

JEL Classification: G38; L9; O18;
O31; R4

UDC 338.49:656.078.1

DOI: 10.30857/2415-3206.2020.1.3

**NATIONAL INNOVATIVE TRANSPORT HUB
AS A SYSTEM OF STATE REGULATION OF
INNOVATIVE DEVELOPMENT OF
TRANSPORT INFRASTRUCTURE**

O. DMYTRIIEVA¹

¹ *Kharkiv National Automobile and Highway
University, Ukraine*

Introduction. The transport industry and its supporting component – transport infrastructure are extremely important for ensuring the innovative development of the country. This is due to the fact that the operation of transport infrastructure, transport networks and vehicles covers almost all types of innovations: product, procedural, marketing, management.

The hypothesis of scientific research is finding out that the results of the transport industry obtained in the course of innovation activities extend to other sectors of the economy (there is a so-called diffusion of innovations).

The aim is substantiation of the architecture of the national innovative transport HUB as a system of state regulation of innovative development of transport infrastructure.

The research methodology is comparative analysis and graphical method – to reflect trends in transport infrastructure; systematization and classification – for the classification of structural elements of transport infrastructure; system approach – for the formation of theoretical foundations of state regulation of transport infrastructure in the system of economic knowledge; modeling – to substantiate the model of innovative development of transport infrastructure.

Results: the main factors determining the conditions and nature of forced internal migration in Ukraine in 2014–2017 were determined. The main directions of forced

internal migration since the beginning of hostilities in the Donbass were determined. The emergence of regional asymmetry of migration processes at the level of aggregate migratory flows is investigated developed a model of innovative development of transport infrastructure in the form of national innovative transport HUB as a system of state regulation of the hexagon of individual components: innovation-production, resource-energy, environmental, investment, international and social, the use of which will create integrated into the world transport network safe, interactive, innovative and efficient transport infrastructure of Ukraine, increase the level of competitiveness of the national economy.

Conclusions: the concept of innovative development of transport infrastructure is specified; a systematic analysis and classified models of state regulation of transport infrastructure, proposed a theoretical and methodological approach to the formation of national innovative transport HUB as a system of state regulation of innovative development of transport infrastructure, the implementation of which will bring the level of their provision and infrastructure to European standards. environment, to ensure socially responsible innovative development of transport infrastructure.

Keywords: innovative development; transport infrastructure; national innovative transport HUB; state regulation.

JEL Classification: G38; L9; O18;
O31; R4

УДК 338.49:656.078.1

DOI: 10.30857/2415-3206.2020.1.3

**НАЦІОНАЛЬНИЙ ІННОВАЦІЙНИЙ
ТРАНСПОРТНИЙ HUB ЯК СИСТЕМА
ДЕРЖАВНОГО РЕГУЛЮВАННЯ
ІННОВАЦІЙНОГО РОЗВИТКУ
ТРАНСПОРТНОЇ ІНФРАСТРУКТУРИ**

О. ДМИТРІЄВА¹

¹ Харківський національний автомобільно-
дорожній університет, Україна

Вступ. Транспортна галузь та її забезпечуючі складова – транспортна інфраструктура мають виняткову важливість для забезпечення інноваційного розвитку країни. Це пояснюється з тим, що функціонування об'єктів транспортної інфраструктури, транспортних мереж і транспортних засобів охоплює практично всі види інновацій: продуктових, процесуальних, маркетингових, управлінських.

Гіпотеза наукового дослідження є з'ясування, що отримані в ході інноваційної діяльності результати транспортної галузі поширюються на інші галузі економіки (відбувається, так звана дифузія інновацій).

Метою є обґрунтування архітектури національного інноваційного транспортного HUB як системи державного регулювання інноваційного розвитку транспортної інфраструктури.

Методологією дослідження є порівняльний аналіз і графічний метод – для відображення тенденцій розвитку транспортної інфраструктури; систематизація і класифікація – для класифікації структурних елементів транспортної інфраструктури; системний підхід – для формування теоретичних основ державного регулювання транспортної інфраструктури у системі економічних знань; моделювання – для обґрунтування моделі інноваційного розвитку транспортної інфраструктури.

