https://doi.org/10.26881/sim.2017.4.03

Ernest Czermański

BALTIC SHIPPING DEVELOPMENT TRENDS IN MARITIME SPATIAL PLANNING ASPECT

SUMMARY

The main purpose of the paper is to select, characterize and analyze the most important trends and areas of functioning and development of the Baltic Shipping market, which have a significant impact on the process of shaping maritime spatial planning in the Baltic Sea, as evidenced by the several years of the "MSP Directive" No. 2014/89 / EU (Maritime Spatial Planning). These areas are divided into two main groups: external (independent of marine navigation itself) and internal (that is, those that act as an element of navigation, have a significant impact on its further development). Therefore, for the scientific purpose of the paper has been stated the main hypothesis of developing Baltic shipping market by increasing the traffic and level of complexity of correlations and internal dependencies. This hypothesis has been evaluated positively by data analysis, logical deduction and induction and inference of analysed processes.

This article is intended to be an element of preparations for the implementation of Maritime Spatial Plans in the Baltic Sea for both, the Polish Maritime Administration, and the international cooperation process in the design of such plans for individual Baltic Sea Region states. The trends and areas presented in this article are of key importance for forecasting the future development of the Baltic Shipping, and accordingly the proper preparation of assumptions for the spatial plans in question.

Keywords: MSP Directive, maritime spatial planning, Baltic shipping, maritime transport, sea ports.

Introduction

Among many changes expected in near future for European seas is, i.a. the MSP Directive [Directive 2014/89/EU]. Baltic Sea Region, as one of the world's heaviest ferry traffic sea, is particularly susceptible to all activities, which concerns the spatial regulation on the sea.

MSP Directive establishes a kind of framework for maritime spatial planning aimed at promoting the sustainable growth of maritime economies (blue growth), the sustainable development of marine zones and the sustainable use of marine resources. IT obliges all EU member states to establish and implement maritime spatial planning as soon as possible, and at the latest by 31 March 2021.

The MSP Directve enumerates possible activities and uses and interests, which may be included [Directive 2014/89/EU, Article 8]:

- aquaculture areas,
- fishing areas,
- installations and infrastructures for the exploration, exploitation and extraction of oil, of gas and other energy resources, of minerals and aggregates, and for the production of energy from renewable sources,
- maritime transport routes and traffic flows,
- military training areas,
- nature and species conservation sites and protected areas,
- raw material extraction areas,
- scientific research,
- submarine cable and pipeline routes,
- tourism,
- underwater cultural heritage.

Establishing such plans should be by public and stakeholders involvement and include all characteristic elements for national sea area (see fig. 1). In this paper will be analysed actually one of above mentioned elements – shipping.

Up to 15% [Madjidian et al., 2013] of the world's cargo traffic is handled in the Baltic Sea making it to be one of the busiest maritime places on earth. By the same time, the Baltic Sea has been known as difficult area for shipping for a long time as narrow straits, multiple islands and shallow waters do not leave a lot of space for navigation. Dependent on season, shipping also has to deal with rough weather conditions (intensive storms during autumn, strong currents in the straits and icy waters during winter). In addition to these natural restrictions to shipping, new interests have arisen in the past decades. Most relevantly is the vast need for space for offshore wind farms, and the concurrent desire to designate additional marine protection areas.

In the shipping business publicity, we can find predominantly three main directions, which are predicted for future shipping industry, catched in following motto's:

1. bigger and better,
2. specialization,
3. green.

