

Structural Development of Polish Seaports the Light of Changes in the Baltic Transport Market

Rozwój strukturalny polskich portów morskich na tle zmian na bałtyckim rynku transportowym

Renata Czermańska, Urszula Kowalczyk

Instytut Morski w Gdańsku

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Abstract: The article presents the most important trends and tendencies in the development of Polish seaports, together with their expected structural changes. It generally discusses current and planned cargo turnover and the growth of passenger traffic. More attention has been given to implemented and planned investments setting direction for the further development of technical capacity and transport infrastructure, together with future capabilities (abilities) of ports' transshipment in relation with fore-land and hinterland.

The article also highlights expected cargo turnover of the main Polish ports in 2020 estimated on basis of the current pace of turnover development and forecasts of further changes of individual groups of cargo turnover until 2020 and 2030, taking into the account future economic conditions of the country.

The further part of the article is devoted to the expected changes in the area of sea transport, the most growing cargo groups, increase in the ships' size, turnover in the Baltic sea ports as well as changes in the role and importance of individual ports on the Baltic transport market. All issues characterizing the development of Polish sea ports were discussed in terms of ongoing and future changes in the Baltic transport sector. Current forecasts of the cargo volumes transported by sea and development of cargo turnover in the Baltic sea ports are especially highlighted.

Keywords: Polish seaports, Baltic ports, investments in the seaports, changes in the Baltic transport, cargo turnover forecast in Polish seaports, Structural Polish ports development

Streszczenie: Prezentowany artykuł przedstawia najważniejsze tendencje rozwoju oraz przewidywane zmiany strukturalne w polskich portach morskich. Omówiono w nim w sposób syntetyczny tempo wzrostu obrotów ładunkowych oraz ruchu pasażerskiego. Więcej uwagi poświęcono realizowanym i planowanym inwestycjom, wyznaczającym kierunki dalszego rozwoju potencjału technicznego i infrastruktury transportowej oraz przyszłe możliwości (zdolności) przeładunkowe portów.

Artykuł przedstawia również oczekiwane wielkości obrotów ładunkowych w głównych portach polskich w 2020 r., oszacowane w oparciu o dotychczasowe tempo rozwoju obrotów, a następnie prognozy rozwoju i zmian obrotów poszczególnych grup ładunków do 2020 r. i 2030 r. uwzględniające przyszłe uwarunkowania gospodarcze kraju.

Dalsza część artykułu poświęcona jest przewidywanym zmianom w obszarze przewozów morskich głównych ładunków wykazujących największą dynamikę wzrostu, w wielkości statków, obrotów w portach bałtyckich, a także zmian roli i znaczenia poszczególnych portów na bałtyckim rynku transportowym.

Słowa kluczowe: polskie porty morskie, porty bałtyckie, inwestycje w portach, zmiany w transporcie na Bałtyku, prognozy obrotów ładunkowych w portach bałtyckich, strukturalny rozwój portów polskich

INTRODUCTION

The Baltic Sea is a body of water characterized by very well developed shipping, which encompasses about 15% of the world's sea transport services. The main cargo transportation lanes go through the Scandinavian and Russian ports. There are over 200 commercial ports located in the Baltic Sea region, including 50 ports providing container handling facilities. In the first half of 2013, the Baltic ports handled transshipment of a total amount of 395.3 million tons [5]. With respect to the level of cargo turnover, the leading positions among the Baltic ports belong to: Primorsk, St. Petersburg, Göteborg, Tallin, Klaipėda, and Riga.

When it comes to sea transport services in the Baltic Sea area, the Polish seaports play an important role due to their location within the main European transport corridors. Polish ports handled a total of over 70.7 million tons of cargo in 2013, and 75.1 million tons in 2014 [14].

The competitiveness of the transport corridors is an additional asset for the growth of cargo turnover volumes in the Polish ports, which are significant nodes along the corridors. The high quality of the freight services and ship maintenance, as well as good transport infrastructure in reference to ports' interactions with both their fore-, and hinterland, are conducive to improving the amount of transit cargoes transported to and from Central and Southern Europe from/to Scandinavia.

Development of cargo turnover

Sustainable growth of cargo turnover has been continued for several years already. The surveys of trend analysis show that in 2005-2013 the turnover was rising by 2.6% per year, to reach a total of 64.1 million tons of cargo¹ in 2013 [2] (Table 1 and Fig. 1).

