

## PROSPECTS FOR THE DEVELOPMENT OF MULTIMODAL TRANSPORTATION TECHNOLOGY

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### Annotation

The theoretical foundations for determining the level of transit cargo turnover in the activities of a multimodal transportation operator, which is an acceleration of multimodal transportation technology, have been developed and modeled based on the results of research, observational analysis of multimodal transportation technology and overcoming obstacles in information technology in this regard.

**Keywords:** Multimodal transportation, technology, intermodal transportation, barriers in information communications, transmodal, multimodal operators, management barriers

### Introduction

One of the important problems negatively affecting the competitiveness of the transport industry in the Republic of Uzbekistan is the insufficient development of transport infrastructure, the functioning of multimodal transportation directly depends on updating the method of transportation routing. The most important thing when considering the route is the reduction of delivery time, the full realization of transit potential does not correspond to existing opportunities, the obstacles associated with the adoption of ICT in multimodal transportation negatively affect the process and quality of transportation.

Multimodal transport is needed today like air, because we live in a global world. It has long been the norm that the production of components and finished products is located in different parts of the globe.

The task of logistics is to provide enterprises with raw materials and all necessary components in a timely manner, as well as delivery of finished products to dealers and distributors around the world.

The growing shortage of containers has led to the fact that in less than two years the cost of container transportation has increased from about two thousand dollars to ten. This, of course, led to a significant increase in prices and supplies, as well as the cost of final production. On the other hand, new opportunities have opened up in the current situation [1].

Multimodal cargo transportation refers to transportation in which different modes of transport are used. In accordance with this, multimodal transport is understood as a complex of all types of transport involved in the transportation of goods along the entire transportation route.

International multimodal transportation is usually defined as transportation carried out by one transportation document at a single price for direct transportation using several vehicles under

the responsibility of one carrier. Today, in the economic and legal literature, such transportation is called "combined", "mixed", "and intermodal" [2-5].

This term creates a number of difficulties both for the parties carrying out the transportation and for law enforcement agencies. In addition, there is no unified approach to the legislation of many countries and a clear definition of multimodal transport adopted at the international level.

Multimodal transportation is the transportation of goods by two or more modes of transport operating sequentially. In case of multimodal transportation, additional cargo operations and associated additional overhead costs and prices arise. Intermodal transportation is the sequential transportation of cargo by one cargo unit or vehicle (TV) by several modes of transport without overloading cargo per unit of cargo.

This is a cargo delivery system at transshipment points from one mode of transport to another without the participation of the cargo owner [6-9].

In case of intermodal transportation, the shipper enters into a contract with an intermediary (operator) for the transportation of cargo along the entire route. Most often, the carrier is a forwarding company, which, on behalf of the shipper, assumes responsibility for organizing all transport operations during transportation and monitoring transportation.

In intermodal transport, each carrier draws up a transport document for its own section and is responsible to the operator only for that part of it that is carried out on its behalf.

Multimodal (transmodal) transportation is transportation carried out by a person organizing transportation, who throughout the entire transportation undertakes to carry out transportation on the basis of a single transportation document, regardless of the number of modes of transport involved in transportation. For example, the first arm of transportation involves the transportation of a tractor, truck, trailer or semi-trailer, removable body or container (20 feet or more) by road, and on the last arm - rail, inland waterways or sea transportation (another option: railway - inland waterways / sea transportation).

Thus, a multimodal transport cargo unit is transported along the specified route by at least two modes of transport, since the efficiency of existing modes of transport is harmonized.

For multimodal cargo transportation, several conditions must be met:

- multimodal transportation must be carried out under a multimodal transportation contract;
- multimodal transportation must be carried out by more than one mode of transport;
- Multimodal transportation should be accompanied by the transfer of goods under the control of a multimodal operator for their delivery from one state to another.

The concept of multimodal transportation is not new; it has received absolute recognition precisely in connection with the container revolution in international trade. It is during containerization that multimodal transportation of Bosch goods becomes a standard trade

practice.

Today, depending on the direction, multimodal transportation includes sea, river, rail, air transportation, which can be combined into any combination. The main advantage of this method of delivery is the maximum use of the advantages of various modes of transport, as well as the provision by the operator of additional services related to the registration of cargo transportation, such as: registration of cargo documentation during transportation, in transport clearance, acceptance, processing, transshipment, warehousing and storage.

Usually, the largest transport services on all multimodal cargo delivery routes have a maritime component. Sea transportation, as a rule, has a much lower and competitive cost of transportation. In some cases, the length of the transport arm on railway transport means that the main transport function is assumed by the same type of transport. Multimodal transportation also allows you to communicate directly not with each carrier, but with a multimodal operator, which is convenient and economical [10-12].

