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## OVERSIZED ROAD TRANSPORT - PARTICULARITIES, REALIZATION CONDITIONS, PROBLEMS AND DEVELOPMENT PERSPECTIVES

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**Abstract.** Transport is in continuous evolution, regardless of the activity sector. Road transport faces various obstacles, and their management is a crucial part of planning and executing bulk transport operations. One of the main obstacles is the low height of bridges or power lines along the planned route. To avoid collisions with these obstacles, detailed studies of the route are carried out, identifying potential conflict points in advance. Preventive measures such as temporarily raising power lines or temporarily changing the height of bridges can be implemented to ensure the smooth passage of oversized cargo. Ground communication routes with a curved axis represent another limiting factor in oversized transport. Solutions include planning routes to minimize the number of bends or using special trailers with directional axles. These trailers allow for easier cornering and ensure that the transport can cross terrain with difficult geographical features. The necessary authorizations also represent a major obstacle. Oversized transport often involves dimensions and weights that exceed the usual limits, which is why it is mandatory to obtain authorizations issued by competent public authorities. But this stage, by way of consequence, determines the legality and admissibility of carrying out transport operations. To manage obstacles in oversized transport, a proactive approach is essential, with detailed route analyses, the implementation of appropriate preventive measures, and compliance with applicable regulations. These solutions contribute to the efficiency and safety of oversized road transport, ensuring harmonious integration in the context of the existing infrastructure.

**Keywords:** *oversized transport, special transport authorization, exceeded mass, authorized route, vehicle with overruns.*

**Rezumat.** Transporturile sunt într-o continuă evoluție, indiferent de sectorul de activitate. Transportul rutier se confruntă cu diverse obstacole, iar gestionarea acestora reprezintă o parte crucială a planificării și executării operațiunilor de transport agabaritic. Unul dintre principalele obstacole este înălțimea redusă a podurilor sau a liniilor de electricitate de-a lungul rutei planificate. Pentru a evita coliziunile cu aceste obstacole, se efectuează studii detaliate ale traseului, identificându-se în avans potențialele puncte de conflict. Măsurile preventive precum ridicarea temporară a liniilor de electricitate sau modificarea temporară a înălțimii podurilor, pot fi implementate pentru a asigura trecerea fără probleme a încărcăturii

agabaritice. Căile de comunicație terestră cu axa curbă, reprezintă un alt factor limitativ în transportul agabaritic. Soluțiile posibile în acest sens, includ planificarea rutelor astfel încât să se minimizeze numărul de curbe sau utilizarea de remorci speciale cu axe direcționale. Aceste remorci permit o manevrare mai ușoară în curbe și asigură că transportul poate traversa terenuri cu caracteristici geografice dificile. Un obstacol major este reprezentat și de autorizările necesare. Transportul agabaritic implică dimensiuni și greutatea care depășesc limitele obișnuite, motiv pentru care este obligatorie obținerea autorizațiilor emise de autoritățile publice competente. Însă această etapă, pe cale de consecință, determină legalitatea și admisibilitatea realizării operațiunilor de transport. Pentru a gestiona obstacolele în transportul agabaritic, este esențială o abordare pro activă, cu analize detaliate ale rutei, implementarea măsurilor de siguranță sporită și respectarea reglementărilor în vigoare. Aceste soluții contribuie la eficiența și siguranța transportului rutier agabaritic, asigurând o integrare armonioasă în contextul infrastructurii existente.

**Cuvinte cheie:** *Transport agabaritic, autorizație specială de transport, masă depășită, traseu autorizat, vehicul cu depășiri.*

## 1. Introduction

Trends and perspectives in the oversize transport sector are important for the evolution and development of transport enterprises. Among the most important sectors dependent on bulk transport include: construction, agriculture, energy (especially the green Sector: wind turbines, solar panels, heat pumps, etc.), metal structures, the oil industry, automotive, and others.