The growth of cargo volume handling in seaports continued during the last year of the ports' turnover. According to the preliminary data of the Central Statistical Office, the volume of cargo turnover in the four major ports has increased by 6.2%, and an even better performance is expected in the current. However, it has to be taken into consideration, that the sulphur directive of the European Parliament passed on the 1st of Jan. 2015 will

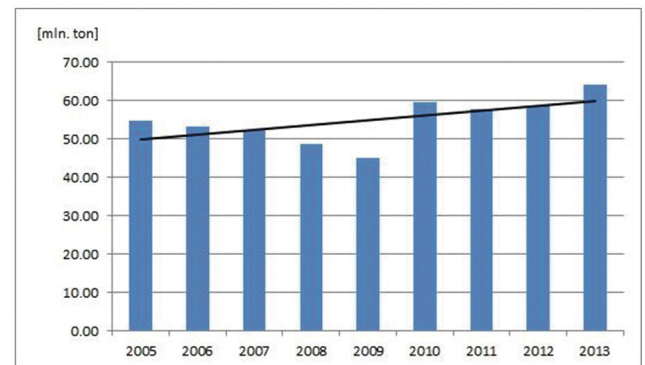


Fig. 1. Cargo turnover in the Polish seaports in 2005-2013

change the operating conditions for maritime transport on the Baltic Sea (causing a rise in its cost). It may have a negative impact on maritime transport in the SECA area, including the waters of the Baltic Sea. The new regulation will directly cause a decline of cargo volumes handled in the Baltic ports. A rise in costs of maritime transport may turn into a factor triggering changes in the branch structure of the freight on European maritime connections or broader involvement of Mediterranean or West European ports (located outside of the SECA area, e.g. French ones) in handling cargo volumes (both internal and transit), previously passing via Polish ports.

Transit cargoes play a significant part in shaping their cargo turnover due to the Polish seaports' location. The volume of transshipment in transit fluctuated in a wide range over the past years, and in 2013 it amounted to 11.6 million tons, which accounted for 18.4% of the total transshipment operations performed in Polish ports in international trade. The most significant here was the transit of crude oil from Russia, which has been directed through the Port of Gdansk for years. In accordance with the assumptions of the Russian ports development strategy aimed at shifting Russian cargo from foreign ports (Lithuanian, Latvian, Estonian, and Polish), to the national ones i.e. independence from the foreign ports, large volumes of cargo has already been or soon will be overtaken by the Russian ports (Ust-Luga, Primorsk). Currently Russia is implementing a program of transferring the strategic export goods, first of all the crude oil and petroleum products, from foreign to national ports.

Tab. 1. Cargo turnover in Polish seaports in 2005-2013 (in thous tons^{a)}

PORTS	2005	2006	2007	2008	2009	2010	2011	2012	2013	AVERAGE DYNAMIC GROWTH IN %
Total	54770	53131	52433	48833	45079	59507	57738	58825	64104	2,6
Of which										
Gdańsk	22478	22034	19944	17073	18758	26421	23513	24380	27171	3,6
Gdynia	11038	12218	14849	12860	11361	12346	12992	13187	15059	4,6
Szczecin	8245	8158	8009	7787	6992	7969	8064	7590	7859	-0,4
Świnoujście	10373	8393	7385	8843	7038	10683	10680	11280	12019	4,0

^{a)} Data do not include weight of boxes or vehicles (containers, trucks, trailers or rail wagons)

Source: own elaboration based on CSO in Warsaw.

¹The turnover registered by the Central Statistics Office (GUS) which do not take into account weight of the loading units (containers, lorries, semi-trailers, and railway wagons), as well as the fuel for the ships.