Результати: розроблено модель інноваційного розвитку транспортної інфраструктури у вигляді національного інноваційного транспортного HUB як системи державного регулювання шестикутнику окремих складових: інноваційно-виробничої, ресурсно-енергетичної, екологічної, інвестиційної, міжнародної та соціальної, використання якої дозволить створити інтегровану до світової транспортної мережі безпечну, інтерактивну, інноваційну та ефективну транспортну інфраструктуру України, підвищити рівень конкурентоспроможності національної економіки.

Висновки: уточнено поняття інноваційного розвитку транспортної інфраструктури; проведено системний аналіз і класифіковані моделі державного регулювання транспортної інфраструктури, запропоновано теоретико-методичний підхід щодо формування національного інноваційного транспортного HUB як системи державного регулювання інноваційного розвитку транспортної інфраструктури, реалізація якого дозволить забезпечити наближення рівня їх надання та розвитку інфраструктури до європейських стандартів, зменшити негативний вплив на навколишнє природне середовище, забезпечити соціально-відповідальний інноваційний розвиток транспортної інфраструктури.

Ключові слова: інноваційний розвиток; транспортна інфраструктура; національний інноваційний транспортний HUB; державне регулювання.

Formulation of the problem. Innovations play a paramount role in the development of the transport sector and further increase the efficiency of its operation. Innovative activities of transport service manufacturers should be aimed at improving their quality, increasing productivity, increasing the range of transportation and, ultimately, increasing market share, entering new markets and at the same time increasing their own flexibility, reducing production costs.

According to the latest CIS (Community Innovation Survey) survey in Ukraine [1], the share of enterprises engaged in innovation was 14.6%, and the share of innovation-active transport enterprises – only 7.13% [2, p. 87–92]. Today the innovative activity of transport enterprises of Ukraine is characterized by negative dynamics, namely: reduction of the number of innovatively active enterprises, reduction of the share of implemented and developed innovations, reduction of the number of innovation partners.

An analysis of recent research and an unresolved part of the problem. Issues of innovative development of transport infrastructure are studied by well-known foreign and domestic scientists: O. Kotlubay [3], O. Edin, Yu. Tsvetov, L. Sokolov [4], Yu. Pashchenko, A. Davydenko, L. Chernyuk [5], E. Sich, V. Ilchuk [6], D. Dabiev, U. Dabieva [7], T. Vermienko [8]. In their works, these scientists consider such important issues in determining the main factors influencing the state regulation of innovative development of transport infrastructure. All these studies allow us to identify the main aspects and issues that arise in the field of state regulation of innovative development of the transport sector. Some institutional-organizational and socio-economic aspects of establishing a system of effective relations between public authorities and business, innovative development of transport infrastructure remain out of the attention of scientists and legislators and need to be considered and addressed.

The aim is to determine the main factors influencing the state regulation of innovative development of transport infrastructure.