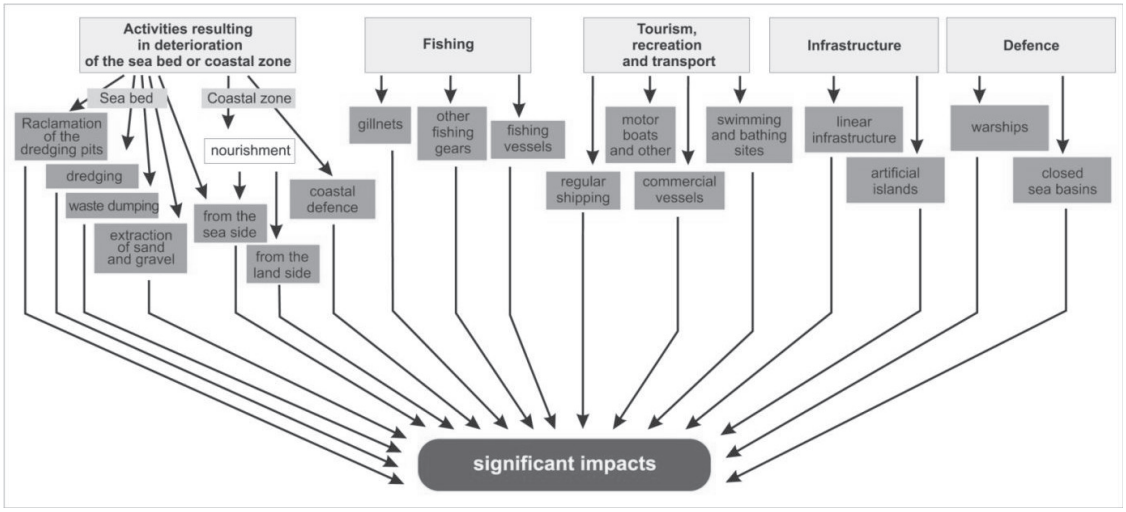

Figure 1. Sources of potentially significant impacts on environment
Source: [Kruk-Dowgiałło et al. , 2011: 11].

The first catchword calls for increased operating efficiency for ships. This, however, can be achieved only through enlarged cargo capacity. These days does not mean extending the ship's length, as this has stabilized at 400 metres and is unlikely to change in the foreseeable future. The same applies to draught which will not increase in the future as a result of natural obstacles (in the Danish straits, the maximum allowable draught is 16.5 metres) and the availability of ports (with the now on-going long-term and cost-intensive infrastructural investments). Even the largest handling facilities do not, as a rule, service ships with a draught exceeding 16.5 metres. Ships ranging in draught from 16.5 to 21.0 metres are in the minority and serve specifically to carry crude oil from roadstead to roadstead or from a drilling rig to a maritime terminal extending into the sea. The other technical parameters of ships, such as width, cargo capacity and deadweight tonnage (DWT), are constantly increasing.

The effect of these changes is to obtain a larger cargo space while retaining the other technical parameters, leading to a lesser per-unit cost of freight transport. This is a requirement facing the shipping industry for years and there is no sign for the trend to subside.

The second catchword points to a general trend of increasing economic efficiency in shipping. Cargo capacity can be improved, apart from the above-mentioned measures, through narrowing ship specialization, particularly in specific carriage technologies and specific cargo groups. The largest potential benefits are offered by sea ports during handling operations. There is a clear pattern to be observed here – the better a ship is adjusted to the type of cargo it is carrying, the shorter time it takes to load / off-load. This shortens the overall travel duration and allows spare time for additional trips.

Another way in which the fleet specializes is by orienting itself towards new cargo groups, as witnessed by containerized cargo and gas carriers. Although they have been in existence for over 40 years, their heyday did not start until after

2000, as a result of globalization, which is why they are still considered new. Containerized general and dry bulk cargo (e.g. Coal, grain) is gradually displacing traditional multipurpose general cargo ships which are in decline.

Another challenge for efficiency is the specialization of drive units, fuel types, prow shape, navigation techniques, etc. with the aim of decreasing fuel consumption both at sea and at port. This enables savings on operating costs, allowing ship-owners to lower freight charges or raise capital for new investments. With regard to fuel economy, there is also the additional goal of reducing the environmental impact of shipping (in everyday parlance, ‚going green'), which is a top priority for the industry at the moment. Less fuel consumption obviously leads to lower CO2, NOx, SOx and other emissions.

The Baltic shipping business is driven by many different factors, which can be divided in two general groups: external and internal. **Externals factor** mean all correlations, which are independent of transport sector and are primary to the shipping. These are basing on simple relation – externality impacts on economy (or one of its section) and, indirectly, on transport sector, here on shipping. Here we can observe i.a. (EEA, 2017):

– demographic growth
– globalization and integration process,
– internationalization,
– economic growth,
– unification and standardization of products, services and procedures,
– capital concentration,
– diverging global population trends,
– urbanization of the publicity,
– accelerating technological development,
– continuing economic growth,
– increasing international competition for resources, markets and consumers,
– growing pressure on ecosystems,
– increasingly severe consequences of climate change,
– diversifying approaches to governance,
– increasing pollution and environmental impact.

