

STRUCTURAL OPTIMIZATION OF MULTIMODAL ROUTES FOR CARGO DELIVERY

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Abstract

Different types of transport involved in the performance of intercity cargo multimodal transportation are characterized by mutual advantages and disadvantages. The main reason why multimodal transportation is gaining more and more use and development is to avoid the use of transportation that burns hydrocarbons and is not environmentally friendly. New prospects also concern increased transportation safety, the possibility of ensuring the working conditions of delivery workers, and reducing logistics costs. However, the successful interaction of different types of transport in the logistics chain can be ensured when the organizational and technological parameters of individual links of the overall transport process are mutually agreed upon. This article is devoted to the coordination of individual stages of the multimodal delivery process, taking into account that the process is discrete in its content. The tact, which has the content of a time window for performing the operation is used for discrete processes. Due to the fact that multimodal transportation of goods is carried out on a large network, time is one of the most important criteria for their perfection. Two time criterias are applied in the article, which take into account the fact that the multimodal process must be synchronized and that the transportation of a large group of goods can be carried out in separate parts. An estimation criterion was also applied, which takes into account constant, variable, contingent costs, which are carried out depending on the structure of the process. In contrast to known studies, the dependence of the optimization criteria of the multimodal process on the total volume of cargo delivery was shown. **The method of analyzing the transport scheme of multimodal transportation and the corresponding algorithm and computer program were developed.** The methodology involves a complete review of all possible route options using three types of continent transport, namely road, rail, and river. The method of structural optimization is applied to the example of a transcontinental transport corridor, which is developing in the direction of the port of Karas (Turkey) - Chornomorsk (Ukraine) - the port of Gdansk (Poland). Recommendations have been developed regarding the structure of the multimodal route by modes of transport depending on the volume of planned transportation.

Keywords: multimodal transportation, discrete processes, structural optimization, process cycle.