Each sector has its own particularities, with corresponding challenges and opportunities. It is difficult to predict how the European and world economies will evolve, and what effects it will have on the transport industry. Regarding the evolution of oversized transport, we can reveal some determining premises:

### I. Increasing demand for oversized transport services.

Analyzing the statistical data for the years 2000-2022, we establish a significant increase in the volume of goods transported by road transport from 20,671.7 thousand tons (in 2000) to 45,082.1 thousand tons (in 2022) [1].

According to an analysis of Industry Market Research, Reports, & Statistics (IBIS) World [2], is reflected the dynamics of the increase in demand for oversized transport services. This demand is due to the increase in global trade and the dynamics of the construction industry in various European countries and beyond.

Every oversized transport operation involves the use of large machinery, especially at the beginning of the construction project. Construction companies request oversized transport services to have cranes, bulldozers, excavators, precast concrete materials, and many other types of equipment available on construction sites.

### II. Digitization and automation of transport processes.

Digitization and automation are two processes that will dominate the development of bulk transport companies, direct and indirect. This trend will highlight new processes and technologies, capable of making the sector more efficient. Automation of ordering processes, tracking, and delivery of goods, represents only superficially the technological process. Digitization also includes the administrative side, which is indispensable for carrying out the activities of a transport company. From recording contracts to logistics notes, software

programs have the ability to significantly optimize the way a company works. For this reason, most of the top oversized transport companies try to find quality software.

### III. Use of alternative fuels.

In Europe and beyond, concern for the state of the environment has grown significantly. Climate change and pollution are major problems that most countries on the European continent face. The use of alternative fuels is a good way to limit the negative impact on the environment.

### IV. Road infrastructure development.

The road infrastructure in the Republic of Moldova is very poorly developed, which creates significant impediments to the development of oversized transport. The development of better highways and roads would better reflect the needs of national and foreign businesses. Also, the quality of the roads contributes to traffic safety.

### V. Development of oversized transport technology

The level of the oversized transport industry is dependent on the development of new techniques, devices, and means of transport. From more efficient loading and handling equipment to specialized trailers and hybrid vehicles, the oversized transport sector is going through an incredible metamorphosis.

## 2. The particularities of oversized transport

One of the most complex types of road freight transport, both from the perspective of the organization and the actual transport, is oversized transport. Because it is a special transport, the oversized transport must comply with certain specially regulated conditions, so that it can be carried out safely and in accordance with the legislation in force.

### 2.1. Conditions for the admission of motor vehicles

Oversized road transport is the road transport operation that is carried out exceeding the maximum mass and/or the maximum dimensions allowed and is regulated by the special rules of the Regulation regarding the performance of road transport on public roads exceeding the total mass of the masses on axles and/or of the maximum allowed dimensions approved by Government Decision No. 326 of May 18, 2022 (hereinafter - Regulation). The maximum allowed masses and dimensions are specified in annex no. 2 of the Roads Law No. 509/1995 as well as in Point 86 of the Road Traffic Regulation. However, the regulation contains special provisions regarding the permissible deviations in the mass and dimensions of vehicles.

Thus, in the case of weighing, according to point 6 of Regulation [3], deviations are allowed within the following limits:

- 1) at fixed weighing installations:
  - a) for the single axle in a group of axles + 200 kg
  - b) for the double axle + 300 kg
  - c) for the triple axle + 350 kg
  - d) for the total mass of the vehicle + 350 kg
- 2) When using portable weighing machines:
  - a) for the single axle in a group of axles + 200 kg
  - b) for the double axle + 300 kg
  - c) for the triple axle + 350 kg

In the case of the actual measurement of the vehicle dimensions, the following deviations above the maximum allowed limits are allowed:

- 1) height + 5 cm
- 2) width + 10 cm
- 3) length + 20 cm.

In the situation where the weighing facilities do not work, are missing, or cannot be used given the characteristics of the vehicle, the mentioned deviations are not applicable, but the total mass of the vehicle is determined from the following documents on board the vehicle: CMR, TIRE card, invoice, special transport authorization, international road vehicle weighing certificate, and registration certificate. So, in any case, these documents, which must be on board the means of transport, must contain data on the total mass of the means of transport.