Table II. General cargo turnover in Polish seaports in 2007-2013 (thous tons)^{a)}

TYPE OF GENERAL CARGO	2007	2008	2009	2010	2011	2012	2013	AVERAGE GROWTH DYNAMIC (%)
Containerised ^{b)}	5900	5609	5093	7828	9420	10781	13042	15,9
Ro-ro	5856	5714	4810	5853	6201	6234	6373	2,0
Conventional	4600	3844	3170	3390	3353	3648	3503	-3,9

a) Excluding the weight of boxes and vehicles used as transport means (containers, tracks, trailers and rail wagons). b) containers $\geq 20'$

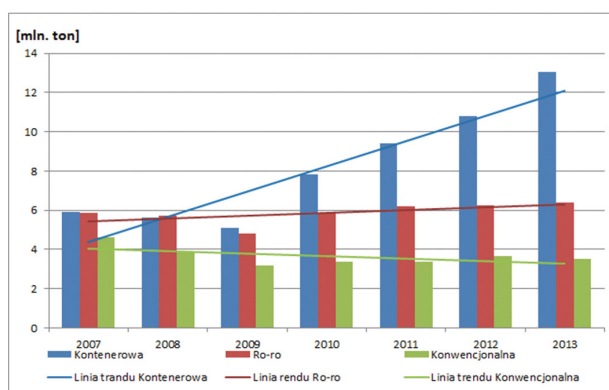


Fig 2. General cargo turnover in Polish seaports in 2007-2013

The investigation related to the cargo handling development of the cargo groups indicates that the container turnover records a particularly high growth dynamic (one of the highest in the Baltic Sea area) in the ports of Gdansk and Gdynia, reaching an average growth rate of 15,9% annually in recent years (tab. 2 and fig.2) [3].

A particularly high level of growth dynamics (one of the highest on the Baltic Sea) is what distinguishes container handling in the Gdansk and Gdynia ports, the level of which was rising by about 15.9% a year (in tons) throughout the period under analysis [2]. As a result of dynamic development, the Polish ports currently are ranked as the second (Gdansk), and fourth (Gdynia) on the list of the largest container ports on the Baltic Sea. While in 2013 the container turnover of the top ten ports rose by 3.1% on average in comparison to the previous year, the Port of Gdansk recorded an increase of 26.8%, and Gdynia by 7.9% [14] (Fig. 3).

Dynamic development of the container turnover is undoubtedly a result of a global trend for increased transport of highly processed goods in containers, while the carriages of conventional general cargo in maritime transport are declining. This tendency requires adjusting the infrastructure and capacity of ports to the demand of container transport services users. In reaction to the sustainable increasing demand for container handling services, the modern Deepwater Container Terminal (DCT) in Gdańsk has been constructed and the extension of already existing facilities for handling and are being carried out in the Gdynia port (the BCT and GCT terminals).

The DCT terminal in Gdansk, offering handling capacity for the largest container vessels, has provided conditions for handling ocean going shipping lines deploying the largest ever calling

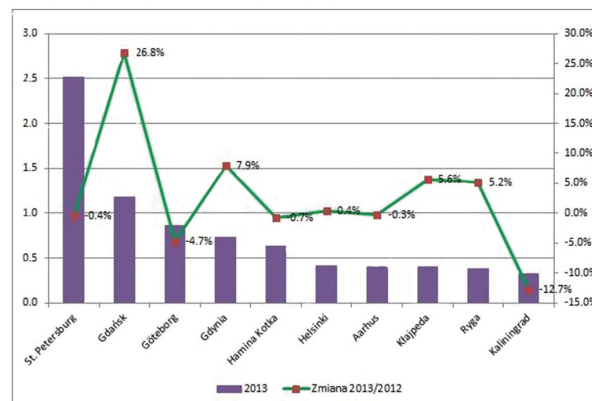


Fig3. Container turnover in the top ten Baltic seaports in 2013 (million TEU)

at the Baltic Sea waters. The terminal is also determined to handle more containers in transshipment and transit. Thanks to the above mentioned developments the Port of Gdańsk has become one of the largest Baltic ports. In 2013 the of volume of container turnover amounted to 1.178 million TEU (i.e. ca. 7 million tons) in 2013, and 1.212 million TEU in 2014 [4]. The current cargo handling capacity and the accessibility infrastructure enabling the top quality service turned the port of Gdańsk into a hub port for many other Baltic ports. It is handling a substantial number of feeder services. That is also the reason why the volume of containers handled within the scope of transshipment has been systematically rising, which may be proved by the fact that sea-to-sea transit accounted for over a half (51.7%) of the port's general transit transshipment as early as in 2013.

In recent years the port in Gdańsk has been continuously improving its position on the Baltic container market in advancing from 8th place in 2009, to the already-mentioned second position, after the port in St. Petersburg, which is still on top.