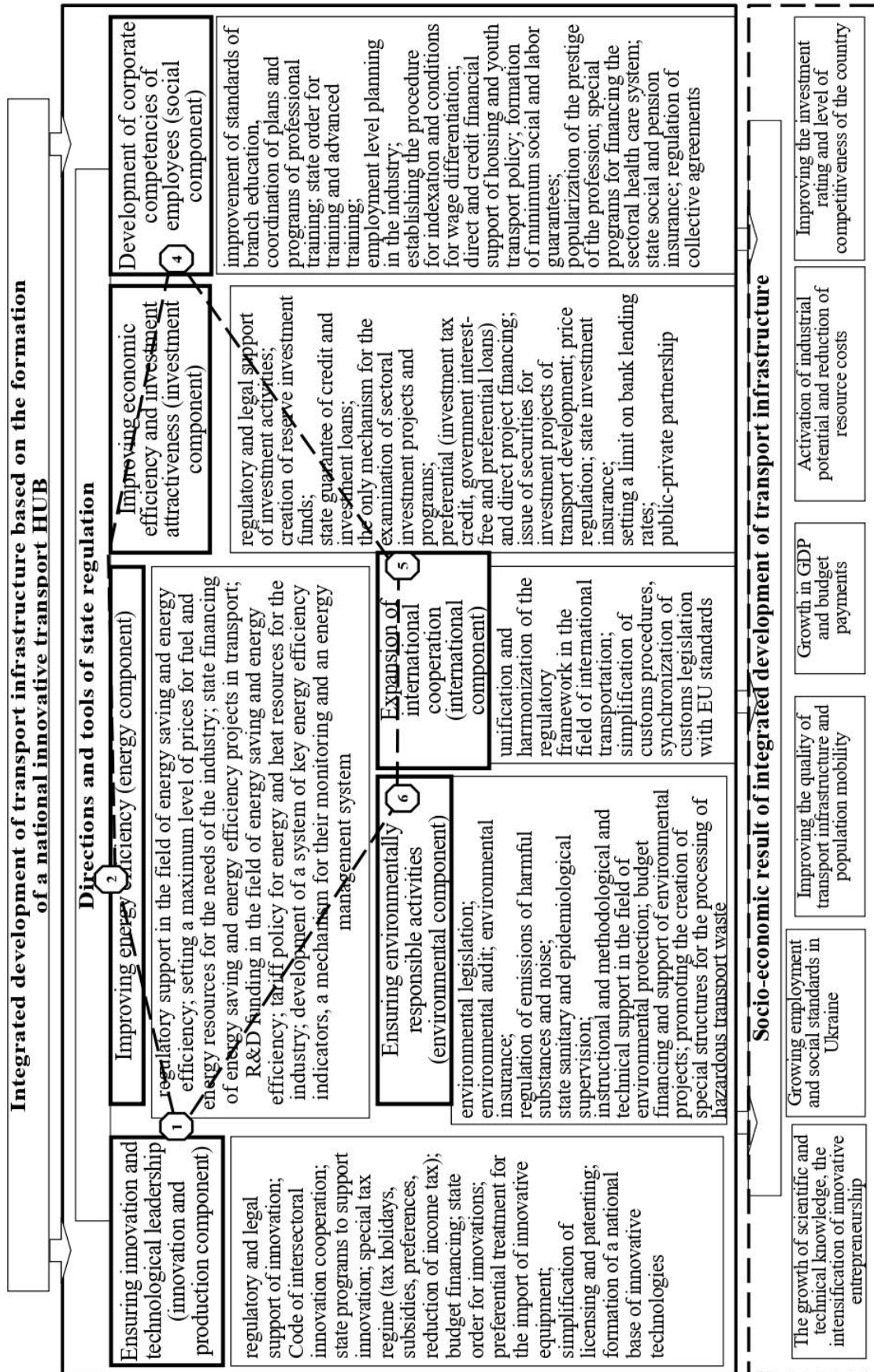
Research results. The transport infrastructure includes the following technological facilities: railways, trolleybuses, trams, domestic air and waterways, highways and routes, contact lines, overpasses, tunnels, bridges, railway and bus stations, railway stations, subways, navigable hydraulic structures, marine, river trade, fishing, specialized ports, port facilities, airports and airfields of international and domestic communication, navigation facilities, communication systems, traffic control of all types of vehicles, ensuring the functioning of the transport complex of buildings, devices, structures, equipment. Subjects of transport infrastructure: legal entities and individuals of various forms of ownership, have objects of transport infrastructure and vehicles owned or used on other legal grounds. In addition to the facilities that ensure the operation of transport to the actual vehicles include: rail, road, electric urban land passenger rolling stock, various types of vessels: aircraft, merchant

shipping or shipping. The transport industry and its supporting component – transport infrastructure are extremely important for ensuring the innovative development of the country. This is due to the fact that the operation of transport infrastructure, transport networks and vehicles covers almost all types of innovations: product, procedural, marketing, management. The results obtained in the course of innovation activities extend to other sectors of the economy (there is a so-called diffusion of innovations). Due to its initial "communication" purpose – as a means of ensuring material communication between the territories – the transport industry also affects the balance of innovative development. First of all, this should be achieved through the technical development of the industry and the elimination of existing gaps from more developed countries. The innovative development of the industry should be aimed at full and effective satisfaction of existing needs in passenger and freight transportation. Innovations fill the transport industry in the form of interconnected supply systems, cargo tracking and tracing systems, radio frequency identifiers, software optimization, etc.

