

## OVERSIZE CARGO TRANSPORT IN THE POLISH PART OF SOUTH BALTIC REGION

**Wiesław Galor**

*The Maritime University of Szczecin  
Faculty of Navigation  
Waly Chrobrego 1/2, 70-500 Szczecin, Poland  
tel.: +48 91 4809 514, fax: +48 91 4809 375  
e-mail: w.galor@am.szczecin.pl*

**Anna Galor**

*The Maritime University of Szczecin  
Faculty of Economics and Transport Engineering  
H. Pobożnego Street 11, 70-507 Szczecin, Poland  
tel.: +48 91 4809 640, fax: +48 91 4809 643  
e-mail: a.galor@am.szczecin.pl*

### **Abstract**

*The paper presents problems of oversize cargo (OC) carried by various modes of transport, relevant legal instruments and problems that carriers face during the preparation and transport of extremely heavy and/or huge pieces of cargo in Poland. The international program Oversize Baltic will be described. The program aims at the standardization of procedures connected with the carriage of oversize cargo pieces in the South Baltic Region. The OV corridors in Poland are presented. Oversize transport is indispensable for economic growth of every nation, but its organization varies in each country of the South Baltic region. Oversize cargo is called a cargo that exceeds mean allowable parameters of a vehicle in terms of dimensions, shape geometry or allowable loads on unit surface area. Unloading of a tank, transport of wide oversize cargo, transport of equipment modules for the refinery industry by C. Hartwig – Katowice S.A., unloading of 330 ton generator from the NORCA wagon by the Metalchem Serwis Ltd, transport of oversize elements, operated by Best-Logistic Sp. z o.o., transport of a drilling rig, transport of a frigate USS Samuel B. Roberts, potential sites of manufacturing and reception of oversize cargoes, transport infrastructure adjusted to OC transport, Oversize Baltic Project, Infrastructural restrictions in each mode of transport, characteristics of OC transport orderers, methodology of designating transport corridors are presented in the paper.*

**Keywords:** *oversize transport, oversize cargo, Oversize Baltic project, oversize transport corridors*

### **1. Introduction**

Along with the development of economy there are an increasing number of shipments that, due to their size, weight or specific character of carriage, require individual solutions. Almost all major investment projects require transport of equipment and their components bigger than the size of trailers or containers. Non-standard cargoes create non-standard problems. Transport of such pieces is of crucial importance for the development of industry, power engineering and improvement of infrastructure. Oversize transport is indispensable for economic growth of every nation, but its organization varies in each country of the South Baltic region. The establishment of joint strategy, practices and the creation of new principles might enhance the economic competitiveness of the South Baltic region. The carriage of oversize cargo is usually a very important link of each infrastructural project, therefore it should be managed without redundant formalities, communication-based misunderstanding or extra investments in infrastructure. A consistent system could make the Baltic region more competitive in power engineering, industry and transport. This calls for an analysis of

possible transport routes, both existing ones and planned transport corridors [3].

The European Union policy, formulated by the Treaty establishing the European Community, aims at enhancing its economic, social and territorial cohesion by increasing the level of such cohesion in its regions [6]. An increase of the economic cohesion consists in reducing the differences in the levels of economic development between rich and poor regions. Strengthening the social cohesion requires that differences in the use of human potential across various areas are decreased, while strengthening the territorial cohesion is achieved by eliminating the existing barriers of access to less favoured peripheral regions by binding them more with regions of the Central Europe. The territorial cohesion is measured by travelling time to a given area by air, road and rail [2].

## 2. Definition of oversize cargo

For each mode of transport oversize cargoes are those with parameters larger than standard ones. This issue is due to the existing restrictions of both vehicle design parameters and the transport infrastructure. For instance, one will not load a larger piece of cargo into an airplane than its hold, as it simply will not get in, and one cannot load a 600-ton of goods onto a barge with a 500-ton capacity because, even if the barge bottom has strength enough to withstand compression forces and the cargo is ideally distributed, the vessel will sink. Similarly, a truck with carrying 4-metre high object will not pass under a bridge having a 3.8 meter clearance. It can be stated that in all the above cases the oversize determinants are either cargo dimensions or weight, as well as available cargo space inside a vehicle and pressure exerted on a unit surface area. The shape of a cargo piece is another important factor, as the geometry of an object carried may affect static and dynamic stability. In road transport it is said that cargo is oversize when its dimensions or weight exceed the maximum allowable parameters of a standard road vehicle or vehicle with a trailer as well as axle loads of this vehicle (Fig. 1 and 2).



