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VILNIUS GEDIMINAS TECHNICAL UNIVERSITY**

# **TRANSPORT MEANS 2021**

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## **PART I**

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## Improvement of Customs and Logistics Services in Ukraine

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### Abstract

Ukraine has a significant transit potential, which is not fully realized. To increase the cargo transit volume, it is necessary to attract carriers by simplifying customs clearance formalities and offering additional logistics services.

The paper considers the possibility of using a logistics chain providing customs and logistics services to the customer at cargo customs complexes in order to consolidate all necessary operations related to the export of goods in the country of origin to the maximum extent. Besides, it is also compared with existing logistics chain variations that are already operated.

**KEYWORDS:** cargo transportation, logistics chain, cargo customs complex, customs infrastructure, improvement

### 1. Introduction

The development of transport and customs infrastructure in the world involves the use of advanced product shipment methods, strict compliance with customs legislation by all transportation process participants and the promotion of the country's positive image in the international trade and service market by public authorities

In terms of development programs for customs infrastructure and enterprises constructing transport and logistics hubs, it is expedient to study cargo customs complexes (CCC's) performance indicators in Ukraine as well as the main criteria for assessing customs infrastructure facilities' operation [1, 2].

The existing CCC's significantly differ in their operation due to their technical, technological and organizational support, the peculiarities of demand generation for customs and logistics services depending on their topological location and capacity, the cost of services, service time as well as the available range of services provided to entities engaged in foreign economic activities.

Among the CCC's performance indicators, we should single out the following: the degree of accessibility, the customs infrastructure facility's reputation, reliability, employee competence, the level of technical support, and the characteristics of the technological process of service provision [3, 4]. The main CCC's operation assessment criteria are the following [5]: location; a range of provided services; service tariffs; service time; quality of service and methods of working with clients; an operating mode.

### 2. Improving the Logistics Servicing of Vehicles

Ukraine has broad foreign economic ties. Trade value between Ukraine, the EU and CIS states and other countries in 2020 in million dollars is shown in Fig. 1.

The cumulative effect of the transport and logistics support of foreign trade operations at cargo customs complexes consists of the results yielded from interaction among government agencies, transport market entities and the owner of a cargo customs complex. The state is concerned with forming the country's positive image as a trading partner as well as with the maximum return of duties on export-import operations.

The World Bank's study on the logistics performance index (LPI) of Ukraine showed that in 2018 the country ranked only 66th. This index consisted of six components, each of which was evaluated on a five-point scale determining the rank. Let us consider the value of each of them for Ukraine in 2018 (among 160 countries participating in the ranking):

- efficiency of customs clearance procedures: score – 2.49 (89<sup>th</sup> position);
- quality of trade and transport infrastructure – 2.22 (119<sup>th</sup> position);
- ease of arranging international shipments – 2.83 (68<sup>th</sup> position);
- competence and quality of logistics services – 2.84 (61<sup>st</sup> position);
- tracking of consignments – 3.11 (52<sup>nd</sup> position);
- timeliness of shipments – 3.42 (56<sup>th</sup> position).

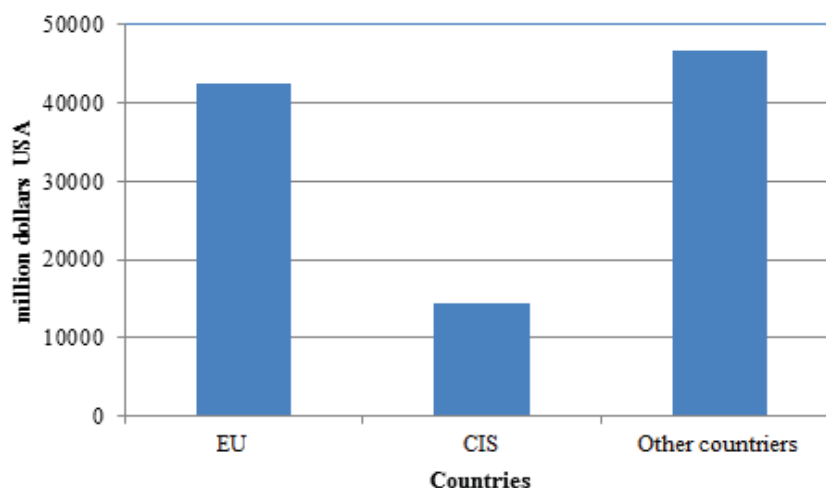


Fig. 1 State of foreign goods trade in 2020

For example, let us consider the dynamics of change in LPI indicators over the course of 2012-2018 years according to the ease of arranging international shipments (Fig. 2). We made a comparison of the dynamics of change in indicators for 5 countries.