It can be assumed from the previously carried out survey, that in the years to come the development of cargo turnover will continue at the current pace. It can be expected that in 2020 the total volume of cargo handled in Polish ports will reach the following volumes² [2]:

Port	Turnover (in million tons)
Total	75.8
Gdańsk	34.0
Gdynia	19.9
Szczecin	7.6
Świnoujście	15.4

The container turnover is expected to rise in that time by 100%, amounting to about 26 million tons. The turnover of general cargo transport in the Ro-Ro system is expected to rise by about 14.0%, i.e. up to 7.3 million tons.

Considering the principles of port statistics (the total weight of cargo including deployed boxes and vehicles), and the previously and currently observed development rate, it can be expected that the total turnover of the main Polish ports will rise from 70.7 million tons in 2013 to about 83.4 million tons in 2020.

Trends in development of port infrastructure and superstructure

In the past few years many ports are determined to take actions aimed at implementing a range of investments focused on further expansion of their cargo handling capacity in order to adjust to the changes in demand on the transport services market in the Baltic Sea region, and to challenge the increasing competition,

The Polish ports are also extensively implementing new investments. These activities are financed to a large degree by private investors (transshipment terminals' operators, business entities leasing port areas), as well as by Port Authorities, by grants from the state budget, and with significant support from EU funds. Several new investment activities are carried out or planned and their targets are:

- ◆ development and upgrading of the technological potential, which will first of all increase the ports' transshipment capacities to service most cargoes (groups of freights) directed to the ports, and secondly, will make it possible to introduce new transshipment technologies and improve the quality of ship and cargo services.
- ◆ improvement of ports' system of transport connections both on the fore-land's side, and on the hinterland's, which will also lead to an increase of the services' quality.

An important aspect of investment activity is the increase of competitiveness and strengthening of the Polish ports' position in the Baltic region.

All the most important planned investments are enlisted in the Implementation Document of the Transport Development Strategy 2020 (with a prospect until 2030) [2].

Intensive development of general cargo transport in containers and other transport units influenced new investments priorities in sea ports. In the recent years, construction of new, and the extension of the already built container, ferry, and Ro-Ro terminals were, to a large degree in the center of focus. At the same time, the Polish ports were developing their potential for operating bulky goods, such as: coal, cereal, crude oil and petroleum products, sulfuric acid, liquefied gas.

The port in Gdansk displays the most favorable conditions for development of investments and location of deep-water transshipment facilities. A strategic direction of the port's development is increasing its capability for transshipment of containerized and bulky goods, with particular focus on the cargoes connected with the country's energy security.

In 2013, two out of eight already completed big investments were finished. In the deep-water part of the port, the Dry Bulk Terminal (funded by the SEA-INVEST group), with annual handling capacity of 6 million tons, was granted permission to operate transshipment of coal, ore, aggregates, and cereal in export and import of these goods [14]. Also the Gdansk Bulk Terminal GBT (investment by the GBT and Copenhagen Merchants) was opened for transshipment of agri-bulk, primarily cereal and ground grain. Handling capacity of the terminal amounts to 330 tons a year.

In 2014, the implementation of the Frozen Goods Terminal, with an annual handling capacity of 200 thousand tons and able to store (in a refrigerator store – sharp freezer room) a total of 24 thousand tons of fish at a time, was completed. The construction of facilities for handling petroleum products in the Liquid Fuel Terminal owned by the Naftoport Ltd. has been continued.

The largest expansion of the port of Gdansk capacity is expected, after the completion of four further investments, in 2015 and 2016.

The greatest of the them is the implementation of the container bay in the DCT Terminal, whose handling capacity will subsequently rise in the first stage, from the level of about 1.5 million TEU to 3 million TEU (approx.. 21 million tons) per annum. The new berth (about 600 meters long) will be equipped with state-of-the-art devices (Super-Post-Panamax swimming cranes, able to handle the biggest container ships, and with an extension arm equaling 25 rows of containers). The investment is due to be completed at the beginning of 2016.

The Storage Base of Crude Oil Terminal for the PERN "Przyjaźń" company will be completed in 2015. There will be 24 tanks installed of total capacity of about 700 thous. m³ for storing crude oil and petroleum products. It will be accompanied by a full technical infrastructure, rail tracks, railway siding, and buildings. The tank farm is to be connected to the already built Crude Oil Terminal by means of a pipeline. The farm's technological system will allow for operating a few types of products: various brands of crude oil, diesel fuel, gasoline, aviation gasoline, and chemical products.

