

PRIORITIES OF DEVELOPMENT OF THE TRANSPORT INDUSTRY OF UKRAINE IN THE CONDITIONS OF DIGITAL TRANSFORMATION

The situation in the modern world is characterized by the rapid development of digitalization processes, which are the main direction of the transformation of society and cover more and more industries, acting as a growth factor and influencing the entire system of socio-economic relations and the competitiveness of the national economy.

First, the intensification of such actions is associated with the search by business entities for new sources and instruments of economic growth. Thus, according to the World Economic Forum, digitalization has enormous potential for business and society over the next decade and could provide an additional \$ 30 trillion in revenue for the global economy by 2025 (BDI, 2021).

According to the research results, the COVID-19 pandemic has significantly affected the performance of the domestic transport complex, further exacerbating the problems and crisis phenomena. Therefore, according to the results of 2020, the volume of freight traffic decreased by 10.6 % (excluding pipeline transport) and passenger traffic by 39.7 % (Derzhavna sluzhba statystyky of Ukraine, 2021). Normalization of the industry is possible if systemic problems are overcome.

Note that the development of domestic transport depends on the introduction of digital innovative solutions in this area, which are able to automate management and business processes, affecting their efficiency; create new business models, types of transactions; to improve the reliability of the transport system and the quality of services; to improve the supply chain.

We state that in scientific discourses, digitalization processes are recognized as one of the most significant manifestations of innovative development (Apalkova, 2015; Liashenko & Vyshnevskiy, 2018). Researchers note that the introduction of information, telecommunication and computer technologies is one of the main trends in the global transport market, where fundamentally new control systems are being introduced, integrated into a single logistics information space (Veretiuk & Pilinskiy, 2016).

Research and Markets predicts that the next-generation logistics market will reach \$ 125 billion by 2030 with supply chain software, robotics and automation, autonomous vehicles and counterfeit tracking,

and the cloud-based supply chain management market until 2026 will double (compared to 2020), reaching \$ 8.610 billion (Research and Markets, 2021).

However, the digital transformations of the transport industry, the country's integration into the EU digital market require a solution at the state level of issues related to financing the introduction of digital technologies and digital products; protection of intellectual property rights; security of subjects (manufacturers, consumers, partners, clients) in the online environment.

Neglect and untimely solution of these issues can lead to a low level of use of digital technologies by industry enterprises, increasing technological gaps with countries – world leaders, hindering integration processes and the use of the transit potential of the state.

Therefore, it seems expedient to formulate development priorities for the transport industry in Ukraine in the context of digital transformation, capable of creating new growth points for the industry, helping to increase its competitiveness and integration into the global transport system.

It should be pointed out that digitalization processes have received considerable attention in scientific research and discourses. Thus, the features of economic development in the context of digital transformations are reflected in the works of foreign scientists. Among them, there are T. Mesenbourg (2001), N. Negroponte (1995), D. Tapscott, (1995) and others.

The issue of digital modernization of the Ukrainian economy, including the corresponding processes in the transport industry, is in the field of view of domestic scientists, in particular: V. Apalkova (2015) C. Veretiuk (2016), V. Dykan (2020), S. Koliadenko (2016), V. Kompaniets (2018) V. Liashenko & Vyshnevskiy, (2018), I. Malyk (2013), Yu. Mashkarov (2014), K. Shvab (2016) and others.

Attention is also paid to the development of digital technologies at the state level. Among the main such documents, there are the Concept for the Development of the Digital Economy and Society of Ukraine for 2018–2020 and an action plan for its implementation (Cabinet of Ministers of Ukraine, 2018a), the National Transport Strategy of Ukraine for the period up to 2030 (Cabinet of Ministers of Ukraine, 2018b), Draft Strategy for the Development of Ukrainian Seaports for the Period until 2038 (Proekt Stratehii rozvytku, 2019).

Note that existing scientific research contains significant results in the field of digitalization of the economy. However, in modern conditions, which are characterized by constant changes in external influences, the study of the peculiarities of the development of the transport complex of

Ukraine in the context of the digitalization of the economy and the formation of corresponding priorities requires additional attention.

The aim of the study is to form priority areas for the development of the domestic transport industry in the context of digital transformation, capable of creating new points of growth, helping to increase its competitiveness and integration into the global transport system.

The digitalization of the transport industry provides the development of business entities and economic relations between them, technological systems, appropriate infrastructure based on the active use and implementation of digital means of communications and technologies, will provide qualitative changes (due to optimization and increase the accuracy and efficiency of work) and increase the competitiveness of the transport complex, implementation transit potential of the country and development of the national economy.

