

# Growth perspectives for the Europe's shipbuilding industry in the context of world economy trends and competition from Asian shipyards

Perspektywy rozwoju przemysłu stoczniowego w Europie i w Polsce w świetle prognoz rozwoju gospodarki światowej i konkurencji stoczni azjatyckich

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Article history: Received: 07.11.2018 Accepted: 17.12.2018 Published: 18.12.2018

**Abstract:** This paper aims to analyze the Polish as well as the European commercial shipbuilding industry in the context of Asian shipyards' competition, particularly its growth, trend, and future forecast. Shipbuilding growth has been analyzed based on data concerning the shipbuilding market segment, countries share in orderbooks, governmental policies etc. The first part contains a brief analysis of the main trends in global shipbuilding that have an impact on the shipbuilding environment in Europe. The second part highlights European aspects of shipbuilding in the context of the domination of Asian shipbuilders. The key factors that drive the growth of the shipbuilding market have also been considered. The third part examines the prerequisites of the shipbuilding sector's future development in the Baltic Sea basin and in particular in Poland. It is revealed that the shipbuilding industry in Poland and the Baltic Sea basin has limited opportunities for significant expansion. Many formerly renowned shipyards concentrate their current activity on supplying hulls and blocks to the main producers of passenger ships or offshore units. As a highly capital-intensive industry, the shipbuilding sector needs strong governmental support and political stability in order to remain on the market and tackle the competition of Asian shipbuilding giants.

**Keywords:** shipbuilding industry, overcapacity, orderbook, new orders, cargo carrying ships, offshore market, cruise sector

**Streszczenie:** W niniejszym artykule przedstawiono sytuację i możliwości rozwoju przemysłu okrętowego w Europie i w Polsce, szczególnie tendencje, uwarunkowania i przewidywane kierunki ekspansji w świetle konkurencji stoczni azjatyckich. W artykule wykorzystano materiały źródłowe i statystyki zawierające dane do 2017 r. oraz prace i badania prowadzone w Instytucie Morskim w Gdańsku dotyczące krajowej i międzynarodowej gospodarki morskiej obejmującej także przemysł okrętowy. W pierwszej części przedstawiono analizę ważniejszych trendów rozwojowych w światowym budownictwie okrętowym kształtujących warunki działania sektora stoczniowego w Europie. Część druga naświetla sytuację w europejskim przemyśle stoczniowym w kontekście dominacji stoczni azjatyckich. Uwzględnione zostały także ważniejsze czynniki kształtujące rynek stoczniowy. W trzeciej części omówiono uwarunkowania dalszego rozwoju i funkcjonowania przemysłu stoczniowego w rejonie Morza Bałtyckiego i w Polsce. Większość znanych wcześniej stoczni opiera swoją produkcję na dostawach kadłubów i bloków dla większych stoczni skoncentrowanych na budowie statków pasażerskich i jednostek dla górnictwa morskiego. Jako wysoko kapitałochłonna dziedzina przemysłu przemysł stoczniowy potrzebuje wsparcia ze strony rządu oraz stabilności polityki gospodarczej, aby utrzymać się na rynku i stawić czoła konkurencji ze strony stoczniowych potentatów. Z przeprowadzonej analizy wynika jasno, że przemysł stoczniowy w Polsce i stoczniach nadbałtyckich ma niewielkie możliwości aktywizacji działalności.

**Słowa kluczowe:** przemysł stoczniowy, nadpodaż, portfel zamówień, nowe zamówienia, statki towarowe, rynek offshore, sektor wycieczkowców

## INTRODUCTION

This is an analytical research paper based on data collected during the author's surveys on maritime economy and maritime statistics conducted for several years in the Maritime Institute in Gdansk. The survey involves data and statistics available until 2017 and is focused on the national and world maritime economy, including the shipbuilding sector. The main sources of information concerning the shipbuilding industry in Poland as well as in Europe were publications of IHS/Fairplay and the Association of Polish Maritime Industries as well as portals or websites focused on issues related to the maritime economy. CSO publications (ex. Maritime Economy Yearbooks) as well as analytical and statistical studies carried out at Maritime Institute in Gdansk have been examined.

Shipbuilding is considered to be one of the most strategic, oldest, most open and highly competitive markets in the world [5]. Recently, the shipbuilding industry has become more global due to the increasing globalization of demand for worldwide transport of raw materials, components or finished products across waterways.

Shipbuilding construction is highly concentrated geographically. Most of the global ship production today is concentrated in Asian countries such as China, Japan and South Korea, though large shipyards also exist in Europe and some other countries (ex. Brazil, Vietnam, Philippines). Asia prevails in the shipbuilding of cargo-carrying vessels. The other shipbuilding countries focus on passenger ships and specialized ships such as offshore vessels. The share of South Korea, China and Japan accounts for more than 85% of the global production. Only the market for cruise ships, which is dominated by EU yards, shows a higher degree of concentration.

Despite some improvement in ordering, 2017 was another difficult year for the shipbuilding industry, with contracting remaining below the trend and most shipyards continuing to struggle for survival on the market. However, some sectors (i.e., passenger/cruise or ro-ro sector were well above the average trends) saw improved contracting activity, while deliveries remained relatively firm.

The economic and financial situation of the shipbuilding industry is losing its stability due to the continuing market imbalance driven by the impact of the continuing financial crisis and decline of vessel prices.

The overcapacity issues and low freight rates in many major shipping segments have consequently brought the contracting of new vessels to stagnation and the shipbuilding industry has received the lowest annual order intake in 20 years. In the shipbuilding industry, most of the earlier new orders are currently delivered and nearly no new orders are made.

The significance of state support in the shipping industry is probably most pronounced in shipbuilding, where vessel con-

struction has become strategic at a national level for Japan in the 1970s and 1980s, for South Korea in the 1980s and 1990s, and for China in the 2000s [1]. Some countries turn to protectionist practices in order to support the national shipbuilding industry and several banks are ready to issue loans for newbuildings regardless of the risk of supporting sometimes speculative investments.

Many segments have been undergoing an extensive fleet renewal in the recent years. As a result, there are fewer older vessels left in the fleet to scrap if it becomes necessary to adjust the supply of vessels. The total orderbook has been at its lowest level for more than a decade and is set to continue decreasing in 2018 [4]. The shipping industry has encountered stricter environmental requirements, some of which apply globally, others regionally. The International Maritime Organization (IMO) is the global regulator of shipping. However, the implementation of many IMO regulations has its regional specificities. Such regional implementation as well as new initiatives on clean and safe shipping are discussed within the HELCOM MARITIME group.<sup>1</sup>

The problem of overcapacity may be slightly mitigated due to the possible effects of the recently ratified ballast water management convention and the new sulphur limits, which could create a need for replacement and premature scrapping or for retrofitting of some older vessels in the deployed fleet. Also, environmental requirements may partially impact the prices of older vessels. Since it might not be financially viable to make the required investments to install new technology in older vessels, thus scrapping might pave the way for increasing demand for newbuildings [3].

