Preconditions for optimizing costs of logistics operator when delivering special categories of cargoes

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Abstract. Activities of logistics operators in providing global supply chains are becoming increasingly relevant, theoretically and practically significant. The purpose of the study was to determine the types of costs of a logistics operator in the delivery of special categories of cargoes and to identify the preconditions for their optimization. In solving the tasks, the authors used the abstract-logical method, methods of generalization, system and statistical analysis, and expert assessments. A critical analysis of scientific researches on the development of Industry 4.0 and the formation of a logistics operator 4.0, the multimodal interaction features, the development of various logistics systems on certain modes of transport and in cities was carried out. The main results of the study were to determine the principles of emergence, structuring and establishing ways to optimize the delivery cost of various categories of special cargo. The results of the study will be relevant for logistics operators, airlines, airports, freight forwarders, and other participants of transport and logistics markets, as well as scholars. Keywords: risk, costs, cargo delivery, special cargo.

1 Introduction

The logistics operator faces the problems of risk prevention in the organization of the cargo delivery process. Moreover, these costs are distributed to the carriers that provide delivery on a particular segment of the route. Measures to prevent the occurrence of risks certainly require costs, and therefore, to ensure the cost-effectiveness of cargo delivery for the logistics operator, it is necessary to determine the optimal size of costs along the entire cargo delivery chain. The authors have found that the problems of optimizing the costs of the logistics operator, taking into account the implementation of measures to prevent the risks of damage and deterioration of cargo along the entire route, remain insufficiently researched.

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It should be taken into account that optimization of insurance coverage of special cargo transportation is only one of the measures to minimize risks. While the main measures in this matter should be the prevention and control of risk during delivery. At present, ensuring the security of supply chains is the most relevant theoretical approach in the field of transport logistics.

2 Literature Review and hypothesis development

The impact of Industry 4.0 on logistics processes today can hardly be overestimated. These processes are extremely deep and continue to deepen every year. Providing global supply chains is a key factor in the success of Industry 4.0 [1-5]. At the same time, the logistics operator 4.0 can be identified and characterized, which is a fundamentally new phenomenon in the market [6-7]. A significant transformation of the innovative business development paradigm in the context of the COVID-19 spread was noted, which required the search for new approaches different from existing ones [8]. The peculiarities of multimodal transport operation have been actively studied and many important scientific problems have been solved by scholars. The general features of multimodal interaction of transport modes are of great scientific interest and require further development [9-10]. In [11], cargo delivery management in global supply chains under sustainable development conditions was considered. The activities of a multimodal logistics operator have also been intensively studied and should be deepened [12-14].

Various aspects of cargo flow management of a network air carrier are presented in [15-17]. The study of the peculiarities of adaptation of logistics operators in pandemic conditions was conducted in [18].

The search for ways to optimize the maritime route of cargo delivery is gaining considerable popularity both in practical work and in scientific research [19-20]. Application of smart logistics technologies is described in [21]. Rail-road deliveries have also aroused keen interest among researchers [22-23] and are among the most promising areas to be expanded in the formation of global supply chains.

In general, it is becoming evident that the delivery of special categories of cargoes within the so-called last mile takes place in cities, and therefore the infrastructure provision of cities is an important component of the overall supply chain. Optimization in multimodal freight transportation problems is discussed in [24].

Air transportation is becoming an integral part of new supply chains, and therefore further research is needed to address a number of economic, organizational and technological challenges faced by transport and logistics market participants [25-26].

3 Methodology

Substantiation of theoretical foundations and practical recommendations for ensuring the delivery process of special categories of cargoes requires the use of special scientific methods, which was successfully implemented.

In the process of implementing the scientific study the authors used the following methods:

- abstract-logical method – in the formation of the scientific hypothesis of the study, categorical study, formulation of conclusions and recommendations;
- generalization method – in determining the general features and properties of the logistics operator's activities in the market of transport and logistics services;
- methods of system analysis – when identifying links between the costs for delivering various categories of special cargoes;

- methods of spastic analysis – when studying phenomena and identifying patterns that take place in the market of transport and logistics services;
- method of expert assessments – in evaluating and forecasting opportunities.

