Application of strategic planning methods in assessing the transport sector as a national economic system component

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Abstract. The relevance of the study is determined by the rapidity of changes in phenomena and processes in the country’s transport system and the need to determine the most optimal methods for its assessment. The emergence of new challenges facing Ukraine's transport system requires additional study and assessment. Within the framework of the study, methods for assessing the transport sector of Ukraine were proposed and a corresponding assessment was carried out. The analysis revealed that the main export cargo of our country is grain and ores, while imports are dominated by ore and coal. The development trends and consequences of the transformation of Ukraine's transport sector were systematised, and the corresponding scheme was provided. A detailed analysis of Ukraine's transport markets during the wartime period was carried out with the development of relevant theoretical and practical recommendations for integration into the European space and unification of relevant regulations.

Keywords: strategic planning, transport sector, national economic, freight transport, system component.

1. Introduction

Ukraine’s transport sector is currently undergoing a transformation and is largely being integrated into the European Union’s transport sector. This integration process is extremely challenging and involves the implementation of a large number of regulatory documents, including laws, resolutions, rules and standards.

Analysing the pre-war figures, it should be noted that Ukraine has a developed transport system, in particular the length of public roads is 169 thousand km. The Big Construction program enabled 6.5 thousand km of roads to be reconstructed in 2020, and more than 7 thousand km in 2021.

Since the outbreak of the war, our country has lost significant territories and its ability to supply a considerable amount of cargo and servicing passenger traffic has deteriorated significantly, and some infrastructure facilities have been destroyed. Despite these negative aspects, the process of integrating Ukraine’s transport sector into the European one continues and even tends to intensify in 2023.

In order to deepen the integration processes, it is necessary to apply strategic planning methods in the assessment of the transport industry as a component of the national economic system, which is the subject of the present research.

2. Literature review and defining the problem

The scientific problem of strategic planning in the assessment of the transport industry as a component of the national economic system has been studied insufficiently.

At the same time, a number of important scientific problems have been solved in the scientific works of domestic and foreign scholars.

The following scientific papers, in our opinion, deserve the most attention. Park [1] examined the quality of transport infrastructure and logistics as a source of comparative advantage. Measuring exports indicators by value added allowed to explain the emergence and nature of the distribution of global value chains. The author proved that the provision of high quality transport infrastructure and logistics is a serious source of comparative advantage in logistics-intensive industries, and therefore transport policy aimed at improving the quality of transport infrastructure and logistics can provide a comparative advantage.

The study of Shokhnekh et al [2] is devoted to strategizing the regional sectoral structure of the labour market of the transport industry under pandemic conditions. It offers an innovative approach to conducting the process of strategizing, an analysis of the influence of static and dynamic factors on regional development, providing a balance of interests, development forecasting, as well as modelling the strategizing of the regional industry structure in the transport sector segment of the labour market.

Carrying out an assessment of environmental sustainability strategies in the area of cargo transport and logistics, implemented by Centobelli et al, allowed

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to identify the best global green practices and information systems in the operations of the transport and logistics market participants. It is necessary to agree with the authors in the heterogeneity of the industry defined by them and the proposal of different development strategies depending on priorities [3].

In a study conducted by Ziaee Bigdeli et al., it was found that the introduction of extended services with weak technological knowledge in production companies represents a high risk strategy. However, it is possible to reduce the risks by using the tool of strategic partnerships in global supply chains, which can also contribute to obtaining a crucial competitive advantage in the target markets [4]. Analysis of the country’s transport industry as a cross-environment for the company should be a prerequisite for the development of such strategies.

A study by Sunio et al [5], based on the Philippine case, investigates governance styles in reforming parts of the country’s transportation sector. The authors are correctly pointing out that the application of governance tools by the state to reform the transport sector should be balanced and take place in a sector-by-sector and niche manner.