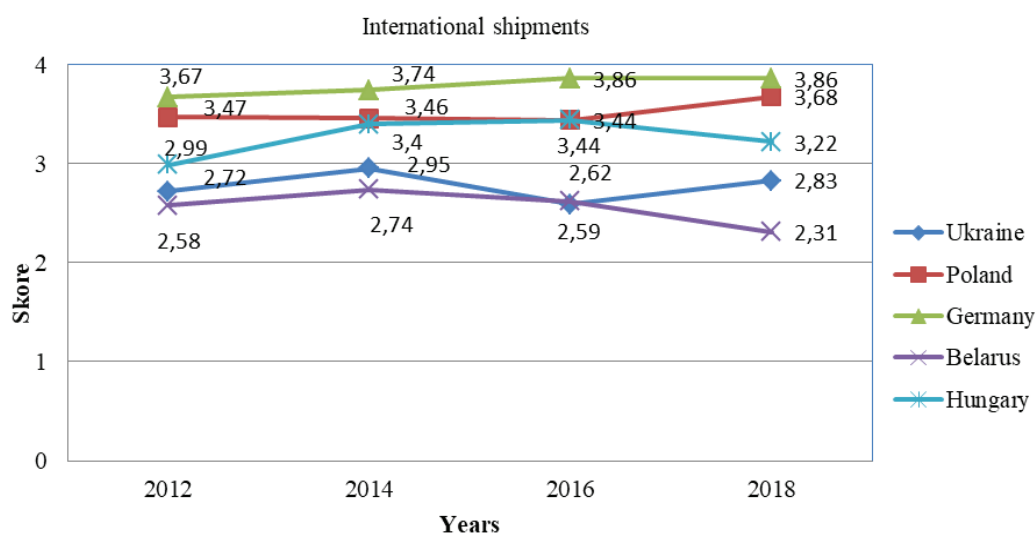


Fig. 2 LPI international shipment indicators over the course of 2012-2018

The analysis of this relationship indicated that Germany was a leader throughout the analyzed period. Poland occupied the second position, gradually improving its indicators, which in 2018 were almost equal to the ones of Germany. Hungary and Belarus were gradually losing traction. As for Ukraine, there was a fluctuant dynamics of change. It was indicative of the fact that the country, in its search for the best conditions for international shipments, had not always made the right decisions.

The obtained results require the initiation of some measures that would help improve Ukraine's rating in the international trade market. One of such measures may be the maximum CCC involvement in the provision of comprehensive customs and logistics services.

This decision results in a number of positive fallouts, among which we should emphasize the following:

- consolidation of a wide range of services in activities carried out by one legal entity, which will significantly reduce the waiting time in queues for service;
- possibility of clients' interaction with one organization providing comprehensive customs and logistics services; it will greatly simplify financial arrangements as well as the exchange of information between all the participants in the shipment process;
- opportunity to complete customs clearance formalities in any customs mode on the territory of a cargo customs complex;
- increase in demand for the services performed by a cargo customs complex will attract additional financial resources that can be used to improve the technical, technological and organizational support of this infrastructure facility.

As, according to world experts, in Ukraine, it is necessary to increase the efficiency of the completion of customs formalities and the quality of the country's infrastructure, the involvement of cargo customs complexes in customs and



logistics servicing will bring it closer to global requirements and standards [6].

Nowadays, in Ukraine, there are different approaches to the organization of customs and logistics services for foreign trade operations. They are mostly related to the customer's requirements guided by the following criteria for evaluating this process effectiveness: cost, time, quality and reliability of service. These services are provided by entities in the transport service market, which are the following: freight forwarding companies, shipping carriers, customs brokerage companies, storage facilities, cargo customs complexes and some other organizations involved in the transport process in specific conditions of its realization.

In addition, in foreign economic activity organization, there are several options to complete customs clearance formalities: internal customs offices providing customs clearance only and not performing any additional logistics services; customs offices located on the territory of cargo customs complexes providing a full range of customs and logistics services on a commercial basis (except for customs formalities which are within the competence of public authorities); customs offices located at border checkpoints. Accordingly, these actions take place only on a country of origin's territory; in turn, in a consignment country, customs agencies do customs clearance paperwork (performing functions similar to those of domestic customs brokers), and then the completion of customs clearance formalities and loading off cargo delivered by motor vehicles are performed on the territory of logistics centers. As seen, there are many possible combinations of logistics service provision by involving various actors in the market for transport services and ways to complete customs formalities in cooperation with customs authorities.

