine to external challenges – significantly displace Ukrainian (in particular automotive) carriers from the international market of transport services.

More stringent norms and standards concerning the functioning of the domestic and international market of transport services and access to it will cover all modes of inland transport (road, pipeline, rail and inland water transport and multimodal transport) and will be focused on the facilitation of border-crossing procedures, traffic safety and transport of dangerous goods, improving environmental and energy efficiency transport and transport infrastructure.

Special attention from the UN / ECE will be given to more effective enforcement of the existing legal framework of the region of influence.

It should be emphasized that in 2016–2020, the UNECE plans to strengthen its role in the formation of a pan-European and transcontinental infrastructure, as well as to expand the region of its influence: it is expected in particular that in the four major agreements in

the field of transport infrastructure will be joined by new countries, primarily from Eastern and South-Eastern Europe, Caucasus and Central Asia.

Thus, given the above, we can say that the lack of state support and reduction of the presence of the Ukrainian transport organizations can lead to a substantial decrease in gross domestic product and the role of Ukraine as an influential player in the domestic and international market of transport services.

As for the technology of international cargo transportation, it should be noted that market relations impose on the transport strict requirements to accelerate time of delivery of goods, while minimizing transportation costs. Between the producer and consumer to a complex system of transport relations, which should ensure a high level of transport service quality.

International cargo transportation depending on the mode of transport can be the following: in the case of water connection, the sea and river modes of transport are used, carrying out the transportation of cargoes and passengers by waterways, both natural (rivers, lakes, seas, oceans, straits) and artificial (canals, reservoirs and other). Water transport requires vessels, ports and waterways.

Allocate main river paths, incl. international, which services foreign trade in some countries, interregional services that operate between large areas within the country, and local services that serve intra-area communications.

All inland navigation vessels are distinguished as follows: by area of navigation; by type of transportation and work performed; housing material; the type of engines and motors; the principle of motion; flight duration.

In road transport, international freight is carried out by specialized vehicles of different carrying capacity. The main normative documents governing the carriage of goods by road are the Charter of Road Transport and the Rules of Carriage of Goods by Road in Ukraine.

Road transport is carried out, which are classified by:

- belonging to transport (public transport, departmental transport, own transport of business organizations and units);
- distance of transportation (suburban, long distance, international);
- ways of organizing and performing transportation (centralized, decentralized, direct, mixed, combined, container, batch);

- duration of transportation (permanent, seasonal, temporary);
- types of cargo (by type of product or type of container);
- sizes of cargo desks (mass, party, small-party).

The main stages of the technological process of transportation of goods by road:

- acceptance of cargo for transportation;
- marking and sealing of cargo;
- car loading;
- registration of documentation;
- carrying out the process of transportation and delivery of cargo to the recipient;
- unloading the car;
- receiving the goods by the consignee;
- payments for freight.

In the case of a railway connection, by type of departure, that is, taking into account the size of the consignment sent by rail, the following shall be distinguished.

Smalls – they have a place when a consignment of goods presented for transportation on one transport document is not required to provide separate cars (in the dispatch mass included the mass of the cargo, containers or packing, and adequate mass transportation facilities). Transportation of small consignments is carried out usually in a mixed universal car. In this car parcels owned by different shippers, combined into a single wagon consignment transportation design for separate consignment notes.

Carload shipment carload shipment is considered a shipment, charged for one consignment of goods for which there is also a separate car.

Container shipment, container shipment is considered freight that are charged with one transport document for carriage in container, or a container empty condition.

If any of the following methods of freight transport, the technology of process of their delivery by road, rail, water, air transport or their various combinations, including handling, customs and other operations aimed at reducing the time of cargo. To date, the process system of multimodal transport represents the delivery of the first vessel and subsequent unloading to the site of the port and load onto a truck or the platform to continue moving goods to customs (where the inspection and registration), and then transfer to the consignee.

Implementation of measures to increase the throughput capacity of road checkpoints at the customs border of Ukraine will create the conditions for a quick and comfortable crossing the border of Ukraine in the framework of the volume of motor traffic across the border, which are formed in the present and in the future in the coming years. Note that throughput in some cases can be increased by changing some parameters, such as reducing the time of wait in international checkpoints, increasing the number of lanes on the roads, increasing speed, through improving the quality of the roadway.

The length of railway network of the international transport system of Ukraine amounts 3162 km, of which 92,3% – double track line, 77,3% – electrified, 90% – equipment-locking. Over the last 5 years in the areas of transport corridors electrified 500 km of tracks, reconstructed 85 stations, increased train speeds. The construction of new railway network with the levels of speed up to 300 km per hour and a fundamentally new rolling stock and gauge of 1,435 (European standard) mm 1520 mm. instead of the high-speed transport will be used for passenger and light truck traffic. This option is related to the period after 2020<sup>7</sup>.

Open railway ferry crossing Ilichevsk – Poti – Batumi, which is one of the main links of the corridor TRACECA (Europe – the Caucasus – Asia). Put into operation the second phase of the grain loading complex in Ilyichevsk sea port engaged in the transshipment of grain in countries of South America, Southeast Asia, Saudi Arabia and the like.