According to point 8 of the Regulation [3], in the case of the actual measurement of the dimensions of the vehicles, the following deviations above the maximum allowed limits are allowed:

- 1) height + 5 cm
- 2) width + 10 cm
- 3) length + 20 cm.

With all these deviations, every road vehicle in motion must enter a circular area with an outer radius of 12.5 m and an inner radius of 5.3 m. The distance between the axis of articulation and the rear limit of an articulated vehicle, it, must not exceed 12 m.

The actual legislation regulates certain conditions for the circulation of vehicles exceeding the total mass and/or the maximum permitted dimensions as follows:

1. Vehicles must be admitted to traffic. In order to be maintained in road traffic, vehicles must undergo periodic technical inspection at authorized stations, under the conditions established by the legislation in force. The confirmation regarding the performance of the technical inspection is the badge printed on the periodic technical inspection report.

2. Correspond from the point of view of technical conditions and traffic safety requirements. The vehicles must comply with the standards and other normative acts related to road traffic safety, environmental protection, technical operating rules, and the instructions of the manufacturing companies.

3. Do not exceed the maximum authorized vehicle weights, established by the manufacturing plant. According to art. 49 of the Road Transport Code, the obligation to comply with the maximum authorized total masses and/or within the limit of the loading capacity established by the manufacturing plant of the road vehicle used and/or by the technical regulations in the road transport process rests with the road transport operator or company that performs road transport operations [4].

4. Have a valid special transport permit. The provisions of art. 62<sup>1</sup> para. (2) of the Road Transport Code, provides as an exception that the road transport of goods with road vehicles, registered in the Republic of Moldova or in other states, on public roads exceeding the maximum permissible total mass, the maximum permissible axle masses, and/or the maximum allowed dimensions is allowed only on the basis of the special authorization, issued by the National Transport Auto Agency (ANTA), under the conditions of Regulation [4].

5. Comply with the provisions written in the special transport authorization.

If we compare with Romanian legislation, on January 18, 2019, the new Norms regarding the authorization and movement of road vehicles with masses and/or dimensions that exceed the maximum permissible masses and/or dimensions provided for in Government

Ordinance no. 43/1997 regarding the road regime [5]. Among the important regulations of the issued act, we can highlight:

- training the driver who carries out oversized transports, on the territory of Romania and who must have a minimum knowledge of the Romanian language. Similar provisions regarding the mandatory training of drivers carrying out oversized transports are also contained in the Commission Directive 2000/56 CE "Safety factors relating to the vehicle, the load and transported persons" [6], which stipulates the need to hold driving licenses of all categories, as well as Directive 2003/59 EC of 15 July 2003 on the training of "professional drivers" [7];

- issuance of the special transport authorization-AST by CNAIR – S.A. for roads other than those of national interest;

- extending the validity and deadlines for issuing AST;

- conditions for drawing up the transport project;

- conditions for drawing up the route study.

The admission conditions for vehicles involved in oversized transport also require their equipping with additional signaling devices. Thus, according to Chapter IV of the Regulation, the following distinctive and signaling signs for motor vehicles are provided for [3]:

a) If the width of the moving vehicle is between 2.60 and 3.50 m, it must have a warning plate with the inscription "CAUTION! SIZE EXCEEDED!", which will have the size of 40×40 cm and the height of the letters of 15 cm, with red characters on a white background, and the tow truck will continuously use the orange rotating light.

b) If the width of the vehicle is between 3.50 and 5.00 m, it will be preceded in motion by a vehicle of the road transport operator or of the person concerned, equipped with an orange rotating light in continuous operation and with a warning plate with the inscription "CAUTION! EXCEEDED SIZE!".

c) If the width of the vehicle exceeds 5 m, it will be preceded and followed by a vehicle of the road transport operator or of the person concerned, equipped with an orange rotating light in continuous operation and a warning plate with the inscription "CAUTION! EXCEEDED SIZE!", mounted in front of the preceding vehicle and in the rear of the following vehicle.