## WORLD SHIPBUILDING MARKET

### General overview

The global economic and political crisis experienced at the end of the past decade has hit the higher shipbuilding industry more severely. Despite some improvement in ordering, 2017 was another difficult year for the shipbuilding industry, with new orders remaining well below the trend and most shipyards continuing to struggle for survival. Some sectors have seen improved in the contracting activity, while deliveries have remained relatively firm [12]. Massive excess supply of vessels in the global shipbuilding industry in the recent years has cumulated over the last ten years. The oversupply was equal to around one quarter of the world fleet in 2015.

<sup>1</sup> The Baltic Sea area has been designated as a special area in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) Annexes I (oil), IV (sewage), V (garbage), and VI (for Sulphur).

In addition to IMO conventions, there are also certain shipping measures adopted by the Contracting Parties as part of the 1992 Helsinki Convention. These include the prohibition of incineration of ship-generated wastes in the Territorial Seas of the Baltic Sea States as well as a general ban on dumping and incineration of other wastes, not incidental to or derived from the normal operation of ships, in the entire Baltic Sea area (<http://www.helcom.fi>).

Tab. I. World shipbuilding market by major cargo carrying ship types as of December 31.

YEAR	TOTAL	TANKERS	BULK CARRIERS	GENERAL CARGO SHIPS	CONTAINER SHIPS	CHEMICAL CARRIERS	GAS TANKERS	RO-RO CARGO
Existing fleet								
2014	1,665	489.4	718.7	76.9	228.4	92.2	49.7	19.0
2015	1,718	449.3	735.6	77.2	244.8	100.0	54.5	19.6
2016	1,772	471.6	755.3	76.5	245.2	106.4	59.9	19.6
Ships completed								
2014	106.6	17.8	59.6	3.5	16.4	4.5	2.5	0.7
2015	94.2	11.8	47.4	1.9	18.8	7.6	5.0	0.9
2016	99.1	26.3	46.4	1.7	10.2	6.9	13.0	0.5
Orderbook								
2014	301.1	55.1	159.3	5.3	39.5	17.0	19.1	1.9
2015	274.8	81.4	108.9	4.3	42.0	16.0	18.0	1.9
2016	199.1	61.4	69.2	3.7	35.8	11.6	13.0	1.6
New orders								
2014	144.1	21.4	79.3	2.3	21.3	11.7	6.5	0.9
2015	104.2	42.7	22.7	1.4	24.1	6.6	4.8	0.9
2016	23.7	7.2	10.1	0.4	3.0	1.0	0.7	0.2

Source: [5]. Source of data: [15].

The shipbuilding sector is currently facing substantial overcapacity of the world shipyards, whilst, despite reduced orders on the shipping market, there are still too many owners ordering an excessive quantity of ships regardless of too many averaged and substandard ships still being deployed.

The drop of oil prices has resulted in the cancellation or delay of many contracts for the offshore industry. In addition, the oversupply of bulk carriers and container vessels on the shipping markets has contributed to a reduced number of new orders.

The struggle caused by reduced orders and decreasing prices of new ships is affecting all shipbuilding regions. The number of active shipyards worldwide has decreased from 1,140 in 2010 to 630 in 2016 and in the near future, more shipyards will close or suspend operation. Many shipyards may be left without orders and forced to close or change their profile of production [1]. Currently, there are around 340 yards with orders covering less than one year of delivery schedule. Considering that the orderbook is filled up with postponed orders, shipyards are not receiving any new capital or liquidity, as final payments are delayed. Therefore, orders will continue to be postponed, and consequently, the already financially troubled yards will remain under pressure [4].

All the shipbuilding countries in the Far East are feeling the effects of the crisis in the industry. In the dry bulk shipbuilding market shipowners have responded to weak market rates by cutting back on newbuilding orders. South Korea's progression to container ships, gas carriers, and modern oil and gas drill ships and processing facilities has been suspended by the collapse in ordering since September 2014. Shipbuilding has become an increasingly important tool for China's economic and political activity as a way of increasing its global footprint,

particularly due to state programs introduced since 2009. However, China's dependence on state subsidies to dump competitors' prices has diminished [14].

At the end of 2017, the world commercial fleet consisted of 94,171 vessels, with a combined tonnage of 1.92 billion DWT, which was a 3.15% increase against 2016. The estimated market value of the world fleet increased by 7.8% thanks to the slightly improved market fundamentals and investments in ships applying the latest technologies and complying with the current and expected future regulations [14]. Detailed information about the world shipbuilding market in terms of DWT is shown in Table 1.

Considering the relatively high global GDP growth and expected recovery in trade volumes, the future growth of demand for shipping is expected to grow by 3.4% in 2018, with differences among ship types. Although shipbuilding demand is not exclusively related to seaborne trade volumes generating demand for shipping, these forecasts indicate some directions of ship demand to be considered [13]. Prospects for the short and medium term are rather positive. Global GDP is expected to grow by more than 3% over the 2018–2023 period. In line with the projected economic growth and based on the income elasticity of seaborne trade estimated for the 2000–2017 period, world seaborne trade volumes are expected to expand by 4% in 2018 with an annual growth of 3.8% during 2018–2023 [14]. The industry needs to adjust active shipyards' capacity for lower future demand in order to balance the declining orderbook, increase newbuilding prices and avert the growing liquidity crisis [4].

The global shipbuilding industry faces historically low capacity utilization rates of yards. The capacity utilization in 2015 was about 57% down compared to its peak of 85% in 2008.