Internal factors, in opposite, mean all elements of shipping business, which are depending on shipping market factors – demand and supply and, both, are influenting the market by changes of all these elements. Internals can be divided into four general categories:

1. fleet & ship characteristics,
2. technologies,
3. ownership and ship operating,
4. future expectations and trends.

The following detailed parameters of fleet and ships can be named:

– type of a ship,
– number of ships in fleet,
– age of the ship,

– linear dimensions,
– weight parameters,
– capacity parameters,
– main engine and auxiliary power.

In terms of technology, the main directions of change are as follows:

– ship engine room power supply,
– hull engineering,
– ship operational parameters,
– marine environment protection.

The most important technologies implemented recently in sea shipping include:

– LSHFO (Low Sulphur Heavy Fuel Oil) and MGO (Marine Gas Oli) as marine fuel fulfilling new SOx limits – 1% and 0,1% (respectively),
– scrubbers for reduction of Sulphur in fuel,
– destilates as a marine fuel (most known is methanol introduced by Stena Line),
– LNG as a marine fuel,
– dual-fuel engine,
– hybrid propulsion system,
– exhaust gas recuperation,
– propulsion efficiency devices,
– waste heat recovery,
– air caution,
– wind power,
– smaller engine rating (for speed reduction),
– ballast Water Treatment systems,
– low NOx tuning,
– light constructions,
– reduction of seawater ballast capacity.

The first 13 above mentioned technologies are caused or motivated by different regulation (i.e. Sulphur Directive, Tier III, Ballast Water Convention), and last 3 are under R&D process, but until now do not have any appropriate regulation. Although we can expect them in coming 5–10 years.

Based on adopted methodology in the analysis, as next will be presented result of choose of most important factors, both external and internal, which were selected during stakeholders consultation in terms of project meeting organized in Gothenburg at 19. September 2017. By voting and evaluating of presented factors, it has been listed two groups of factors. And four of them from each group are presented below.

1. Changes in Baltic shipping caused by external economic factors

1.1. Changes in socio-demography

Demographic changes have a directly proportional impact on the growth of the maritime fleet. As 90% of global trade is carried on by water, it may be concluded that a larger population in the Baltic Region will also stimulate trade between the countries in that area, thereby forcing ship owners to increase the supply of transport services. This can be achieved through a number of measures, among others, by raising the speed of ships already in use to increase their annual carriage capacity. Such a measure is not desirable, however, as it generates disproportionately high fuel costs and is used only in times of freight charge spikes when ship owners can use added funds to cover their losses in fuel. Last time this happened was in 2006–2008. Another solution is to extend the fleet size. In this case, the enlargement would be cancelled out, to a large extent, by numerous other measures already undertaken by ships owners in respect of sea shipping, with the aim of improving its efficiency, e.g. increasing cargo capacity while retaining external dimensions, implementing IT and ICT for better route planning or shipping alliances to maximize the output of the existing fleet.

It seems that demographic change has no impact on the technical parameters of ships, as these are designed to match demand for transport services. Such demand, in its technical and logistical senses, is generated by forwarders who act on behalf of consignors.

Expanding populations, on the other hand, have quite a strong impact on the size of the market, including also the transport service market. More customers means more needs and more market demand.

Another market driver is the quality of transport services offered by ship owners. On the one hand, quality follows from the need for more efficient services; on the other, a growing market produces more goods to be transported, thereby creating a more pressing need to adjust technical parameters to the freight.

An even stronger progressive correlation occurs between a region's growing population and sea port development. Ports do not grow in number, but expand in a spatial, technical and organisational sense. This trend, as mentioned before, contributes to the vessel's cargo capacity and throughput at the port. New ports cannot be expected to arise overnight. Most of the major ports, however, have specific investment plans, including ones providing for their spatial extension. This is in response to the anticipated demographic growth which is likely to bring with it a rise in demand for carriage and port services, but it comes well in advance of said rise.

The same trend has a progressive impact, although to a small extent, on cargo handling operations at the anchorage. As cargo handling technology includes, above all, energy resources, it can be said that the rise in of a region's population

equals increased demand for energy and fuels. However, the correlation is very weak.

In spatial terms, population growth leads to phenomena relating to space, urban planning, travel and tourism. Therefore, it should be kept in mind that increasingly large strips of coastal land will be occupied by cities, residential and commercial areas, limiting the opportunity for port and maritime operations to expand. The growth in tourism generated by a larger number of residents in the coastal areas will increasingly exclude coastal areas from commercial activity at sea, including shipping and off-shoring. This correlation, however, is not very strong.

