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## DEVELOPMENT OF THE SEAPORT IN GDYNIA

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*Seaports operate on a highly competitive global transport market. To retain its competitive position a port (terminal) must strengthen its competitive advantages in all fields of activity. Ports are to expand and modernize their infrastructure and superstructure, and develop links with the hinterland and the foreland. The article describes how the port of Gdynia manages to meet these challenges. The author analyses the period 2007—2015. Special attention is paid to the port development plan for 2020. The EU Structural Funds have provided a good opportunity to strengthen the competitive position of the port by making investments in the port infrastructure and superstructure. It allowed the port to strengthen its links with the hinterland. The author uses a set of fundamental, analytical and technical research methods to analyse materials provided by the port authority and the port terminal operators. By the end of 2015, the port authority had completed five investment projects, including the modernization of three wharfs and a rail terminal, the development of the port infrastructure aimed to provide services to ro-ro ships. Strategically important projects for the coming years include dredging and widening of the port channel, fairways and the internal basin. Cooperation between the port and the city authorities allowed the port administration to improve road access to the port of Gdynia. The key investment project aims to link the port of Gdynia to the TriCity ring road. Apart from it, there are plans to improve access to the railroad network. Railway line 201 to Bydgoszcz is to be modernised to transport cargoes from Gdynia further inland. The current and future strategic investments create conditions for growth in handling both container and other types of cargo in the port of Gdynia and significantly improve competitiveness of the maritime sector.*

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## Introduction

Seaports operate on a highly competitive global transport market. Based on the existing literature, Tongzong and Heng [10] drew attention to the eight determinants of port competitiveness: the port (terminal) operation efficiency level, port cargo handling charges, reliability, port selection preferences of carriers and shippers, the depth of the navigation channel, adaptability to the changing market environment, landside accessibility, and product differentiation. This article examines certain factors, which are important for the development of the seaport of Gdynia.

The article is organized in the following way: the historic foundations of the described port are surveyed in the introduction. Section 1 describes basic features of the port and its organizational structure. The most important investments in the port and its directly neighbouring areas are presented in Section 2. The main trends of the development of the seaport in Gdynia are outlined in Section 3. The article ends with conclusions.

For years, the port of Gdynia was the biggest Polish port for general cargoes. The port handles the majority of containers for the Polish market. Gdynia is a unique city, which grew as a result of the construction and development of the port. Due to the extensive hinterland and modern infrastructure of the Polish ports in the 1930s, Gdynia seaport started competing with other ports of the Baltic and the Northern Sea. After World War II, Gdynia was assigned the role of a general cargo port. In the 1950s, it was the most modern port in Poland. In the 1960s, Gdynia became the main port for handling grain imported to Poland. In 1965, the port handled the same cargo volume as before World War II.

At the end of the 1960s, all general cargo started to be transported in containers that replaced barrels, crates and pallets. The change led to the opening of a temporary container base in the seaport in 1972, and in 1976—1979, the Helskie Wharf built a container terminal. The Liquid Fuel Handling Base was opened in 1973. Seven years later, in 1980 — the first section of the container terminal by the Helskie Wharf started handling containers in the lo-lo system. In 1993, the seaport opened a regular ferry line with Karlskrona [11] from the new terminal. In 2001, a modern ro-ro terminal started operating with a container yard for 700 TEU. In 2006, the next container terminal, Gdynia Container Terminal (GCT), was opened. In 2005 and 2010 two additional modern roadways and ramps for loading lorries on ferry top decks were built. The privatisation process of Gdynia port began in 1991 and finished in 2015.

### 1. General characteristics and organisational structure of the seaport

At present Gdynia seaport belongs to a group of most efficient ports in the Baltic Sea region. The port continues to specialise in handling general cargoes, including the ones shipped in containers and in the ro-ro system. Bulk cargo forms nearly one third of the port cargo structure. The port is

linked to the hinterland by a multimodal network and a forefront of regular short shipping lines and ferry connections. The port has easy access to the sea. A 2.5 km long external breakwater protects it. Two fairways lead to the port. The main entrance is 150 m broad and 14.5 deep. The total port area covers 755.4 ha with its aquatory covering 262.8 ha. The port of Gdynia authority S.A. (ZMPG S.A.) covers 264 ha. Warehouses cover approximately 230 thousand m<sup>2</sup>, and the storage yards — approximately 400 thousand m<sup>2</sup>. The total length of quays is 17.7 km with 11 km designated for cargo handling operations. The port maximum quayside depth reaches 13.5 m [8].

