

# Transport Geopolitics in the Global Food System

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**Abstract**—The article is devoted to the development of the global transport system in the context of the transformation of the geopolitical space, the main directions of the development of the transport component of the economy in the global food system are substantiated.

**Keywords**—world transport system; transport corridors; global food system; food security

## I. INTRODUCTION

The international economic integration of states, the formation of supranational geo-economic associations and consortia requires special attention to the formation of transport systems at the geopolitical level. The changes in this regard in the world transport system are making significant adjustments to the development of the global food system and food security.

The main purpose of this article is an analytical overview of the trends in the world transport system, the impact of globalization of the economy on the logistics aspects of the transport system in the light of the development of national food security and identification of modern problems and analysis of factors affecting the geopolitical component of the transport system in the world food system.

## II. METHODOLOGY

The article used scientific methods of abstraction, analysis and generalization of published data and Internet resources, comparison and other methods of empirical and theoretical levels of cognition. The instrumental and methodical apparatus used by the authors of the article includes table representations of the received statistics and analytical data. The study is based on a dialectical approach to the study of economic processes and phenomena.

## III. OVERVIEW OF THE MODERN TRENDS IN THE DEVELOPMENT OF THE WORLD TRANSPORT SYSTEM IN THE GEOPOLITICAL CONTEXT

The transport component of the economy of states requires solving pressing problems at the inter-country level. This contributes to the creation of a global transport system that will reduce administrative and infrastructure barriers. In addition, the world transport system is implementing a trend of geopolitical transport that can give regional communications a world-class level. Depending on

geographical location, regions are able to form a transport system on their territory with geopolitical dynamics directions of different orientation. The processes of globalization, which pose new risks and threats that lead to a reassessment of the basics of food security and the struggle for food resources, eventually led to the world transport system taking over geopolitical significance. However, the impact of the global transport system depends directly on the logistics component of the food market infrastructure. Since the key modes of transporting agricultural products and food are road, sea and river, rail and air transport, the totality of these modes of transportation forms a single global transport system.

Assessment of the level of development of the transport system by type of transportation is made using indicators of length (distance) and density of the transport network (defined as the ratio of the length of the tracks to a unit of area of the territory or to a certain amount of residents) and calculation of the share of a particular type of transportation (in %).

TABLE I. COUNTRY LENGTH OF RAILWAYS

No	Country	Length of Railways (km)	Electrified (km)
1	USA	293 564	< 1600
2	China	124 000	80 000
3	Russia	87 157	43 700
4	Canada	77 932	25 367
5	India	68 525	
6	Germany	43 468	19 973
7	Australia	36 968	2940
8	Argentina	36 917	136
9	Brazil	29 850	24 800
10	France	29 640	15 140
11	Japan	27 311	
12	Ukraine	21 733	
13	South Africa	20 986	
14	Italy	20 182	9752
15	Poland	19 231	3971
16	United Kingdom	16 837	
17	Spain	16 102	5 429
18	Mexico	15 389	22
19	Kazakhstan	14 184	9623
20	Sweden	14 127	4300

Source: [1].

Table 1 shows that the level of availability of railways, based on the rating of states, is higher in the regions of North and South America, Eurasia and Australia. Africa is represented only by the southern part. According to the table, it is possible to calculate the density of railways network based on the length of railways and the area of the country, the results are presented in Fig. 1.

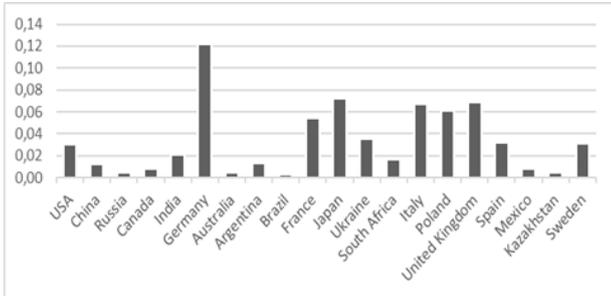


Fig. 1. Railways Density

Source: compiled by the authors

It is evident from the calculations and histograms that the density (and, therefore, transport accessibility) is the most in Germany, and other European countries, so the European region has great logistical opportunities.

