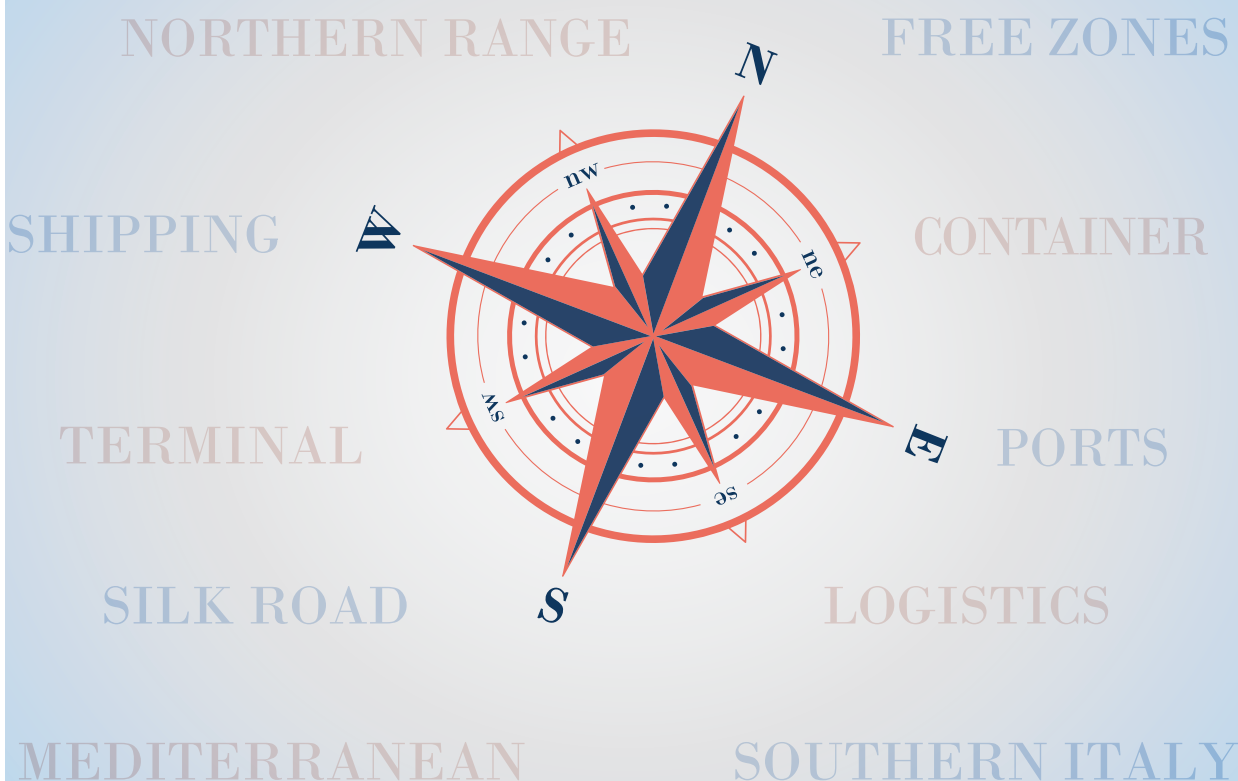


Italian Maritime Economy

New scenarios in the Mediterranean: Suez and China,
the strategies of big carriers, new technologies and energy routes

6th Annual Report

2019



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ITALIAN MARITIME ECONOMY

**NEW SCENARIOS IN THE MEDITERRANEAN: SUEZ AND CHINA, THE
STRATEGIES OF BIG CARRIERS, NEW TECHNOLOGIES AND ENERGY ROUTES**

Annual Report 2019

GIANNINI EDITORE

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“Joins the sea that separates the countries”

Alexander Pope

Published by



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The 2019 Annual Report on Italian Maritime Economy is part of a broader research project launched by SRM and called “Permanent Observatory on the Economy of Maritime Transport and Logistics”, from which the specialised website www.srm-maritimeconomy.com was born. This has the primary aim of monitoring and analysing the dynamics and economic impact of the sector in the economy of the country with a European and Mediterranean scope.