In 2014, the port had a network of 53 regular lines, and in 2015—64: 28 container lines, 10 ro-ro lines, one ferry line and 25 traditional lines. Gdynia foreground includes 44 ports in 25 countries in Europe, Africa, North and Latin America, Asia and Asia Minor.

In 2015, the port handled a volume of over 18 million tons — the second best result in its history. The biggest hike was noted in grain handling — over 3 million t, mainly export. Gdynia seaport became the leader in the group of Polish ports and in the group of oil and oil derivatives — 401.9 thousand t (a 175% increase).

In 2015, the share of Gdynia seaport in the cargo volumes handled by Polish ports reached 23%. In 2015, the handling of grain and fodder came first (54%), and general cargo went down being second with 33%. Coal and coke came third (15%), liquid fuels — 3% and other bulk cargo — 14%.

Private ownership is believed to result in higher efficiency compared to the public one [5]. This fundamental argument of the neoclassical theory is increasingly called into question [4]. There is no clear association between the ownership structure and port efficiency. Tongzon and Heng [10] summarized the results of quantitative research in this area. Some of the results suggest that there is no significant effect of privatization on the efficiency of ports, while others show certain dependence. One survey [2] states that the dependence between the degree of private ownership and port efficiency may be negative. In Gdynia, privatization of the main terminal has had extremely positive effects. Perhaps this is due to the specifics the transition from one economic system to another. In the post-socialist countries, the state did not have sufficient resources to build competitive cargo terminals.

ZMPG S.A. administers the port infrastructure, plans the development and modernisation of the port, and acquires land for the port development. At present, the port cargo handling capacity is assessed at 26 million t. Most of the volume, i.e. 10.5 million t, falls to Western Port, which houses the Baltic Container Terminal (BCT), Gdynia Container Terminal (GCT) and the ferry terminal. OT Port Gdynia<sup>1</sup> and Koole Tankstorage Gdynia Terminal<sup>2</sup> premises come next with 6.5 million t. The Maritime Bulk Terminal

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<sup>1</sup> Up to June 2015 the terminal was called Bałtycki Terminal Drobnicowy. Since July 1, 2014, the company has been called OT LOGISTICS S.A.

<sup>2</sup> Earlier called Westway Terminal Poland SP. In April 1, 2014 it was taken over by Koole Tankstorage — a company specialising in handling liquid raw materials for the food industry. The company has many terminals in Western Europe and North America.

(Morski Terminal Masowy Gdynia) (MTMG) and the Baltic Bulk Base (Bałtycka Baza Masowa) (BBM) show a similar handling capacity of 6.5 million t. Other terminals include the cement terminal Aalborg Portland and Marine LPG Terminal (Morski Terminal LPG) Gasten (Fig. 1).