It should be noted that digital transformations in the transport industry are entirely dependent on the progress of these processes in the country. Therefore, it seems quite justified to pay attention to the position of Ukraine in the globalized digital world, which will allow us to study the processes of digital changes and assess the achievements in this area (table 2.5.1).

Table 2.5.1

Dynamics of the rating of Ukraine according to the indices of the development of the digital economy

Index name	Ranking place		
	2017	2018	2019
Global Innovation Index (Global Innovation Index, WIPO), (0-130)	50	43	47
Global Competitiveness Index (Global Competitiveness Index, WEF), (0-140)	81	83*	85

** In 2018, the GCI methodology was changed to version 4.0, which diagnoses the development of the economy in the context of the Fourth Industrial Revolution, taking into account the processes of digitalization and technologization.*

Source: the table was compiled by the author based on (WIPO, 2019; WEF, 2019).

The analysis of the level of digitalization of the country in the global dimension made it possible to state that after the improvement of the

results on the Global Innovation Index, in 2019 there is a loss of positions, indicating a slowdown in the corresponding processes. Regression is also observed in the Global Competitiveness Index and the main sub-indices that are able to characterize achievements in this area. Among them, there are “the introduction of information and computer technologies” and “innovative potential” (fig. 2.5.1).

Such alarming trends are associated with certain problems that hinder digital transformations in the national economy and in the region in particular.

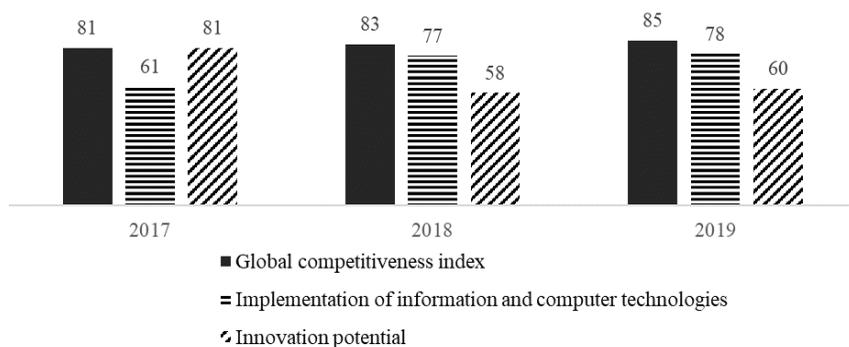


Fig. 2.5.1. Ukraine’s place in the Global Competitiveness Ranking (2017–2019)

Source: the data is built on the basis of (WEF, 2019).

Among the main ones, the following should be highlighted:

- imperfection of the specialized legal framework aimed at the effective functioning and development of the digital economy;
- insufficient accounting in the current industry programs for the necessary measures aimed at digitalization;
- low level of coverage of the country’s territory with broadband Internet access (about 60 %);
- gaps in the availability of digital technologies and interregional differentiation;
- insufficient development of digital infrastructure;
- lack of standards for the use of digital technologies;
- insufficient investment activity in the field of digitalization;
- lack of a systematic approach at the state, regional, sectoral levels to the organization and management of relevant processes, a low level of government support and stimulation of digital transformations;

- problems associated with interagency cooperation;
- ensuring data confidentiality, protecting against cybercrime;
- low innovative potential of the organization and the industry as a whole;
- problems associated with the possibilities of cooperation with other enterprises and scientific organizations;
- low digital culture of a number of employees of enterprises.

It should be noted that in order to successfully solve the above problems, there is a need to form a balanced state policy aimed at the development of the digital economy and the corresponding processes in the transport industry. Conceptually, the process of digitalization of the transport industry is presented in fig. 2.5.2.

Note that digital transformation processes should be managed systematically based on an appropriate strategy. The approach that makes it possible to make timely effective decisions and respond with state policy instruments, taking into account market changes and modern challenges.

It should be noted that the technical and technological support of digitalization processes in the region provides for the development of intelligent systems for managing the transportation process, comprehensive automation of the main planning and dispatching traffic control processes, ensuring safety and quality of service.

Organizational support of digital transformations in the industry provides the formation of the necessary regulatory and legal framework; introduction of new business models and innovative solutions aimed at creating platforms for interaction between participants in the transportation process and partners; creation of a system of state bodies that ensure the implementation of the state policy of digital transformations; professional development of personnel, development of digital culture.

