Mechanism of formation and development factors of international transport corridors

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Abstract. International transport corridors are developing under the influence of a complex of factors and conditions. The decisive factor in the development of international transport corridors is the spatial localization of transport routes in neighbouring countries and the possibility of their integration into a unified transport system. In addition to territorial proximity, the formation and development of international transport corridors are also influenced by economic, military, legal and institutional factors. The effect of these factors can be both stimulating and limiting in relation to the country's participation in the transport corridor. This study analyses the essence, factors of formation and development of international transport corridors, examines the structure and mechanism of their creation based on the integration of transport systems of neighbouring countries to ensure stability and stable passage of transport and logistics flows through their territory.

1 Introduction

Under the conditions of external and internal restrictions, achieving stability in the development of the economies of countries, their enterprises and companies is possible by strengthening ties between participants in production activities. Such connections and contacts ensure the reliability and sustainability of supplies in international supply chains. These connections are realized by transport as a branch of the economy. Transport moves goods and passengers and thus unites various economic entities, consumers of finished products, suppliers of raw materials, intermediaries. Representing a complex of ways of movement and rolling stock, transport plays the role of an integrator of various participants in the production process, often located in opposite regions of the world.

The importance of international transport corridors (ITC) causes great attention to their study by scientists from various countries. In their research, they consider various aspects of the functioning and development of transport corridors. Our study reveals the essence, role and significance of ITC in the implementation of transnational transportation, as well as a model of their structure and functioning.

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2 Materials and methods

Interpretations of transport corridors take place in the studies of various scientists, as well as in the program documents of integration associations. For this purpose the authors use such terms as "development corridors", "economic corridors", "multimodal transport corridors", "transit corridors", "trade corridors", "logistics corridors", "main corridors and auxiliary networks" [1]. Despite the differences in all concepts, they are united by the transport cooperation of states to ensure foreign economic activity. From a spatial point of view, transport corridors are links in the global transport network and link the transport flows of several states. The term "international transport corridor" has different definitions (Fig. 1).

Definition	Source, authors
An international transport corridor is a part of a national or international transport system that provides significant international freight and passenger traffic between certain geographical areas, includes rolling stock and stationary devices of all types of transport operating in this direction, as well as a set of technological, organizational and legal conditions for these transfers.	United Nations Economic Commission for Europe (UN ECE)
An international trade (transport) corridor is a structure of four elements (commercial and financial customs and practices; government requirements; infrastructure and equipment; participants) that interact with each other and with their surroundings in order to import and export a particular country.	United Nations Conference on Trade and Development (UNCTAD)
A transport corridor is a generally linear area that is defined by one or more modes of transportation crossing the limits of more than one city or county like highways, railroads or public transit which share a common destination.	M. Roberts, M. Melecky, T. Bougna, Y. Xu
International transport corridors are a set of the most technically equipped main transport communications, as a rule, of various modes of transport, providing transportation of passengers and cargo in international traffic in the directions of their greatest concentration, connecting different countries.	L. Mirotin, O. Larin
International transport corridor is a set of multifunctional objects of transport (roads, vehicles, terminals, etc.), logistics (multimodal logistic centers, customs and border posts, packaging, etc.) and digital (information system) infrastructure, as well as services that provide consolidated goods movement in global chains / networks.	V.M. Isaienko, D.O. Bugayko, M.Y. Grygorak, O.V. Ovdiienko
The international transport corridor is the backbone of a national or international transport system, which provides significant international freight and passenger traffic between separate geographic areas, considering modern geo-economic conditions.	E.V. Kryukova

Fig. 1. Definitions of the concept of "international transport corridor" in the interpretation of various authors [2-7].

Based on the above approaches and definitions, we will consider under the term "international transport corridor" a part of a national or international transport system that includes various modes of transport and communication routes (highways) laid in a specific direction to ensure cargo flows strategically important for the economy, provided with a developed international transport infrastructure and functioning within the framework of common, uniform requirements for technology, equipment and legal regulation of international transportation.

3 Results

ITC play an important role both in the development of national economies and in the world economy as a whole. The functioning of ITC is influenced by a complex set of factors. We define these factors as spatially expressed conditions and prerequisites for the effective development of transportation between countries in cross-border directions. These factors can not only stimulate transport between countries, but also interfere with their normal functioning, creating difficulties and introducing a destructive nature. For many countries of the world, the entry of their transport communications into ITC is an important opportunity to overcome the existing backwardness in their development. Transport corridors make it possible to overcome the isolation of their territory and the monoculture of the economy in the agricultural or mining sectors. Therefore, as an initial factor contributing to the participation of countries in ITC, we identify the geographical location of the country. The territorial proximity of the countries represents for their national economies a unique prerequisite for development through the formation and use of cross-border transport communications [8].

We consider the emergence and development of ITC as a complex cross-border transport and logistics structure that has emerged in the process of globalization of the world's economies. It is globalization, by linking the economies of the world, that has created strong and sustainable transport flows between them. Therefore, ITC facilitate the movement of large volumes of goods and raw materials from one country to another. This pushes the countries of the world to establish more intensive transport links between themselves, which leads to the formation of ITC.