Demographic growth brings about increased passenger and tourist traffic. This applies especially to the recent years when there has been a growing need for employee mobility. This is combined with a brisk development of tourism thanks to societies growing wealthy. This will result in a growing performance passenger shipping, especially on short distances. At long distances, sea shipping is no match for air-borne transport except, perhaps, for entertainment purposes where the cruise is an end in itself.

A growing demand for sea shipping will bring with it developments in the auxiliary fleet used for a variety of accompanying services such as towing, commuting, etc. No radical changes are expected here, however.

It is open to doubt whether demographic growth will translate into any improvements in off-shoring. The shipbuilding and off-shore industry will benefit from it to some extent, but direct correlations between these two indices are difficult to find.

1.2. Changes in environmental protection regulations

Virtually, all new environmental regulations relating to sea shipping, including on the Baltic Sea, impose new restrictions on ships and compliance is crucial for the survival of businesses that operate them. Therefore, most operational functions in sea shipping will perceive all new environmental regulations negatively.

The size of the Baltic fleet is bound to shrink, especially where older, technically obsolete vessels are concerned. New ships equipped with cutting-edge drive systems, or powered by alternative fuels such as LNG, are now being and will continue to be purchased. For example, when new regulations on sulphur content in fuel were passed, a dozen oldest ships were decommissioned from service on the Baltic Sea, for their conversion to MGO fuel or refitting to install scrubbers did not make financial sense. This trend has a negative impact on the condition and development of the maritime fleet. The regulations will impact the market as a whole, especially in the short term, as ship owners struggle to keep up with new technical standards. A bottle-neck may occur on the supply side, leading to short-lived hikes in freight rates. This has negative implications for sea ports, as the market shrinks, ship owners go out of business and there is demand that cannot be met. This could be solved by moving the cargo handling operations to the

roadstead, thereby shortening the time needed to off-load and eliminating the need for the ship to enter / exit the port or moor at the wharf.

On the other hand, this trend has a positive influence on the technical parameters and equipment of new ships now entering the market. A large number of ship owners place advance orders for ships complying with technical standards of the future, especially where fuel consumption, noise levels and economy are concerned.

New technical standards will have a strong impact on the lay-out of sea routes. More and more will be excluded from sea shipping or any commercial activity altogether. There are currently a large number of Marine Protected Areas on the Baltic Sea, with implications for spatial distribution of shipping facilities. On the other hand, this will preserve, or at least prevent further incursion of human activity into, intact marine nature sites, making them into attractive destinations for maritime tourism. This will be supported by numerous regulations on environment protection.

Mandatory environmental protection will bring with it developments in the Blue Economy, e.g. the auxiliary fleet and off-shoring.

On the other hand, as maritime shipping is set to play an increasing role in maritime policy, services related to it, such as auxiliary fleets or off-shoring, will also gain importance.

1.3. Changes in economic growth

Changes in the world economy, as discussed in chapter II, lead to a steady increase in international trade exchange. This is strongly correlated with maritime transport, adding importance to sea shipping.

An even stronger catalyst of sea shipping development is represented by the technical advancement of the fleet, especially its technical parameters, as ships have to respond to the ever increasing organizational demands and to transportability requirements of various cargo types.

Developments in both of the above areas lead to growth in the sea shipping market as a whole. This growth has a quantitative (larger cargo volume) and qualitative dimension (increasingly more demanding technical requirements for cargo service at the port and at sea).

The same applies to the port service market which is facing increasingly higher quality demands. This relates especially to increasing the handling efficiency of port facilities, better cargo status information as well as more capable handling of maritime traffic passing through the port. This applies to cargo handling at the wharf and at the roadstead.

A positive impact of economic growth is also seen in passenger shipping, particularly where this relates to sea tourism, where the aim is travel itself rather than to move from one place to another.

Economic growth is accompanied by advances in off-shoring and auxiliary services accompanying maritime transport. A growing market poses increasing

technological demands, on one hand, but on the other, provides the shipbuilding industry with the necessary investment capital.

It appears that the only aspect unaffected by economic growth is spatial change and protection of specific maritime areas. On the other hand, an indirect connection certainly exists between the intensification of human economic activity and the need for environmental protection on a spatial, generic and qualitative level.