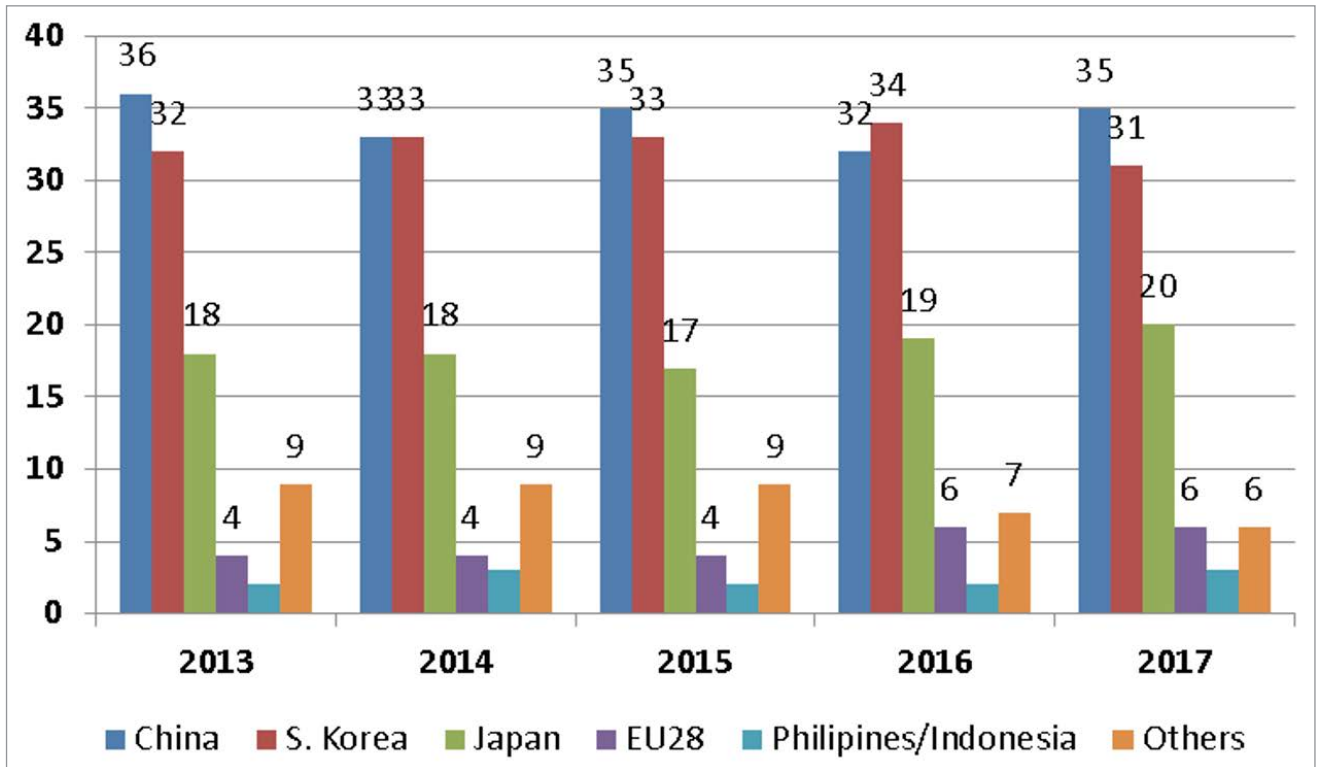


Fig. 1. Percentage share of world shipyards deliveries in CGT by country. Source: [16].

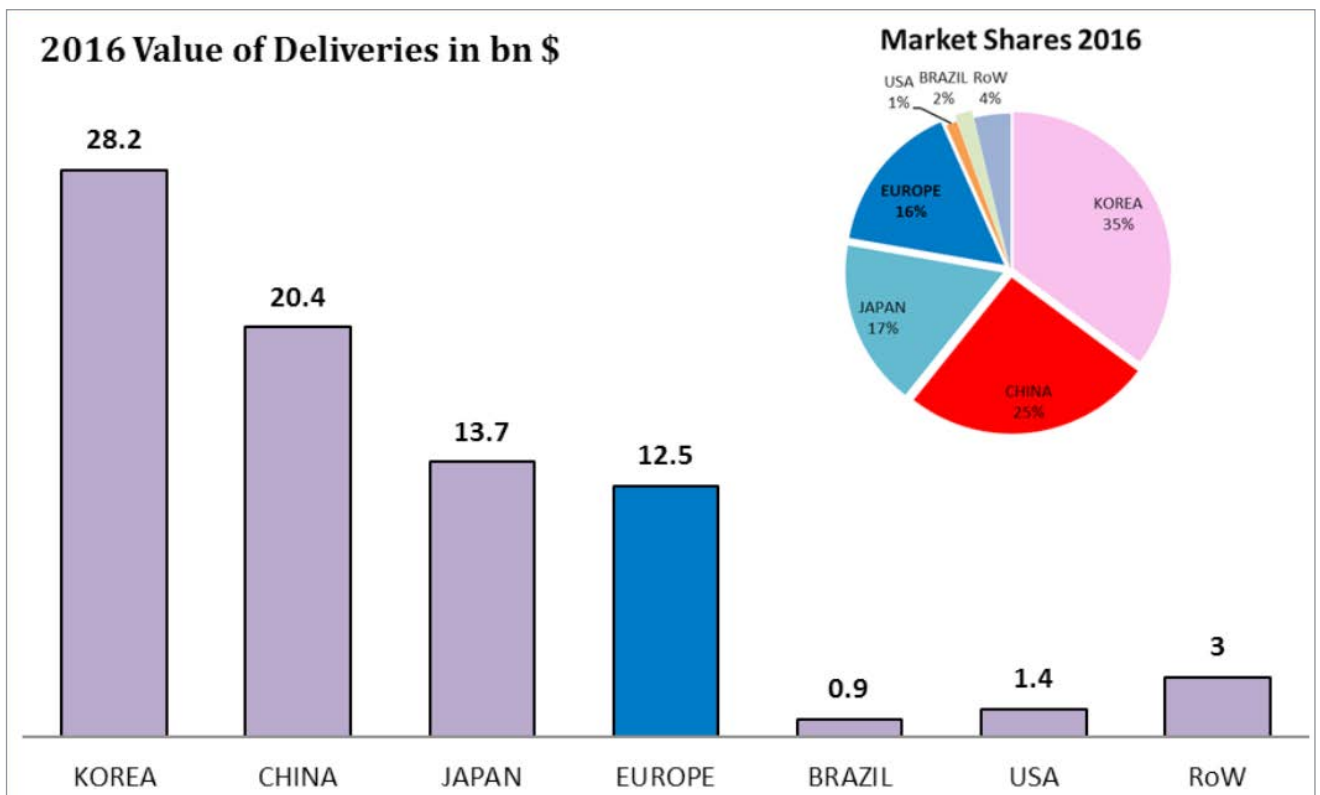


Fig. 2. Value of deliveries by main shipbuilding areas in 2016. Source: [13].

on the shipbuilding market may reach some balance only by 2030, when the main supply will be at the level of 2011.

### World shipyards deliveries

Global delivery of ships amounted to 65 million GT in 2017, which was a 5.2% increase against the previous year. In addition, 23 million GT were scrapped in 2017, leading to a net growth in the world fleet of 42 million GT, equivalent to 3.3% a growth rate. The size of new delivered ships continued to be larger than the existing fleet but the growth rate of the vessel number was therefore lower, at 1%. In terms of CGT (Compensated Gross Tons)<sup>2</sup> the world shipyards delivered 2,351 vessels of a combined 34,597 thousand CGT in 2017. Again, the number of deliveries substantially surpassed the order intake, continuing the downward trend of the global orderbook [14].

Out of the total world shipyards deliveries in 2017, in terms of GT 95% came from Asian shipyards and only 2.4 million GT accounting for 3.6% from Europe. China is the largest shipbuilding economy, followed by Korea, Japan, and the European Union. Global deliveries have remained at similar levels in the last 3 years. In terms of CGT, in 2017 the three East Asian economies China, Korea and Japan represented 86% of all CGT delivered (Fig. 1). South Korea continued to dominate the sectors of containers and tankers with a share of 43% and 45%, respectively and 32% of container ships and 30% of tankers were made in China. Japan followed with shares of 12% and 14% in the respective segments. The EU continues to dominate the market for cruise ships and passenger vessels by a wide margin, with CGT deliveries in 2017 totaling 61%.