An important factor contributing to the development of ITC is economic integration. The strengthening of ties between member countries of economic unions contributes to the intensification of the transport of goods between them. In turn, the intensification of traffic flows is one of the conditions for the formation of a common market and a single economic space between states. Inclusion of transport routes of neighboring states into the composition of ITC will contribute to the promotion of integration. For example, integration processes within the European Union have led to the need to develop a common transport policy and the formation of a single transport space, within which 9 pan-European (trans-European) transport corridors have emerged [9]. Similarly, the creation and formation of the Eurasian Economic Union (EAEU) was facilitated by the inclusion of the highways of Belarus, Russia and Kazakhstan in the structure of the ITC "Western Europe – Western China" [10].

The formation of ITC is complex, multifaceted and lengthy. Figure 2 shows a model of the structure of an ITC.

The key elements of the ITC are:

• Infrastructure, represented by transport communications, facilities that serve transport and ensure the rhythm and safety of transportation,

• IT-Communications, the function of which is to create a digital environment for coordinating the work of various modes of transport involved in the movement of goods within the ITC. IT-Communications are a means of managing transportation work within the transport corridor,

• Service and logistics providers that organize transportation and control over their implementation. These include producers and consumers of goods, transport infrastructure and warehousing facilities [8]. It is they who build the most convenient and optimal routes and schemes for the delivery of goods in various parameters and take into account the time of delivery of the goods, the distance of transportation, the cost of transport and related services.

• Transport companies carrying out the movement of goods using their vehicles. They perform important cargo transportation work, moving goods from one point in space to another.

• Transport authorities that regulate the activities of various means of communication through the development and enforcement of regulations in the field of transport.

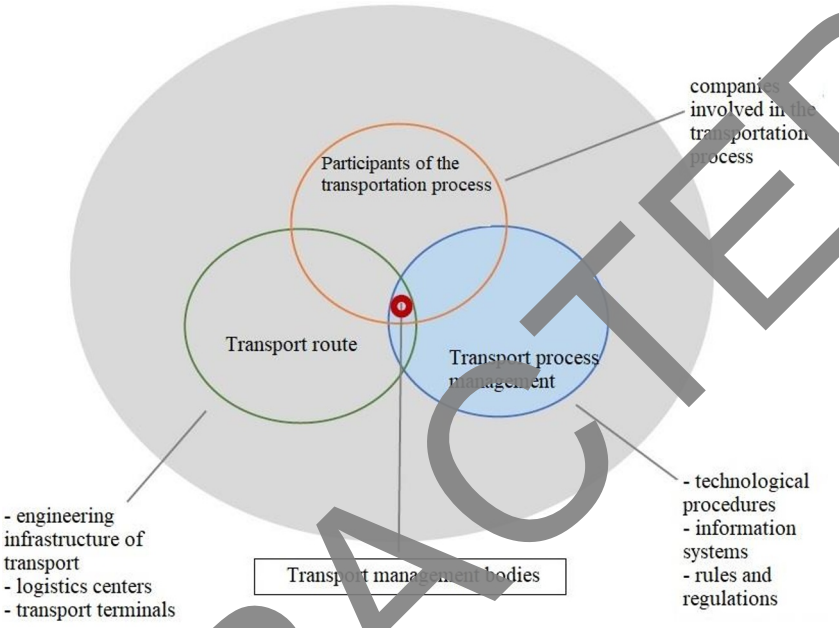

Fig. 2. Model of the structure of the ITC.

ITC should have integrated management in the form of a single body coordinating the activities of all participants in the transportation process. This will ensure the viability of the transport corridor and the economic efficiency of its operation. The basis for the transportation of goods in the ITC should not be its individual sections, but the general chain of transport and production activities. The efficiency of the functioning of the transport corridor is determined by the economic benefits of transportation, the distance of the route, is characterized by useful actions related to the modal organization of transportation and the availability of their choice.

4 Discussion

Participants of the ITC pursue their economically significant interests in the process of transportation. These interests do not always coincide with each other. At the same time, the success of the creation of an ITC and its effective development is possible only with the maximum convergence of the interests of all its elements and finding a compromise. The State uses its entire arsenal of means to integrate into existing or projected ITC and to carry out transit traffic on its territory. For this, special international agreements, tax incentives, state credit guarantees are used. In more developed countries, budget allocations are used for these purposes.

The formation and development of ITC is of a contractual nature between the countries involved in their operation. Therefore, we consider the creation of a transport corridor as a set of agreements aimed at including the territory of the participating countries in the

existing and future transport and logistics flows. In this regard, we can be interpreted the transport corridor as a specially developed agreement of the participating countries for the implementation of transportation through their conjugate territory. Such an agreement is based on international legal acts regulating the joint provision of international transport and logistics services.

