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Forming a Symbiosis of the Transport Services Market and Innovation in Transport

This study aims to establish a harmonious interaction between the transport services market and innovation development in the transport sector. A comprehensive set of measures must be implemented to ensure a long-term presence in the European transport services market. These measures should promote the achievement of sustainable development goals, creation of a unified European transport system, strengthening of competitive advantages, and efficient management of resources in transport and logistics companies.

The article examines the functioning of transport services market in the context of innovative activities and construction of an organizational and economic platform for its operation. It establishes that transport services market's success hinges on introducing innovations and investments, as these processes significantly impact any country's economy.

The key factors in forming the transport services market are outlined: organizational, economic, social and cultural, political, managerial, military, infrastructure, and resource-related. The article also identifies main trends in the formation and development of transport services market.

transport services market, transport system, innovation, innovation activity, investment, technological progress, digitalization

Problem statement. An important component of the symbiosis of transport services market is the introduction and use of innovations and know-how to maximize the availability and profitability of transport logistics in interregional and international communication. The expansion of global and regional markets is primarily due to the increase in international contacts between Ukraine, the EU, the US, and other countries providing military and humanitarian assistance after the introduction of martial law in Ukraine. Introducing large-scale innovative technologies requires a clear organization and conduct of various calculations and research preparatory work, of which transport services market is a part. Analyzing transportation services market in Ukraine, it can be noted that main obstacle on the agenda is the lack of innovation, which prevents this sector from reaching the level of the world's leading countries.

Analysis of key research and publications. Such scholars have considered the issues of justifying the need for innovation as A. Atkinson, I. Alekseev, I. Aleksandrov, S. Beera, M. Vovk, P. Grechan, H. Dmytryk, P. Doyle, M. Kyzym, T. Klebanova, S. Ilyashenko, M. Krupka, O. Lapko, O. Novalska, and many others. At the same time, it is currently important to improve legal, organizational, and economic mechanisms for the development of transport system using European experience, attracting investments in infrastructure development and formation of transport hubs and intersectoral clusters, effective spatial planning and large-scale implementation of the latest technologies [2]. Despite minor achievements in the use of innovations in transport, insufficient attention is paid to the problem of innovative development of transport system at the regional level, which requires further systematic analysis and study.

Task setting. The main objective of this study is to form a symbiosis of the functioning of transport services market and innovation, as well as to analyze the status and prospects of organizational and economic platform for the functioning of transport services market at the regional level. To achieve this goal, the following tasks should be carried out: to consider the model of the organizational and economic platform for the functioning of transport services market, as well as the factors of formation of the organizational and economic platform for the functioning of transport services market; main trends in the formation and development of transport services market in modern conditions.

Summary of the primary material. Modern wartime economy of Ukraine is significantly inferior to the advanced innovative economies of the West and needs a radical change in the development model. This problem is particularly acute in the context of the full-scale military aggression that Ukraine is experiencing from Russia. In this regard, globalization of the road transportation market is of particular interest. New technologies, demographic and climate change, and the growing demand for the transportation of military goods are all factors driving freight traffic growth in all regions of the world. Improved connectivity between regions is changing how goods are delivered to their destinations. Supply chains are transforming as new markets emerge, and technological advances make the delivery process more efficient.

Demand, supply, and competition are the basis of any market, including road transportation market. The demand in transport services market and the formation of the market are based on the laws of social and economic development and social effects, which are governed by the laws of the market (law of value, law of demand, law of supply, law of competition, laws of money circulation), as well as the presence of subjects and objects of market relations.

The main features of transportation services market include: high degree of differentiation of services (associated with diversification, personalization, and individualization of demand for services); high dynamism of market processes; territorial segmentation; high sensitivity to changes in market conditions; specifics of the organization of service production.

The market for transportation products is in the formation process, with definite transitional processes and inherent uncertainty. The nature and dynamics of these processes significantly depend on the system's structure. In turn, the structure of transportation market includes two main interacting entities: the transportation system and the consumer of transportation products – the shipper and the consignee. The peculiarities of behavior of these entities in certain situations determine the state of the system and the type and structure of the model that describes this state.

All these components form the organizational and economic platform for the functioning of the transport services market (Fig. 1).

The operation of transportation services market is ensured by the compliance of all market participants, starting with producers, intermediaries, and ending with consumers, with the following market functions: regulatory, stimulating, distributing, integrating, informational, sanitizing, social, and intermediary. Compliance with these functions ensures free movement of goods, guarantees relationship between various industries and business entities, establishes proportions in a market economy, and forms a continuous process of transport services market.