Fig. 1. Unloading of a tank [12]



Fig. 2. Transport of wide oversize cargo [12]



Fig. 3. Transport of equipment modules for the refinery industry by C.Hartwig – Katowice S.A. [7]



Fig.4. Unloading of 330 ton generator from a NORCA wagon by the Metalchem Serwis Ltd [8]

In rail transport an oversize cargo is a shipment that cannot be carried without exceeding the loading gauge of a wagon or/and exceeding allowable load on the wagon axle or on one running metre of the rail. (Fig. 3 and 4).

In inland shipping an oversize cargo is one that protrudes beyond the vessel's length or/and width or which reaches up above the highest fixed element of the vessel (vertical clearance of bridges, lock gates etc.), so that the helmsman has restricted vision (Fig. 5).



Fig. 5. Transport of oversize elements, operated by Best-Logistic Sp. z o.o. [5]

In sea transport oversize cargo items are sometimes a few hundred metres in length, weighing from a few hundred to several thousand tons. Therefore, they are carried by dedicated ships. Examples include drilling rigs, cranes, ships, yachts, turbines etc. (Fig. 6 and 7).



Fig.6. Transport of a drilling rig [9]



Fig.7. Transport of a frigate USS Samuel B. Roberts [4]

Taking all above into account, it seems that the most adequate definition for all modes of transport can be formulated as follows:

*“Oversize cargo is called a cargo that exceeds mean allowable parameters of a vehicle in terms of dimensions, shape geometry or allowable loads on unit surface area”.*

### 3. Oversize Baltic Project

One of the study under the South Baltic Project, approved for implementation in 2009, is related with the transport of oversize cargo in the South Baltic region.

At present nearly each industrial investment requires transfer of various structural elements and equipment, whose dimensions exceed standard size of transport vehicles (trucks, wagons etc.). Cargo that needs special means of transport and lifting facilities to be moved is called oversize

cargo, although other terms are sometimes in use, such as outsized, bulky or non-standard cargo, heavy lifts etc.

Some examples of oversize cargoes include elements of land and marine structures (sea platforms, elements of tunnels, bridges or pipelines, power line pillars, turbines, etc.). These often require precision and special conditions of the manufacturing process (including special tools). As a result, structural elements are made in one place and have to be transported to their destination as oversize items of cargo. The number of construction sites where these large elements are needed is on the rise in Poland (e.g. LNG terminal in Świnoujście) and Europe alike.

The transport of oversize cargo is indispensable to develop such sectors as industry, power supply or infrastructure and, undoubtedly, makes up an important part in any major investment project. It significantly affects the economic development of each country, where, however, various regulations and solutions are in use [1].

Transport of this type is the last link of a long chain of specialized logistic operations. The oversize transport operator has to make careful preparations, provide for proper equipment and have experience in oversize cargo carriage. For the entire operation to be successful, the appropriate route has to be selected along with the right vehicle, and the plan for loading and securing each bulky or heavy item has to be drawn up [15]. Vehicles adjusted to carry oversize cargo generally have the dimensions; load capacity, design and marking that differ from standard vehicles. Cargo handling equipment has much higher lifting capacity than cranes or other machines handling standard items.

Besides, to arrange a smooth movement of the oversize cargo carrying vehicle, one needs special permits and other arrangements with transport infrastructure managers concerning the route, and, naturally, cargo has to be insured. If the transport is international, the operator has to satisfy the requirements of the region to be crossed, which sometimes is very difficult.

Each country in the South Baltic region has different procedures required to prepare the transport of oversize cargo and to actually transfer such items from one point to another. These procedures are sometimes very time-consuming and costly, due to the need to adjust the route to oversize cargo and vehicle (e.g. a too small roundabout lying on the route of oversize transport has to be dismantled, then restored) [1]. The development of a joint strategy, practices and creation of new principles in this sector might increase the economic competitiveness of the South Baltic region.

In this connection, aimed at the improvement of the quality of oversize cargo handling in the South Baltic region, the Oversize Baltic project is being implemented. Commenced in July 2009, the project is scheduled to end in June 2011. The project, headed by the Klaipeda Science and Technology Park, comprises partners from Poland, Germany, Lithuania and Sweden [10].