The value of shipbuilding deliveries in 2016 is illustrated in Fig. 2.

The share in the total value of ships delivered in 2017 year is lower by 28% in the case of China and 17% for Japan. Korea has delivered 31% of all vessels in terms of CGT, but 35% in terms of value. European shipyards accounted for 7% of the world deliveries in CGT, but it represented 13% in terms of value.

### New orders

In 2016, global new orders were the lowest in the past 30 years. In 2017, contracting increased reaching a volume of 20.2 million CGT at the end of 2017, which was almost double of the 2016 ordering levels. However, the global ordering remains at a very low level due to the fact that the increase occurred from a very low level and orders were still below the 2015 level [14]. The drop in demand of cargo carriers in China, Korea and Japan is reflected in the new orders' intake. New orders in 2016 accounted for 798 vessels totaling 10.68 million CGT, while 2,273 vessels were ordered in 2015 totaling 39.64 million CGT. Due to such a sharp decline in new orders, the global orderbook contained 5,065 vessels and 89.2 million CGT [16]. In 2017, South Korean shipyards received orders for 17.6 million GT, Chinese 13.5 million and European 3.3 million GT, which in

<sup>2</sup> Ship's capacity measure

relation to 2016 was an increase by 300%, 85% and by 34% accordingly. In the three main Asian shipbuilding countries, new orders account for 13.8 billion dollars altogether. In the future the situation will continue.

The number of inactive shipyards is growing. This is affecting the production ability of the shipbuilding industry. New orders remained below deliveries in 2016 and through a greater part of 2017, however recently, new orders have slightly increased, mainly due to revived orders for bulk carriers [16]. As of April 2016, scheduled orders for 2017 were capable of employing only 69% of the current active newbuilding capacity and it is assumed that the usual number of orders has been either postponed or cancelled, global yard utilization could have fallen below 50% in 2017 [4]. New orders for cargo carriers decreased by more than 80%.

In new orders intake, China remains the main contractor with 215 vessels accounting for 3.3 million CGT, followed by Europe with 155 vessels of 2.7 million CGT, Korea with 2 million CGT and Japan with 152 vessels of 1.5 million CGT. This indicates that the type of vessels ordered in Europe are of a higher complexity and value.

The tonnage on order for all main vessel types further decreased in 2017. Investment in the markets of cargo carriers has been the lowest over the last 20 years, accounting for 4.5 billion \$ for tankers, 3.4 billion \$ for bulkers and 2.1 billion \$ for containerships. In 2016 investment in cruise-ships accounted for 15.6 billion \$, 71% more than investment in the whole 2015. In terms of CGT, China leads the orderbook with 31.7 million CGT, followed by Korea 20.4 million CGT, Japan 19.2 million CGT and Europe 8.6 million CGT. The share of passenger ships accounted for 8.2% and offshore and ONCCV<sup>3</sup> 12.8%.

In terms of value of new orders in 2017, European shipyards have dominated the shipbuilding industry with orders estimated at 22 billion \$ in 2017, driven by the strong cruise ship market, ahead of China with 18 billion \$ and Korea with 16 billion \$. The total worth of orders received by Japan is 3.8 billion \$ [15]. Of the total 63.8 billion \$ in new contracts concluded in 2017, Europe's share is 34%, while for China, Korea and Japan the share is 28%, 25%, and 6%, respectively.

Despite the historically low orders for newbuildings in 2016, the shipyards of South Korea are still ahead of their foreign competitors. HHI, DSME and SHI<sup>4</sup> globally receive the largest number of contracts for newbuildings. HHI received a contract worth 660 million \$ from the Russian shipowner Sovcomflot for the construction of up to 12 tankers. Sovcomflot is the largest national shipowner in Russia, specialized in the transport of liquid fuels and LNG. The tankers being built in HHI shall be deployed in delivering Russian oil to importers. These new vessels will be chartered out to the Shell company. Also, the Rus-

<sup>3</sup> ONCCV – Other Non-Cargo Carrying Ships

<sup>4</sup> HHI – Hyundai Heavy Industries, DSME – Daewoo Shipbuilding and Marine Engineering, HHI – Hyundai Heavy Industries

sian shipyard Far Eastern Shipbuilding and Ship Repair Center is collaborating with HHI, aiming to develop designs for new ships in cooperation with a Korean company.

In 2018, estimated 1,400 vessels will be ordered, which is 1,000 fewer than in 2009 and the lowest in terms of DWT since the 1970s. The pace of ordering is expected to pick up in the second half of the year. A fair share of these orders consists of tugs, fishing vessels, bunker tankers, small passenger ships and small general cargo carriers, all of which require replacements. A fleet average 30-year replacement cycle needs 3,800 new ships per year to replace the withdrawals. The need for replacement is growing despite the remaining overcapacity in most shipping sectors [1]. The recently ratified ballast water management convention and the new sulphur limits shall create a need for replacement and premature scrapping or for retrofitting of some older vessels in the deployed fleet and might be helpful in mitigating the problem of overcapacity of the global fleet to some extent.

## ENVIRONMENTAL REQUIREMENTS

In the last couple of years, the shipping industry has encountered stricter environmental requirements, some of which apply globally, others regionally. In order to mitigate the negative effects of vessels on the environment, a number of regulations related to environmental protection has been introduced by governments and international organizations. The main regulations that are likely to influence future shipbuilding demand are:

1. The Ballast Water Treatment Convention (BWTC) – All vessels that operate beyond their domestic waters need to have a Ballast Water Management System installed by 2024 the latest. Retrofitting due to this regulation could amount to 20% to 50% of retrofitting capacity. As retrofitting can be rather expensive, owners of older vessels might opt to sell their ships for scrapping instead. The introduction of the BWTC could lead to an additional scrapping of 11 to 54 million CGT in the upcoming years [14].
2. The Energy Efficiency Design Index (EEDI) – All vessels constructed after the regulation entered into force on 1 January 2013 need to be compliant with the standard, which mandates an initial CO<sub>2</sub> reduction level by 10% compared to the baseline. Requirements are tightened every five years in order to stay ahead of technological improvements.
3. The Emission Control Areas (ECAs) – According to MARPOL Annex VI “Regulations for the Prevention of Air Pollution from Ships”, vessels operating within Emission Control Areas (ECAs) are subject to stricter emission limits [14].

The new Ballast Water Management Convention was ratified in 2016, and the upper limit for sulphur emissions from shipping is already set to take effect from 2020. These initiatives may have severe consequences for the industry, as for some

shipping companies it may be challenging to make the investments necessary to meet the increased requirements. Consequently, the environmental requirements may also partially impact prices of older vessels, because often it will not be financially viable to make the required investments to install new technology in older vessels [3].

Based on shipbuilding predictions made by IMO, the industry could become 75% more efficient in reducing CO<sub>2</sub> emissions by installing LNG/LPG-fueled engines and designing solar and wind-powered ships. The innovative LNG propulsion often entitles shipowners to claim government support for investment and some shipyards may also benefit from such a trend.