The model of state regulation of innovative transport development in the form of a national innovative transport HUB is shown in Figure 1.

According to Figure 1, the model of the national innovative transport hub as a system of state regulation of innovative development of transport infrastructure is a hexagon of connection and interaction of individual components: innovation and production, energy, environmental, investment, international and social, which will implement the main mission of the National Transport Ukraine's strategy for the period up to 2030 – the creation of an integrated into the world transport network safe, interactive innovative and efficient transport infrastructure of Ukraine, the operation of which will meet the needs of the national economy in transportation, improving business conditions on the basis of corporate social responsibility to ensure competitiveness and efficiency economy. The implementation of each of the components is as follows.

The implementation of the innovation and production component allows to provide innovation and technology leadership in each segment of the transport infrastructure. Formal provision of this component is due to the implementation of regulatory and legal support for innovation in accordance with European standards; implementation of state programs to support innovation; special tax regime (tax holidays, subsidies, preferences, reduction of income tax); state order for innovations; preferential treatment for the import of innovative equipment; simplification of licensing and patenting; formation of a national base of innovative technologies.



Source: proposed by the author.
Figure 1. Model of national innovative transport HUB as a system of state regulation of innovative development of transport infrastructure

The tools for implementing the innovation and production component are the introduction of transport and logistics technologies by expanding the use of multimodal transportation, the introduction of e-government to reduce the workload and simplify administrative procedures for business; introduction of electronic services of administrative services in the transport sector; securing Ukraine's place in the top 50 in 2025 and in the top 20 of the world ranking in the logistics efficiency index (LPI of the World Bank) in 2030 through the development of a system of multimodal transport and logistics clusters and logistics centers at borders, ports and airports; ensuring the separation of the infrastructure operator of PJSC "Ukrzaliznytsia" from freight and passenger carriers; separation of unusual functions of public administration of the state enterprise "Administration of seaports of Ukraine"; improving the management of state assets in aviation infrastructure; ensuring the development of multimodal transportation technologies, modernization and reengineering of infrastructure complexes to ensure interactive interaction of different modes of transport; creation of a network of multimodal transport and logistics clusters, "dry ports", basic logistics centers, terminals, specialized transshipment complexes; optimization and proportional redistribution of freight traffic towards rail and inland water transport.

The target indicators for achieving the planned indicators of development of the innovation and production component should be: the share of non-state-owned carriers in railway transport; the percentage of multimodal cargo transportation is not lower than 10–15% of the transport market; door-to-door delivery speed and on time; the share of container traffic in the total volume of traffic; specific weight of mobile dimensional and weight complexes in the total volume of traffic.

The implementation of the second component – energy allows to increase energy efficiency in each segment of the transport infrastructure. Formal provision of this component is due to the implementation of regulatory and legal support in the field of energy saving and energy efficiency; tariff policy for energy and heat resources for the industry.

The tools for the implementation of the energy component are the establishment of a maximum price level for fuel and energy resources for the needs of the industry; state financing of energy saving and energy efficiency projects in transport; R&D funding in the field of energy saving and energy efficiency; introduction of a system of key energy efficiency indicators, a mechanism for their monitoring and an energy management system.

Targets for achieving the planned indicators of energy component development should be: the percentage of R&D funding in the field of energy saving and energy efficiency; the share of electric cars in the total fleet.

Implementation of the third component – investment allows to increase economic efficiency and investment attractiveness of the transport infrastructure. Formal provision of this component is due to the implementation of regulatory and legal support for investment activities; branching out of the system of public-private partnership; price regulation; carrying out of reform of tariff regulation of transportations according to the European experience; state investment insurance; implementation of structural reform of PJSC "Ukrzaliznytsia" – financial and organizational separation of the infrastructure operator and the carrier.