The main objectives of the Oversize Baltic project include:

1. development of an oversize cargo transport strategy, which will enhance the attractiveness of the region,
2. creation of an information network that will raise the efficiency of oversize transport in the South Baltic region (integration point where an appropriate permit will be obtained along with information on route details),
3. creation of a database on available routes for oversize cargo transit, existing transport infrastructure and obstacles, which will increase transport effectiveness,
4. enhancing the safety associated with the carriage of oversize pieces,
5. improvement of the co-operation in trade and infrastructure of the developing regions, which will contribute to an increase in the competitiveness of the region on the global market of transport services.

As a result of project implementation, five strategies are to be established for oversize transport: four regional strategies for Germany, Poland, Lithuania and Sweden, and a joint strategy for the entire South Baltic region. Besides, an Oversize Transport Information Network (OTIN) is to be created. The network will provide information on carriage, maps of possible routes by various modes of transport in the South Baltic region and will enable submitting an application for transport permit.

The South Baltic Program covers both 'new' and 'old' EU member states, where substantial disparities exist in the level of social and economic development. The aid provided under this program focuses on two major priorities of co-operation:

Priority 1. Economic competitiveness.

Priority 2. Attractiveness and joint identity.

Priority 1 envisages support for projects aimed at developing enterprise, integration of higher education and job markets, as well as regions transport accessibility.

Priority 2 comprises actions taken to support projects concerned with the environmental protection of the Baltic Sea, saving energy and renewal energy, sustainable use of natural resources and cultural heritage for the regional development, and initiatives of local communities. Activities relating to transport accessibility include the preparation of feasibility studies of undertakings aiming at the elimination of transport bottle necks within the South Baltic coastal area. Additionally, there are plans to make joint efforts to improve the quality of transport links and creating new ones. Besides, proposals are expected to provide solutions for increasing the quality and life cycle of passenger transport means in the region [11].

#### **4. Infrastructural restrictions in each mode of transport**

Restrictions connected with the existing infrastructure have to be taken into account while organizing the transport of oversize cargo. The fewest such restrictions exist in air and maritime transport. In the latter case relevant restrictions may be those of port infra- and suprastructure. Operators of bulky and heavy pieces have to take into account the use of specialized high lifting capacity facilities, allowable load on the quay and sufficient depth along the berth, enabling ships to moor. A sufficient depth of a port basin is needed for submersible ships to submerge to the required depth (the ship submerges, the cargo such as a drilling platform is being towed over the ship's deck, the ship goes up, and the cargo is secured on deck).

In air transport the basic infrastructural restriction lies in the capability of the airport to handle the cargo and the plane (e.g. runway length), as well as the transport links with the hinterland.

In inland waterway transport major restrictions result from the parameters of the navigable routes and locks, air clearance under bridges, pipelines and other facilities crossing the waterway, the width of bridge spans and the width of waterway channels. In this connection, regional waterway authorities issue orders specifying vessels' and push trains dimensions that are permitted to navigate along particular waterway sections [1].

In rail transport restrictions refer to, first of all, the loading gauge and the building gauge, load on one running meter of rail, [13], arcs of rail bends and transverse inclination of the rail track, bridge and flyover load capacities, tunnel and other infrastructure facility size, sometimes the varied transit speed. Additionally, the existing semaphores, signs, junctions, water towers, crossing attendant's house, railways stations and platforms, distances between platforms etc. have to be taken into consideration as well.

Road transport faces the greatest number of various limitations connected with the carriage of oversize cargo. Route planners have to take into account the width of transit roads, bend radiuses, existing road signs and posts, height and width of clearances under bridges and flyovers, allowable bridge load capacity, roundabouts, safety islands, allowable road surface load, electric and rail tractions, road repairs in progress etc. Quite frequently the mentioned obstacles have to be removed for the time of transit. This means dismantling of road signs or even roundabouts and lifting overhead tractions. Even if the shortest route to the place of cargo destination is about 100 km, with all diversions it may take 300 km to carry one particularly bulky or long element. There is a lack of immediately available information on the parameters of bridges and flyovers, and other restrictions on each road. As a result of all such difficulties, the end recipient of the cargo pays more and waits longer for the delivery [15].

## 5. Characteristics of OC transport orderers

Companies ordering oversize transport services include various firms, operators and government institutions. However, it should be borne in mind that places where oversize cargo is sent and received differ from the headquarters locations of the OC transport orderer or recipient. Transport operations are usually carried out between the place of production and destination.