1.4. Changes in alternative routing

The new and future transport corridors discussed present an alternative to intra-Baltic shipping. As such, they are, and will continue, reducing the quantity of cargo handled by that branch of transport. These are mainly railway corridors designed particularly for containerized cargo. For example, the extension of the OBOR (One Belt, One Road) corridor will lower the number of containers moved by shipping lines terminating at Baltic ports (for most of these lines, the only and last Baltic hub port is Gdańsk with its DCT terminal). This will consequently reduce the number of containers shipped by feeder services in the hub – target port connection. However, it is estimated that these changes will not assume a considerable size due to OBOR's limited throughput. In theory, the throughput of the Transsiberian Railway at present is 1.5–1.8 million TEU, while in practice it is no greater than 1 million TEU and, as such, accounts only for 1/8 of the annual increase in the container volume traded worldwide. A possible shortage of 1 million TEU would represent a significant loss for the Baltic Sea ports. It should be noted, however, that this route, which has an eminently latitudinal orientation, mainly services central and western Europe, not northern Europe or Scandinavia.

Another example is the shift of cargo to the Baltic – Adriatic corridor. This refers to unitized cargo, mainly semi-trailers, not necessarily containers. Here, we can expect bidirectional changes. One of them is, of course, the withdrawal of some types of cargo from maritime routes and onto railways. However, the other will have the effect of activating longitudinally oriented liner traffic between the ports of Sweden and Germany/Poland, with cargo bound for destinations in the south. At risk, here are the routes connecting the Baltic Sea with Mediterranean ports which will be severely affected by the competition from the already operating railway corridor.

Alternative transport corridors are designed for cargo and, in that sense, they have no impact on passenger shipping. As a result, there is no change to report in that area.

As we survey the areas of impact, we can note that no such impact is exercised on alternative corridors by either the Baltic fleet, the technical parameters of its ships and auxiliary vessels, off-shoring or sea port activity. A regressive trend will only occur in terms of market size. As usage increases of alternative corridors operating cargo traffic from / to BSR countries, a corresponding slump will be seen in the volumes travelling by sea. However, no overall market shrinkage will ensue thanks to annual increases in the cargo volume handled in that region.

A positive (progressive) correlation with the increased usage of alternative transport corridors will be represented by improvements in the quality of shipping services offered by ship owners as a way to discourage cargo operators from leaving for a different transport chain. Perishable freights are probably a lost cause, as they naturally gravitate towards air-borne or rail transport. The rest will be fair game for competitive efforts.

2. Changes in selected maritime economy areas

2.1. Changes in ship & fleet characteristics

According to UCTAD Statistics world's merchant fleet in 2017 reached level 93 000 unique vessels [UNCTAD, 2017]. Which means that it is 11% growth during last seven years. In the same time world's fleet DWT increased by almost a half and levelled at 1 861 852 thousand tones . It means that ship-owner companies continue their strategy to order and build bigger units. Of course, creating new vessels portfolio for ship-owners is permanently liked with nearest business environment which includes:

– shippers/customers,
– market and global economy,
– carriers and competitors,
– terminal operators,
– port authorities,
– technology.

This strategy is clearly visible in the range of container ships. In this vessel category DWT increased during last seven years by 45% when vessel quantity only by 4%. Also container vessels are most numerous in very large vessel category according to Equasis statistics. In 2015 almost 30% of very large vessels belong to category container ship. Similar percentage of very large ships belongs to tankers and dry bulk carriers. Rapid growth of containerships started right after breaching measurements of Panamax class vessels in early 90's. By 1996, full Post Panamax containerships were introduced with capacities reaching 6,600 TEUs. The first Post Panamax ship classes where not much longer than the Panamax class, but wider (40m when 32m width is standard for Panamax) making them more efficient. A ship above the panamax size required a substantial amount of cargo to be used profitably along a service loop and by the late 1990s the rapid growth of global trade made such a ship class a marketable proposition. Once the panamax threshold was breached, ship size quickly increased with capacities reaching 8,000 TEUs (Post Panamax II; "Sovereign Class"). Post Panamax containerships triggered an infrastructure challenge for many ports since require deeper drafts (at least 13 feet of draft) and highly efficient, but costly, STS cranes having wider reaches. Draft constraints became a factor placing pressures on ports to dredge to accommodate post Panamax containerships.