We wish to thank all the supporting partners of the project: Assoporti (Italian Ports Association), Port Network Authority of the Ionian Sea, Port Network Authority of the Central Tyrrhenian Sea, Port Network Authority of the Sardinian Sea, Port Network Authority of the Central North Adriatic Sea, Confetra, Contship Italia, Federagenti, Grimaldi Group, Lotras, Morandi Group, Unione Industriali Napoli.

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We would like to express a heartfelt thanks to Sergio PRETE and Fulvio Lino DI BLASIO (President and General Secretary, Port Network Authority Ionian Sea) for their crucial support to the activities of the observatory.

We would also like to thank the National council of Accountants and Auditors, and in particular, Mr Achille COPPOLA for his remarkable scientific and technical contribution to this research. Another important scientific and technical contribution was that of SEA EUROPE, to which we hereby address a special thanks.

The MONOGRAPHIC part of this work was possible thanks to a series of important scientific missions carried out by SRM which have allowed to sign agreements with prestigious centres of research and to gather data, information and documents which resulted in considerable value added to this publication.

During the different missions it was possible, through visits of the ports, to understand the most interesting port models and maritime phenomena currently affecting the global situation.

The first mission took place in ALEXANDRIA (EGYPT) in September 2018, in collaboration with the Ministry of Foreign Affairs, the Arab Academy for Science, Technology and Maritime Transport and the League of Arab States. SRM's researchers wish to thank Italian ambassador in Egypt, Mr Giampaolo CANTINI.

The second mission took place in SINGAPORE in November 2018 and for this a special thanks goes to the International Propeller Club and in particular to its national President Mr Umberto MASUCCI for the crucial support provided to the mission, during which it was possible to visit the port and the global player PSA Singapore. For this mission, we would also like to thank Italian ambassador in Singapore, Mr Raffaele LANGELLA.

The third mission took place in COPENHAGEN in January 2019 and for this a special thanks goes to Michele ACCIARO, professor of the KLU-Kuhne Logistics University of Hamburg for all the support he provided to SRM's researchers.

The fourth mission took place in ANTWERP and ROTTERDAM in April 2019, and a special thanks goes to the International Propeller Club and in particular to its president Umberto MASUCCI for his crucial contribution to the success of the mission, during which it was possible to visit ports and operators of primary standing in the maritime and logistic world.

The fifth mission took place in HONG KONG in May 2019 for the fourth plenary meeting of the **GLOBAL SHIPPING THINK TANK ALLIANCE** of which SRM is a member. For this, we would like to thank professor Meifeng LUO for the hospitality and support provided, and the SISI-Shanghai International Shipping Institute who also authored two of the chapters of this Report.

We would also like to highlight SRM's participation to the European project **Docks THE FUTURE** (www.docksthefuture.eu) aimed at identifying future drivers of growth for European portuality. In this regard, SRM has been actively engaged in the activities of a panel of European experts who worked in technical FOCUS GROUPS in OPORTO (Portugal) in October 2018 and in TRIESTE in April 2019.

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See page 189 for further detail.

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The Annual Report “Italian Maritime Economy” has reached its sixth edition. The publication continues in its path of national and international growth, increasingly enriched by the contributions of prestigious national and foreign research centres such as, in this case, the Hong Kong Polytechnic, specialising in ports and shipping, the Shanghai International Shipping Institute and the ITF-OECD.

This represents a source of pride for SRM, which has established and consolidated a first-level network that has led the present publication to have essays with different currents of thought, interpretations and original and variegated elaborations with the involvement of authors coming not only from the field of research but also from the world of maritime and intermodal operators.

It is also noteworthy that this research hosts papers by the presidents of the Port Network Authorities of the Central Tyrrhenian Sea (ports of Naples, Salerno and Castellammare) and Northern Adriatic Sea (Venice, Chioggia) alongside that of the director of Seaeurope, an association grouping also shipbuilding companies.

These players, together with the partners of the Observatory who are always present and active, represent valid partners in our pathway of growth offering insights, reflections and analyses while allowing our researchers to carry out important scientific missions aimed at investigating port models, traffic routes, maritime phenomena and current and future issues.