Within the organizational and economic platform for the functioning of transport services market, an important role in the formation of this order plays the following factors:

- organizational factors include conditions of the material environment, the content of work and social conditions of activity of various market entities;
- economic factors characterize existence of healthy competition in the market, formation of carrier's competitiveness in foreign and domestic markets;
- social and cultural factors reflect the society's values and social and cultural characteristics, available number of consumers in the region, their average income, moral values, etc. They have a significant impact on customer behavior and, thus, have a significant impact on market sales;

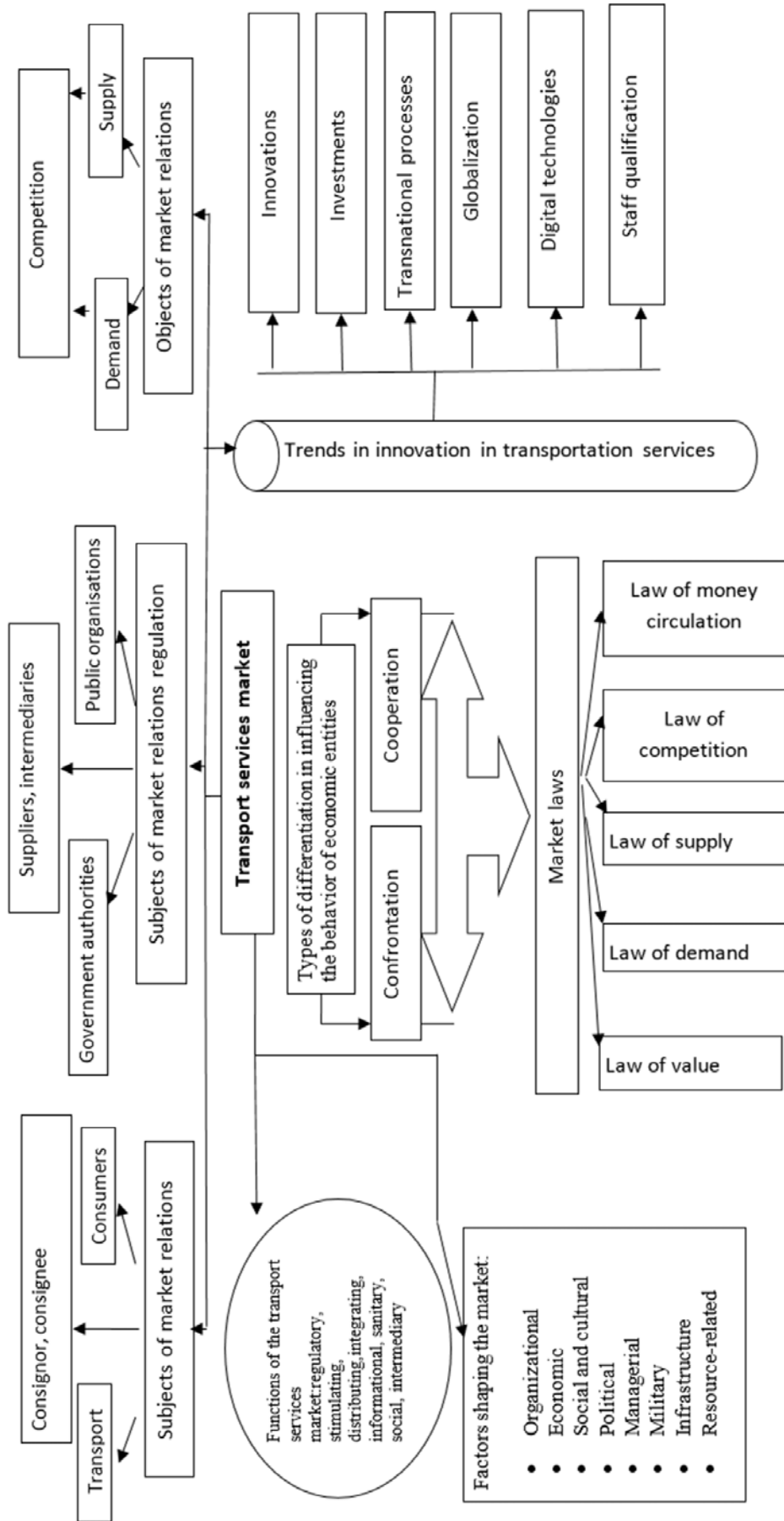


Figure 1 – Organizational and economic platform for the functioning of the transport services market

Developed by the author

– political factors usually include political situation in the country; martial law; instability; loyalty to the government; protectionism in the industry; administrative barriers; and the property protection system. However, it is advisable to take into account such important driving forces as changes in the social and political system, religious preferences, and the revival of nationalism;

– managerial factors are very important, as they ensure the analysis of the situation, correct decision-making at all stages of cargo delivery in the market;

– soldiers take into account the level of threat of armed conflicts, a sharp decline in imports or exports, introduction of embargoes and various trade sanctions designed to suppress the market economically;

– infrastructure factors are “capable of ensuring transparency of the process of sale of commodity products by producers”. They include “...production, social, transport, engineering infrastructures - provision of the territory with production, social, transport (roads, transport facilities) and engineering (engineering networks, engineering structures) resources that determine the functioning and reproduction of its social and economic system”.