Under the Oversize Baltic program the area of Northern Poland was examined in view of OC transport. Besides, the transport corridor linking Berlin and Moscow was reviewed on the grounds that it is the main east-west link that has proper infrastructure capable of accommodating OC transport [14].

The following factors were taken into consideration in determining places of production and reception of oversize cargoes:

1. existing and planned wind farms,
2. special economic zones,
3. presently executed and planned investment projects.

Example locations of currently executed and future investment projects, and OC manufacturing sites are shown in Fig. 8.

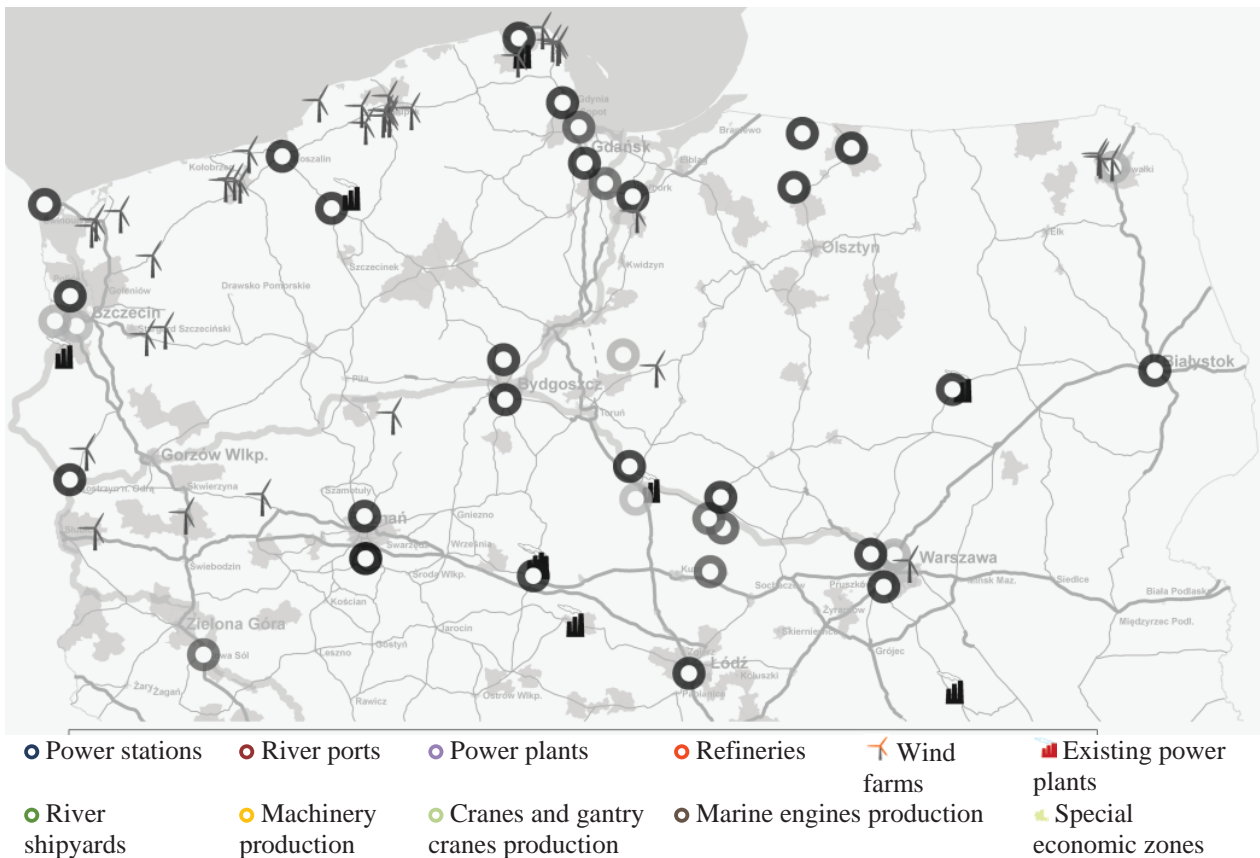


Fig. 8. Potential sites of manufacturing and reception of oversize cargoes

## 6. Methodology of designating transport corridors

The ‘Strategy for oversize cargo transport for the South Baltic Region’, recommends increasing the share of maritime, river and rail carriage in oversize transport. For this reason the infrastructure of all modes of transport has been taken into account in preparing the concept of transport corridors. Besides, it has been assumed that corridors for OC transport should mainly make use of the existing TEN-T – Trans-European Transport Network. However, it turned out that

in the area under consideration, these corridors run only along the north-south direction. Therefore, the examined area has been extended to include the Berlin-Moscow corridor [14].