Renovated a significant number of road sections Chop – Lviv – Kiev and Novi yarylovychi – Chernigov – Kiev – Odessa. Reconstruction of roads in the area, the MTC has allowed to increase the permissible weight of vehicles from 36 to 40 tons. Reconstruction of existing roads involves bringing their parameters to the international requirements and standards. Additional to the existing construction of new high-speed roads mainly in certain areas in a new row.

To ensure the efficient operation of transport corridors is important to create the border and customs checkpoints, as well as transport and storage facilities for cargo processing, which are divided into:

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<sup>7</sup> Prokudin G., Chupaylenko O., Dudnik O. Development of Ukraine's international transit potential. *European Journal of Intelligent Transportation Systems*. N.1(2). 2019. P.26-31. DOI: 10.31435 /rsglobal\_ejits/ 31072019/ 6580.

– border land, which are located in Kovel, Rava-Ruska, Mostyska the, chop, Kharkiv, Sumy, Chernihiv;

– land (Kiev, Zhytomyr, Vinnytsia, Poltava, Sumy, Dnipropetrovsk, Kirovohrad, Cherkasy, Simferopol, Melitopol, Odessa, Khmelnytsky, Ternopil, Rivne, Lviv, Ivano-Frankivsk);

– water (in Reni, Izmail, Ust-Danube, Belgorod-Dnestrovsky, Illichevsk, Odessa, Yuzhny, Nikolaev, October, Kherson, Skadovsk, Yalta, Berdyansk, Mariupol, Zaporozhye, Dnepropetrovsk, Kiev).

International transport network of Ukraine and the current systems of transportation in the conditions of transformation economy require fundamental changes in operational and technological activities, as well as replacement of vehicles and equipment the main requirements in these matters are:

1) maximum reduction of transportation costs;

2) reevaluation criteria in approaches to the definition of transport efficiency, the transition from the workload of transport in economic and financial;

3) providing adequate velocity of the transportation and delivery of passengers and cargo;

4) ensuring the safety of cargo during transportation;

5) improving the quality of services in transport.

Special geographical position of Ukraine, which allows it to rightfully take the place of a transit country, and as a consequence of the large number of existing transit corridors, highways of international and European importance, major transport hubs, which concentrate in themselves the railway stations, airports, river and sea ports, places high demands on the control system of transport of passengers and cargo.

As evidenced by the analysis of the available data, in the absence of an adequate reaction from the Ukrainian state expected in the next 3-4 years, changes in the functioning of the international market of transport services and access thereto, to a large extent can be reduced, the share of domestic road carriers on the international transport markets. The latter, in turn, have a negative impact on the situation with the loss of transit potential of the country and could lead to a significant reduction in the national gross domestic product of the state.

On the introduction of more stringent norms and standards of the international market of transport services and access are now working for international organizations in the field of transport economic

Commission for Europe, UN, European Commission, Organization for security and cooperation in Europe and international transport forum. The new norms and standards will apply to Central and Eastern and South-Eastern Europe, the Caucasus and Central Asia, covering all modes of inland transport (road, rail, inland waterway and mixed transport). The introduction of changes is aimed at the development of cross-border transportation in the pan-European and transcontinental market of cargo and passenger transportation by simplifying border procedures, ensuring the safety and traffic of dangerous goods, improving the environmental and energy efficiency of transport, the proper functioning of transport infrastructure and so on.

## CONCLUSIONS

Creating a unified international transport and logistics system, geographical position of Ukraine's transport space, as well as the presence of many transport corridors requires the following:

- separate analysis of the management of the transport nodes;
- ensuring coordination and interaction of all modes of transport;
- introduction of modern achievements of the scientific and technological revolution in the work of transport.

The development of an efficient organization of cargo delivery with the coherence of all links in the transport process has necessitated a large number of theoretical and experimental studies on various issues of transport. On functional grounds they can be classified in the following areas:

- general questions about the theory of transport systems and processes;
- operational properties of vehicles;
- interaction of modes of transport and freight forwarding activities;
- formation of logistics systems.

The study of transport processes has made the following conclusions:

1) one of the main factors affecting the efficiency of the transport system is the quality of routing of freight traffic and the level of interaction of different modes of transport;

2) stochastic characteristics must be taken into account when modeling the individual components of the transport system to obtain adequate results;

3) the assessment of the performance of international freight traffic in market conditions requires improvement of the relevant performance criteria.

### **SUMMARY**

Modern market conditions require Ukraine to form a competitive logistics system with the further entry into the international world macrosystem, which will allow Ukraine to form a competitive transport system and effective infrastructure, strengthen international relations with other trade regions and countries.

The question of improving competitiveness on the world market is one of the most urgent areas of development for Ukraine, and clusterization is one of the ways of effective economic development and its maintenance on the proper level in the system of world economic relations. Taking into account that the transport and logistics industry plays an important role in the public production of our country, the formation of transport and logistics clusters will have great social and economic significance for both the regional and national economies. Clusters become the poles of economic growth, not only of individual regions in which they are localized, but also of the state as a whole. The task of the state is to create the necessary conditions, an attractive investment environment for the emergence of new ones and the development of existing clusters.

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