Rapid growth of markets and Asia-Europe trade development was a factor to project and build new generation of containerships. In 2006 Maersk Line launched 3rd generation of Panamax vessel with their Emma class vessels and set a new benchmark for building containerships. Emma class vessels had approx. 400 m LOA, 49m beam and 15,5m draft with total capacity of 12 000 TEU. Further development of technology led the market to introduce new vessels with bigger capacity. In 2013 Maersk line released 18 000 TEU vessel (Triple E-class) and started kind of arms race between container lines. One year later CSCL breached the level of 19 000 TEU with its four ocean class vessels. In 2017 shipping lines breached another level and released over 20 000 TEU vessels (MOL Triumph, Madrid Maersk, OOCL Hong Kong).

All these vessels have similar measurements which do not exceed 400m LOA and 15,5m draft so now we can say about kind of standard set by Maersk Line. Increasing TEU capacity is connected only with construction details like shape of vessel body or engine position along vessel. Building new Panama Canal in 2014 set a new trend in building container vessels called new Panamax class. This kind of vessels has 366 meters LOA and 49 m beam with approx. 12.5 TEU capacity and operates mainly between Europe and West coast of South America but also Transpacific lines .

Currently there aren't any vessel in ship-owner's orderbook which exceed above max parameters. Main reasons are closely connected with business environment. Ship-owners arms race caused essential oversupply of free space on Europe-Asia lines which led market to huge rates plummet in 2016 and bankruptcy of Hanjin Shipping which was kind of milestone in containerisation history. Container terminals and port authorities conducted huge investment to prepare infra- and suprastructure to service new very large containerships. New standard means for them necessity to conduct another upgrades to keep fast and safe service of containerships.

2.2. Baltic shipping density increase

The Baltic Sea is highly diversified (vessels entering yearly, calling 295,000 times to sea ports) both in terms of ship types operating within its waters, ports and national economies found along its shores. This diversity prevents a uniform, general characterization of the entire region. However, a survey of statistical data and historical records from AIS allows pointing out and describing a number of trends which make it easier to elaborate a cohesive development strategy for the Baltic Sea region.

Baltic shipping is dominated by general cargo vessels with an average number of 3,800 vessels performing 21.9 million NM IN 2.9 million hours and port calls exceeding 43,000. The available statistical data prevent the number of port calls from being precisely broken down by vessel type, i.e. ro-ro and con-ro ships following the intra-Baltic lines – for example, the Gulf of Finland – Germany axis. In terms of the number of calls at Baltic ports, the most important group is represented

by passenger/passenger-and-cargo vessels (ro-pax) making more than 136,000 port calls annually, performing 9.7 million NM in 1.4 million hours. This is due to the very expanded sipping lines network on the Baltic Sea, especially for ferries. Besides the above-mentioned ships, another type of vessel with regular operations on Baltic waters is represented by cruisers, calling at ports 9,000 times yearly, with pronounced seasonal traffic peaks in the second and fourth quarters [Helcom, 2017].

These figures are reflected in the AIS records of 2016 [HELCOM, 2017, see fig. 2], showing an increased traffic rate within the Baltic Sea. The Danish straits were crossed in 2013 by around 8,000 vessels, of which 4,000 were cargo (dry bulk, ro-ro, and container) carriers and 1,500 were tankers. Nearly half of these cargo carriers travel as far as the Gulf of Finland, while the figure for tankers stands at a much higher 70%. Around 30% of cargo ships leaving ports in the Danish straits follow the Polish coastline, heading for ports in Gdańsk, Gdynia and Kaliningrad. The remaining percentage of cargo ships are bound for the Baltic states, i.e. Latvia, Lithuania and Estonia, as well as the Gulf of Bothnia.

Figure 2. Baltic Sea shipping traffic intensity in 2016

Source: [HELCOM, 2017].

Passenger and ro-pax traffic is limited to a large number of crossings along the lines of Finland-Estonia, Finland-Sweden, Germany/Denmark/Świnoujście-Sweden. Short distances between these ports translate into heavy traffic generated by this vessel type. A survey of traffic produced by this vessel type shows a sharp spike in passenger movement in the central Baltic Sea area, including along the line of Gdynia–Karlskrona. As for ports, the highest number of calls is recorded by locations operating ferry services provided by passenger/passenger-and-cargo vessels.