The mechanism for the formation of an ITC begins with the preparation and subsequent signing of an international agreement by all interested states through whose territory the ITC will pass. At this stage of the creation of the transport corridor, the leading role belongs to the ministries of transport and roads and communications, diplomats and other governing bodies involved in multilateral negotiations to agree on the route of the corridor, the regulations for its use and the conditions of transport services. At the next stage of the mechanism for the creation and operation of an ITC, special supranational (international) bodies are formed on the basis of the agreements reached. Their goal is to coordinate transport work on the formed integration routes of cargo transportation.

The following conditions exist for the inclusion of transport communications of individual countries in the ITC:

1. Coincidence of the highways of the national transport system with the integrated directions of ITC agreed by an international agreement. The composition of ITC includes only those highways that represent the main vectors of relations between countries, supply channels of goods serving international and global value chains.

2. Maximum use of existing transport communications. To do this, the transport routes passing through the country and included in the ITC must be in a technically satisfactory condition. This should be constantly monitored and supported by the corridor member country to ensure the safety and comfort of transportation.

3. Competitiveness of the price of transportation along the route of the ITC. To do this, those highways are selected as part of the transport corridor that allow the transportation of large volumes of cargo systematically, with minimal dependence on natural and weather conditions and in a relatively short time. This creates the possibility of transporting goods at minimal cost, which makes the route of the ITC cost-effective.

4. Acceptable terms of cargo transportation in comparison with competitive routes. This is achieved by choosing the optimal shortest route in given conditions of relief and hydrography, taking into account the seasonality of transportation by many modes of transport.

5. Proper quality of transportation, expressed in safety, timely delivery of goods, their safety, completeness of information about the state of the cargo and its location at any given time. The reliability of transportation is achieved through the use of digital IT-technologies and services for tracking cargo transportation, satellite systems for servicing information flows accompanying transportation.

6. Organization of intermodal transportation using several modes of transport for transportation along the routes of ITC. Intermodal transport links can duplicate each other, but at the same time they can be interchangeable. This provides an alternative in choosing the most appropriate and optimal route and vehicle.

As a technically complex production system, ITC combine rolling stock and related engineering and technical devices that serve transportation [11]. Therefore, the development of ITC is influenced by the technical factor. It determines the technical parameters of the functioning of the transport corridor according to the possibilities of cargo transportation. An important aspect in this case is the interchangeability of different modes of transport as the possibility of forming multimodal transportation, maintaining duplication of supply directions by different modes of communication, as well as faster and easier transition from one mode of transport to another. This is especially important for the

transshipment of goods from one type of transport to another or the use of a container transportation method as the most versatile for various types of goods [12].

ITC can be viewed as an integration of economics, technology and law, which determine the possibility of cross-border transportation on the basis of international treaties and agreements. In this regard, the institutional factor in the development of ITC is important. It is expressed in the presence of common, unified transportation management bodies as one of the conditions for the development of ITC. There is also a legal factor. These are the legal norms of the national and international legal systems that regulate the creation and operation of the ITC, the implementation of transportation along the highways of the countries that are part of it.

Among the negative consequences associated with the functioning of transport corridors, we can note the deterioration of the environmental situation. The creation of a transport corridor leads to the intensification of transportation, and this increases the degree of environmental pollution [13]. Another negative effect that accompanies the development of ITC is the asymmetry of the country's economic space. It arises due to the redirection of traffic flows along the main highways that are part of the transport corridor to the detriment of other means of communication available in the country. Therefore, regions that are far from the ITC do not receive any development incentives and become depressed areas [14]. At the same time, the inclusion in the transport corridor of highways already laid across the country's territory is an additional incentive for enhancing the economic development of the regions.

The design of ITC intensifies the competition between neighboring states for the right to pass routes through their territory. This competition takes place not only for participation in transportation, but also for obtaining investments for the arrangement and development of transport and logistics infrastructure. This problem is especially urgent for inland states deprived of access to the sea.

The importance of ITC is manifested not only in obtaining commercial benefits from their use, but also in aspects of national security in the economic, military, industrial, demographic and food and social spheres of the life of the state. At the same time, it is political agreements that give the necessary stability to the functioning of ITC. The laying of the route of the ITC through the territory of states that maintain good-neighbourly peaceful friendly relations among themselves is the key to the success of transport communications and the safety of transportation.

5 Conclusions

Summarizing the results of our research, we can note that ITC are complex entities. They are integrated the transport routes of individual states into a single interstate transport and logistics system. ITC are designed to increase the efficiency and reliability of traffic flows along the most rational routes for the transport of goods. At the same time, the formation and development of transport corridors is carried out under the influence of various economic, technical, legal conditions and factors that can act as incentives or as limits in relation to the country's participation in international transport.

By their structure, ITC unite infrastructure facilities, freight companies and transport authorities that manage the transport and logistics flow. The mechanism for the formation of an ITC is of a contractual nature between the countries and is based on documented agreements on the inclusion of transport routes and related engineering, road and logistics infrastructure in a single route. Such a route should ensure the efficient transportation of goods both between neighbouring countries and in the direction of other countries. At the same time, an important aspect is the complementarity of transport communications of neighbouring countries in ensuring the sustainability and stability of transit cargo

transportation. It depends on the engineering and technical docking of the transport systems of the states included in the ITC.

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