In all situations, beacon-type lamps with flashing orange warning lights will be mounted on the highest parts of the vehicle, trailers, or cargo, so that during transport they are visible from all sides.

d) If the width dimension exceeds 3.50 m, the side edges that exceed the platform of the trailer or semi-trailer will be marked at the front and back (left and right) with plates 30 cm wide and 1.20–1.50 m high, with reflective strips, alternating white and red, with a width of 10 cm, having an inclination of 45°, descending towards the outside of the vehicle or load, or mounting in the same position some vertical plates with a height of 1.20–1.50 m, similarly painted.

In all the cases mentioned (letters a–d), until the special transport authorization is issued, the preliminary approval of the National Public Security Inspectorate is mandatory.

## **2.2 Conditions of carriage of oversized goods**

The load that forms the object of the oversized transport must be marked on the sides and back by writing with paint, which will indicate the mass in tons and the dimensions of the outer contour in the transport position in centimeters (length, width, and height). The mass of motor vehicles, semi-trailers, and trailers will be marked with paint on a visible surface.

According to point 88 and point 89 of the Road Traffic Regulation, if the load exceeds the dimensions of the vehicle in the longitudinal plane, front or rear, by more than 1 m, in the transverse plane - by more than 0.4 m at the outer edge of the marker lights, it must be marked with a distinctive sign, as shown in Figure 1 [8], and at night - additionally signaled by white reflectors or lanterns in front and red in the back. Vehicles that, constructively or because of the transported load, exceed the maximum gauge limits can move on public roads only after being authorized by the road administrator (road administrators) and the National Inspectorate of Public Security, and if they have activated the orange roundabout lights.



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**Oversized load**

**Figure 1.** Means of vehicle identification.  
Distinctive sign no. 12 [8].

In order to carry out oversized cargo transports, the following conditions must be met:

1. Obtaining the Special Transport Authorization. This permissive act issued by the National Auto Transport Agency is mandatory and absolutely necessary for carrying out the oversized transport operation. Based on the reference document, the road administrator will establish the route and the fees charged for this route.

2. Payment of the tax for using the roads. All owners of motor vehicles whose total mass, mass load on the axle, or dimensions exceed the permitted limits are obliged to pay the tax for using the roads. The tax for the use of roads is calculated according to the total mass, the mass on the axles, the distance traveled, and the dimensions of the vehicles and is used for the administration, exploitation, consolidation, maintenance, repairs, and modernization of the roads they administer. The tax rates are established in annex no. 3 of Title IX of the Fiscal Code of the Republic of Moldova [9].

3. Route planning and safety measures. In the planning stage of oversized transport, a detailed study of the planned route is carried out. This study identifies potential obstacles such as bridges, power lines, or sharp curves and devises strategies to avoid them. An essential aspect is anticipating and solving any challenges that may arise during the course. At the same time, appropriate safety measures are planned and implemented. These may include possible temporary infrastructure changes to allow cargo to pass or close coordination with local authorities. By anticipating and applying these safety measures, it is ensured that oversized transport operations are carried out in a safe and efficient manner, respecting both the integrity of the load and the rules and regulations in force.

4. The availability on board of the means of transport of the documents related to the transported goods. There are numerous documents and special terms in the fields of logistics, forwarding, and national and international freight transport. International and national legislation regulates the specific documentation required for the transport of goods. However, there are transport documents required for any type of transport of goods, including oversized ones, which include: the tax invoice, the customs declaration (depending on the

customs regime under which the transported goods are to be placed), the international waybill (CMR), TIR Carnet [10] and other documents depending on the type of bulky goods and the geographical area served.