Financing of digitalization processes should be carried out through a combination of budgetary funds, money of business entities, private domestic and foreign investors, as well as earmarked funds of international organizations supporting relevant structural reforms in Ukraine.

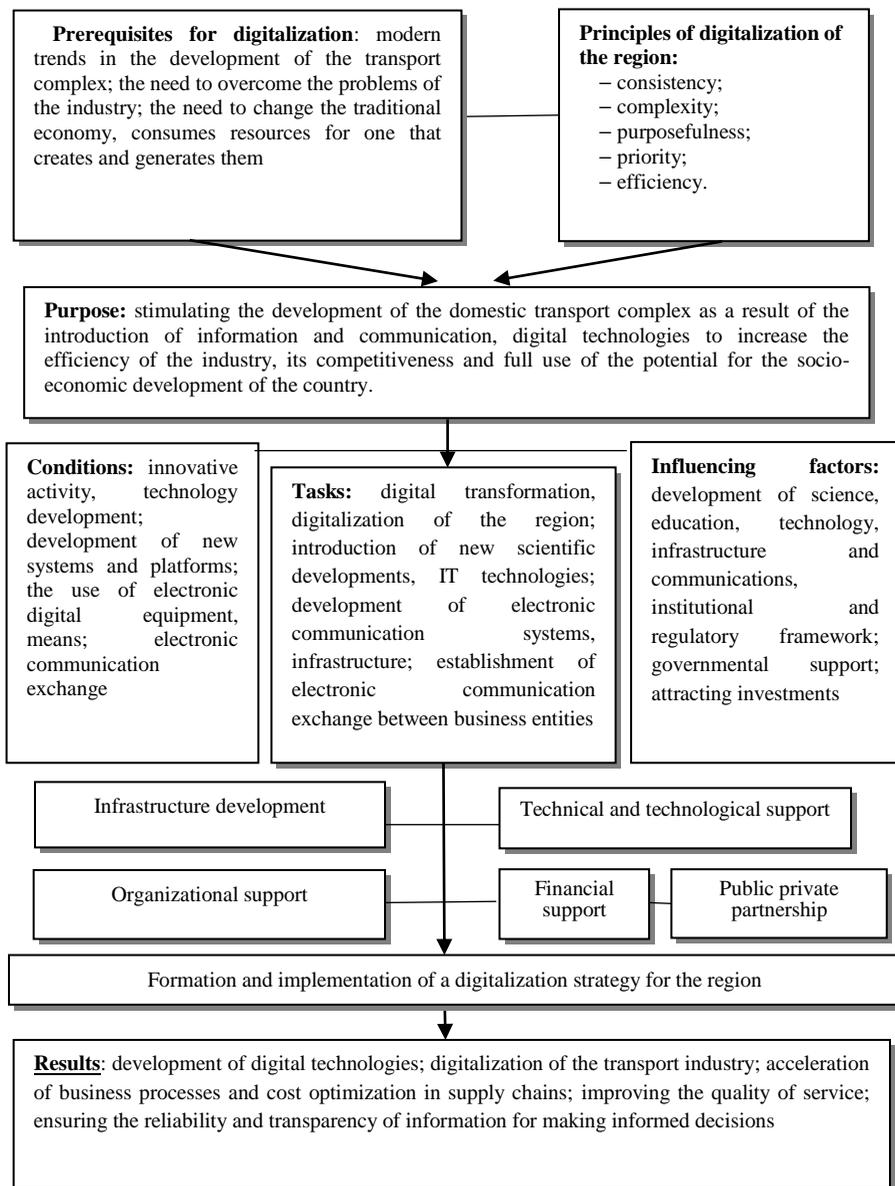


Fig. 2.5.2. Conceptual foundations of digitalization of the transport industry

Source: the data is suggested by the author.

Drawing attention to the positive foreign experience in solving financial issues in the field of digital transformations, it seems advisable to use public-private partnership, which provides for the complex and systemic integration of actions of the private and public sectors and the direction of joint efforts in the field of digitalization of the transport industry and ensuring information security. Having various financial opportunities for implementing projects in the field of digitalization, private business entities have significant practical experience in the field of transportation, capable of quickly adapting to market changes and being flexible in decision-making and business risks. In such a situation, government agencies are able to focus their efforts only on regulatory functions, providing certain preferences and guarantees to participants. Among the factors that determine the use of such models, the following should be noted:

- dependence of industry infrastructure and software on information and telecommunication systems and their vulnerability;
- privatization of individual critical infrastructure facilities, which makes it impossible to guarantee full information security and protection from government agencies;
- a significant number of electronic information resources that are important for the activities of both private owners and government agencies.