Within the German strategy to promote LNG as an alternative fuel for maritime transport, the government has introduced a 270 million Euro budget package for subsidies to German flagged ships covering up to 60% of the cost of conversion (depending on the size of the work) [14].

These initiatives may have severe consequences for the industry, as shipping companies with weaker balance sheets may find it challenging to make the investments necessary to meet the increased requirements. Consequently, environmental requirements may also partially impact prices of older vessels, because often it will not be financially viable to make the required investments to install new technology in older vessels [3]. The demand for new (and more environmentally friendly) ships could increase if regulations applied to the existing vessels and retrofitting might turn out to be unfeasible or costly, leading to increased scrapping of old ships.

## CHALLENGING COMPETITION FOR EUROPEAN SHIPBUILDING

### Key market development factors

The key factors driving growth of the shipbuilding market are GDP, global seaborne trade, improved economic growth, rising urbanization, fossil fuel price and increase in global steel production. Other trends and developments of this industry are green shipbuilding technology, automation in the industry, modular shipbuilding technique, advanced outfitting, ship launching airbag, LNG/LPG fueled engines and solar and wind powered ships. Albeit, the expansion of the shipbuilding industry can be affected by increased competition, environmental regulations, enhanced globalization and political and financial instability [5]. Far Eastern shipyards prevail in the number of dry docks, quays or slip-ways. The quality and technologies of products delivered by the main Asian shipyards seem to be sufficiently reliable considering that even orders for gas carrier, until recently considered the monopoly of European shipbuilding, have been overtaken by Asia. Chinese shipyards no longer limit their production to bulk carriers but also produce more advanced units like gas carriers, chemical carriers, offshore units, RoPax ferries (even for Stena Line). In the offshore sector, world shipyards have produced 400 ships

Tab. II. Electric field ALs at frequencies from 1 MHz to 10GHz\* [14].

SHIPYARD	GT ON ORDER	NUMBER OF SHIPS ON ORDER
Meyerwerft-Papenburg-Neptun-Turku (Germany/Finland)	4,449,566	28
Fincantieri (Italy)	3,047,826	29
STX France—Saint-Nazaire	1,786,500	11
Navantia (Spain)	495,632	6
Uljanik—3 MAJ (Croatia)	420,275	13
Vard (Romania/Italy)	167,054	17
Ferus Smit (Netherlands)	85,335	15

Source: [3]

in 2015 of which only 40 were built in Europe including barely one built in Poland. In 2016, out of around 1,000 offshore ships on order, only 3 were placed in Poland. The offshore market is decreasing mainly due to the low cost of oil and lack of competitive advantage of shipyards in Europe against Asian competitors. The European shipbuilding industry has hardly any competitive advantages over their Asian competitors, except some cultural differences and passenger ships construction. The orders for passenger ships consist nearly 80% of the orderbook. The world shipbuilding market is almost entirely based on free market principles. However, some countries are determined to place orders for ships in national shipyards in order to create internal demand. The existing national policies in China, South Korean and Japan linking such strategic sectors like shipping and shipbuilding are reflected in the orders of Asian shipowners, who place 90% of their new orders in shipyards of their own nationality. It is completely different in Europe, where most shipowners order their vessels in Asia, not just for cargo carriers but also for cheaper offshore vessels.

South Korea is planning extensive state subsidies for shipbuilders and carriers, despite that other shipbuilding countries (ex. Denmark) criticize state subsidies as a threat to the balance of the shipbuilding market and are determined to urge the OECD to review state subsidies to shipbuilders [16]. What is more, Japan questions Korean subsidies for national shipbuilders letting lenders finance unprofitable ship orders, aimed at ensuring survival of struggling shipbuilders [15].

European owners order most of their cargo carrying fleet in Asian shipyards, with the exception of a few small ones, which are built in European shipyards. On the other hand, complex high technology vessels such as cruise ships, ferries, fishing vessels, tugs and dredgers orders are placed on European shipyards. In the case of offshore vessels, the picture is mixed, with orders placed in all main shipbuilding countries [14]. The European maritime technology industry is the leading global region in terms of aggregated production value, calculated at 112.5 billion Euro [3].

### Deliveries and orders of European shipyards

The comparison between past deliveries and the current orderbook gives a first indication of the prospects of shipbuilding economies. The growth in demand for passenger ships

and ONCCV contrasts with the tough situation that some European companies are experiencing due to the decline in demand for offshore vessels and equipment.

European shipyards have maintained their world market share in 2017 at about 2%. After the increase between 2013 and 2015 from 2.7 million DWT to 5.8 million DWT, the European orderbook decreased in 2016 as well as in 2017 accounting for 4.2 million DWT, which was mainly due to the sale of the Daewoo Mangalia shipyard, the main European contributor in DWT deliveries. The number of European new orders fell from 90 ships in 2016 to 76 in 2017, but in terms of DWT, it rose from 0.8 million DWT to 1.3 million DWT. Russian shipyards, receiving around 0.65 million DWT of new orders, were the main contributors of orders. At the shipyard Zvezda substantial contracts were placed by Sovcomflot/Rosneft. The boost in newbuilding orders made by the cruise industry began in 2013. In 2017, a record number of 37 cruise ships was ordered. Three major shipbuilders: Meyerwerft, Fincantieri, and STX France, received orders for 20 units in total. Other major European yards such as Vard, Kleven and Ulstein in Norway, Barreras in Spain, De Hoop in the Netherlands and West Sea in Portugal managed to receive 11 orders. There were 29 cruise orders in 2016, 21 in 2015, 16 in 2014, 10 in 2013 and 4 in 2012. The orderbooks of the four major European cruise shipbuilders are filled up until 2025 [2].

But already in 2017, European shipyards were under the pressure of losing their fields of expertise, ferries and RoPax as several contracts were placed at Chinese yards: Stena's RoPax at AVIC Weihai, DFDS' ro-ro at Jinling, and Viking Line's ferry at Xiamen. Some other European companies might follow that instance, although the Flensburg and Visentini shipyards have managed to receive some key ferry contracts [2].

Russia has recently introduced a ban to local shipowners on the purchase of commercial ships from foreign shipyards. Russian companies will be forced to buy commercial ships for port operations and exploration work only from domestic shipbuilders. The ban on the purchase of foreign dry cargo ships and tankers follows the new amendments in the Code of Merchant Shipping. These have been introduced in order to accelerate the shipbuilding industry and increase the number of orders for national shipyards. So far, Russian shipowners have preferred to purchase tankers and dry cargo vessels from foreign shipyards. Most of the orders are located in South Korea, China, and Finland [15].

Tab. III. Electric field ALs at frequencies from 1 MHz to 10GHz\* [14].