2.3. Changes in the technical standards of the fleet relevant for environmental protection

In technical standards follow from numerous environmental and shipping safety regulations. These standards are being and will be constantly raised to minimize the risk of disasters or, where they do happen, mitigate their effects on human life and natural environment.

Therefore, these changes have quite a considerable impact on the technical parameters and equipment of ships as well as crew training, designed to improve the carriage services that they provide. It is open to doubt whether standards impose market restrictions. It seems that competition between ship owners does not generate such changes, because even if one of them goes out of business through failure to comply with the new requirements, he will be replaced by another, who is more equal to the challenge in a financial or technical sense. Therefore, this area should be considered unaffected by changes in standards.

Table 1. An overview of future environmental regulations and standards for the maritime industry

2017	2018	2019	2020	Later on
Cargo liquefaction (IMSBC Code amendment)	EU CO2 monitoring, reporting and verification (MRV)	Future ECAS	EEDI II	Global SOx limits
Polar Code	Low Sulphur Availability Review		0,5% Global Sox Limit	EEDI III
			Operational requirement on CO2, Energy Efficiency Operational Index (EEQI)	

Source: [University of Antwerp, 2015].

The changes affect not only shipping itself but also port operations, auxiliary services extended to shipping entities, off-shoring and maritime tourism. A positive correlation is visible everywhere.

A negative correlation emerges only in the case of spatial restrictions on some maritime areas, as some of the regulations impose generic, directional or technological limitations on the shipping sector.

2.4. Baltic ports development

That interdependence between sea ports and shipping is bidirectional, because ports, in seeking to adapt to new requirements exacted by the ship building industry, lay down certain limits, e.g. maximum draught or length on deck (LOA), which cannot be exceeded.

An enduring phenomenon is generally visible, whereby port investments anticipate changes and new trends on the shipping market. This is related to the basic nature of transport – supply comes before demand.

In response to market demand, ships are getting larger. This rising trend might force the concentration of cargo in bigger ports which have better chance of financing port infrastructure. Small and medium sized ports will not be able to handle larger ships, which in a long term might stimulate the concentration of cargo in bigger ports even further. This may push the later ports to pursue cooperation with larger ports in order to achieve synergy between them. Making a local or regional alliances as well as mergers of small ship-owners are also plausible scenarios in the future [Liuhto, 2016].

Expansion investments related to sea ports comprise a broad spectrum of efforts which can be classified according to their scope, namely fundamental projects (e.g. construction of new sea ports), minor upgrades of harbour infrastructure or equipment additions at terminals. This publication focuses on the largest projects implemented or planned in Baltic sea ports. Separate treatment has been given to one of the more interesting developments at sea ports, i.e. the construction of LNG terminals. This type of investment involves actions aimed at both the diversification of energy sources (import terminals) and the development of alternative drive systems for sea-going vessels powered by LNG (terminals/bunker stations). The impulse for the development of LNG bunker terminals was provided by restrictions imposed on sulphur content in marine fuel in the SECA area as of 2015.

An important direction in the development of sea ports is represented by the creation of logistical centres and industrial parks in the port hinterlands. This type of initiative is aimed to make port services more attractive through providing comprehensive logistics and, as a result, creating additional load weight, contributing to extra added value from the port.

Priority efforts seem to be directed towards developing potential for servicing containers and ro-ro ferry traffic as a response to the needs present in the Baltic Sea area. Importantly, investments related to container terminals usually

envision the construction of deep-water handling stations, pointing to ambitions for handling ocean traffic. An important factor determining the future potential for development of sea ports in the Baltic area is represented by market change forced by the implementation of the so-called sulphur directive. Ports wishing to remain competitive will have to offer carrier companies access to alternative fuels. Therefore, they have stepped up efforts to expand LNG terminals and bunker stations. Another important expansion effort in ports and their surroundings is also represented by industrial parks and logistical centres opened to diversify the services offered by ports and, at the same time, to activate regional economies. As a consequence, ports are transforming into multimodal logistical platforms where, besides cargo handling, a number of actions are being undertaken in relation to load weight and means of transport. This helps strengthen their position within the supply chain and provide extra added value. This aspect is important, because it is supply chains these days, not individual ports, which are the key level of competition. Those facilities will become market leaders which can offer the most advantageous logistical solutions including sea transport, cargo re-loading, logistical operations as well as efficient overland transport to destinations. The conclusion is that development understood as creating new infrastructural facilities is just as important as ensuring an efficient transport process and establishing good business relations for ports.