– resources in the transportation services market characterize the availability of technologies and conditions for storing products. “The study of the storage processes of final products is of high importance because by knowing the norms and period of their storage, it is easy to determine whether the goods are suitable for consumption, as well as what conditions should be created to make the products tasty and healthy for longer.”

The transportation services market in Ukraine is the lifeblood of the economy, which armed aggression of the Russian Federation has radically changed. The invasion has virtually paralyzed Ukraine's export capabilities, and attempts to transport grain by land have led to a logistical collapse.

Since transportation of goods by sea and rail has its limitations, the domestic transportation market has begun to prioritize road transportation for cargo transportation, and shippers and carriers have been forced to change the logistics of export transportation and direct cargo to western border crossings.

Organizing road transportation has become challenging due to the low capacity of border crossings in western Ukraine, and the cost of logistics has increased significantly as the distance to EU ports has increased many times.

In addition, businesses have faced problems in European ports on a massive scale. This also applies to the work of customs and other regulatory authorities, terminal operating hours, and service quality. Ukrainian shippers are used to receiving information 24/7, so they felt a big difference when they started working with logistics companies in Romania, Poland, and Turkey.

As many cargoes were sent to land routes, the checkpoints were blocked. For example, in August and September, the situation on the Ukrainian-Polish border in the direction of the Yahodyn checkpoint was catastrophic.

There were also positive developments in road transportation during the war. The state introduced so-called transport visa-free regime or abolished administrative barrier through road transportation permits, which was a deterrent to the free market.

It was a massive pain for road carriers, logisticians, and freight forwarders: every year, there was a shortage of permits, and negotiations were underway to increase their number. The abolition of this administrative barrier intensified international road transportation and economic processes in general.

Today, businesses have adapted, reoriented, and developed new export routes via land corridors through European countries. They can be divided into two global directions: the western transport corridor to Poland, Germany, and the Baltic countries, and the southern transport corridor, mainly to Romania.

While the western border is struggling with traffic congestion, checkpoint capacity, differences in railroad gauge, and other challenges, the situation on the southern border is

somewhat different but no less intriguing: corruption at customs, not only on the Ukrainian side but also on the Romanian side.

Despite all the hardships, considerable assistance from fellow freight forwarders from neighboring countries is worth noting. Since the beginning of the war, Ukrainians have been provided with substantial and practical assistance by freight forwarders' associations from Turkey, Romania, Bulgaria, Poland, and Slovakia, and colleagues from the Hungarian Association have taken an active role.

They helped to solve problems with containers in Turkish and Romanian ports, explained issues related to Turkish customs and admission of Ukrainian road carriers to work in Turkey, the issue of exporting containers from terminals at the port of Constanta in Romania, and paying crazy bills for searching and moving containers at the terminal, issues of customs in Poland and Romania, etc.

Thus, we can identify the leading current trends in the formation and development of the transportation services market:

1. The use of innovative technologies in the transport services market is primarily manifested in new areas of development and implementation of Intelligent Transport Systems: mathematical modeling of traffic and traffic flows (the so-called micro and macro modeling); a unified information system; an electronic system for selecting and indicating a route; a system for assisting drivers.

2. Investment will ensure the development of the industry and access to international markets.

3. Transnational processes "... affect the economies of host countries, accelerate scientific and technological process, internationalization of economic life, attract FDI, provide access to financial resources of TNCs, integration into global economic processes, access to foreign markets" [4].

4. Globalization is manifested in transnational corporations that operate effectively in different parts of the world and actively use new historical conditions to their advantage. Globalization stimulates the strengthening of interconnection, as well as civilizations in general. Globalization ensures the development of a single world market.

5. Digital technologies in the transportation services market have become available to all categories of consumers through mobile phones. They also significantly increase the efficiency of interaction between all types of transport. The interconnectedness of logistics chains deepens the feasibility of forming production and financial flows. The primary sensors provide information about specific cargoes, the peculiarities of their movement, and possible loss of cargoes and provide information in real-time.

6. Training of qualified specialists to ensure the safety of the transport industry during the transition to digital platforms.

Innovative Technologies in Transportation Services

Artificial Intelligence and Machine Learning. AI and machine learning are being actively implemented to optimize transportation processes:

– Traffic Prediction: AI algorithms analyze large volumes of traffic data, weather conditions, and other factors to accurately predict congestion and optimize routes.