COUNTRY	NO OF SHIPS	1000 CT	%	1000 CGT	%
World total:	5065	160522	100,0	89208	100,0
...Japan	915	37569	23,4	19276	21,6
...South Korea	514	40645	25,3	20488	23,0
...China	1893	62228	38,8	31781	35,6
...Europe:	464	8882	5,5	8645	9,7
Croatia	36	794	0,5	589	0,7
Finland	12	828	0,5	808	0,9
France	9	988	0,6	922	1,0
Germany	26	1732	1,1	1638	1,8
Italy	33	2090	1,3	2239	2,5
Netherlands	49	161	0,1	229	0,3
Poland	74	173	0,1	330	0,4
Romania	82	1109	0,7	871	1,0
Spain	64	771	0,5	566	0,6
Norway	35	165	0,1	300	0,3
Russia	45	325	0,2	366	0,4
Turkey	130	282	0,2	511	0,6

Source: [13].

The Russian shipbuilding industry has gained the lead position in 2017, going from the previous level of 0.2 million DWT to 1.1 million DWT thanks to large domestic orders including four Aframax tankers with LNG propulsion from Sovcomflot and ten Arctic shuttle tankers from Rosneft placed at the Russian state-owned shipyard Zvezda. The Spanish shipbuilding industry has retained its second position in 2017 thanks to the six Suezmax tankers ordered by Ibaizabal with Navantia Puerto Real to be delivered in 2018. Barreras has joined the cruise ship builders' sector with an order for a 300-passenger luxury cruise ship from Ritz Carlton. La Naval specializing in dredger and RoPax units has faced the threat of bankruptcy. Croatia was ranked third, despite the lack of orders in 2017 and current difficulties. The main shipbuilders in Croatia are [3]: Uljanik/3Maj, Trogir and Brodosplit (Table 2). Romania has lost its leading position in Europe – its orderbook stood at 0.3 million DWT at the end of 2017 compared to 1.5 million DWT at the end of 2016. This was the consequence of the lack of new orders at Daewoo Mangalia (DMHI) and the decision made by the parent DSME to sell its facilities as part of its own rescue strategy. But Romania still owns other shipyards, such as Constanta, Vard Tulcea, Vard Braila, and Damen Galatz.

Norwegian shipyards, which have lost a number of customers due to an offshore crisis, in 2017 have managed to capture 15 newbuilding orders out of 76 placed in Europe across 9 different shipyards.

In 2016, the European shipbuilding sector has performed better than most shipyards in other regions as the orders in niche segments such as ro-ro and cruise has been stronger than in previous years. Such a trend is expected to last in the coming years, with low ordering activity and continuous pressure on newbuild-

ing prices. Only European shipyards have a higher value of new orders than deliveries. European new contracts accounted 18 billion \$, 52% of the total value of global new orders.

In the coming years some significant transitions may be expected in many sectors of the shipping and shipbuilding industries [1]. The quality and technologies of products delivered by the main Asian shipyards seem to be sufficiently reliable, considering that even orders for gas carriers, until recently considered the monopoly of European shipbuilding, have been overtaken by Asia. Chinese shipyards are capable of producing more advanced floating units, like gas carriers, chemical carriers, offshore units, RoPax ferries. The European shipbuilding industry's competitive advantages over their Asian competitors, except passenger ships construction, is shrinking.

#### Orderbook of European shipyards

Compared to other regions, the European orderbook has remained the only one growing in 2016, despite the order intake being lower compared to 2015. In 2016, there were 155 vessels contracted accounting for 2.7 million CGT European new contracts have accounted 18 billion \$, which was 52% of the total value of global new orders, with new orders in the three main Asian shipbuilding countries accounting 13.8 billion US\$ altogether. The value of the European orderbook increased compared to 2015, mainly thanks to passenger ships and ONCCV, and its market share also increases to 19%, however, certain segments in Europe, in particular offshore, continue to face significant difficulties.

At the end of 2017, the aforementioned orderbook accounted 493 vessels with a value of 11.17 million CGT and a value of 64



billion \$, driven by the continued high demand in cruise newbuilding and sustained contracting in the ONCCV. While some specialized shipyards in Europe are benefiting from such a favorable situation, others continue to struggle due to persistent weak ordering in other markets, for example offshore. In 2016, the value of new orders of European shipyards totaled 22 billion \$, which was 35% of the total value of global new orders.

The European orderbook has been growing since 2012. There were 155 vessels contracted in 2016, accounting for 2.7 million CGT (see Table 3). The types of vessels ordered in Europe are of a higher complexity and value. In 2016, investment in cruise-ships accounted for 15.6 billion \$, which was 71% more than the investment in the whole 2015. In 2016, the segment of cruise ships and ferries was the only one with an increased orderbook, mainly thanks to the demand generated by the cruise ship market.

The forward cover, a measure used to determine how much work yards still have in their current orderbooks, has declined to comparatively low levels. While European shipyards have their forward cover reaching nearly five years, shipyards in other regions seem to be in a challenging situation with a shorter period of orderbook cover.

In the European orderbook, 62% of CGT are passenger ships, followed by offshore vessels and ONCCV. The orderbook value in 2016 increased against 2015, mainly thanks to passenger ships and ONCCV, and its market share has also increased to 19%. In 2016, passenger ships' share in the global orderbook was 8.2% and 12.8% was the share of offshore and ONCCV. Cruise ships are built only in a few shipyards in Europe, of which four are located in Germany. Their orderbook consists of 2.5 million GT, of which 90% are cruisers and mega yachts. In Finland and Italy, the share of these units accounts for over 95% of the orderbook [4].

The growth in demand for passenger ships and ONCCV contrasts with the tough situation that some European companies are experiencing due to the decline in demand for offshore vessels and equipment. European yards seem to be in a rather comfortable position with their forward cover reaching nearly five years. Despite these rather positive results, certain segments in Europe, in particular offshore, continue to face serious difficulties [14].

Consolidation of the cruise newbuilding sector and new entrants are changing the picture of the industry. Fincantieri and the French government concluded an agreement on the acquisition of the majority of the STX France share by the Italian shipbuilder. The French owner joined Fincantieri's global yard portfolio and thanks to that move Fincantieri became a major player in the cruise and naval shipbuilding business [14].

Some smaller European yards, determined to diversify their activities, are attempting to enter the cruise segment. However, Chinese shipyards have received several European orders

for ferries and began developing joint ventures to establish a domestic supply network in aiming at joining the cruise construction market [1].

Shipbuilders in the EU28 have recorded 4.9 years of forward cover. Shipyards prefer their forward cover to be above 24 months in order to have sufficient planning security. Europe has most of the orders that are due in 2021 and beyond [15].

The decline in the shipbuilding industry in Asia or other areas in the world does not necessarily generate increased shipyard production in Europe. The orderbook of shipyards in China still counts over 60 million GT, including, among others, 10 gas tankers LNG, 25 passenger/car ferries, including 6 for Swedish shipowners and 450 vessels for offshore and power industries. In the niche shipbuilding sectors, in which European yards have been unquestionable leaders so far, stronger competition from Asian shipbuilders is expected.