Conclussions

Many different trends and factors are moving Baltic shipping busieness foreward. In this paper were listed most important of them and some of them were analysed in the maritime spatial planning context.

But, for policy-makres and decision-makres there is one, crucial conclusion coming form the analysis: **the shipping business in the Baltic Sea Region will increase in next years** due to following reasons:

- economic growth and globalization,
- increasing demand for shipping services,
- growing preasure on efficiency and environmental friendly shipping,
- technology development enabling progress in shipbuilding.

This increase will be observe in market dimensions (by gowing number of shipping lines, ship voyages and port calls), as well as in technical standards of used ships (better & greener). This will surely have an impact on spatial use of the Baltic Sea and, due to the MSP Directive, should be taken into account by the planning process.

Bibliography

Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning, Official Journal of the EU, No. L 257/135, 28/08/2014.

ECORYS, 2016, *Draft Scoping Paper. Shipping. Developing an Impplementation Strategy for the Sustainable Blue Growth Agenda for the BSR*, ECORYS Netherlands.

European Environmental Agency, 2017, *Mapping Europe's environmental future: understanding the impacts of global megatrends at the national level*, Luxembourg.

Future scenarios towards 2030 for deep sea shipping, Harvik/Norway, (2013), Report DNV No. 2013-0394/16SEPL-13.

HELCOM, 2017, AIS Project, Helsinki.

HELCOM, 2017, Maritime Assessement. Maritime activities in the Baltic Sea, report of HELCOM, Helsinki.

Kruk-Dowgiałło L, Opioła R., Michałek-Pogorzelska M., 2011, *Prognoza oddziaływania na środowisko pilotażowego projektu planu zagospodarowania przestrzennego zachodniej części Zatoki Gdańskiej*, Gdańsk, Wydawnictwa Wewnętrzne Instytutu Morskiego w Gdańsku Nr 6603.

Liuhto K. (ed.), 2016, *Maritime cluster in the Baltic Sea Region and beyond*, Turku, No. 1, Centrum Balticum.

Madjidian J., Björk S., Nilsson A., Halén T., 2013, *CLEANSHIP – final project report*. CLEANSHIP Project Report. Interes sources: http://www.cleanship-project.eu/.

Mapping shipping intensity and routes in the Baltic Sea, Swedish Institute for the Marine Environment, 2014, Gothenburg, Sweden, Havsmiljöinstitutet Report 2014:5.

UNCTAD, *World merchant fleet.* New York: 1980-2017, http://unctadstat.unctad.org/.

University of Antwerp, 2015, Study on the Analysis and Evolution of International and EU Shipping. Final Report. Zoetmeer.

TRENDY W ROZWOJU ŻEGLUGI BAŁTYCKIEJ W ASPEKCIE MORSKIEGO PLANOWANIA PRZESTRZENNEGO

STRESZCZENIE

Głównym celem artykułu jest wytypowanie, scharakteryzowanie oraz przeanalizowanie najważniejszych trendów oraz obszarów funkcjonowania i rozwoju bałtyckiego rynku usług żeglugowych, które mają istotny wpływ na proces kształtowania morskiego planowania przestrzennego na Bałtyku, co wynika z przyjętej przed kilku laty Dyrektywy MSP 2014/89/EU (planowania przestrzennego obszarów morskich). Obszary te podzielono na dwie główne grupy: zewnętrzne, tj. niezależne od samej żeglugi morskiej, oraz wewnętrznej, czyli te, które stanowiąc element funkcjonowania żeglugi, w istotny sposób wpływają na dalszy jej rozwój.

Niniejszy artykuł stanowić ma element przygotowań do wdrożenia morskich planów przestrzennych na Bałtyku zarówno dla polskiej administracji morskiej, jak i międzynarodowego procesu współpracy przy tworzeniu tych planów dla poszczególnych państw Re-

gionu Morza Bałtyckiego. Przedstawione w tym artykule trendy i obszary mają kluczowe znaczenie dla prognozowania przyszłego rozwoju żeglugi na Bałtyku, a co za tym idzie, odpowiedniego przygotowania założeń do przedmiotowych planów przestrzennych.

Słowa kluczowe: Dyrektywa MSP, morskie planowanie przestrzenne, żegluga bałtycka, transport morski, porty morskie.