Multimodal transportation requires the multimodal operator to have absolute control at every link in the transport chain. This will make it possible not only to effectively use other capabilities of the vehicle and other carriers, but also to create a vehicle management regulation system that provides the operator with freedom in planning and managing the transport process. Thus, the main criteria of multimodal transportation are the quality of cargo transportation by a multimodal operator, their success and the possibility of control by a multimodal operator. The main objectives of this transportation are: elimination of interruptions in the entire transportation process, reduction of transportation costs and timely delivery of cargo to the destination.

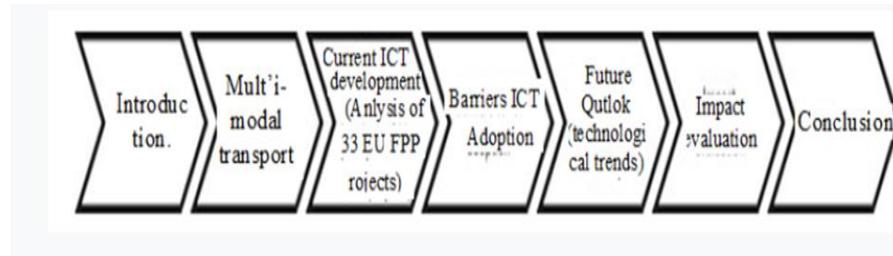
Signs of intermodal and multimodal deliveries:

- the presence of an operator who delivers goods from the initial destination to the final destination;
- uniform tariffs for transportation;
- single transport document;
- Sole responsibility for cargo transportation and contract fulfillment [13].

## **Methods**

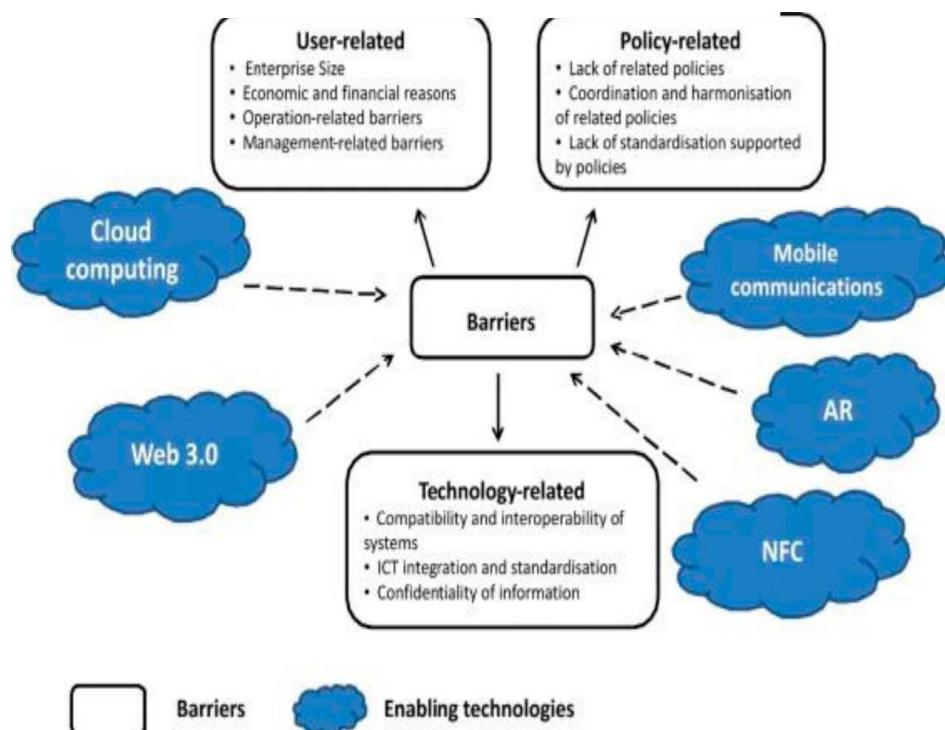
These projects, sponsored by the framework programs of the European Union, reflect the ongoing great efforts to address the need for the adoption of ICTs for multimodal transport at the European level and to inform about the latest developments in this area, providing us with a broader and clearer picture of the current state of ICTs. Acceptance in the provision and management of multimodal transportation.

**Figure 1: Research approach**



Portal of the European Commission Community Research and Development Information Service (CORDIS, <http://cordis.europa.eu>) and a list of EU projects on 4, 5, 6 and 7 major programs through the portal of Transport Research and Innovation (TRIP), ([www.transport-research.info](http://www.transport-research.info)) was discovered and thoroughly investigated. A total of 33 projects were selected to review ongoing ICT development initiatives. The selected projects are multimodal (intermodal) and are focused on specific ICT applications to solve various problems faced by multimodal transportation. The data was collected using the archives of the CORDIS and TRIP projects and their own project websites [14-16].