5. Professional training. Both the people who accompany the oversized transports, and the people who will draw up oversized transport projects, must have a specific professional training and be authorized by the competent authority. The drivers who will carry out the oversized transport must hold a certificate of professional competence issued by ANTA under the conditions of the Road Transport Code.

6. Police escort and discharge requirements. In the framework of oversized transport, it is required to accompany the transport by police bodies to ensure safety on the road and to facilitate the crossing of intersections and other critical points. The police force provides assistance in traffic management and ensures a safe route for vehicles with bulky and heavy loads. At the destination, specific procedures are implemented to safely unload the cargo. These procedures are aimed at minimizing the impact on the infrastructure and ensuring the protection of the cargo. Close coordination between the carrier, unloading personnel, and local authorities is essential to the efficient conduct of unloading operations, helping to prevent incidents and protect both cargo and infrastructure.

### 3. Types of oversized loads

Oversized transports are used in various fields, such as: construction, industry, energy, and agriculture. Carriers of bulky goods manage to attract the attention of the public by the distinct nature of the transported goods, as well as by their prudence and vigilance in the transport process. Each type of oversized cargo has unique characteristics that cannot be ignored by motor carriers and logistics teams.

In general, oversized loads are of the following types:

**a. Oversized loads:** goods or vehicles that exceed the maximum dimensions permitted on public roads, but not the maximum permitted weight. In other analyzed sources, is also specified the category of **Long load** – of which transportation on a truck, it will extend beyond the tailgate by at least 2 meters [11].

**b. Overweight loads:** goods or vehicles that exceed the maximum weight allowed on public roads but do not have the maximum dimensions allowed.

**c. Oversized and overweight loads:** goods or vehicles that exceed both the dimensions and the maximum weight allowed on public roads.

The most common oversized loads requested to be transported include:

1. Industrial components and equipment. In this category, we can include power generators, wind turbines, drilling equipment, industrial machines, and other types of heavy equipment.

2. Prefabricated construction elements and oversized machinery. Construction companies need large concrete beams, precast panels, cranes (of various sizes), excavators, bulldozers, ladders, and other large precast elements needed in the optimal execution of construction projects.

3. Metal structures. These include metal beams, pipes, and other types of steel elements, often used in large construction projects, for example: the construction of bridges, railways, or warehouses.

4. Agricultural equipment. In a predominantly agrarian country such as the Republic of Moldova, agricultural enterprises permanently require oversized transport services,

constantly needing agricultural machinery and equipment for their activity. Among the most common products transported in this segment are agricultural combines, tractors, seeders, complementary components of large and heavy agricultural machinery.

5. Transport and construction equipment. Conveying and handling equipment is needed in many industries. Among the most transported products are motor graders, road graders, bulldozers, excavators and other types of large machinery required for construction projects.

6. Equipment and machinery required for the green industry. The green energy industry is growing. Many countries start and run numerous green energy projects: wind turbine parks and solar parks.

The weight that is considered oversized also varies from place to place. In the United States, the weight that is considered oversized is 80,000 pounds. However, there are some places that have heavier weight limits [12].

#### **4. Major problems of oversized transport in the European Community**

The legal dimensions and weights vary between countries and regions within a country [13]. Any road transport is framed by the CMR Convention (Convention on the Contract for the International Carriage of Goods by Road) [14], which relates to various legal issues concerning transportation of cargo, predominantly by lorries, by road.

According to the Federal Motor Carrier Safety Administration, National Highway Traffic Safety Administration, Large Truck Crash Causation Study [15], 7% of U.S. trucking accidents are caused by improper cargo securement or cargo shifts. Shifting cargo can cause the truck to destabilize or the load can fall off completely leading to serious public safety issues. Load shifting is prohibited by law and it is the responsibility of the shipper, motor carrier, driver, receiver, and the securing device manufacturer to ensure the cargo is completely secured [16].

In a specific country, the roads are built in a way that allows a vehicle with dimensions within the standard legal limits to safely (though not necessarily easily) drive and turn. Roads that do not allow large vehicles may be marked with the traffic signs [17]. These may include per-axle load, height, width, or overall length limits.