This book has become a product that provides operators of the sector, such as academics, associations, companies, infrastructures, with ideas, statistics and analyses always up to date, which is a remarkable achievement in an international maritime context constantly hungry for good-quality knowledge.

Therefore, SRM’s observatory continues its activities while constantly and closely monitoring the dynamics and phenomena that are shaping the Mediterranean in the global maritime context.

Furthermore, infrastructure investments are on the rise along the Belt & Road Initiative implemented by China which has positioned itself in many of the main Mediterranean ports from the North to the South bank as well as in the Northern Range.

Our country will have to measure up and take advantage of the opportunities that will arise from the presence of this trade colossus without ignoring emerging countries in the Middle and Far East.

It seems important to highlight that this 2019 Annual Report falls in the 150th anniversary of the Suez Canal which is continuing to break monthly records in terms of ships and goods transited. This hub accounts for 10% of global goods traffic and is the real indicator of the maritime economy in the Med area. SRM frequently analyses the dynamics of the Canal and its impact on the economy.

Another phenomenon that could create new competitive scenarios for Italy is SEZ- Special Economic Zones. These represent a great development opportunity for Italian ports because they are an extra tool to attract businesses and make port areas more appealing thanks to incentives such as tax discounts and streamlined bureaucracy. Many

ports of the Mediterranean, Moroccan, Turkish, Egyptian, have based their development on Free Trade Zones that have encouraged manufacturing settlements of multinationals that have given the ports new and more intense traffic in import and export. We urgently need to implement this tool which could give us a significant added value to stimulate the territory.

Last but not least, there is the phenomenon of naval gigantism due to which we will have to equip our ports with more streamlined regulations allowing the necessary changes to sea floors to accommodate giant ships which need increasingly efficient terminals for swift loading and unloading of goods.

As is common with its style of research, SRM checked the field for what underlies the statistics and data that are usually found on this wide topic. It is only through direct observation that we can fully understand the extension of a certain phenomenon. We shall not forget that we have always been a maritime country, that we are located in the middle of the Mediterranean in a privileged position and that our ports and ship owning sectors are still important economic symbols for our country.

Furthermore, Italy has a maritime import-export amounting to over € 250 billion, we have handled almost half a billion tonnes of goods yearly and, finally, we are still first in the sector of Short Sea Shipping in the Mediterranean. Implications of these achievements concern Italy but, even more importantly, the Mezzogiorno, a region contributing significantly to the aforementioned figures.

SRM continues to maintain that investment in infrastructure, intermodality and the development of human capital – while betting on the sea as a resource – represent the three mainstays on which Italy needs to work if it intends to take full advantage of its privileged geographic position and intellectual abilities.

The increasing number of partners participating in this research project is a testimony to the fact that our Observatory has been experiencing remarkable growth. Our ambition is that the Observatory will become the point of reference for operators, institutions, associations and obviously the banking sector, of which SRM is a member. We will continue to provide food for thought, analyses and reflections in order to contribute to increased knowledge and awareness of the importance of this sector for Italy. All of this will always be done with the Mezzogiorno as a protagonist.

Paolo SCUDIERI

OBJECTIVES AND STRUCTURE OF THE ANNUAL REPORT

The volume *Italian Maritime Economy*, one of SRM's main research projects within the Observatory on Transportation and Logistics, has reached its sixth issue. Enriched by food for thought, data and ideas, this year's issue is based on the most significant phenomena currently shaping competitiveness in the Mediterranean.

The Suez Canal has just celebrated 150 years of operations. Its 2015 enlargement established new port balances in the Mediterranean: the two records broken in terms of number of ships and goods transited (18,000 vessels and almost 1 billion tonnes) have a deeper meaning than mere statistics. A closer look at maritime areas reveals the increased importance of East-Med ports (over a 5-year period, +40% and +7% of southbound and northbound traffic, respectively) and an upward trend in container and tanker traffic which seem to indicate increased centrality of the Mare Nostrum in terms of manufacturing and energy trade flows.