By the year 2016 a Multipurpose Deepwater Container Terminal, where among others, goods of plant origin will be handled.

Of crucial importance for development of the deep-water section of the port are the planned investments, which stipulate

a modernization of the outer part of port's fairway with a new turning circle, construction of a new eastern breakwater, and a new Northern Berth by this breakwater. Also currently carried out and further planned investments aimed at improving the accessibility infrastructure from the hinterland are under way. They include the Sucharskiego Route together with the tunnel under the port channel of the Martwa Wisła river; construction of the new railway bridge on the route leading from the external port to the main railway line connecting Gdańsk with the south of Poland. At present, the Słowackiego Route between the Lech Wałęsa Airport and the Port of Gdańsk is under construction.

From the point of view of stabilization, and increasing the supply of cargo expected in the port, the Pomeranian Logistics Centre (*Pomorskie Centrum Logistyczne*), being built at the back of the DCT, will play a significant role since it will work in close cooperation with the ports and its hinterland.

Apart from extending the external part of the port in Gdańsk, also berths of the inner port (i.e. of the Mining Basin, where coal, coke, aggregates, industrial chemicals, and general cargo are handled) are being modernized. Also the Gdańsk Container Terminal (*Gdański Terminal Kontenerowy GTK*) is to be upgraded to reach a handling capacity of 120,000 TEU a year (at present it is only 80,000 TEU). Moreover, there are plans to modernize the fairway, extend the berths, and generally improve the conditions for navigation in the inner port.

Within the framework of the Gdynia Port's investment program, the already operating BCT and GCT terminals, as well as the ferry terminal have been expanded. Expansion of the BCT terminal was aimed at both, increasing its cargo handling capacity, and creating conditions for serving larger vessels. Among the port's most important investments is the planned extension of the turning circle, and dredging the port's fairway and basins so that their depth is increased from 13.5 to 15.5 meters. Thanks to that investment, the port will be able to accommodate the largest ships sailing on the Baltic Sea, similarly to the port of Gdańsk. Moreover, it will strengthen the competitive position of the port of Gdynia among the Baltic ports.

In the Port of Gdynia there are projects for the expansion of the port's cargo handling capacity being carried out. They include: completion of renovation works at the Bułgarskie Quay area; reconstruction of the inter-modal railway terminal, which will allow it to handle longer sets of container trains; and reconstruction of the Szwedzkie Quay. The latter investment is aimed at enabling the accommodation of larger bulk cargo ships (of PAN-AMAX type).

Construction and modernization of transshipping terminals is also going on in the ports of the West Coast.

In the Port of Szczecin, where reloading of general cargo, coal and other bulky goods (aggregates, metal ores etc.) is traditionally predominant, new terminals have been put into

operation over the past few years, namely the grain terminal (with an annual handling capacity of 700,000 tons), the DB Port Szczecin Container Terminal, and the sulfuric acid terminal.

Nowadays, in the ports in Szczecin and Świnoujście a range of infrastructure investment projects is being implemented. In the Świnoujście port's external part the construction of the LNG terminal for transshipment of gas, which is the biggest energy project in the country, is coming to an end. The terminal will enable accommodating gas tankers of lengths up to 315m and width of 50m, with a maximum permissible draught of 1.5m, and storage capacity of 120 - 216m³. Development of the existent ferry terminal for ferry units of a maximum length of 220 meters is also in progress.

The investment plans provide for, among other things, modernization (extending and dredging) of the grain quay on the Ewa Peninsulain Szczecin, as well as carrying out a range of projects, crucial for increasing the container handling volume of the port complex, and development of the entire region of West Pomerania.

In the new development strategy, up to the year 2027, the ferry terminal is anticipated to be further rebuilt, and a station for the LNG export is anticipated to be built in Świnoujście, which will allow redistribution of liquid gas in the region of the Baltic Sea's basin. Also the modernization of the grain and general cargo quay is to be continued in Szczecin.