The tools for implementing the investment component are the creation of reserve investment funds; state guarantee of credit and investment loans; introduction of a single taxation system for all entities engaged in one type of activity; the only mechanism for the examination of sectoral investment projects and programs; preferential (investment tax credit, government interest-free and preferential loans) and direct project financing; issue of securities for investment projects of transport development; setting a limit on bank lending rates.

The target indicators for achieving the planned indicators of investment component development should be: the share of preferential (investment tax credit, government interest-free and preferential credit), direct project financing in the total amount of loans issued for the development of transport infrastructure; share of securities issue under investment projects of innovative transport development in the total volume of securities issues.

Implementation of the fourth component – social allows to ensure the development of corporate competencies of employees, to increase the social and corporate responsibility of transport activities. Formal provision of this component is due to the introduction of a new approach to licensing of road carriers in compliance with the requirements of business reputation, financial capacity, professional competence of staff and ensuring access to the road transport market in accordance with EU legislation; improvement of standards of branch education, coordination of plans and programs of professional training; state order for training and advanced training; employment level planning in the industry; establishing the procedure for indexation and conditions for wage differentiation; direct and credit financial support of housing and youth transport policy; formation of minimum social and labor guarantees; popularization of the prestige of the profession; introduction of a special program for financing the sectoral health care system; state social and pension insurance; regulation of collective agreements.

The tools for implementing the social component are the development of a network of road service points to ensure verification of compliance with the requirements of work and rest of drivers in accordance with the European Agreement on Crews of Crews of Vehicles Performing International Road

Transport (EUTR) (Law of Ukraine of September 7, 2005 № 2819-IV), and regulations; guaranteeing equal, open and transparent access of operators to the transport infrastructure; ensuring the transparency of the national market of freight forwarding services; entry of the transport industry in the top 5 sectors of the national economy in terms of attractiveness in the labor market.

The target indicators for achieving the planned indicators of the development of the social component should be: the level of wages of workers in the industry; the share of points of road service of rest of drivers in the total volume of stopping points of vehicles; the level of labor productivity in transport (ton-kilometers, passenger-kilometers per employee per year), the number of new jobs created.

The implementation of the fifth component – international – allows to expand international cooperation on a new, innovative and interactive basis. Formal provision of this component is due to the unification and harmonization of the regulatory framework in the field of international transport; gradual liberalization of international transportation; implementation of the Common Aviation Area Agreement with the EU; liberalization of the transport services market in accordance with the Association Agreement and the Common Aviation Area Agreement with the EU; organization and use of Ukraine's airspace in accordance with ICAO standards and recommended practices, the European Organization for the Safety of Air Navigation (Eurocontrol), other international aviation organizations and EU legislation.

The tools for implementing the international component are the provision of an interoperable national transport system with a world transport network (railway network of 1435 mm wide track); increase the efficiency of internal logistics operations of freight transport by removing existing barriers and improving the relevant infrastructure for international transport, integration with the international and trans-European transport network (TEN-T); simplification of customs procedures, synchronization of customs legislation with EU standards; reduction of time of cargo handling and registration of documentation by simplification of administrative procedures during international transportations; technical improvement of the air navigation system for the organization of air traffic; introduction of free routes (FRAU) and navigation technologies based on GNSS in the airspace of Ukraine; development of terminal passenger and cargo complexes with multimodal technologies; creation of a cyber security system for civil aviation in accordance with ICAO practice and EU legislation.

The target indicators for achieving the planned indicators of the international component development should be: the volume of transit traffic through Ukraine; the number of ship calls to the ports of Ukraine, the level of quality of transport services during export transportation; obtaining a rating of

the top 100 largest ports in the world by Ukrainian sea trade ports in terms of the number of processed containers; the share of cargo transportation in intermodal transport units from the total volume of traffic; interoperability of the transport system of Ukraine; the number of routes of regular container / multimodal freight trains synchronized with the routes of trains of EU member states; time of cargo handling and documentation during international transportation.

Implementation of the sixth component – environmental allows to ensure environmentally responsible activities in transport. Formal provision of this component is due to the implementation of environmental legislation; creation of an environmental insurance system; support and development of an interactive system of state sanitary and epidemiological surveillance.

