ABSTRACT

of the dissertation «Improving the management of road freight transportation based on the development of digital ecosystems of transport and logistics services»
submitted for the degree of Doctor of Philosophy (PhD)
by education program «8D11301 – Logistic (by industry)»

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Relevance of the research topic. The Republic of Kazakhstan, as a strategic approach to sustainable economic growth and improving the quality of life of its citizens, prioritizes the digitalization of its transport and logistics sector. Following the decrees and addresses of the president of Kazakhstan, the country pays special attention to the development of transit potential and the introduction of modern technologies to optimize transport and logistics processes. The main attention is paid to improving the efficiency of transport activities, developing transit and multimodal potential, ensuring the safety and stability of transport links.

Kazakhstan's efforts to digitalize the transport and logistics complex, including proposals for the introduction of digital transport corridors and the development of an integrated information and logistics platform, are an important step towards realizing these advantages. This approach not only increases the transparency and efficiency of management processes, but also reduces costs and improves the end user experience, making a significant contribution to the country's economic growth and regional integration.

Kazakhstan expects a significant increase in transportation volumes in the coming years. According to forecasts, the volume of export railway transport will increase to 130 million tons, Road Transit – up to 6 times. The relevance of the problem of managing road cargo transportation in Kazakhstan is confirmed by their significant contribution to the economy and the growth of the share of domestic carriers in the international market. As of January 1, 2025, 9,500 transport companies with a fleet of 92,900 trucks are registered in the country. Of these, about 58 thousand cars are transported mainly in the direction of China and Uzbekistan, and about 2400 transport companies with more than 35 thousand cars carry out international transportation to foreign countries. At the end of 2023, the share of domestic carriers in the international freight market was 50%, which is a significant increase compared to 31% in 2021 and 43% in 2022, 1 year. These data show the growing role of road transport in ensuring domestic and international logistics of Kazakhstan, which makes it an important element of the country's transport infrastructure.

In the context of global changes in trade routes and transport corridors, the EAEU states are actively developing measures aimed at optimizing transport and logistics infrastructure. These measures are necessary to increase the competitiveness of regional markets and create conditions that will help develop the export potential of the EAEU member states. One of the main tools for achieving these goals are digital transport and logistics platforms that simplify business processes and increase transportation efficiency. According to GlobeNewswire, the artificial intelligence market in the supply chain reached долларға 5,610.8 million in 2021 and is expected to grow to. 20,196. 6 million by 2028, with an annual growth rate of 20.5% between 2022 and 2028. This confirms the trend towards the growing role of artificial intelligence and machine learning in logistics processes.

All this indicates the need to expand the potential of logistics and accelerate the transition from the traditional form of economic management to the digital economy and digital logistics to the next technological structure in the framework of the process of developing modern digital ecosystems of transport and logistics services.

Thus, the relevance of the dissertation research is determined by the above problems, their significance from the point of view of conceptual-theoretical, methodological and practical justification, insufficient elaboration of issues related to the management of road cargo transportation in Kazakhstan. the need to improve the processes of managing material flows in transport and logistics systems based on the development of digital ecosystems of transport and logistics services and the introduction of modern digital information technologies.

Purpose and objectives of the study. The purpose of the study is to develop scientifically based recommendations for improving the management of road cargo transportation based on the introduction and development of digital ecosystems in the field of transport and logistics services.

To implement the set goal, it was necessary to solve a number of the following scientific tasks:

– to study the conceptual and theoretical foundations of road freight management in the transport and logistics system and the fundamental foundations of the development of digital ecosystems;

– in Industry 4.0 study of international experience in the management of road cargo transportation;

– analysis of the state and trends of the current market for road freight management in the transport and logistics system of Kazakhstan;

– assessment of the development of digital ecosystems of transport and logistics services in the management of road cargo transportation in Kazakhstan;

– identify the main obstacles and problems of road freight management and the introduction of digital technologies in the field of transport and logistics;

– -development of recommendations for the formation of an optimal model for effective management of road cargo transportation based on improving the mechanism of interaction between the subjects of the transport and logistics service ecosystem using digital information platforms.