To study the interaction among all the transportation process participants, let us consider the current trends in logistics chain formation in the international transportation market. The links of a logistics chain in international road transportation are a consigner (C-R), a forwarder (F), a carrier (C), freight forwarding companies (FFCs), customs brokerage companies (CBCs), storage facilities (SFs), cargo customs complexes (CCCs), checkpoints (CPs), customs agencies (CAs), a logistics center (LC), a consignee (C-E) and a number of other actors in the transport services market involved in the transport process in specific conditions of its realization. There are several types of the most common logistics chains used in international road transportation.

A logistics chain of the first type is the longest according to the number of links (Fig. 3). Its advantages are a clear division of responsibilities between all organizations; it ensures a qualified approach to service. However, there are some drawbacks associated with considerable time expenditures on information and financial flows as well as the increased cost of services due to a big number of involved entities.

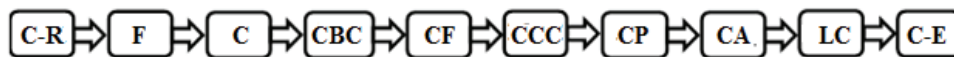


Fig. 3 Type 1 logistics chain

The second type of logistics chain involves the implementation of freight forwarding services by one company ensuring the maximum consistency of actions in transport process organization (Fig. 4).



Fig. 4 Type 2 logistics chain

According to the operation conditions of the third logistics chain type, in the structure of a freight forwarding company, there is a customs brokerage department providing the most efficient freight forwarding and customs brokerage servicing of customers (Fig. 5).

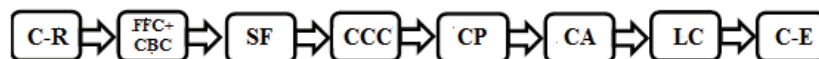


Fig. 5 Type 3 logistics chain

Accordingly, the fourth logistics chain type provides customs and logistics services to the customer at cargo customs complexes in order to maximize the integration of all the necessary operations related to the export of goods in the country of origin (Fig. 6).

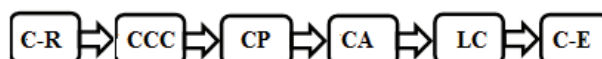


Fig. 6 Type 4 logistics chain

In order to reduce the load at border checkpoints, it is recommended to complete customs clearance formalities at internal customs offices at the consigner's location, as there is a risk of customs clearance delay due to a limited number of checkpoints and their service areas where representatives of state control bodies, customs brokers, etc. can perform their duties. This logistics chain type provides comprehensive customs and logistics services to foreign economic entities.

Given the specifics of the CCC's operation, let us consider its functions as a part of a logistics chain (Fig. 7).



Fig. 7. Main services provided at a CCC

The need to perform certain functions in the organization of foreign economic operations is determined by the type of cargo, the shipment size, transportation distance, materials handling time, etc. Developed countries of the world acknowledge comprehensive customs and logistics servicing feasibility as it ensures high quality and reliability of the international shipment organization and reduces its cost and time. Its implementation also contributes to enhancing the level of confidence in Ukraine as a reliable business partner for foreign countries. In fact, an increase in the volume of outbound and inbound cargo entering a CCC will increase cash inflow into the state budget in the form of customs duties.

A CCC's operating efficiency lies in optimizing the management of material, information and financial flows to ensure minimal total costs, high-quality service and the integrated interaction of all the parts of a logistics chain; complex use of integrated customs and logistics functions; prompt analysis of customs and logistics activity results; reasonable formation and timely correction of logistic tactics and strategy in the conditions of demand fluctuation for services; integrated use of modern information technologies in customs and logistics activities [7].

The advantages of a CCC's operation as a link in the logistics chain are the following: integration of the links in a logistics chain into a single service system providing effective cargo flow management; ensuring the interaction of customs authorities with business entities; comprehensive servicing of foreign trade cargo; transport and logistics service cost minimization; reducing the number of logistics intermediaries; reduction in time for the attendance of customs formalities. A significant shortcoming of domestic CCCs' operation is the inconsistency of their technical facilities with the level of European standards.

To study the CCC's operation as a link in the logistics chain, we analyzed the characteristics of one of customs and logistics infrastructure facilities under different operating conditions:

- completion of customs formalities for exported and imported cargo only given that paperwork provided to the customs authorities for verification is correct or that some paperwork errors have been detected by customs officers;
- provision of complex customs and logistic service for foreign trade operations;
- placing goods at the customs warehouse and temporary storage warehouse.