All the presented methods are effective and are of significant scientific interest and were used by the authors in solving the tasks set in the scientific paper.

4 Results and discussions

In view of the mentioned above, the organization of safe cargo delivery should include ensuring the integrity of the cargo, as well as compliance with the delivery time, which is becoming crucial. Securing the integrity of the cargo at any stage of delivery is very important, as it affects further processes. Therefore, ensuring the integrity of the cargo during delivery is one of the main preventive measures to eliminate risks and possible losses, both for the logistics operator and for the transport enterprise.

The air traffic growth is one of the key global trends in the world economy, and this trend will only continue to accelerate. More active involvement of air transport in the delivery of special categories of cargo has an extremely strong impact on the increase. It is clear that the main factor affecting the growth of air traffic will be the increasing overall mobility of the population and the growth of tourist travel. It is worth noting the significant level of overlap between air passenger and cargo flows, as a significant part of the most expensive cargo is delivered on passenger flights.

Implementation of various measures to reduce risk during delivery requires corresponding costs. The selection of specific risk reduction methods requires a comparison of the risk level and the costs of risk prevention and control. In the process of risk management in the transportation of goods involving air transport, it is necessary to take into account not only the risk of untimely departure of goods from the airport, but also other types of risks: damage or loss of goods, creation of danger during transportation, delays or termination of transportation, and additional costs during transportation. This is important for many categories of cargo, especially it becomes relevant when organizing the delivery of special categories of cargo.

One of the most complicated processes is the organization of the delivery of dangerous and perishable goods, as they require more complex procedures, including preparation for transportation, formation of cargo consignments, work with refrigerants, specific conditions for handling, transportation, warehousing and organization of loading and unloading operations, etc. In addition, it should be noted that the value of cargo can be determined not by its real or insurance value, but by its real value for the supply chain provision. That is, by disrupting the delivery of a certain cargo, a logistics operator can cause its client losses of hundreds of thousands or even millions of US dollars, since this cargo, for example, was a critical component of a certain production chain, while the real price of the cargo itself, which was lost or damaged, can be measured in small amounts – even hundreds of US dollars.

Cargo delivery with the participation of air transport is becoming more and more relevant every day for a larger range of goods. This is especially true for perishable categories of goods, as well as goods the value of which is determined by their novelty in the market. The first group includes goods that quickly lose their consumer values due to physical deterioration – chilled seafood, elite vegetables and fruits, flowers, etc. Whereas the second group includes, for example, mobile phones and laptops, which are new to the market and the value of which for buyers is considerably decreasing as the market is getting saturated.

It is necessary to consider the entire cargo delivery chain involving air transport, and not only the processes directly related to cargo handling at the airport, as damage or loss of cargo at any stage can make the entire further process inexpedient. The cargo clientele is primarily interested in ensuring the integrity of the cargo and the total cost of delivery, while other

aspects of delivery are non-priority and obviously much less important for them.

The complexity of managing the delivery process of special categories of cargo determines the need to develop integrated solutions for the delivery chain, taking into account the specifics of the cargo and the interaction of the transport modes involved in each specific case of delivery. The risk of the cargo that the cargo carries becomes the risk of the logistics operator in the supply chain, because, as noted earlier, it is he who acts as the organizer of the supply chain and ultimately he is responsible for the damage or loss of the cargo to the client.

Special cargoes generate special risks and need to be managed through the prism of supply chains. Depending on the form of the supply chain, logistics operators will organize the delivery process in one way or another, and hence the consequences of the emergence and impact of risks will differ. General types of delivery costs for certain categories of special cargo are shown in Fig. 1.