On the list of investments there are also numerous infrastructure enterprises related to improvement of accessibility to the ports of the West Coast, including upgrading the Świnoujście-Szczecin waterway to the depth of 12.5 m, improving the infrastructure of the Oder River Waterway, as well as further modernization of the road and rail network.

Similarly to the Polish ports, other ports of the Baltic Sea region are also investing in their cargo handling capacity and infrastructure development.

From the point of view of competitiveness, of particular importance for the Polish ports located on the East Coast are significant investments in the Russian

Forecasts for the development of the cargo turnover until 2020, and until 2030

The development observed to the present moment, combined with the broad investment program planned to be implemented in the Polish seaports, allows for an assumption that the upward trend in cargo turnover will continue in the years to come. The forecasts drawn up, taking into consideration the future economic conditions of the country, anticipate that in 2020 the transshipment in particular categories of cargo will look as follows (in millions of tons) [5]: in total 72.8 – 93.7

of which:	
coal and coke	10.0-13.0
ores and scrap metal	0.9-1.3
grain	3.0-6.5
crude oil and petroleum products	15.0-17.0
other bulk cargoes	14.1-17.0
containerized general cargo	21.0-28.0
ro-ro cargo	7.2-9.0
conventional general cargo	1.6-1.9

The forecasts do not only anticipate an intensive increase in the container turnover, but also in the turnover of crude oil and its products, as well as of dry bulk goods (grains and products included in the "other bulk cargoes" category).

Due to the need to diversify the supplies of energy resources to Poland and the anticipated increase in consumption, the imports of crude oil by sea will increase too, including imports from new directions of supply. At the same time, the Polish Oil Industry and Trade Organization (*POPiHN*) foresees a rise in production of fuels in Poland, which should cause an increase in exports of petroleum products, until 2020, by 10-30%.

The higher rise in turnover of grain in the Polish ports expected in the forecast is, first of all related to the anticipated growth of seaborne imports of soybean and fodder, which are showing dynamic growth of a certain percentage a year, in line with the rise in livestock production in Poland. However, the directions of supply of raw materials for production of fodder are to change (supplies will come mostly from European countries, where there are programs encouraging farmers to cultivate protein crops, which could replace soybean being developed). At the same time, there should also be expected, a significant decrease in imports of agricultural products through the seaports. In line with the progress of agriculture's modernization process, and the development of crop production in Poland can be expected, and in consequence the exports of agricultural products shall increase (primarily of grain and rapeseed meal), also via the Polish seaports.

In the context of the need for diversification of energy resources' supplies, there is foreseen to occur, among other things, a rise in imports of liquid gas, which provided a basis for undertaking construction of transshipment terminal in Świnoujście. Import of this resource is anticipated to reach a level of 1.1-1.5 million tons a year by 2020.

Systematic rise in the volume of cargo handled in the Polish seaports is anticipated also in the longer term, that is to the year 2030. It is assumed that a number of trends occurring now, and anticipated to last till 2020 will continue also in the following years [5]:

- ◆ the transshipment of containerized goods is still to be characterized by the greatest growth dynamics,
- ◆ the downward trend will continue in transshipment of conventional general cargo, including first of all, such

cargoes as metallurgical products and wood processing industry products,

- ◆ due to the increasing significance of Poland as a transit country on the North-South Europe transport route, the volume of cargo shipping on board of Ro-Ro ships will be gradually rising
- ◆ exports of Russian crude oil through the Port of Gdańsk will be limited, but at the same time there will be an increase in the transshipment of oil imported by sea from Russia and other countries,
- ◆ import of oil under long-term agreements will decrease, and its import related to spot purchases will increase, thus allowing a greater diversification of oil supply sources, and improving maritime transport's participation in operating in the import of the fuel,
- ◆ import of hard coal will rise, and its exports will simultaneously decrease; it should be underlined, however, that these predictions are susceptible to change, depending on policy orientations adopted by the government concerning development of the mining sector in Poland,
- ◆ there should not be any significant changes in relations to transshipment of liquid gas expected. Due to the planned shale gas production, the demand on this resource's import will decrease; yet, it should be emphasized that no legal regulations have appeared so far, and the works to implement the program of shale gas extraction in Poland are not advancing, and so these forecasts may turn out to be overoptimistic,
- ◆ there may be a stabilization of transshipment of cargoes included in the "other bulk cargoes" category expected, resulting from a big internal disparity in the group. A decrease in transshipment of one cargo may be compensated by a rise in that of another one.

