

process. The suggested procedure for optimal transportation parameters management takes into account the effect of the “first and last mile”, as well as the probability of financial risks in the wagons traffic in case of non-compliance with the terms of freights delivery. Due to the efficient organization of transportation processes at the corresponding divisions of wagon traffic, the freight cost of the railway is reduced by approximately 10% compared to the current methodology of determining the actual cost of freight.

UDC 656.07

CHANGES IN THE LOGISTICS OF THE EXPORT OF UKRAINIAN GRAIN

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The Ukrainian economy is largely dependent on international trade. In 2018, exports of goods and services accounted for 40.7% of the country's GDP, and imports, respectively, for 41.9% of GDP (Minfin, 2021). These indicators are much higher than the world average. Ukraine, being one of the key players in the global agricultural market, provides export deliveries of significant volumes of food. For example, the average annual total export for the last pre-war 3 seasons of only four key commodities – corn, wheat, sunflower oil and sunflower meal – is estimated at 58.1 million tons, which is more than 14% of the total world export of these goods. Moreover, for corn and wheat, the average annual share of Ukrainian exports in total world trade is estimated at 15% and 10%, respectively (in 2022). Over the past few years, Ukraine has been demonstrating a consistently high increase in the volume of gross grain harvest and is strengthening its importance both in the Black Sea region and in the global market. At the same time, seaports of Ukraine are an extremely important transport road for Ukraine to world markets. More than 60% of Ukrainian exports took place through seaports. Ukrainian seaports were able to handle 250 million tons of cargo annually.

In 2022, at the beginning of the war, grain transportation almost stopped. This raised fears of a food crisis around the world and led to a sharp rise in prices. Meanwhile, the Ukrainian authorities find a solution and set out to change the logistics of cargo flows towards the European Union. Most of Ukrainian exports have been transported by rail towards European ports across borders with neighboring countries such as Poland, Romania, Moldova, Slovakia and Hungary. The volume of rail traffic through the western border crossings in 2022 increased significantly.

However, not only Ukraine had to face a number of problems when changing logistics routes towards the western borders and blockade of seaports. Such changes affected the international market, our state, maritime transport and, of course, railway. There was a shortage of agricultural products on the international market in at least 10 countries, the growth of world prices for agricultural products began, food

inflation appeared and access to food was reduced in countries dependent on imports, duplication of control procedures was created in Ukraine and European countries, and everything else, the protests of European farmers were added. Our state had sanctions from neighboring countries on the import and transit of Ukrainian grain, cargo owners suffered huge losses, there was no profit from the sale of grain and, as a result, the fall of the Ukrainian gross domestic product.

In sea transportation, additional costs appeared due to vessel downtime and the cost of storing goods before transshipment at sea terminals increased. Ukrainian grain had to face the limited capacity of European ports, in connection with which, there were queues of wagons on the approaches to European ports. In turn, the workload of Ukrainian ports was less than 50%. In the Bosphorus Strait, a line of ships artificially created by Russia has appeared, the waiting for the inspection of which is from 2 to 5 weeks.

At the same time, it quickly became clear that neither the Ukrainian nor the European railway infrastructure was ready to receive and handle the available volume of cargo from Ukraine. On the railway, additional costs arose due to idle wagons queuing at the border of Ukraine with the European Union and the inability of transit railway stations to process the increased wagon traffic. In addition, small railway terminals on the territory of the European Union, different widths of railway lines in Ukraine and Europe, the initial lack of integration between the railway structures of Ukraine and neighboring countries, as well as the lack of wagons from European railway carriers have led to a number of problems.

УДК 656.1

МОДЕЛІ ПРИСКОРЕННЯ АВТОМОБІЛЯ ПРИ РОЗРАХУНКАХ ЧАСУ ЗСУВУ ПОЧАТКІВ ЦИКЛІВ У ПЛАНАХ КООРДИНАЦІЇ

MODELS OF VEHICLE ACCELERATION IN CALCULATING THE SHIFT PARAMETER OF CYCLES IN COORDINATION PLANS

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Прагнення до точного моделювання розгону автомобіля в різних умовах руху має важливе значення в галузі транспортного планування та дорожньої безпеки. У цьому напрямку в різноманітних спеціальних дослідженнях отримано певний емпіричний матеріал, обробка якого привела до появи моделей постійного та лінійно убиваючого прискорення [1, 2].

Модель постійного прискорення є найпростішим варіантом моделювання, так як у ній припускається, що прискорення автомобіля не змінюється з часом і