#### Future prospects for shipbuilding activity

Referring to the prospects for development in the shipbuilding industry, the key factors driving growth in the shipbuilding market are GDP, global seaborne trade, improved economic growth, rising urbanization, fuel price, and increase in global steel production, since there is a direct relationship between world GDP growth and shipbuilding growth. The growth of world GDP, seaborne trade and active fleet are expected to be steady in the next years, at least like in the previous couple of years. Despite some deterioration in the growth outlook for the global shipbuilding industry, the growth rates for the sector are expected to pick up in the next years. Growth will be driven largely by the Asia-Pacific region, but also Latin America and the Middle East. Long-term economic growth will have implications for the maritime sector, especially growth in demand for imports of commodities and finished goods. In consequence, the maritime sector will gain long-term growth opportunities for all commercial and particularly container ships. However, the expansion of the shipbuilding industry may be affected by increased competition, environmental regulations, enhanced globalization and political and financial volatility.

There is still a lot of space for the shipbuilding industry to grow in the next few years, especially in markets with a cost advantage and increasing domestic demand which attracts global capital. Shipbuilding is changing rapidly, taking advantage of highly advanced technologies, which aim to solve issues such as environmental pollution, rising fuel costs etc. The global shipbuilding industry will continue to be dominated by South-East Asia. The global shipbuilding market is expected to grow in the future due to increasing seaborne trade and economic growth, rising energy consumption, demand for eco-friendly ships and shipping services. The main trends of this market are growing market segments, significant consumption of steel, average age of global fleet, advancements in container shipping, rising demand for LNG fueled engine. All this will lead to a rising demand for new ships. The increasing global invest-

ment in oil and gas development will require more offshore oil and gas platforms and promote the development of offshore wind farm equipment and LNG-related equipment.

Especially in major markets like China, Japan and South Korea, there are strong reasons behind the growth of shipbuilding supported by their governments, national investment and substantial foreign investment due to lower labor costs and business friendly regulations as well as strong forward and backward linkage industries. In Europe, advantages and new opportunities for expansion in shipbuilding activity will also be explored and implemented, despite the rather limited domestic market. Since shipbuilding markets are experiencing fluctuations in stability, shipyards must explore different types of ship markets, rather than specific types of the ships in order to enable shipyards to switch to profitable types of shipbuilding to maintain a strong position in the global market. Shipbuilding countries in Europe must consider alternatives in order to compete with large shipyards and deep ports of the Asia-Pacific region. The environmental policy and a shift in international shipping power will continue to change the maritime industry. Advancement in technology is key to the development of the shipbuilding industry. The European shipbuilding industry should also reinforce its innovative capacity and foster demand for the resulting innovations. The shipbuilding industry will continue the process of consolidation, which has already been taking place in the recent years. The collapse of some shipyards will benefit competitors, including those from outside Europe. Nevertheless, governmental support and subsidy for the shipbuilding industry is necessary for growth and long-term development of the industry.

## PROSPECTS FOR THE BALTIC REGION AND THE POLISH SHIPBUILDING SECTOR

### The position of the Baltic shipbuilding sector on the shipbuilding market

The highest level of global shipbuilding completion of 101.8 million GT was recorded in 2011, however, Europe's share in the output has decreased by 10% down to 2.5%, while the share of Baltic shipyards has dropped from 4% down to 0.027%. The output of European shipyards in 2016 totaling 2.4 million GT is barely larger than the capacity of vessels constructed in the Baltic shipyards alone in 2008 with 2.3 million GT, of which: Poland 545 thous. GT, Denmark 565 thous. GT, Finland 308 thous. GT and Russia 51 thous. GT. The Baltic shipyards (from Flensburg up to Wolgast) have delivered 856 thous. GT, which was two times more than is currently delivered by all German shipyards [2].

In 2016, the Baltic shipyards delivered only 269 thous. GT, which is roughly the equivalent of the output recorded in 1947–1948. The largest producers of vessels in 2016 include shipyards from Italy with 421 thous. GT and Germany with 420 thous. GT (including shipyards located at the Baltic Sea basin).

The main production of German shipyards in 2016 included

two cruise ships with a total of 319 thous. GT. German shipyards located at the Baltic Sea coast delivered 504 thous. GT in 2017, including two cruisers of 318 thous. GT from Meyer/Papenburg, four ro-ro from Flensburg (with Norwegian capital) at a level of 130 thous. GT, six mega yachts 31 thous. GT (constructed in various workshops) and 10 ONCCS 24 thous. GT. Finland delivered 106 thous. GT, Netherlands 191, Norway 182 and Turkey 115 thous. GT. In the nearest future, Baltic shipyards might construct even six cruisers per year thanks to the purchase of these German shipyards by the Malaysian company Genting Group. Until recently, this cruise operator has not been involved directly in the shipbuilding industry.

The only shipyard from the Baltic Sea basin which has participated in the output of German shipyards was FSG from Flensburg, which delivered two units for well stimulation and a car carrier totaling 71 thous. GT. The shipyards' output in Russia was 59 thous. GT, in Finland 106 thous. GT, France 228 thous. GT, the Netherlands 191 thous. GT, Norway 182 thous. GT, Turkey 115 thous. GT [3]. Other shipyards in the Baltic region including: Estonia, Lithuania, Latvia and Poland are nowadays engaged in supplying ship parts, mainly ship sections and blocks for the large shipbuilding companies completing cruise ships in Finland or Germany or for offshore vessels completed in Norway.

### Solutions introduced by the Finnish shipbuilding sector

The shipbuilding industry in Finland is the perfect example of a successful internal market. It is part of Finland's broader maritime cluster, which has a total turnover of approximately EUR 13 billion and a total value added of EUR 3.8 billion, representing 1.8% of GDP. Finland belongs to the four European countries that construct very large cruise ships. Currently, around 70% of the world's icebreakers are produced in Finland. Moreover, Finland's marine industry also develops "green" marine technology, notably the new generation of dual-fuel engines leading to a reduction of almost 100% of sulphur oxide and 85% of nitrogen oxide emissions. Finland has a wide network of companies involved in manufacturing marine equipment for cargo carrying vessels, offshore and other marine activities. In 2015, the Finnish marine industry employed around 28,800 workers, which represented approximately 2% of the country's total workforce including 2,800 workers in shipyards. In 2016, Finland was the 17th largest shipbuilding economy with vessel completions amounting to 122 thous. CGT, representing a share of 0.34% of the global shipbuilding industry's total output. Finland's maritime industry has managed to maintain its international competitiveness thanks to its capability to innovate and develop new solutions, which have sometimes been later adopted widely in the international maritime sector [9].