A large proportion of vehicles and routes are concentrated in developed countries, and this is also reflected in the ranking of countries for the length of highways and expressways (Table 2).

TABLE II. COUNTRY LENGTH OF ROADS

№ п/п	Country	Length of Roads (total in km)	Motorway Length (km)
1	USA	6 650 000	259 032
2	India	5 603 293	1 581
3	China	4 773 500	136 500
4	Brazil	1 751 868	11 000
5	Russia	1 452 200	866
6	Japan	1 215 000	8 050
7	Canada	1 042 300	17 000
8	France	1 028 446	11 882
9	Thailand	1 004 310	545
10	South Africa	947 014	1 400
11	Australia	823 217	3 132
12	Spain	683 175	16 583
13	Germany	644 480	12 917
14	Sweden	579 564	2 050
15	Indonesia	523 974	1 851
16	Italy	487 700	6 758
17	Finland	454 000	863
18	Turkey	426 906	2 289
19	Poland	423 997	3 421
20	United Kingdom	422 310	7 242

Source: [1].

Road and air transport are now the fastest to develop and the role of sea transport has increased significantly. More than 80% of all foreign trade cargo is transported by sea, and the

fleet of container ships of large cargo capacity continues to expand.

The Russian Federation's cargo turnover shows a trend in the transport development (Table 3)

TABLE III. CARGO BY TYPE OF TRANSPORT (BILLION-TON-KILOMETERS)

	Year			
	2016	2017	2018	2019
Transport of all Industries	2518	2703	2772	2824
Including:				
Railroad	1141	1226	1282	1307
Road	105	115	119	127
Sea	22.7	22.2	19	17
Intracoastal Waterway	25.8	26.9	27.8	26.93
Air	2.97	3.63	3.72	3.49

Source: compiled by the authors, based on [2].

From the above (Tables 1 and 2) it can be said that transport availability is much worse in developing countries, while developed countries account for the largest share of the cargo and passenger turnover of the world's transport system.

In the process of analyzing regional transport systems, it is necessary to identify the North American system, which is the world's leading system in terms of total length of communication routes, frequency and density of the network. [3] In addition, the single transport system of CIS countries occupies about 10% of the world transport network and therefore leads in terms of total cargo turnover. Currently, the parameters of the world transport system are the following ratios presented in Table 4.

TABLE IV. PARAMETERS OF THE GLOBAL TRANSPORT SYSTEM

№ №	Parameters	Type of Transport				
		Land		Water		Air
		Railroad	Road	Sea	River	
1	Length, million km	13.2	27.8	—	0.9	—
2	Cargo transportation, % of world volume	9.0	13.0	62.0	4.0	1.0
3	Number of employed, million people.	More than 100 million				

Source: compiled by the authors, based on [4].

The total length of the world transport network has stabilized by the types of routes, but there has been a significant qualitative change in the network, the structure of transport between some types of transport, and as a result, the transport intensity of the world food system. In this regard, the world transport system receives geopolitical content.

#### IV. STUDY ON THE ROLE OF MULTIMODAL CENTRES AND THE LOGISTICS COMPONENT OF THE TRANSPORT NETWORK STRUCTURE IN THE WORLD FOOD SYSTEM

Multifunctional/multimodal centres of international transport communication, which realize the essence of infrastructure, get a special role in the world transport system. Geographically, such multimodal centres are located in a single country, but the logistical importance of these centres to provide the world's transport systems goes far beyond the national importance. In general, the centers are located in the largest cities, which are nodes providing high-speed transport relations, for example, a chain that combines several types of transport: ship-car-plane-train, car-train-car. Examples of transport and distribution multimodal centers of international importance include Frankfurt and Hamburg (Germany), Hong Kong and Shanghai (China), Singapore (Singapore), Dubai (United Emirates), Dallas and Los Angeles (USA), Paris and Marseille (France), London (UK), Moscow, Simferopol and Vladivostok (Russia), Rotterdam (Netherlands), etc.