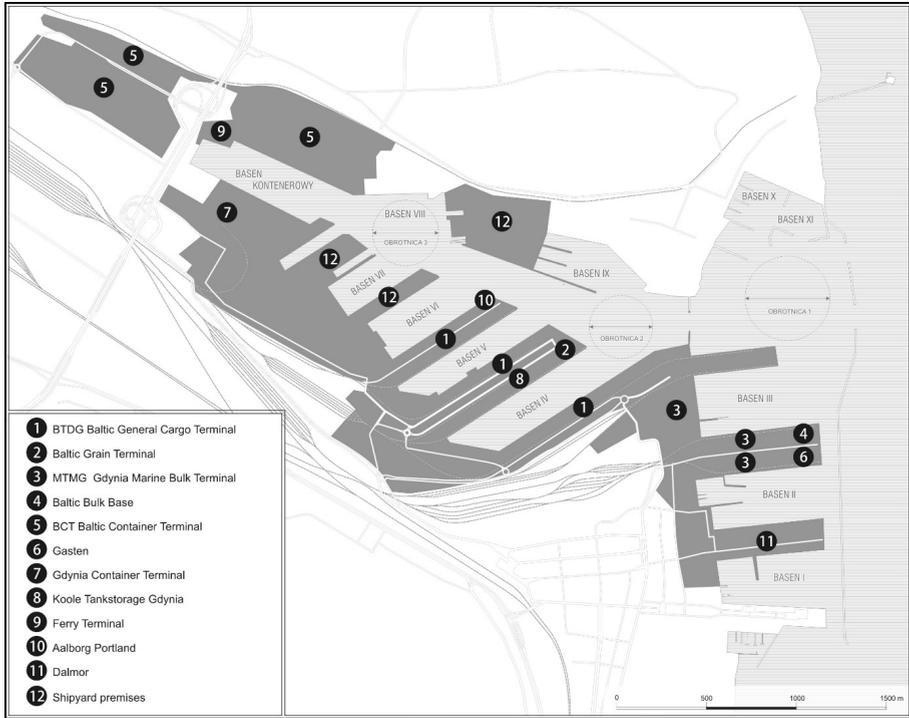


Fig. 1. Cargo handling terminals in Gdynia seaport in 2015

Source: Own study based on ZMPG S.A data.

## 2. Investments in the port and the neighbouring areas

Any port that strives to remain competitive on the Baltic and global cargo handling market is to continually upgrade its infrastructure and superstructure and develop links with the hinterland and the foreland [1]. The port of Gdynia has been developing rapidly lately. Investments have been made to improve access to the port from both the sea and land as well as to improve the port safety and environmental conditions. In 2007—2015, major investments were made into the improvement of road and rail access to the port, modernisation of its ro-ro infrastructure, conversion of the port channel, the development of the Bulgarian Wharf, modernisation of the Swedish Wharf and conversion of the intermodal rail terminal in BCT. All the investments were co-financed by the Operational Programme ‘Infrastructure and Environment’ 2007—2013.

Since 2008, the improvement of road and railway access to the terminals located in the eastern part of the port of Gdynia has been the main goal of

the seaport administration. The road along Polska and Chrzanowskiego streets is a part of Gdynia municipal communication network and links the eastern part of the port to Motorway A1. The modernised Polska Street ensures a better road access to the port. It is a two-lane extension of roads to the TriCity ring road through the flyover called after E. Kwiatkowski (opened in 2008) and Wiśniewskiego Street. The road leads to a ferry terminal located by the Polish and Finish Wharfs. The conversion of the railway system ensured better access to terminals located by the Polish Wharf and improved cargo handling in intermodal systems and rail carriages. The road and rail system capacity grew with the completion of several investment projects in 2008—2013.

The railway station ‘Gdynia Port’ was built before World War II. Today the station covers an area of approximately 70 ha with 160 km of tracks and 400 turnouts. However, it fails to meet the current and future needs for the development of intermodal transport covering shipments of containers and semitrailers by regular rail lines. In 2014—2015, a feasibility study was carried out as the initial step of a complex project aimed at improving railway access to the seaport in Gdynia. Polish Railway Lines are planning to make the next two steps and invest into the construction of a new railway station in 2014—2020<sup>3</sup>. The new railway station should have a more modern infrastructure meeting the port’s needs. It will lead to the reduction of the number of delivery tracks. Hence some parts of the railway station infrastructure can perform commercial functions.

The departure of freight trains from Gdynia Port encounter major problems. At present freight trains travel along the busy main railway tracks, leading through the entire TriCity, characterised by heavy passenger traffic. An alternative solution would be to follow line 201, going from the port to Bydgoszcz. However, this solution requires comprehensive modernisation of the existing transport infrastructure [3].