The lack of authority and resources for small and medium-sized businesses that work in the transport industry to create software, the necessary infrastructure and full protection of their own information creates the need to obtain certain services from government agencies and/or from large specialized companies.

Note that such models have proven their effectiveness in the creation of infrastructure facilities (contract, concessions), software (contract); development of technical capabilities (contract, lease); using, through the outsourcing model, the possibilities of non-formal education to improve the qualifications of existing specialists (trainings, international internships), as well as to attract scientific, analytical and consulting companies for research and consultation; supporting educational and research initiatives, attracting private enterprises in financial assistance to universities that are engaged in research in the field of software (joint activities); state support of relevant innovation projects; implementation of cooperation programs for the exchange of information in the field of cybersecurity between the state and the subjects of the transport industry.

World practices prove that digitalization should cover such components of the transportation process as organization of transportation, rolling stock and technical infrastructure. At the same time, attention should be paid to the variety of areas of application of digital technologies in the transport industry, which determine the features of implementation and the specificity of the mechanisms for implementing this process (table 2.5.2).

Table 2.5.2

Areas of using digital technologies in the transport industry

Usage scope	Mechanism for the implementation of the digitalization process
Electronic document management	Introduction of electronic tickets, remote processing of travel documents; creation of “virtual offices”
Remote communication	Providing remote communication between business entities, as well as with clients
Payment for services	Using mobile applications to obtain transport services
Cloud technologies	Data processing at a qualitatively new level: collection and analysis of data on traffic flows, use of big data technologies
Integrated control systems	Automation of transport control systems; involving the client in the process of managing and controlling the cargo; integration of various modes of transport according to the concept of a single multimodal transport operator
Intelligent transport systems	Automation and robotization of traffic control and management in real time; predicting the traffic situation for predictability of processes, support for autopilot systems (for civil aircraft, sea freight).
Logistics service platforms	Creation of digital platforms focused on the provision of logistics services, including booking and ordering tickets, searching for a carrier for goods, identifying the optimal route.
Supply chain analytical platforms	Focused on the provision of data optimization services for transport, allows you to obtain the necessary data for route optimization, ensuring the accuracy of delivery (for example, Transmetrics, Xeneta and CargoX).

Source: the data is formed from (Subrahmanya & Puttanna, 2018)

Note that the effectiveness of the use of digital technologies and the effectiveness of the mechanisms for the implementation of these processes depend on the level of development of the digital infrastructure.

In this context, attention should be paid to the research of V. Fischuk (2017, July 3), who draws attention to such multicomponent interconnected and complementary components of infrastructure: hard (including information and communication technologies and is designed to provide access to digital technologies) soft (digital technologies).

The key components of the digital infrastructure of the transport industry are shown in fig. 2.5.3.

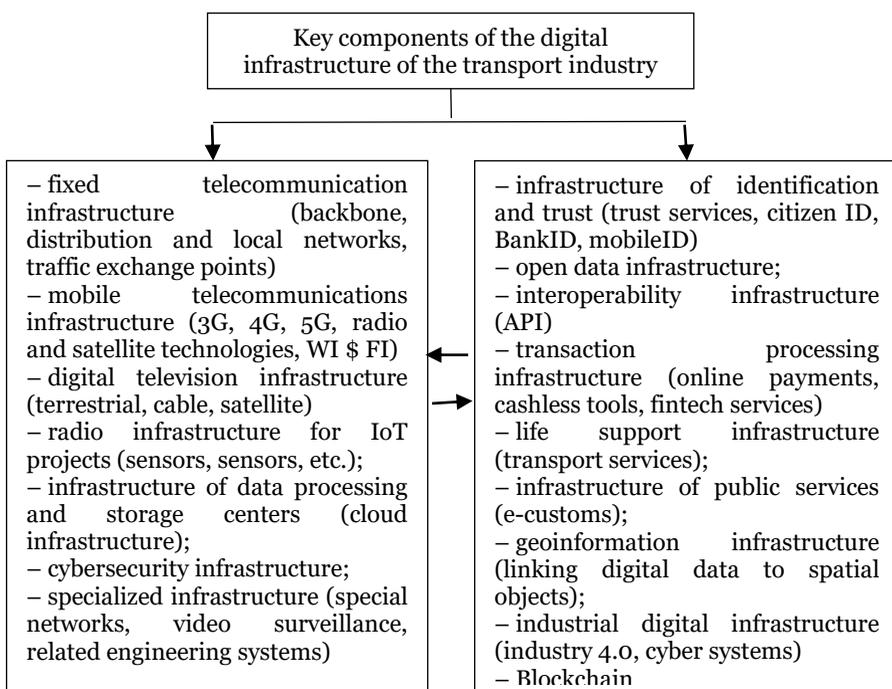


Fig. 2.5.3. Key components of the digital infrastructure of the transport industry