Regarding the study of innovative mobile transport networks by De la Oliva et al. [6], the authors identified opportunities for segmented response to industry needs and virtualized infrastructure management.

The transformation of the paradigm of ensuring the innovative development of entrepreneurial activity in the context of the pandemic spread is outlined by Lytvynenko et al. in [7]. The study of Lowe et al [8] focuses on the adaptation of the transport industry on the example of Australia [8]. According to the authors, the orientation on the needs of passengers, the conquering of new segments, as well as the expansion of bus transportation services is able to offset the reduction of their financial support by the government.

According to a study by Merkert and Bushell [9], integrated transportation in value chains should help to improve the air transport effectiveness as a service and turn it into a valuable ecosystem.

Overall, much attention has been given to assessing transport sector trends globally or in regional markets, but each such study is in many ways unique given the different assessment tools.

There have been many scientific studies of analyzing the transport industry’s development, and authors have used various methods with varying degrees of effectiveness. The most interesting methodological developments of previous studies are outlined below.

In the study of Rowsell et al. the authors proposed four methods for assessing the value of benefits and costs of freight transportation. The authors noted that there is no single coherent approach to the evaluation of values, adequate for different modes of transport. The evaluation of transport industries has also been proposed [10]. One should agree with the authors in their hypothesis about the relevance of the multi-approach as a more adequate assessment tool.

The methodological completion of freight demand matrices is presented in the study of Madar-Vani et al. [11]. Six mutually exclusive industry groups with different spatial interactions are proposed. It is proved that a subset of links of important trade corridors is critical.

Of interest is a survey by Vural et al [12], in which the authors proposed a study of the potential of a number of tools in order to mitigate barriers to the spread of intermodal transport. In particular, the authors effectively used interviewing techniques, the Delphi method, brainstorming and other methods.

A study by Liu et al [13] proved that decentralized freight transport decision-making is a false step and an obstacle to freight network optimization from an economic point of view. Models of minimum intermodal transport costs with a nonlinear target function were proposed, as well as new route-based variable solutions. A hybrid genetic algorithm and particle swarm optimization algorithm (GA-PSO), the effectiveness of which has been confirmed experimentally, should be recognized as a scientific achievement of the authors in methodological development.

A study by Kumar [14] is devoted to modelling the implementation of social responsibility standards in the field of cargo transportation. The author used a multi-criteria decision-making method in a fuzzy environment for evaluation. The variation of the rank of the methods was checked using sensitivity analysis. The reliability of the model is confirmed by the lower sensitivity of the results to weight variations.

Selected management models of transport and logistics market participants are presented by Bo et al. and Yan Sen et al. in [15] and [16], respectively. Other problems of transport and logistics enterprises are presented in [17-23].

Despite such a significant number of solved scientific problems, it should be pointed out that the issue of strategic planning in the assessment of the transport industry as a component of the national economic system should be solved with the involvement of a number of modern scientific and practical tools. The authors have made an attempt to create and adapt these tools to practical realities, taking into account the current situation related to the military aggression of the Russian Federation against Ukraine and the challenges that arise.

3. Research aim and objectives

The aim of the study is to determine the means of applying strategic planning methods in the assessment of the transport industry as a component of the national economic system and to develop practical recommendations.

At present, the transport system of Ukraine faces challenges that require additional discussion and evaluation. For this purpose, the analysis of the preliminary studies was carried out, the methodological tools proposed by the previous researchers were evaluated, the methods of evaluating the transport sector of Ukraine were proposed and the respective assessment
was carried out. These are the goals of the scientific research.

4. Overview key findings

In order to achieve the set goals, analyzing the structure of Ukraine’s export cargo processing was carried out. It should be noted that 38% were grain cargoes, 28% were ores, 12% were ferrous metals, 4.7% were edible oil, and 5.6% were containers (as of the end of 2020). Imports were dominated by ore (28%), coal (20.6%), containers (22.2%) and oil (5.5%). However, this is all pre-war data, and the situation has changed dramatically since the beginning of the Russian military aggression.