Such centres of international importance have a major impact on the global food system by facilitating cross-border transport in the form of global (international) transport corridors. Such corridors are links in the supply of food products between multimodal centres in the global food system. Their supply and effective operation depends, among other things, on the strict implementation of accompanying government obligations, such as the introduction of favourable customs policies, tax tariffs, administrative legal relations, the provision of a preferential tariff grid for additional logistics services and are able to activate the economic component of the regions connected by transport corridors.

The current global strategy to reduce food costs is constantly searching for new regions where food is cheaper at the expense of low labour, production and material costs. In this situation, there is a tendency to shift food production centers to the regions. However, a balance needs to be struck between the increasing cost of food transportation and, consequently, the risks associated with longer delivery times and reducing production, material, labour and other costs. Nevertheless, the dynamic development of new transport network concepts contributes to the levelling of economic development of related regions and creates new logistical opportunities for them.

In the Russian Federation, for example, the centre of geopolitical space has shifted westwards, and the northern and eastern regions have a very weak network of transport communications, which affects the country's food security system. At the same time, geo-economic infrastructure and transport projects are contributing to the further integration of economic activity in one way or another. One of the main projects is the Strategy for spatial development of the Russian Federation for the period up to 2025, approved by the order of the Russian Government on February 13, 2019 No. 207-r and formalizes the domestic provisions of the geopolitical reality, including its transport component [5].

However, the transport system of the Russian Federation is only one of the components of the world transport system, and the combination of all the above-mentioned factors, their interaction among themselves leads to the fact that the world transport system is developing very contradictory.

As noted above, there is a global trend to accelerate the transport process (high-speed highways, railways, high-speed specialized vessels), and on the other hand, the excess tonnage of ships forces the reduction of running speeds, and the policy of reducing energy costs leads to the reduction of speed on land transport types. In multimodal centres, differences between central points, nodes and linear elements of the transport system are increasing, for example, supply imbalances between sending and receiving port countries, which creates the need to organize non-loading systems [6]. Another contradiction is the construction of powerful transport corridors, but at the same time the formation of quite small transport flows, the construction of identified highly specialized transport and the creation of narrowly targeted transport lines, the so-called feeder transport system [7]. If we consider feeder transportation in Russia, an example is the delivery of imported cargo to the port of St. Petersburg from Hamburg, where containers from the world's congestion centers, are imported by main vessels, then the cargo is delivered by road or rail to Moscow, and then the cargo is dispersed all over the country.

The reviewed trends in the global transport system have a very significant impact on the global food system and, in particular, on the quality of food. As food products move through the transport and logistics chain, the quality of products declines, with environmental, social and economic consequences, resulting in food security problems. The deterioration of food quality is a major issue related to the quality, flexibility and logistics of food transportation. The problem of food delivery from farmer to processors or food retailers and preservation of food quality is a very pressing problem in many countries, especially with regard to perishable products, as the decline in their quality leads to heavy economic losses.

The solution to individual problems may be the optimization of transportation and more careful planning of food delivery routes by all related types of transport. Planning should be carried out on the basis of storage and transportation requirements for various products, as well as automatic information collection, such as storage/transportation temperature, humidity and other climatic features of food transportation. Current radio-frequency identification and information readers (RFID, Radio Frequency Identification) allow unique labels to be assigned to products Depending on the technology used, labels can only identify "RO" (Read Only) food, or contain a memory unit for reading/writing information "RW" (Read and Write), a so-called electronic passport, which allows to optimize the processes of food reception and shipment, record food in real time monitor the quality of products and determine the remaining expiration date. The use of RFID systems allows to optimize the procedure of passport control of food products throughout the supply chain, which plays a very significant role in the information system included in the general food security system of the Russian Federation.

#### V. CONCLUSION

As a result, it can be said that geopolitical ideas that have become widespread in the world transport system are born of the formation of a global world food system, a world space with challenges and threats, a struggle for food resources. Moreover, solving a significant number of geo-economic and

socio-political problems is not possible without the proactive development of a global transport system capable of increasing or shrinking depending on geopolitical reality, which is fundamental in the present world order.

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