In 2011, the port authorities initiated a project aimed at the development of the port infrastructure for ro-ro ships and offering road and rail access to the terminal. The last stage of the project was completed at the beginning of 2015 and increased the efficiency of handling cargoes. This required, *inter alia*, conversion of the rail and road systems in the eastern part of the port as well as demolition of several existing facilities. The port authorities decided to build 0.8 km of new roads and modernise a 1.2 km section of the road. The construction of a new 0.7 km railway section in the port transport network and the conversion of a 2 km long rail line section contributed to the improvement of the whole system. The project also resulted in modernisation of the ro-ro ramp (Fig. 2).

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<sup>3</sup> The project was co-financed by European Union funds, Operational Programme Infrastructure and the Environment 2007—2013. It is listed as one of the fundamental maritime projects planned for further financing by the Cohesion Fund under Connecting Europe Facility (CEF).

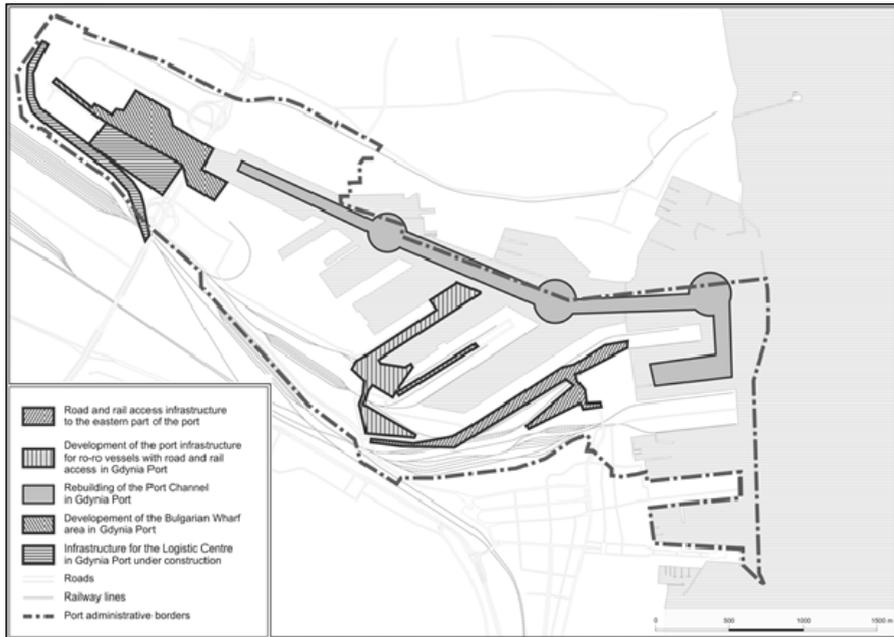


Fig. 2. Investment projects of the Port of Gdynia Authority in the years 2007—2014

Source: Own study based on ZMPG S.A data.

The conversion of the port channel started in 2009—2011. The main aim was to increase the admissible ship draught and to improve navigation conditions in the port aquatory. The investment project included dredging the port channel, increasing the diameter of the turning basins, converting six quays, increasing quayside depth and reconstructing the Pilot Groyne. Dredging the port channel to 13.5 m allowed the port to handle ships of 13 m draught by the Dutch Wharf and 12.7 by Helskie I. The depth of basins by the French, Norwegian and Slovak Wharfs also grew. Further development of the seaport foresees the construction and conversion of wharfs to handle vessels of 13.5 m draught. Conversion of the Pilot Groyne widened the internal entry to the port to 98 m and ensured the depth of 13.5 m. The investment project also covered dredging and extending the diameter of turning basins, improving safer manoeuvres in the port.

The implementation of several investment projects allowed Gdynia seaport to maintain its competitive edge in the Baltic Sea region. The port boasts the most modern infrastructure and technical potential providing efficient services for bigger ships [6]. The container vessel *MSC Charleston*, which entered the Baltic Container Terminal (BCT) on June 5, 2015 is a good example. The 105 thousand DWT vessel, flying the German flag, was over 324 m long and 42 m wide, with a GRT of nearly 8.1 thousand TEU. The greatest cargo in terms of weight handled in the port reached 110.4 thousand tons of coking coal on board a 179.2 thousand DWT Panama bulk carrier *Cape Keystone* on May 13, 2015. The biggest vessel, in terms of GRT, to

berth in BCT was *MSC Asya* calling on August 7—9, in 2015. The Panama flagged 117 thousand DWT container vessel was 337 m long, 46 m wide and GRT of 9.6 TEU. Such large vessels could call the port thanks to port channel dredging to the depth of 13.5 m.