The process of determining transport corridors began from collecting the maps with the existing roads, rail tracks and inland waterways that are adjusted to accommodate oversize transport, then the point infrastructure was mapped, e.g. sea and inland ports that may become major reloading sites for OC carriage. Then the maps were supplemented with infrastructure to be built or modernized till 2020 and which will be adequate for OC transport (Fig. 9). The next stage was the mapping of potential points of sending and reception of oversize cargo [2].



Fig. 9. Transport infrastructure adjusted to OC transport

OC transport corridors were determined by taking into account places where oversize goods are manufactured, places in Northern Poland to which such goods may be sent, the road, rail and waterway networks, potential points of transshipment to other modes of transport [12].

## 7. Conclusions

Analyses of transport corridors that might be selected for oversize cargo carriage indicated that the existing rail and road infrastructure is not fully adjusted to such operations. To create conditions for the development of OC transport in the South Baltic Region, new investment and modernization projects should account for this type of transport. When sufficient funds are provided, the existing infrastructure should be adjusted to oversize cargo transit. Some works, presently performed by OC carriers for temporary adjustment to let one or a few OC transits, should result in permanent conversions facilitating future OC transport. All these investments should concentrate along the designated transport corridors. Another very important aspect of OC carriage intermodality is that permit-issuing bodies should enforce the use of waterways and railways on carriers in order to relieve congested roads.

Besides the following problems with oversize cargo transport are connected:

1. Each country within the Baltic Sea region has different procedures connected with the preparation of oversize cargo for transport, and the transport itself.
2. At present the transport of oversize cargo encounters numerous problems.
3. Road transport, the most common form of transportation used for the movement of oversize cargo (over 30 000 permits issued in 2008, over 24 000 in 2009), faces the largest number of problems.

4. Information on existing obstacles or possible transit routes is not easily available.
5. No specific instructions or guidelines exist in reference to the correct securing of cargo pieces on road vehicles in Poland, while in Germany, for instance, there are specific transport standards of cargo securing and they are strictly enforced.
6. The Oversize Baltic project is underway, aimed to improve the quality of oversize cargo handling in regions around the Baltic Sea. The project will result in a joint strategy and practices and the creation of new principles, which may increase the economic competitiveness of the Southern Baltic region.

## References

- [1] Galor, A., Galor, W., *Problematyka krajowego transportu ładunków ponadnormatywnych w aspekcie przewozów w regionie południowego Bałtyku*, Logistyka, Nr 2, 2010.
- [2] Galor, A., Galor, W., Wiśnicki, B., *Koncepcja korytarzy transportowych dla transportu ładunków ponadnormatywnych w regionie południowego Bałtyku*, Logistyka, Nr 8, 8 p., 2010.
- [3] Galor, W., Galor, A., *Transport ładunków ponadgabarytowych*, XIII Międzynarodowa Konferencja Naukowa „Transcomp 2009”, Radom 2009.
- [4] <http://ukarmedforcescommentary.blogspot.com> [dostęp: 15.05.2011].
- [5] <http://www.best-logistics.com> [dostęp: 15.05.2011].
- [6] <http://www.funduszeuropejskie.gov.pl> [dostęp: 15.05.2011].
- [7] <http://www.hartwig.katowice.pl> [dostęp: 15.05.2011].
- [8] <http://www.metalchemserwis.pl> [dostęp: 15.05.2011].
- [9] <http://www.offshoreenergytoday.com> [dostęp: 15.05.2011].
- [10] <http://www.transportoversize.eu> [dostęp: 15.05.2011].
- [11] <http://www.transportoversize.pl> [dostęp: 15.05.2011].
- [12] Materiały firmy Bedmet Logistic Damian Bednarz sp.k.
- [13] Mincewicz, J., *Trudne przewozy kolejowe*, Polska Gazeta Transportowa, 8.10.2008.
- [14] *Strategia dla przewozu ładunków ponadnormatywnych w Regionie Południowego Bałtyku – Polska*, Akademia Morska w Szczecinie, Szczecin 2010.
- [15] *Transport ponadgabarytowy – Schenkeroversized*, <http://www.logistyka.net.pl> [dostęp: 15.05.2011].