Source: compiled by the author based on (Fishchuk, 2017, July 3, UCCI, 2020) and updated

The study of the features of digitalization of the domestic transport complex, the problems that impede such processes and hinder the corresponding reforms, made it possible to form the main priority areas for

the development of the industry in the context of digital transformation (within the framework of the proposed concept), capable of creating new points of growth, helping to increase its competitiveness and integration into the global transport sector system. Namely, the following:

- development of fixed infrastructure of broadband Internet, as well as mobile Internet (4G, 5G)

- development of the domestic market, use and consumption of high technologies in the transport industry;

- activation of cooperation with the countries of the European Union in the field of Ukraine's integration into the European digital market, participation in specialized projects in the field of technological and digital modernization of the transport complex; attracting Ukrainian IT companies to participate in such programs;

- formation of a regulatory and legal framework for digitalization of the transport industry and its harmonization with international norms, which will contribute to strengthening international cooperation and intensifying the process of integrating the transport system of Ukraine into the pan-European and global transport networks;

- development and approval of basic strategic documents that determine the course, tools and mechanisms for the implementation of the state policy of digitalization in the domestic transport industry; formation of a set of programs in the field of infrastructure development, software, building effective cooperation in the exchange of information in the field of cybersecurity, including on the basis of public-private partnerships;

- introduction of innovative technologies for the transportation of goods; the use of modern information technologies (appropriate software, satellite communication systems and navigation systems), which will create an effective communication system between participants in real time, increase the level of automation of technological processes and optimize logistics operations;

- creating conditions for enhancing investment activities, attracting investments and using them for the development of digital innovations, software, the Internet of things, big data and cloud computing, and the like;

- development of Blockchain technology, which will allow tracking the movement of goods and ensuring user awareness throughout the supply chain;

- using the Internet of Things by introducing appropriate software to optimize routes and rationalize vehicle traffic management;

- increasing the level of confidence of participants in the transportation process in digital transformations, conducting consulting and explanatory work in this direction, including with the participation of

specialized specialists, using the potential of non-governmental organizations and online platforms in this area; protection of personal data and observance of the rights of users of digital technologies;

- prevention, elimination and management of associated risks in cyberspace, introduction of new cybersecurity technologies; creation of appropriate industry standards in the field of cyber defense;

- creation of a modern communications infrastructure, data storage and processing centers, the latest software, including using public-private partnership models; formation of an appropriate regulatory framework for the implementation of such processes;

- support at the government level for scientific research in the field of digital innovation and cybersecurity, development of a scientific base;

- improving the training system for the transport industry, taking into account transformation processes, increasing the level of their digital competencies and the formation of a digital culture (conducting trainings, seminars, international internships, using the potential of electronic services for business (specialized platforms for obtaining digital knowledge and skills)).

So, let us note that one of the main trends in the development of the modern economy is the penetration of information technologies into various industries and spheres of activity. The transport industry did not stand aside from such transformations, integrating digital technologies into production and logistics processes.

It should be noted that the informatization of this sphere is considered as one of the most important conditions for increasing competitiveness, creates new points of growth for the industry, contributes to its integration into the world transport system. However, the management of digital transformation processes should be carried out systematically based on an appropriate strategy. The approach that makes it possible to make timely effective decisions and respond with state policy instruments, taking into account market changes and modern challenges.

Systematization of new trends in the field of intellectual development, research into the features of digitalization of the domestic transport complex, problems that impede such processes, made it possible to form conceptual foundations and main priority areas for the development of the industry in the context of digital transformation. Among the main areas identified are the following: overcoming institutional and legislative barriers; attraction of investments; stimulating innovation and development of digital infrastructures; intensification of cooperation with the countries of the European Union; increasing the level of confidence of participants in the transportation process in digital transformations;

prevention, elimination and management of associated risks in cyberspace, introduction of new cybersecurity technologies; government support for digital innovation research; professional development of personnel and the development of relevant digital competencies, and so on.

However, their practical implementation requires the formation of appropriate implementation mechanisms with the identification of funding sources, and provides prospects for further research.

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