The turning basins no 2 and no 3 in the internal port allow for manoeuvres of ships up to 300 m long. Nevertheless, better parameters must be met for ocean going container vessels calling directly from Asian ports. At the end of January 2014, the ZMPG S. A. acquired 240 m of quay III along the Gościny Wharf from Naval Shipyard S. A. This step was necessary for further dredging of the access fairway and the port's internal basins. The development project of this turning basin foresees demolishing the purchased quay and dredging the fairway to the depth of 16 m. Expansion of the turning basin no 2 to a diameter of 480 meters will provide sufficient conditions to handle ships 384 m long of approximately 12 thousand TEU. The extended turning basin is to become operational in the second half of 2016. Quayside dredging works are in progress to ensure a depth of 13.5 m with further prospects of 15.5 m.

In September 2009, the seaport authorities made a decision to construct a deep water berth along the Bulgarian Wharf. The new berthing station, operational since 2012, is 357 m long and can handle ships over 8 thousand TEU. In March 2015, the 192.3 m missing sections of the Bulgarian Wharf and the perpendicular 127.5 m wharf closing the port channel westwards were completed. This step marked the development of the last vacant fragment of the port. Gdynia Container Terminal features a 450 m wharf with new roads and manoeuvring yards adapted to handle 370 m long vessels with a draught of 13 m and 14 thousand TEU. The objective is to service *Balitmax* type ships with a draught of up to 15 m.

A section of the Swedish Wharf and the road and rail system has undergone conversion in the eastern part of the port. The investment project increased the port's bulk cargo handling capacity. The port got the most modern infrastructure to handle fodder and mineral cargo. The Swedish Wharf underwent upgrading of a 400 m section both above water and underwater, increasing the structural depth to 13.5 m.

A new modern logistic centre is being built in close proximity to both container terminals and the ferry terminal. Part of this 30-hectare area serves as a storage centre and vehicle centre. Forwarding and logistic companies have gained a modern office facility. An 8 thousand m<sup>2</sup> high storage warehouse was built in January 2011. The warehouse and the necessary infrastructure required 14 thousand m<sup>2</sup>. The nearly 0% vacancy rate confirmed the need to build another facility. In 2012, Rolls-Royce Marine Poland built a service facility covering an area of nearly 7 thousand m<sup>2</sup>. Another high storage warehouse was commissioned in May 2014.

### 3. Trends in the seaport development

Gdynia seaport participates in research projects, examining the possibility of developing multimodal corridors and reducing negative impact on the environment. The results of these projects facilitate the development of in-

novative transport services, help in agreeing on international spatial development and transport trends, integration of domestic and regional transport systems with pan European networks (Table).

**Completed research projects with the participation  
of the Port of Gdynia Authority**

Project title	Key objectives
SoNorA (A-B Landbridge)	Developing the hinterland southwards to the Adriatic coast
Baltic Cruise Project	Enhancing attractiveness of the port for cruising vessels and tourists
Sea Motorway Baltic-Link Gdynia-Karlskrona.	New investments in infrastructure and logistic enterprises for servicing the dynamic progress in trade between Sweden and Poland and ferry links between cities. A feasibility study for a new ferry terminal in Gdynia with accompanying road infrastructure. A study on transport covering the area between the new ferry terminal and the city centre.
Baltic Gateways	Increasing the share of rail transport in servicing the port's hinterland in view of growing cargo handling volumes and burdens for the transport infrastructure in the hinterland.
Baltic Gateways Plus	Coordination of investments in intermodal transport in Baltic Europe taking into account major projects along international corridors. The development and modernisation of intermodal terminals and logistic centres.
Baltic Master II	Prevention and response to hazardous oil spills.
Smocs	Developing innovative methods of stabilising contaminated sediments, reducing the impact of pollutants on the environment and improving physical and chemical properties of sediments.