– Autonomous Driving: Development of autonomous driving systems for trucks and public transport to increase safety and efficiency of transportation.

– Logistics Optimization: AI helps optimize vehicle loading, route planning, and warehouse inventory management.

Internet of Things (IoT). IoT technologies enable the creation of "smart" transportation systems:

– Vehicle Condition Monitoring: Sensors track the technical condition of vehicles, warning about the need for maintenance.

– Cargo Tracking: IoT devices provide real-time tracking of cargo location and condition.

– "Smart" Stops: Sensor-equipped stops provide passengers with up-to-date information on transport arrivals.

Electric and Autonomous Vehicles. Development of environmentally friendly and autonomous transport:

– Electric Buses: Electric buses should be introduced into public transport systems to reduce emissions.

– Autonomous Trucks: Testing and gradual implementation of autonomous trucks for long-distance transportation.

– Delivery Drones: Use unmanned aerial vehicles for small cargo delivery to hard-to-reach areas.

Mobile Applications and Digital Platforms. Development of digital solutions to improve user experience:

– Multimodal Apps: Creation of applications that allow planning trips using different modes of transport.

– Electronic Payment Systems: Implementation of contactless payment systems in public transport.

– Freight Transportation Platforms: Development of online platforms connecting shippers and carriers.

Safety Innovations. Implementation of technologies to increase transportation safety:

– Driver Assistance Systems: Use cameras and sensors to warn about dangerous situations on the road.

– Biometric Identification: Implementation of facial recognition systems to enhance security in public transport.

– Blockchain for Data Security: Use of blockchain technologies to protect transportation and payment data.

Implementing these innovative technologies will significantly increase the efficiency, safety, and environmental friendliness of transportation services and improve user experience. It is important to note that successful implementation of these innovations requires close cooperation between transportation companies, technology developers, and government agencies.

Conclusions. Despite the great shock that the Ukrainian transport and logistics system experienced at the beginning of the war, it coped with the challenge and ensured transportation of essential goods to and from Ukraine. However, several measures need to be taken to ensure a long-term presence in the European transportation market in the future. It is necessary to introduce solutions to achieve sustainable development goals, build a unified European transport structure, and strengthen a healthy competitive advantage in the market and services with cost-effective resource management of transport and logistics companies. The recent EU strategies and programs adopted are tools for achieving these goals. They should support fair and efficient freight prices, promote multimodality, improve vehicle testing, etc. Among the means to achieve these goals is digitalization, i.e., digital solutions in transport and logistics.

Digitalization is one of the essences of logistics that cannot stop because stopping means no trade and exchange of goods, virtually no consumption, which in the modern world is equal to no life.

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Формування симбіозу ринку транспортних послуг та інноваційної діяльності на транспорті

Стаття присвячена дослідженню функціонування ринку транспортних послуг в контексті розвитку інноваційної діяльності та побудови організаційно-економічної платформи для його ефективного функціонування. Автори наголошують на необхідності запровадження інновацій та залучення інвестицій у транспортну галузь, оскільки це має безпосередній вплив на економічний стан країни.

У роботі детально розглянуто основні чинники формування ринку транспортних послуг, серед яких виділено організаційні, економічні, соціально-культурні, політичні, управлінські, військові, інфраструктурні та ресурсні фактори. Особлива увага приділяється аналізу сучасного стану транспортного ринку України в умовах воєнного часу, висвітлюються проблеми та виклики, з якими стикається галузь.

Автори визначають ключові тенденції формування та розвитку ринку транспортних послуг, серед яких: впровадження інноваційних технологій, зокрема інтелектуальних транспортних систем; залучення інвестицій для розвитку галузі та виходу на міжнародні ринки; посилення транснаціональних процесів; глобалізація ринку; широке застосування цифрових технологій; підготовка кваліфікованих фахівців для забезпечення безпеки транспортної галузі в умовах переходу на цифрові платформи.

У статті наголошується на важливості адаптації українського транспортного сектору до нових реалій, зокрема, переорієнтації на сухопутні маршрути через європейські країни. Автори підкреслюють необхідність впровадження рішень, які сприятимуть досягненню цілей сталого розвитку, створенню єдиної європейської транспортної системи та посиленню конкурентних переваг українських перевізників на міжнародному ринку.

Дослідження акцентує увагу на ролі діджиталізації як ключового інструменту для досягнення поставлених цілей. Зазначається, що цифрові рішення в транспорті та логістиці є невід'ємною частиною сучасного розвитку галузі та запорукою ефективного товарообміну.

ринок транспортних послуг, транспортна система, інновації, інноваційна діяльність, інвестиції, технічний прогрес, діджиталізація

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