Barriers related to the introduction of ICT in multimodal transport



**Figure 2: Barriers to the adoption of ICT in multimodal transport**

The positive role of ICTs in improving overall productivity, visibility and connectivity between multimodal transport operators has been recognized by many stakeholders, but since there are many obstacles to the adoption of ICTs that vary in different modes, several factors of ICT adoption have been identified according to the area of impact, which can be divided into three categories: user-related, barriers related to technology and politics. (Fig 2). This section examines in detail the obstacles and related factors for the adoption of ICTs, paying particular attention to its impact on multimodal transport. Here, users are transport-related organizations that are engaged in multimodal operations, as well as authorities and companies that use ICT applications in their daily activities and management.

## Results and discussion

Obstacles to the introduction of ICT. Barriers related to users include economic, operational, managerial barriers and relate to the company's environment

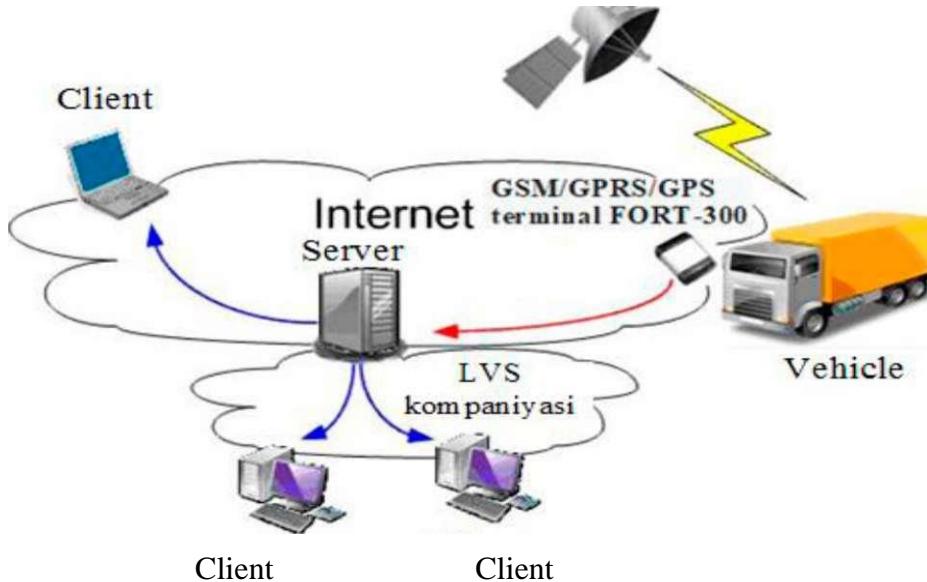
The GPS system is an automated global satellite system designed to determine the latitude and longitude of the location of a vehicle (ship, airplane, truck, etc.)

The system communicates with Earth's satellites. Each satellite transmits time signals and continuously transmits the coordinates of its location. The vehicle must be equipped with a special receiving device that simultaneously receives signals from three satellites, processes them and displays the coordinates of the location point (the error of the result does not exceed 3-15 m). The data is extremely necessary for the correct processing of the goods and monitoring the effectiveness of the activity. In order to use the information for any output, it must be derived from analysis and presented in a form that is easy to understand. Such information is contained in reports in the company's management information system in a form developed earlier by the company's management. Thus, based on the reports, the expert can draw conclusions and then make the right decision. Therefore, it is important that the report is easy to work with. The company's management needs high-quality information from the information system. [17]

Satellite transport process control system with the expansion of the sphere of cargo transportation, there is a need to improve the transportation and processing of goods. It is important for the sender and recipient to know the location of the goods and the essence of the problem. Such useful information can be obtained in several ways, namely: The use of satellite communications. Cellular and wireless data transmission systems. Automatic procurement detection system. Electronic information exchange system and the Internet.

Satellite communications provides real-time information through a global geographic information system provided by satellites that transmit information about cargo and vehicles in real time.

## Conclusions



**Figure 3: Modern information technologies and telecommunications connect vehicles with customers**

Today, such a system is divided into on-board programs, with the help of which data is transmitted via a satellite, through which communication with land is carried out, and it is also possible to transmit sound and images of ship parts. The system can also be used on other types of transport.

Modern information technologies and telecommunications connect vehicles with customers and apply only to transported goods. Its main advantage is automation or complete elimination of bureaucratic procedures and rapid updating of information for all interested parties. [18, 9]

To summarize the results of multimodal transport technology for evaluating the results of the multimodal transport operator based on the results of the above studies, we have developed a theoretical basis for accelerating the technological level (B), and these results are evaluated by the formula:

$$V = E \cdot AL \text{ (km/h)}$$

For example, AL - by increasing the level of technology, walking symbolizes an increase in productivity.

At-indicates the result of reducing the time required for the transportation of all types of goods (for loading, preparation of documents and customs inspection), due to an increase in the level of technology [16, 19].

It is an insignificant expression with an assessment of the results of transport technology, determination of the speed of movement of transit international goods, assessment of the practical state of the technological level of multimodal transportation, making a conclusion,

determining the speed of movement of transit goods and the costs of their expenditure and the possibility of influencing the transit territory, as well as with the implementation of tasks such as determining price reductions in international transportation.

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