The study of multiple informational sources highlighted several major problems in the field of the materialization of oversized transport in the European Community:

- Differences between the number of necessary escort crews;
- Differences between the format of the special transport authorizations and the filling language;
- The need for police escort crews, sometimes only from the zonal road service. This means that, in each county/city, a different police crew is needed;
- Differences in costs for obtaining special transport authorizations;
- The transit of a country is carried out only with accompanying crew certified according to the legislation of that country;
- Differences between possible dismantling of works of art;
- Different restrictions on the roads, at certain times of the year.

Conceptually, the transport of oversized goods is a special type of transport. In order to successfully complete the oversized transport process, it is necessary to complete the following steps:

- Choosing the right vehicle for transporting bulky goods;
- Analysis and estimation of the specifics of the regions to be transited;

- Choosing the convenient transport route from a financial point of view and transport time;
- Calculation of the duration of the transport;
- Analysis and estimation of possible difficulties that may arise in the transport process;
- Preparation of related documentation.

Compliance with the strict rules for loading, fixing and transporting oversized goods results from the need to immobilize it during transport, so that it remains intact and undamaged, until the destination and last but not least, oversized transport must not endanger the life and health of people, traffic road, infrastructure and environment. The rules for fixing oversized goods are strictly regulated by the European Commission [18]. Most of the regulations apply directly to drivers of vehicles who are directly exposed to the risks associated with oversized transport.

## 5. Conclusions

Today, there are certain norms and laws that regulate the transportation of oversized load in our country. These must be strictly adhered to ensure legal transportation.

First of all, moving a truck with oversized load along the roadway must take into account the Traffic Rules. If at least one violation is detected, it will be necessary to pay a fine in the prescribed amount.

Oversized transport has a significant development potential in the Republic of Moldova. This is due to the fact that the Republic of Moldova is a country with a growing economy, which needs imports of modern equipment and technologies.

A decisive role in favoring the development of oversized transport belongs to the public authorities, by making and/or developing contributions such as:

- Ensuring an adequate road infrastructure for oversized transport;
- Simplification of authorization procedures for oversized transport;
- Promoting collaboration with neighboring countries in the field of oversized transport.

The future outlook of oversized transport indicates a number of trends and changes that could shape the evolution of this field in the coming years. These can be leveraged by implementing and/or deepening the use of innovative levers, which include, but are not limited to:

Autonomous Vehicles (which can self-assess the surroundings in which they are, by means of several sensors, can also process the data received to later configure their operation accordingly). The integration of autonomous driving technologies into large-scale transportation could bring significant benefits in terms of efficiency and safety. Autonomous vehicles can better manage routes, reduce the risk of accidents, and enable more efficient transport.

Artificial Intelligence Technologies. Using of the artificial intelligence in the process of planning routes, simulating and strengthening traffic safety, as well as optimizing logistics processes will contribute to the efficiency of oversized transport.

Alternative Fuels. The use of fuels from renewable sources and with a low carbon content definitely reduces their impact on the climate. In this context, the use of alternative fuels is a topic actively analyzed and promoted by the European Union. Increasing environmental concerns will accelerate the transition to the use of alternative fuels in bulk

transport. Thus, the increased use of sustainable and innovative means of transport such as electric vehicles, hydrogen vehicles or other renewable energy sources will become more important and in demand.

Advanced Communication and Tracking Systems. Cooperative intelligent transport systems allow the exchange of information between vehicles, as well as between vehicles and the road infrastructure, and thus, increase road safety, making traffic more efficient and more comfortable. The development of advanced communication systems and tracking technologies will facilitate more efficient management of large vehicle fleets and increase the safety of operations.

Overall, the future of bulk transport will be shaped by advanced technologies, sustainability concerns, and adaptation to the specific requirements of ever-changing industries. These changes are expected to bring significant benefits to the efficiency, safety, and sustainability of this vital transport sector.

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