

OPTIMIZATION OF THE TECHNOLOGICAL PROCESS OF FREIGHT TRANSPORTATION IN URBAN CONDITIONS

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Increasing the efficiency of the delivery process from an economic point of view is primarily achieved by increasing the productivity of rolling stock, which directly affects the overall costs of the logistics system and the level of customer service. The level of this productivity is largely determined by how expedient and rationally selected vehicles are, taking into account the specifics of specific logistics tasks, type of cargo, operating conditions and regional restrictions. As evidenced by the analysis of modern scientific sources, rolling stock not adapted to real conditions causes increased fuel consumption, downtime, frequent technical malfunctions and increased transportation costs [1–5].

One of the key tasks in the field of organizing freight transportation is the well-founded selection of rolling stock that most fully meets the conditions for carrying out the transport process, taking into account the intensity of the flow, seasonality of demand, topography of routes, and environmental standards.

Within the framework of this task, two interrelated subtasks are solved : establishing an appropriate specialization of the vehicle (isothermal, tented , refrigerated, tank, etc.) and determining its optimal carrying capacity depending on the standard size of the transported cargo. Special attention should be paid to modeling and forecasting consumer demand for transportation, which allows to increase the accuracy in choosing the type of vehicle and minimize the costs of empty mileage [4–9]. The suitability of the vehicle for transportation conditions is one of the determining factors of the efficiency of the entire logistics system, especially in conditions of uncertainty of demand, the threat of traffic obstacles and limited access to infrastructure facilities.

In the case of transportation of multi-item cargo, the need for active implementation of delivery routes and careful selection of the optimal vehicle load

capacity becomes particularly relevant. One of the most significant reserves for increasing the efficiency of road transport is the introduction of such types of vehicles or road trains that fully meet the specifics of a given type of transportation and operating conditions.

The greatest efficiency for each type of cargo is provided by vehicles whose technical characteristics, in particular the load capacity and body design, correspond to specific transport and operational and road conditions. In general, the load capacity of the vehicle should correspond to the volume of cargo to be delivered; it is desirable that this volume be as close as possible to the technical maximum of the vehicle without creating risks or inconveniences for the consignor and consignee. An increase in load capacity helps to reduce the cost of transportation, although exceeding the values of the total load capacity of the vehicle and the permissible standards of road infrastructure is also unacceptable. The body design, in general, must correspond to the physicochemical properties of the cargo being transported [2, 3, 5, 9].

For road transport companies that transport a wide range of goods, an effective solution may be to operate several types of vehicles, each of which will be adapted to the specifics of a certain type of cargo. If the nature of the transportation of each type of cargo is stable throughout the year, then in such a situation it is advisable to carry out a reasonable distribution of the fleet of vehicles by type of cargo. Vehicles can be assigned to clients on a permanent basis or be involved periodically in accordance with emerging needs.

The main vector for increasing the efficiency of batch transportation is the formation of combined batches of cargo intended for one or more consumers, with their subsequent delivery along delivery routes. This approach allows you to significantly optimize the costs of labor and fuel and energy resources due to more efficient use of transport capacity. In the case when the volume of transportation exceeds the carrying capacity of the assigned fleet, it is necessary to attract additional transport units, which can be temporarily released from other facilities or be part of the reserve of the motor transport enterprise [3, 4, 6, 7, 8].

Depending on the characteristics of the cargo and the road environment, one or

more types of vehicles may be used for its transportation. In the case of several alternatives, the final choice is made on the basis of a system of efficiency criteria, the main ones being minimization of operating costs, maximization of productivity, reduction of labor and energy intensity of transportation, as well as reduction of material intensity of the delivery process.

The main criteria for the validity of the choice of a vehicle include: minimizing overall transportation costs, reducing labor costs, optimizing fuel costs, ensuring cargo safety, timely delivery, and guaranteeing a high level of safety of the transportation process.

In the field of trade, batch transportation prevails, characterized by the delivery of goods in quantities smaller than the carrying capacity of the most efficient vehicles. It is advisable to differentiate such transportation by the size of the batches in accordance with the accepted classification of goods and types of rolling stock. When transporting limited batches on shuttle routes, it is critically important to ensure that the carrying capacity of the vehicle corresponds to the volume of the batch being transported. In case of discrepancy, the material consumption of transportation increases, fuel consumption increases for moving a vehicle with excessive dead weight, which ultimately leads to an increase in the cost of delivery [4, 8, 9, 10, 11].

It should also be noted that the size of a cargo lot is significantly affected by fluctuations in market demand. As noted in [2, 3, 5], the size of a cargo lot in most cases obeys normal or exponential distribution laws. Keeping vehicles with different payloads within the limits between the minimum and maximum levels of demand determined by these laws leads to significant downtime of rolling stock and increased costs for their operation.

The issues of the variable nature of demand for transportation and the variability of the size of cargo lots are considered in [4, 6, 7], where a methodology for determining the rational carrying capacity of vehicles is presented, taking into account probabilistic fluctuations in demand. The methodology also includes an analysis of the delivery of small orders in urban environments, where traffic jams may occur, as well as environmental restrictions. The carrying capacity in this case is determined taking

into account the probability that the size of the order will not exceed the technical capabilities of the vehicle. Taking into account the effect of constant fluctuations in demand at the final points of delivery allows optimizing the logistics processes of small-lot transportation in conditions of limited resources.

The cost of transportation can be reduced by using rationally planned delivery routes with a number of service points from one to n [6, 9, 11]. At the same time, the further the arrival points are located from the central warehouse or base, the higher the total length of the routes, which, if optimized, increases the efficiency of the use of vehicles. Similarly, if the size of cargo lots is reduced and the density of arrival points within the delivery area increases, the efficiency of delivery routes increases significantly.

Thus, the problem of increasing the efficiency of small-batch cargo delivery, as well as the rational use of the fleet of vehicles for the transportation of batch cargo, remains relevant. Its solution is achieved by implementing optimized delivery routes, a well-founded selection of rolling stock of appropriate carrying capacity for their service, as well as taking into account the probabilistic nature of the demand for transportation.

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RETAIL LOCATION STRATEGIES IN EMERGING MARKET

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In recent years, the Ukrainian retail sector has emerged as one of the most dynamic and rapidly expanding segments of the national economy. This growth has been driven by increasing consumer demand, urbanization, and the gradual integration of global retail practices into the local market. Despite these developments, the