Based on the historical analysis of cargo transit trends in Ukraine, the following global trends can be noted that have occurred in the long historical retrospective and have significantly influenced the development of the Ukrainian market. The volume of transit cargo has decreased significantly compared to the early 2000s due to the creation of alternative ports in the Baltic Sea and the development of existing ports in the Black Sea basin.

Table 1. Cargo transportation by modes of transport in 2021

<table>
<thead>
<tr>
<th>Cargo turnover</th>
<th>Cargoes transported</th>
</tr>
</thead>
<tbody>
<tr>
<td>mln tkm</td>
<td>in % to 2020</td>
</tr>
<tr>
<td>Total (all transport modes)</td>
<td>289 635.4</td>
</tr>
<tr>
<td>Railway</td>
<td>180 361.0</td>
</tr>
<tr>
<td>Road</td>
<td>46 808.1</td>
</tr>
<tr>
<td>Maritime</td>
<td>2 949.5</td>
</tr>
<tr>
<td>Pipeline</td>
<td>59 170.5</td>
</tr>
<tr>
<td>Air</td>
<td>346.3</td>
</tr>
</tbody>
</table>

In order to assess the importance of export transportation for the national economy, it is sufficient to point out that Ukraine is an important player on the international grain market, one of the guarantors of food security in the world, and has the potential to increase production and export of grain.

These problems, however, tended to worsen. In general, the transport and logistics sector of the national economy changed significantly in 2020-2021, primarily due to the rapid spread of COVID-19 around the world and the introduction of strict quarantine, which led to the bankruptcy of a significant number of tour operators, airlines and other enterprises focused on servicing passenger flows.

On the other hand, companies in the transport and logistics sector that served freight flows gained new opportunities for development. Demand increased significantly, and tariffs rose substantially, which opened up new opportunities for development to transport and logistics companies.

However, there was also a negative imbalance in the markets due to the disruption of sustainable trade relations and the sharing of transport vehicles’ passenger and cargo capacities (especially in air transport), which caused a considerable shortage.

After experiencing such a significant decline in the 2000s, a gradual recovery began in the 2010s. In the period before the outbreak of a large-scale war, transport performance stabilised and was characterised by a large potential for growth.

It is worth noting the significant problems in a number of transport modes that emerged long before 24 February 2022. The events of 2019-2021 in the Black and Azov Seas were characterised by acts of full or partial blockade of seaports, which significantly hampered their operations. This was especially true of the ports of the Azov Sea, which were actually isolated and ceased to actively operate during this period, cutting Ukraine off from a significant part of the markets and reducing opportunities to promote its products, thereby creating an imbalance.

Characterising the prerequisites for analysing the transformational changes in the transport sector that took place in 2020-2021, as well as those that emerged with the outbreak of war, it is worth noting the need for a comprehensive study.

To achieve this, the development trends and implications of the Ukrainian transport industry transformation in a period of dynamic changes were determined (Fig. 1).

Rail transport of Ukraine is one of the most powerful in Europe. As of January 1, 2021 the deployed length of the main railway lines of Ukrainian Railways is 27 thousand km, electrified sections – 9.3 thousand km, through which more than 70% of freight is transported. In 2021, 314 mln tons were transported, whereas at the beginning of the 1990s there were 1 bln tons of cargo. The main customers are mining and smelting, agrarian, fuel and energy and construction industries.

In January-April 2022 the railway transported 7.4 million passengers, which is 1.5 million passengers more than in the same period of 2021. The largest increase (64%) occurred in March 2022, with April 2022 carrying 19% fewer passengers than the same period in 2021.
The railways are in a state of reform according to the principles of European law. In recent years, Ukraine has undergone an active process of modernization and electrification of the railway infrastructure.