### The Polish shipbuilding industry

Until 2008, container or car carriers used to constitute the main output of Polish shipyards. According to official data, the deliveries of Polish shipyards in 2016 totaled 45.5 thous. GT. As a producer of fully fitted ships, Poland is ranked 22 among

significant shipbuilding nations [3]. Polish shipyards manage to contract very few orders for fully fitted ships from the international market and for the national market. Only two new orders have been placed recently: one ferry ship for Polferries and four icebreakers for inland water administration [10]. However, the total orderbook shows that the shipyards have an order cover for some years ahead. The orderbook contains nine vessels of 74 thousand CGT, but it seems that fully completed floating units will be built only for national entities and institutions. This situation reminds to certain extend the practice of Finish shipyards in 2011–2012 when renown national shipyards were supported by national shipowners financially encouraged by the government to place orders in national shipyards. The shipyard in Turku, specializing in building large cruise ships (Genesis type with a capacity of 225,300) constructed a ferry of 812-ton capacity and a small cargo vessel of 3,360-ton capacity at that time. The solution in overcoming the crisis was found in selling the shipyards to companies with orders exceeding the production capacities of their own workshops at that time. The Turku shipyard joined the German group of Mayer and Arctech Helsinki was purchased by the Russian national giant OSK [3]. Currently, the main output of European shipyards contains RoPax, ferries and cruise ships. In this context, the takeover of the Vistal shipyard in Gdynia by the Danish shipyard Karstensens might seem as the beginning of a similar process in Poland. However, the case is not that obvious, since in Europe large orderbooks are attributed only to shipbuilding companies, which construct cruise ships and they hardly require some additional shipbuilding capacity, except the Italian Fincantieri. Even if the cruise market is be more active, remarkable subcontracts are doubtful due to the progressing depreciation of Polish shipyards [12].

The activity of the Polish shipbuilding industry is currently based on subcontracting and (similarly to Romania) turned into the largest supplier of hulls, hull blocks, hull parts and superstructures for shipyards in Western Europe. Over 20 Polish workshops are involved in this kind of activity, delivering around 50 thous. tons of hulls, hull parts and estimated 80 thous GT of blocks and sections mainly for passenger ships. Considering the increasing demand for cruisers and mega yachts, Polish shipyards hope to gain some subcontracts from the main European shipbuilding. Outsourcing may also include highly skilled services. Constructors and IT specialists employed in Poland participate in designing ships for foreign shipyards, but unfortunately, the added value goes mostly to the ordering party.

The average output of fully completed vessels in terms of GT in Polish shipyards after 2009 has dropped to a mere 1/20 of the output level of 1996–2006. The result is slightly better terms of CGT, indicating the value of shipyards' production. At the national level, the utilization of means of production is better in the ship repair and conversion sectors. According to official statistics (CSO), in 2016 Polish shipyards completed repairs or conversions of around 560 floating units, including large and complex conversions. The total income of the whole shipbuilding sector in 2016, including newbuildings, repair

and supplies of equipment and services totaled 10.6 billion PLN of which the share of newbuildings was 19%, repair and conversions 16% and equipment and other services supply 65%. In 2016, there were 6.7 thousand entities employing 32.6 thousand people in Poland involved in the production and repair of ships and boats and other activity related to shipbuilding. Currently, Remontowa Shipbuilding is the only shipyard in the Baltic region participating in free market competition without any backup from the government or the regional cluster. Recently, Polish companies received a new order to supply six sea-going search and rescue (SAR) vessels for Vietnam. The Polish yard responsible for design of the series and construction of the initial units will be Remontowa Shipbuilding SA [11]. On August 1, 2018 Remontowa Shipbuilding signed a contract for the construction of two Double Ended Diesel Electric Hybrid ferries for Norled.

The weakness of the Polish shipbuilding industry is, among other factors, the consequence of remaining lack of an internal market, weakness of national shipowners and national shipping, lack of infrastructure engaging support vessels. Such a market creates conditions for legitimated support justified by the European Union in the case when the country shows evidence of national demand for ships [11]. For example, if Finland needs icebreakers, then the national operators in team with the shipyard, the government authority and banks make a deal on the construction. The lack of a national market has prevented the establishment of real shipbuilding clusters, like in Norway or in the Netherlands, which would be based on common interest instead of strictly financial benefits.

Due to the lack of an internal market, Polish shipyards depend entirely on foreign contractors, which are motivated only financially. In the case of higher costs in the Polish shipyards, contractors will find subcontractors somewhere else. In the areas where the offshore industry is being developed, like for example in Norway, all Norwegian support vessels are built in national shipyards. Out of over 30 vessels built recently, only 3 were built for export and the rest for the national market. Another example of a strong inner market—Estonia, where the foreign trade of that country and to a certain extent also trade between Sweden and Finland Tallink is involved and Finland is taking advantage of this activity by building ferries Tallink.

## CONCLUSIONS

1. The shipbuilding industry is undergoing substantial changes driven by development trends in shipbuilding markets. There are opportunities for the shipbuilding industry to grow, especially in markets with a cost advantage and increasing domestic demand. In the context of the current and expected development trends, the prospects for Europe appear moderately promising but the shipbuilding sector needs to find a way to meet local demand and continuously improve a positive impact on maritime safety as well as on competitiveness.



Fig. 3. Hybrid ferry contracted by Remontowa Shipbuilding. Source: [11].

2. A holistic industrial strategy for the European maritime technology sector is needed. Most European shipowners are ordering their vessels in Asian shipyards, with the exception of a few small ones, which are built in European shipyards. At the same time, Asian shipowners place an estimated 90% of their new orders in shipyards of their own nationality according to the existing national policies in China, South Korea, and Japan linking strategic sectors like shipping and shipbuilding. On the other hand, as far as complex high technology vessels are concerned (cruise ships, ferries, fishing vessels, tugs, and dredgers), orders are placed in European shipyards. Orders for offshore vessels are placed in all main shipbuilding countries.
3. The shipbuilding economies in Europe will need to find a way to save and develop their shipbuilding sector. The establishment of real shipbuilding clusters, based on common interest, is recommended in order to prevent further

deterioration of the country's shipbuilding industry. While the cruise newbuilding sector in Europe is seeking business opportunities in order to strengthen its market position, smaller European shipyards are trying to enter the cruise segment in order to diversify their activities.

4. Lack of an internal market and a weak national shipping industry contribute substantially to the difficulties experienced by the Polish shipbuilding. Under these circumstances, the Finnish model of combating the decline in shipbuilding might be an inspiration for some European shipbuilding nations including Poland in applying efficient measures aiming at overcoming difficulties and strengthening the capacity of their shipyards. And, it is relevant that a substantial internal market creates conditions for legitimated support justified by the European Union in the case when the country shows evidence of national demand for ships.

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Word count: 8130 Page count: 13 Tables: 3 Figures: 3 References: 14

Scientific Disciplines: Natural science section

DOI: 10.5604/01.3001.0012.8065

Full-text PDF: <https://bullmaritimeinstitute.com/issue/11463>

Cite this article as: Kowalczyk U.: Growth perspectives for the Europe's shipbuilding industry in the context of world economy trends and competition from Asian shipyards: BMI, 2018; 33(1):159-171

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Competing interests: The authors declare that they have no competing interests.

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