Passenger transport services

In the Baltic Sea region there is a big concentration of passenger traffic. The greatest intensity of this traffic can be observed between the Scandinavian ports and Tallinn and the Baltic ports in Germany. Among the main ports operating the passenger traffic are Helsinki and Stockholm.

The Polish ports play a relatively insignificant part in the passenger transport services on the Baltic Sea. Contrary to the development of cargo turnover, operating passenger transport does not show an upward trend in the Polish ports, and has for a number of years continued at a similar level of 1.4 - 1.6 million passengers, with an average ratio of dynamics for the 2005-2013 period equaling 0.3% [2].

When it comes to passenger movement, passengers are predominantly arriving from/going to the Scandinavian countries on ferries, mostly from Sweden (Ystad, Karlskrona, Trelleborg, Nynäshamn). Despite the increasing attractiveness of Poland and Scandinavian countries and growing interest in seaborne tourism, rather minor growth of passenger traffic on board of ferries can be expected in the longer perspective, since alternative modes of transport (air transport in particular) are being developed.

No upward trend can be observed in the number of passengers travelling on cruise ships. Number of passengers arriving at the ports (mainly at Gdynia) oscillates between 80 and 120 thousand people a year. However, a trend towards increasing the size of ships and the number of passengers present on board at a single call of a ship is evident. Despite the fact that the Baltic Sea is still going to be perceived as an area attractive for tourists in the next few years, no significant tourist revival should be expected to occur in the Polish ports in this sector of passenger traffic. The forecasts concerning development of this traffic anticipate that in 2030 the total number of passengers (both in the ferry and the cruise ship segment) in the Polish ports will be somewhere in between 1.6 (the current level), and 1.9 million people [5].

The list of main ports of cruise ships' calls on the Baltic Sea will traditionally remain the same as in the past (including first of all St. Petersburg, Stockholm, Tallinn, Helsinki, Gdynia, Riga).

Polish ports perspectives within the forecast of maritime transport development on the Baltic Sea

The directions of Polish seaports' development outlined above prove that, in the coming years, they will be gaining importance on the port services market of the Baltic Sea region, considering the volume of cargo handling. What it also indicates is that such course of events as are the forecasts drawn up for the Baltic ports, which anticipate that the ports that will display the most dynamic development within the time frame until 2030, are the Polish ports (see Fig.4). The forecasts assume that in the 2010 - 2030 period total cargo turnover of the Baltic ports is to rise from 757.1 million tons to 984.8 million tons, that is by about 30% [2]. At the same time, the Russian ports' turnover is to rise from the level of 171.6 to 243.8 million tons, that is by 42%, whereas that of the Polish ports is to rise by 49% [2].

It can be assumed that the increased flow of cargoes will be directed first of all to the Polish ports, primarily to Gdańsk (containers, dry and liquid bulk cargoes), and to the Russian ports, namely to St. Petersburg (containers), Ust-Luga (dry and partially also liquid bulk cargoes) and Primorsk (liquid cargoes).

Growth dynamics of the marine turnover in Baltic countries will be quite stable, and a particularly intensive growth will characterize the sector of unitized, and dry bulk cargoes.

Predictions of a substantial development of marine transport on the Baltic Sea can also be found in the WWF Baltic Ecoregion Program [5]. The Programme assumes that if the current trend continues, container traffic may rise, by 2020, by 64%, and double by 2030. When it comes to transport of crude oil, it should increase by 64% by the year 2030.

Forecasts for development of cargo turnover in the Baltic seaports drawn up for the period until 2020 predict the turnover's general rise to reach 50%, while ones drawn up for the period until 2030 is to reach 100%. At the same time, it is estimated