The tools for implementing the environmental component are the introduction of environmental audit; regulation of emissions of harmful substances and noise; instructional and methodological and technical support in the field of environmental protection; budget financing and support of environmental projects; promoting the creation of special structures for the processing of hazardous transport waste.

Target indicators for achieving the planned indicators of development of the environmental component should be: the percentage of environmentally insured vehicles in the total volume of rolling stock; the number of special structures for the processing of hazardous transport waste.

Conclusions and suggestions. The implementation of the proposed model of interaction between public authorities and business allows to implement a comprehensive interactive mechanism of state regulation of innovative development of transport infrastructure. As evidenced by the analysis of all components, forms, tools and targets of formation and implementation of the national innovative transport HUB as a system of state regulation of innovative development of transport infrastructure will bring the level of their provision and development of infrastructure to European standards, reduce the negative impact on the environment socially responsible innovative development of transport infrastructure.

References

1. Kuznietsova, M.S. (eds.) (2019). *Naukova ta innovatsiina diialnist Ukrainy 2018: statystychnyi zbirnyk* [Scientific and innovative activity of Ukraine 2018: statistical collection]. State Statistics Service of Ukraine. Kyiv: TOV "Avhust Treid". 108 p. [in Ukrainian].
2. *Obstezhennia innovatsiinoi diialnosti v ekonomitsi Ukrainy za period 2014–2016 rokiv* [Survey of innovation activity in the economy of

Література

1. *Наукова та інноваційна діяльність України 2018: статистичний збірник / За редакцією М. С. Кузнецової; Державна служба статистики України. – К.: ТОВ "Август Трейд", 2019. – 108 с.*
2. *Обстеження інноваційної діяльності в економіці України за період 2014–2016 років [Електронний ресурс]. – К.:*

- Ukraine for the period 2014–2016]. Kyiv: State Statistics Service of Ukraine, 2017. Retrieved from: http://www.ukrstat.gov.ua/druk/publicat/kat_u/publnauka_u.htm [in Ukrainian].
3. Kotlubai, O.M. (2012). *Teoriia i metodolohiia rozvytku transportno-tekhnolohichnykh system perevezennia vantazhiv* [Theory and methodology of development of transport and technological systems of cargo transportation]. Odesa: IPREED NAN Ukrainy. 200 p. [in Ukrainian].
4. Yedin, O., Tsvietov, Yu., Sokolov, L. (2000). *Transportna polityka v Ukraini* [Transport policy in Ukraine]. *Ekonomika Ukrainy* [Economy of Ukraine], No. 1, P. 24–34 [in Ukrainian].
5. Pashchenko, Yu.Ye., Davydenko, A.M., Cherniuk, L.H. (2008). *Perspektyvy rozvytku transportnoho kompleksu* [Prospects for the development of the transport complex]. Kyiv: Lybid. 269 p. [in Ukrainian].
6. Sych, Ye.M., Ilchuk, V.P. (2006). *Innovatsiino-investytsiini kompleksi transportnoi haluzi: metodolohiia formuvannia ta rozvytku: monohrafiia* [Innovation and investment complexes of the transport industry: methodology of formation and development: a monograph]. Kyiv: Lohos. 264 p. [in Ukrainian].
7. Dabiev, D.F., Dabieva, U.M. (2015). *Otcenka transportnoi infrastruktury makroregionov* [Assessment of the transport infrastructure of macroregions]. *Mezhdunarodnyi zhurnal prikladnykh i fundamentalnykh issledovaniy* [International Journal of Applied and Basic Research], No. 11, P. 283–284. Retrieved from: <http://applied-research.ru/pdf/2015/11-2/7726.pdf> [in Russian].
8. Vermienko, T.H. (2008). *Rozvytok innovatsiinoi infrastruktury v Ukraini* [Development of innovation infrastructure in Ukraine]. *Efektivni instrumenty suchasnykh nauk* [Effective tools of modern sciences]. Retrieved from: http://www.rusnauka.com/11_EISN_2008/Economics/30551.doc.htm [in Ukrainian].
9. Petrenko, I. (eds.) (2019). *Transport i zv'язok Ukrainy – 2018: statystychnyi zbirnyk* [Transport and Communications of Ukraine - 2018: statistical collection]. State Statistics Service of Ukraine. – Kyiv: TOV "Buk-Druk". 152 p. [in Ukrainian].
- Держстат України, 2017. – Режим доступу: http://www.ukrstat.gov.ua/druk/publicat/kat_u/publnauka_u.htm.
3. Котлубай О. М. Теорія і методологія розвитку транспортно-технологічних систем перевезення вантажів / О. М. Котлубай. – Одеса: ІПРЕЕД НАН України, 2012. – 200 с.
4. Єдін О. Транспортна політика в Україні / О. Єдін, Ю. Цвєтов, Л. Соколов // Економіка України. – 2000. – № 1. – С. 24–34.
5. Пащенко Ю. Є. Перспективи розвитку транспортного комплексу / Ю. Є. Пащенко, А. М. Давиденко, Л. Г. Чернюк. – К.: Либідь, 2008. – 269 с.
6. Сич Є. М. Інноваційно-інвестиційні комплекси транспортної галузі: методологія формування та розвитку: монографія / Є. М. Сич, В. П. Ільчук. – К.: Логос, 2006. – 264 с.
7. Дабиев Д. Ф. Оценка транспортной инфраструктуры макрорегионов [Электронный ресурс] / Д. Ф. Дабиев, У. М. Дабиева // Международный журнал прикладных и фундаментальных исследований. – 2015. – № 11. – С. 283–284. – Режим доступа: <http://applied-research.ru/pdf/2015/11-2/7726.pdf>.
8. Вермієнко Т. Г. Розвиток інноваційної інфраструктури в Україні [Електронний ресурс] / Т. Г. Вермієнко // Ефективні інструменти сучасних наук. – 2008. – Режим доступу: http://www.rusnauka.com/11_EISN_2008/Economics/30551.doc.htm.
9. Транспорт і зв'язок України – 2018: статистичний збірник / за редакцією І. Петренко; Державна служба статистики України. – К.: ТОВ "Бук-Друк", 2019. – 152 с.