The object of the study is the processes of managing road freight transportation in the context of digital transformation of the logistics industry in Kazakhstan.

The subject of the dissertation research is the economic and organizational and managerial relations of road freight management in connection with the formation and development of digital ecosystems of transport and logistics services.

The theoretical basis of the study is the fundamental scientific works and applied works of domestic and foreign scientists in the field of supply chain management theory, logistics, management theory, systems theory, general economic theory, the activities of transport and logistics systems.

Methodology. In the field of Economics and logistics, methods of general scientific knowledge, economic and statistical methods and the method of system analysis were used. The research methodology includes the analysis of existing literature and the study of the experience of foreign countries, econometric analysis, as well as a survey of specialists from companies engaged in the provision of transport and logistics services.

Tool and methodological apparatus of the study. This study uses a mixed approach that combines quantitative data analysis with qualitative analysis to assess the impact of digital ecosystems on road freight management in Kazakhstan. This approach allows you to get a comprehensive idea of the current state of digitalization in the transport and logistics sector and identify obstacles to its implementation.

The scientific novelty of the dissertation research consists in the development of theoretical-methodological and conceptual provisions aimed at improving the management of road cargo transportation on the basis of the development of digital ecosystems in order to optimize the parameters of material and information flows, namely:

– the concepts and methods of management of road cargo transportation were systematized, its evolution was studied and the scientific foundations were determined;

– structural elements, key technologies and business models of digital ecosystems have been systematized, and a model of their impact on efficiency has been developed based on international and domestic experience;

– international models of cargo transportation management within the framework of Industry 4.0 were analyzed, on the basis of which the structure of the Kazakhstan management system was proposed;

– identified problems and obstacles to the implementation of digital technologies and management of road cargo transportation in the transport and logistics market of Kazakhstan;

– the international experience of Transportation quality management within the framework of Industry 4.0 through correlation, regression and qualitative analysis methods was studied and the author's methodology was developed;

– -on the basis of economic and mathematical modeling, a scheme for improving the management information system was proposed, and a new approach to improving the quality of transportation in the conditions of Industry 4.0 was developed.

Concepts of the dissertation research to be defended:

1. The scientifically based structure of the road freight management system is determined.

2. A model of the impact of digital ecosystems on the effectiveness of road freight management has been developed.

3. In the perspective of Industry 4.0, the structure of the Kazakhstan road freight management system was substantiated.

4. Developed and applied its own methodology for analyzing the latest international experience in managing the quality of road cargo transportation.

5. An improved scheme for the Organization of road freight management and Industry 4.0 a new vision of road freight management in the industry was presented.

6. The project of the national digital platform «KazLogistics Hub» has been developed and an integrated architecture of the digital ecosystem has been built on its basis.

The theoretical significance of the study is that the conceptual and theoretical foundations of Management in the field of road cargo transportation are the development of scientific approaches, the development of a methodology for the formation and development of digital ecosystems of transport and logistics services for road cargo transportation.

The practical significance of the results of the dissertation research is that the theoretical and methodological provisions formulated in the work can be used in the development of strategic decisions on the implementation and development of digital ecosystems of transport and logistics services in order to reasonably reduce aggregate logistics costs and increase the efficiency of road freight management.

Publication of research results. The main provisions and scientific results of the dissertation research are reflected in 8 scientific publications, including 3 articles

published in scientific journals recommended by the Higher Attestation Commission of the Ministry of Science and higher education of Kazakhstan, 1 article published in peer-reviewed scientific journals Scopus.

The structure of the dissertation. The dissertation consists of an introduction, 3 chapters in 9 parts, a conclusion, as well as 44 tables and 33 figures that reveal the main results of the study, is accompanied by a bibliographic list.