In 2020-2021 about 95% of exports of more than $47.0 billion were shipped by maritime transport. In 2022 maritime shipping is practically impossible, and river shipping is complicated.

Road transport remains a priority in the current conditions, and the active use of road transport can provide partial compensation for the transportation capacity of other transport modes.

Air transport was significantly affected by the spread of COVID-19, especially in mid-to-late 2020. Negative trends took place in 2021 as well. As of today, the aviation space of Ukraine is closed.

Transit traffic along international corridors between Asia and Europe was actually interrupted. Transit traffic by rail decreased by 88.4% in March-April 2022 against the level of the same period in 2021.

More than 1400 train cars (about 70 thousand tons) per month of cargo are transported, as well as the container direction, providing transportation from neighbouring countries to Kyiv, Kharkiv, Zaporizhzhia and Odesa.

There was a significant drop in the volume of freight traffic (for 4 months of 2022 by 31% as compared with the same period of 2021).

But by the end of 2022 and in 2023, rail freight began to grow. However, this was largely due to an increase in domestic traffic, while international rail traffic did not have a clear trend. Thus, in May 2023, it showed a downward trend [24], and in June 2023, it increased by almost a quarter [25].

The blocking of the “grain corridor” remains a significant obstacle, but Ukrzaliznytsia is actively trying to implement new projects, intensify the use of innovations, attract new partners, etc.

There is a significant problem of the lack of specialized rolling stock (grain carriers, tankers) and the different track width of the railroads, because at the border with the EU all cargo is transshipped (except for dangerous goods), when there is a change of railway carriage to a track of 1435 mm.

Maritime traffic, which provided the largest share of transportation, is to some extent impossible. Their development at the current stage is conditioned by the blockade of Ukrainian seaports, which makes it impossible to deliver most cargoes. Grain cargoes under the so-called “grain deal” were delivered using Ukrainian ports.

However, as of the beginning of August 2023, this agreement was terminated and deliveries have significantly decreased and are carried out at the risk of cargo owners and ship owners. In addition, in July-

**Fig. 1. Development trends and implications of the Ukrainian transport industry transformation in a period of dynamic changes**
August 2023, Ukrainian seaports suffered numerous destructions as a result of attacks.

Inland water transport is represented by ten river ports of the Dnieper River. Although there are ports on other navigable rivers in Ukraine – the Danube, Southern Bug, and Dniester – the latter two provide exclusively local transportation.

The operation of Ukraine’s river ports has also been severely hampered by the war, with some of them not actually functioning, some damaged by enemy missiles and drones, and others significantly reduced due to the inability to ensure safe. In recent years, there has been an intensive increase in the volume of inland water transport, especially grain shipments. The Law of Ukraine “On Inland Waterways” was adopted, and the Specialized Fund for Inland Waterways Development was created.

Air traffic significantly decreased already during the spread of COVID-19, starting from March 2020, when air passenger flights were suspended. As for air cargo transportation, the following can be noted: since a significant part of the traffic by Ukrainian charter airlines is carried out between third countries, it continues to be carried out as usual.

At the same time, there is no service for cargo traffic, which was transported on passenger-cargo flights to and from Ukraine and they switched to other modes of transport or left Ukraine. Since air transportation is currently not possible in Ukraine, various logistics delivery schemes using multimodal connections have been activated, whereby the Ukrainian part of the route cargo is transported by road (much less frequently by rail), and the rest of the way, starting from the territory of a foreign country neighbouring Ukraine, the cargo is delivered by air. Ukrainian air carriers also practice other mechanisms of operation that involve servicing cargo and passenger flows in third countries under various cooperation options, and actively lease their existing aircraft.

As for the regulatory and legal aspects of the transport activity, the following can be highlighted. Above all, on June 23, 2022, the European Parliament decided to grant Ukraine the status of a candidate member of the European Union. The Association Agreement between Ukraine and the EU, which was signed back in 2014, includes requirements for all modes of transport except aviation, which is singled out in a separate agreement.