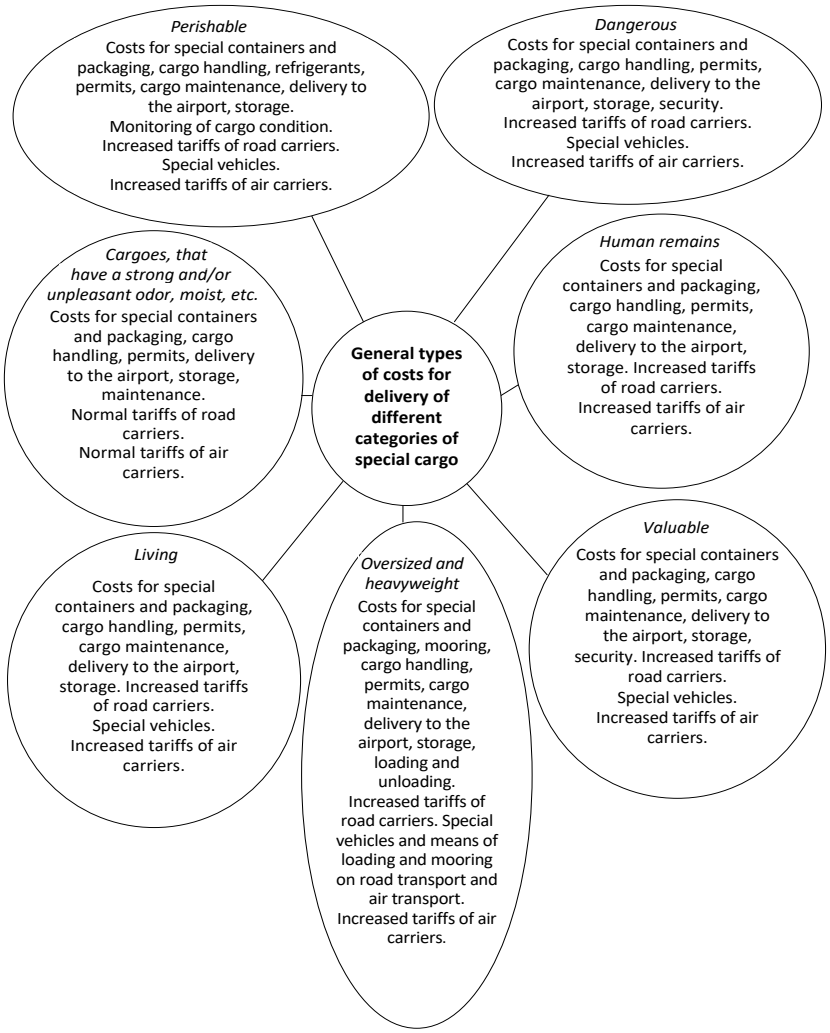

Fig. 1. General types of costs for delivery of different categories of special cargo

The specific properties of each particular special cargo significantly affect the entire technological process of transportation organization and technology, at the same time they can be aggressive towards other categories of cargo, vehicles and warehouses and this should always be remembered. The manifestation of aggressive properties of special cargoes can lead to damage to other cargoes, damage to vehicles and warehouses, create a danger to the personnel of carriers, employees of infrastructure facilities, as well as their customers. On the other hand, many categories of special cargoes are exposed to the aggressive properties of other cargoes. The consequences of exposure to aggressive properties may be deterioration in quality or complete damage to the cargo.

5 Conclusions and implications

During the scientific study it was found that the activity of a logistics operator that organizes the delivery of special cargoes requires structuring of the general types of costs for the delivery of certain categories of cargoes, which was carried out. Particular difficulty, when analyzing practical experience, can be traced in the delivery of goods that have both dangerous and perishable properties, which requires the development of approaches to risk management in the servicing of such goods. This will allow to identify and assess the level of uncertainty of the external environment, the factors affecting the risk and its consequences, to make decisions aimed at minimizing the financial and reputational losses of the logistics operator, in the event of risk situations and disruption of supply chains.

Further research should address the scientific problems that will arise with the further expansion of air transport participation in global supply chains. Herewith, these problems can already be conditionally classified both by detection levels – macro-, meso- and micro-level, and by nature – economic and organizational-technological.

Future directions of scientific research should be related to: development of methodical recommendations for tariff planning of a logistics operator; improvement of cargo delivery management systems, including through the prism of the traffic management system; implementing the strategy of a smart logistics operator as a driver of the global economy within the framework of global supply chains; improving the sustainability of the delivery of special categories of cargo involving air transport.

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