Source: own study based on: [www.port.gdynia.pl](http://www.port.gdynia.pl)

The investment projects were in line with the *Development Strategy for Gdynia Port to the year 2015*. The next document, adopted in August 2014, the *Development Strategy for Gdynia Port to the year 2027* [9] includes such projects as the construction of a public ferry terminal, further stages of dredging the port channel and internal basins, conversions of consecutive quays, the improvement of rail access to the western part of the port, the development of infrastructure for collecting sewage and power supply for ships, the restructuring of the southern port entrance as well as conversions of the E. Kwiatkowski flyway to a full TEN-T capacity, and the construction of the North Ring Road taking over the port road traffic (Fig. 3).

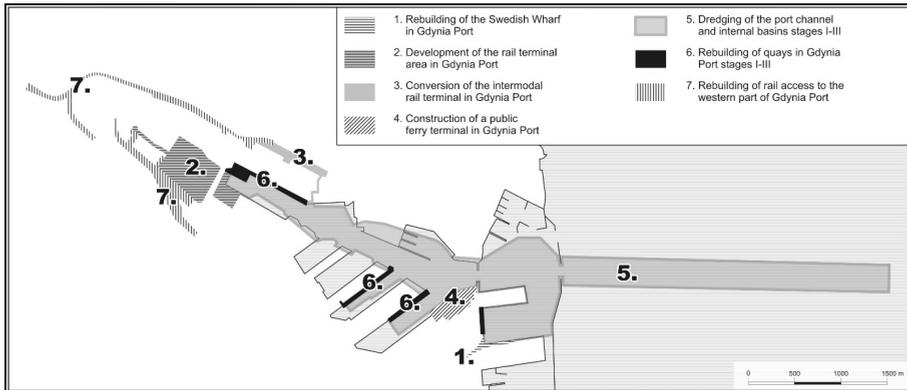


Fig. 3. Investments of Port of Gdynia Authority for the years 2015—2020

Source: Own study based on ZMPG S.A data.

The new strategy demonstrates the universal character of the seaport and presupposes sustainable development in three key cargo markets: container, ro-ro including ferry, and bulk cargo markets. This strategy remains in line with the port's predispositions, which following adaptive works shall be capable of handling the biggest container, bulk and passenger ships on the Baltic. The port is to handle transit north-south markets and undertake necessary steps to become an ocean port, handling marine transit. Thanks to the infrastructural projects in the hinterland, including the Baltic-Adriatic Corridor, the port has a greater potential for transit markets. Strengthening competitiveness on the domestic, Baltic and European scale and keeping a strong standing of the port in key cargo segments are the overall goals of the port.

## Conclusions

By the end of 2015, ZMPG S.A. completed five investment projects. These include conversion of three wharfs, development of the port infrastructure to provide services to ro-ro ships and upgrading of the rail terminal.

The dredging and widening of the port channel, fairways and internal basins are of strategic importance for the port's competitiveness. The diameter of the turning basin no 2 is to be enlarged to 480 meters, and the internal basins are to be dredged to 16 m in the channel and 15.5 m at the quaysides. The upgraded port will be capable of servicing 380—400m long ships, such as container vessels. At present 329—330 m long vessels can berth in the port. The planned investment will be crucial for container handling. The development and upgrading of the port infrastructure in the years 2016—2018 will cost ZMPG S.A. PLN 605.5 million.

Construction works of Stage I, including increasing the diameter of the turning basin no 2, began in 2016. The completion of this stage is planned for December 2017. Design works on the dredging of the port basins to maximum depth of 16m will be continued. It is planned to start dredging in 2017 and complete the project in 2020.

Improved road access to Gdynia port is a joint task for the port authority and the city. The key investment projects are to link the port with the TriCity ring road, develop the rail infrastructure and dredge the channel/fairways. The city supports the development of access infrastructure to the port. The Red Road that extends the TriCity ring road to Gdynia port is a good example.

There are plans to improve access to railway transport. It is necessary to modernise railway line no 201 towards Bydgoszcz. The completion of strategically important investment projects will create conditions for further growth in handling both container and other cargoes in Gdynia port. Such developments will significantly improve the competitiveness of the maritime sector.

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