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FORMATION OF CRITERIA FOR CHOOSING A RATIONAL TECHNOLOGY FOR DELIVERY OF PERISHABLE CARGO TO EU COUNTRIES

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A rather complex network of global economic interconnections around the world, including in the EU, is in constant dynamics. By reducing irrational financial costs and constantly adapting to the relevant conditions of an unstable external environment, it is possible to fully and efficiently develop the available import and export opportunities in the logistics space. When managing different processes and objects in the logistics system, there may be a certain separation of technological processes of state control services, disconnection of existing technologies of the main elements (ports, terminals, stations). As a result, a single technological process is not used by all participants in the delivery process and unified planning, the quality and degree of interaction with transport companies and cargo owners are insufficient, and the level of effective interaction of the transportation process with the external environment of the system is low [1-4].

The dynamics of the value of exports of cargo to the EU countries for the period

from 1996 to 2023 shows that trade volumes have been constantly growing with small fluctuations during periods of crises [5]. From 1996 to 2023, the volume of exports increased 7.3 times in value. This indicates our country's constant desire to take appropriate positions in the large EU market. In 2024, the value of exports from Ukraine to six EU countries amounted to more than USD 15 billion. Most of the exports are to Poland. But Spain also accounts for a significant share of the value of exports - 19 percent. Most cargos are shipped by sea and rail. Containerized cargos are shipped by rail.

Having analyzed the existing results of scientific research on improving the technology of delivery of perishable cargos in containers in international traffic, we have identified the main results and directions: the formation of sufficiently reliable supply logistics at the macro level, taking into account the rational use of all types of resources [5-8]; determination of reasonable technologies for the delivery of various types of cargos, taking into account stochastic changes in demand for transport services [9-13]; introduction of modern technologies for ordering services in logistics centers in the organization of transportation processes [14-16]; development of an effective logistics supply chain for related products, taking into account the risks in certain technological operations [17-21].

The responsibility of Logistics Companies (LCs) extends beyond simply handling logistical processes and choosing transportation routes; they focus on being competitive and efficient in their operations. In multiple origins and destinations networks, LCs attempt to select the most optimal routes from each point. To address this challenge and reduce the time needed to identify potential routes, a novel method has been developed in this research for LCs. In operational planning, additional factors need to be considered to increase efficiency, customer satisfaction, and competitiveness. To confront this issue, the study proposes a novel model and contributions, inspired by the LPI, to apply the transformative impact of smart ports, the integration of smart containers, the choices of clearing and forwarding agents and port operators, and time uncertainty in the multi-objective framework. Specifically, the mathematical model's objectives include cost, time, customer satisfaction, and

environmental impact in the periodic multimodal network. An innovative customer satisfaction function is introduced by integrating the selection of smart containers and smart ports, emphasizing their impact on enhancing customer satisfaction, while addressing time uncertainty through a chance-constrained approach and coefficients of variation. The model is solved using goal programming, and the results show that smart ports and smart containers can majorly affect transportation time and customer satisfaction. Furthermore, comparing the results to other studies demonstrates its superiority in decision-making for LCs, particularly by including time uncertainty and the role of clearing and forwarding agents and port operators. Therefore, the model holds practical significance in lowering costs, enhancing customer satisfaction, and facilitating smart international logistics. This research offers insights that are not only useful for the LCs but also for other stakeholders in the transport industry [22].

The supplier's company organizes the delivery of perishable cargos in containers in cooperation with shipment customers, trucking companies, the transport logistics center of Ukrzaliznytsia, and the Mostyska container terminal.

The study proposes two alternative technologies for the delivery of perishable cargos in containers from senders in Ukraine through the Mostyska container terminal to the recipient by railway through the territory of the European Union. The peculiarity of the first scheme is the delivery of a container with perishable cargos from the sender by road to the Mostiska container terminal, and in the second scheme by railway.

An estimation parameter for determining the rational variant of the technology is proposed - the total cost of delivery of perishable cargos in containers.

The structural model of interaction between the participants in the process of delivery of perishable cargos in containers to the EU countries takes into account the participation of the supplier company, customers of shipments, motor transport companies, the transport logistics center of Ukrzaliznytsia, and the Mostiska container terminal. Two alternative technologies are proposed for the delivery of perishable cargos in containers from senders in Ukraine through the Mostyska container terminal to the recipient by rail within the European Union. The peculiarity of the first scheme is the delivery of a container with perishable cargos from the sender by road to the

Mostiska container terminal, and in the second scheme by railway. The criterion for determining the rational variant of the technology is the total cost of delivery of perishable cargos in containers. The constraint system takes into account the relevant environmental factors (perishable cargo order volume, transportation distance on the i-th section) and controllable parameters (loading and unloading time of one ton of cargo, loading and unloading time of one container, and railroad transportation time).

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ANALYSIS OF FOOD DELIVERY TECHNOLOGY ON INTERNATIONAL ROUTES

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By definition, food is a substance or product (unprocessed, partially processed or