According to these requirements, draft laws on the implementation of EU directives have been developed and registered in the Verkhovna Rada of Ukraine, which provides for a number of reforms in transport. So far, only the laws “On Inland Water Transport” from 03.12.2020 № 1054-IX and “On Multimodal Transport” from 17.11.2021 № 1887-IX were adopted by the Parliament.

It is extremely important to adopt new laws on transportation by various transport modes, on transport, logistics and forwarding activities, which would become the drivers of the development of the transport sector as a whole.

Regulation, control and enforcement of the road transport market remains a significant issue, due to its significant fragmentation and instability, and the fact that its small players are not interested in certifying their activities and adopting and adapting the best European and global practices in Ukraine makes it uncompetitive on a global scale.

Private railway traction, within the framework of the implementation of the relevant regulatory and legal norms, can bring railway transport to a new stage of development. The prospects of this mode of transport in Ukraine are determined by its extreme branching, relative cheapness, convenience and the use of particularly underutilised railway sections can create conditions under which their closure will become irrelevant.

In addition, rail transport is defined as environmentally sustainable in the EU’s transport priorities and its development is relevant. Combined, these factors determine the need for active implementation of new transport and logistics schemes for the delivery of cargoes involving railway transport as the main one.

With the adoption of the Law of Ukraine “On ratification of the Common Aviation Area Agreement Between the European Union and its Member States, of the One Part, and Ukraine, of the Other Part” it is possible to consider the open road to the implementation of all EU legislation in the field of air transport. This also opens up new opportunities for Ukraine in this area. The increasing use of air transport in servicing the most expensive freight flows of special categories of cargo in supply chains provides opportunities to intensify this activity in the country. To do this, a number of organisational and technological problems must be resolved, primarily related to the development of airport infrastructure for cargo servicing.

The creation of logistics hubs, with the airport as a key centre, is now becoming a key trend. The best example of this is the Hong Kong logistics centre, which is now one of the largest in the world, and its airport component is the driving force behind its development and the largest cargo airport complex.

The Special Transport Agreement on the liberalization of road transport between Ukraine and the EU has ensured the removal of the need to obtain the corresponding permits and greatly simplified the movement of goods through road checkpoints.

Ukraine's joining to the Convention on a Common Transit Procedure and the Convention on the Simplification of Formalities in Trade in Goods will also greatly contribute to the development of transit traffic. Joining the Interbus Agreement will make it possible to unify the rules of international passenger bus transportation, significantly improve the competitiveness of market participants with an increase in the quality of transportation, as well as to implementation of best practices. The implementation of these regulations will bring Ukraine closer to the world's best practices and the most developed countries.
5. Conclusions

The transport industry of Ukraine is developing dynamically, but recently faces challenges that require assessment. In the course of the study, an attempt was made to make such an assessment. It was noted that Ukraine is going through a difficult time in terms of the transport sector development. The need to implement strategic planning methods in the assessment of the transport industry as a component of the national economic system was pointed out. A critical analysis of previous scientific studies has shown that there is a lack of necessary tools for this.

The trends in the development of the transport and logistics industry of Ukraine in the pre-war and modern (wartime) periods were analysed in detail, which showed a significant number of problems, including full or partial blocking of seaports and the impossibility of air transportation. As part of solving these tasks, the scheme for analysing the development trends and consequences of the transformation of the transport industry of Ukraine in the period of dynamic change was proposed, intended to systematise and significantly simplify the understanding and solving of existing issues. The new opportunities that need to be addressed in rail, sea, river, air and road transport modes for their successful integration into global supply chains and the Pan-European transport model were described specifically.

The key aspects of the regulatory and legal support of the transport cluster of Ukraine were systematised, and the urgent issues that should be addressed in the near future were noted, since now is the best moment to implement such changes, given the time required for their practical implementation in the relevant areas.

References