In the current research, we used the model described in [8]. The proposed queuing model was implemented in the GPSS World simulation automation package. We conducted the research during one calendar year at the CCC opened 5 days a week from 9 a.m. to 6 p.m. Simulation model limitations were related to the conditions imposed on the incoming flow of vehicles going into service - it was assumed that it was the simplest, i.e. there were no re-applications and no phenomena changing the patterns of vehicle service time at the CCC (equipment failures and errors, etc.).

An example of the modeling results of the mean cargo customs complex dwell time for vehicles to get customs and logistics servicing is shown in Table 1.

Table 1

Modeling results of vehicle servicing at the CCC

Customs and logistics service operations	Mean service time value, min (.MEAN)	Standard deviation, min (STD.DEV.)
Export Customs Clearance, $t_1$	254.8	152.3
– correct paperwork	216.2	91.0
– in case of paperwork errors	566.3	185.1
Export Customs Clearance, $t_2$	253.8	148.7
– correct paperwork	217.0	91.4
– in case of paperwork errors	558.1	179.0
Comprehensive customs and logistics services, $t_3$	500.2	84.9
Placement of goods at the customs warehouse, $t_4$	352.4	28.4
Placement of goods at the temporary storage warehouse, $t_5$	426.6	91.6

When comparing the results of service time for different types of procedures, we can conclude that the mean time required for comprehensive customs and logistics servicing at the CCC is quite optimal given that this process includes many components to support foreign trade operations. The distribution of the annual duration of comprehensive customs and logistics services for vehicles is shown in Fig. 8.

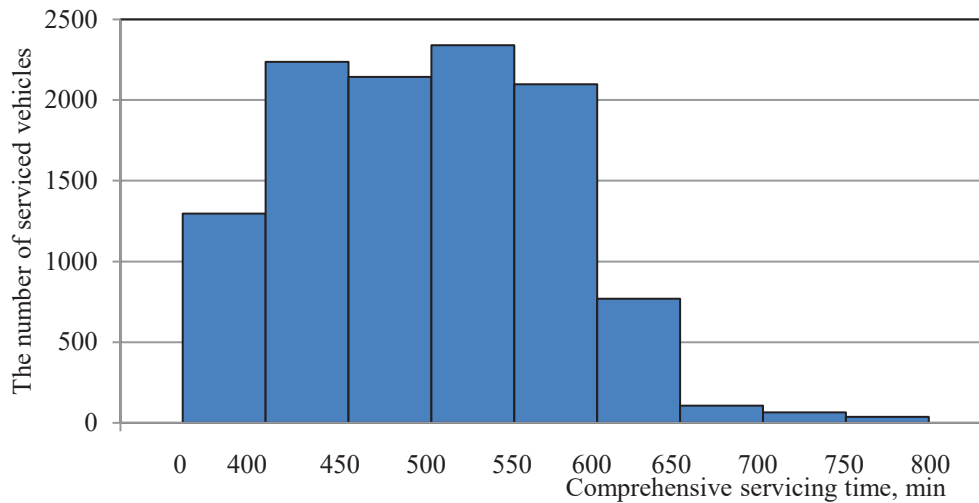


Fig. 8 Distribution of the annual duration of comprehensive customs and logistics services

As a result of modeling, some Evaluation of comprehensive customs and logistic service operation characteristics were also obtained, which are shown in Table 2.

Table 2

Evaluation of comprehensive customs and logistic service operation characteristics

Characteristics		Estimation
Mathematical expectation for the provision of complex customs and logistics services, min		500.2
Standard deviation for the provision of comprehensive customs and logistics services, min.		84.9
Probability of timely provision of complex customs and logistics service (the norm is 650 minutes)	570 min.	0.80
	610 min.	0.93
	650 min.	0.97
	690 min.	0.98
	730 min.	0.99

The reliability  $p$  of the logistics supply chain and its links, defined as the estimated probability of a timely execution of individual operations and the process as a whole, is the following:

- type 1 logistics chain:  $p_I = 0.77$ ;
- type 2 logistics chain:  $p_{II} = 0.81$ ;
- type 3 logistics chain:  $p_{III} = 0.90$ ;
- type 4 logistics chain:  $p_{IV} = 0.93$ .

### 3. Conclusions

The analysis of the research results allows us to conclude that type 4 logistics chain implying customs and logistics services at the CCC is the most efficient, as it provides the highest reliability of compliance with the comprehensive vehicle service time. In this case, as compared to type 3 chain characterized by almost the same reliability, it is shorter. This reduces operating costs and the risk of corruption in the completion of customs formalities.

The reliability of logistics chains of type 1 and type 2 is low due to unsatisfactory reliability indicators of its individual links. To ensure a sufficiently high reliability level of the logistics chain as a whole, it is necessary to ensure a high reliability level of each of its links, which is problematic given their number.

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