10. Problemy i perspektivy postkryzysnogo razvitiia transportnoi sistemy Ukrainy [Problems and prospects of post-crisis development of the transport system of Ukraine]. Retrieved from: http://www.nbuuv.gov.ua/portal/natural/UZTNU/zapiski/econ/2010_1/Poteiv.html [in Russian].

11. Natsionalna transportna stratehiia Ukrainy na period do 2030 roku. Skhvaleno rozporiadzhenniam Kabinetu Ministriv Ukrainy vid 30.05.2018 № 430-r [National transport strategy of Ukraine for the period up to 2030. Approved by the order of the Cabinet of Ministers of Ukraine dated 30.05.2018 № 430-r]. Retrieved from: <https://zakon.rada.gov.ua/laws/show/430-2018-%D1%80> [in Ukrainian].

12. Pro transport: Zakon Ukrainy vid 10.11.1994 № 233/94-VR iz zminamy i dop. vid 16.07.2019 № 2704-VIII [About transport: Law of Ukraine from 10.11.1994 № 233/94-VR with changes and additions from 16.07.2019 № 2704-VIII]. Retrieved from: <https://zakon.rada.gov.ua/laws/show/232/94-%D0%B2%D1%80#Text> [in Ukrainian].

10. Проблемы и перспективы посткризисного развития транспортной системы Украины [Электронный ресурс]. – Режим доступа: http://www.nbuuv.gov.ua/portal/natural/UZTNU/zapiski/econ/2010_1/Poteiv.html.

11. Національна транспортна стратегія України на період до 2030 року. Схвалено розпорядженням Кабінету Міністрів України від 30.05.2018 № 430-р [Електронний ресурс]. – Режим доступу: <https://zakon.rada.gov.ua/laws/show/430-2018-%D1%80>.

12. Про транспорт: Закон України від 10.11.1994 № 233/94-ВР із змінами і доп. від 16.07.2019 № 2704-VIII [Електронний ресурс]. – Режим доступу: <https://zakon.rada.gov.ua/laws/show/232/94-%D0%B2%D1%80#Text>.