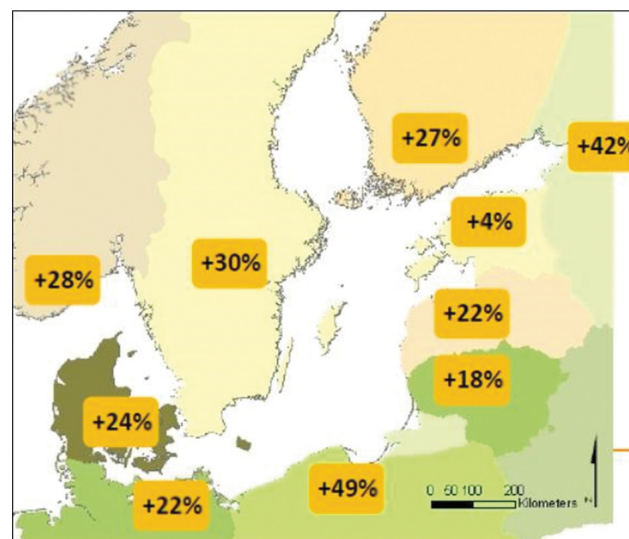


Fig.4. Forecast cargo turnover growth of the Baltic Sea ports until 2030 (base year 2010).

that the current technological potential of all the Baltic ports is sufficient to handle the marine transport in the next few years, and their further development will be focused around upgrading the ports already in place, rather than around building new ones. It may turn out, however, that the Baltic (especially the German and Finnish) ports' capabilities will not be sufficient, given the expected rise of the cargo transport on the Baltic Sea, especially of containers and crude oil.

The anticipated rise in cargo turnover in the Baltic ports will make it necessary to launch new shipping connections, and increase vessel traffic on the Baltic Sea. Simultaneously, due to constant growth of ships' dimensions, there will be more big vessels appearing on the waters of the Baltic, however, this growth should be more restrained than on the oceanic shipping lanes. That is why the shipping traffic's development will not progress as fast as the rise in turnover. Nonetheless, some of the Baltic ports will have to be prepared to handle larger ships. Those predictions are reflected in the investment programs of the Polish ports presented above, where the number of calling ships is systematically rising. The Port of Gdańsk is a perfect example of this, as during the past few years, average size (capacity in gross tonnage) of the ships has risen from 10,000 GT to the level of 14,600 GT in 2014 [4]. Whereas the average net capacity (NT) has increased over the past five years (2009 - 2013) by 35.6% in Gdańsk, and by 41% in Gdynia [4;5]. Undoubtedly, some of the ports will still employ feeder services, where smaller ships work.

Conclusions

The past few years were a period of significant development of the Polish seaports, and solidifying their position on the Baltic transportation market. The ports' handling capacities have been increasing with respect to most cargoes, and cargo turnover levels have been rising.

The economic growth projected for the countries of the Baltic region, as well as the broad program of development-oriented investments both in the sphere of technical capability, and in the sphere of infrastructure improving transport accessibility from land and the sea, gives solid premises for the current ratio of Polish ports' development to be continued in the years to come.

In the light of the current and past development trends, and the anticipated growth in sea transport on the Baltic Sea, it may be expected that the process of extending and upgrading capability for handling containers (in Gdańsk and Gdynia), and ferries (in Gdynia and Świnoujście), as well as dry and liquid bulk cargoes such as: crude oil and petroleum products, and coal (in Gdańsk), grain (in Gdańsk and Szczecin), liquid gas (in Świnoujście), will be continually advancing over the next few years.

Another important direction of the ports' development is improvement of the network of transportation connections with the fore-land and hinterland. An especially crucial task is to continue (in Gdańsk and Gdynia) the implementation of hydro-technical investments (dredging of fairways and port

basins, reconstruction of the breakwaters, amplifying the parameters of the turning circles), which make it possible for bigger ships (including the biggest container and tanker vessels appearing on the Baltic Sea's waters) to call at the ports.

Due to the intensive development of technical capability, and improvement of transportation infrastructure's quality, the competitive advantage and participation of the Polish ports in the Baltic transportation market will rise, and as the forecasts foresee, they will achieve the highest level of turnover growth on the Baltic Sea (namely by 49%) by 2030. Further development of the ports is undoubtedly closely correlated with the anticipated big increase in sea transport on the Baltic Sea, especially with respect to containerized cargo, the volume of which is to double, and the crude oil, transportation of which is to rise by 64%.

In the context of some ports' spatial conditions (e.g. in Gdynia, Szczecin, St. Petersburg), and the tendency for constant growth in the size of ships, it may be anticipated that some of the ports will be expanded also "seawards", e.g. by means of turning port basins into solid land areas.

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Corresponding author: Urszula Kowalczyk, Instytut Morski w Gdańsku, e-mail: ulak@im.gda.pl