Furthermore, the phenomenon of naval gigantism does not seem to stop, and the most reliable forecasts indicate further future growth. In particular, orderbooks show that 133 new containerships in the 10-23,000 TEU category will be launched by 2022 and 45 of these will belong to the 18-23,000 TEU category. Also, rumors seem to indicate that a Mega-Megacontainership will be ordered by COSCO with a capacity of 25,000 TEU. The criteria for the selection of ports in the MED area will probably become more stringent. While this analysis was undergoing, SRM found only 4 ports capable of accommodating this type of ship. Therefore, it seems clear that smaller ports will be concentrating on *feeder* traffic and medium-sized vessels as their core business, despite the need to implement dredging to increase capacity.

The scenarios outlined in this Report also illustrate the implementation status of China's *Belt & Road Initiative* which indicates the end of the previous aggressive Chinese approach to terminal acquisitions in the Mediterranean and Northern Europe. The Asian giant's position has been strengthened in the East Med (Piraeus), West Med (Valencia), access canals to the Black Sea (Istanbul), the Mediterranean (Suez) and in Northern Europe (Rotterdam) where intermodal capacity allows to reach the central-European markets. Further significant investments have been made in Abu Dhabi, Marseille and Malta while an MoU was signed with Italy at the end of March 2019 which will lead to investments in Italian ports (ie Genoa and Trieste) as well as in other sectors such as rail transport, intermodality and logistics. Debate on railway connections to/from China is still open in our country and there seems to be an intention not to miss out on this opportunity.

This Report also takes a closer look at Shortsea traffic which represents one of our country's strengths. Indeed, Italy has a 36% market share in this type of traffic in the Mediterranean. Also, Ro-Ro in Italy amounts to more than 100 million tonnes of goods, 50% of which handled in the Mezzogiorno, and represents a strong sector of our maritime

economy with excellent shipowners and a worldwide network of terminals. This needs to be continuously supported so as to avoid losing market shares in an area where our know-how is solid and well established.

Therefore, according to SRM's analyses, the idea of a *Portuality 5.0* is the new key to interpret port roles. A modern port intending to be an active player in the international competitive situation needs to be moving faster than the industry because it needs to serve it adequately and efficiently while contributing to the growth of the local territory through attraction of investments that create jobs and boost the economy.

The port needs to encourage the growth of businesses by offering efficiency and streamlined internationalization processes which are generally speeded up whenever ships are allowed to reach destinations in short times thanks to high-quality direct services. All of this makes the port the engine of a country's import-export.

Furthermore, a port needs to increase its ability to stimulate the creation of new businesses and start-ups. In particular, port models such as those of the Northern Range are increasing activities aimed at encouraging the growth of companies in terms of business but also of creation of companies.

Another important driver is represented by intermodality which has long been hoped for in Italy but still remains a goal to be achieved since a successful integration of ports, dry ports, roads and railways has not been completed yet. An analysis carried out by SRM in collaboration with Contship Italia (*Corridors and logistic efficiency of territories*) revealed that only 19% of manufacturing companies in three major Italian regions use a mixed modality of transport (road-railway) to move goods between the port and their warehouses. Working on this aspect could represent the key to improving logistics in our country.

Cooperation between the port and the world of economic research should also be taken into account. A modern port must be aware of the dynamics of traffic and the phenomena that surround it, while avoiding isolation and strategies unrelated to those of the national system. SRM has long been supporting the whole maritime system also through its network of partners with the aim of helping the implementation of works and research that could promote awareness and discovery of new frontiers of development and of the changes happening in the Mediterranean in terms of trade flows.

Last but not least, it is important to highlight the ability a port needs to show with regards to its role as driver of the territory. In particular, the introduction of SEZ (Special Economic Zones) in our regulatory framework has required portuality to make the effort of becoming a mainstay of the crucial connection between industry and logistics. In this way, the port becomes a catalyst to the import-export of the territory and therefore one of the main engines of economic development.

Italian ports, after a difficult season determined by a complex reform which is still undergoing, are trying to find new competitive momentum and the new presidents are working hard to design and implement new strategies through the identification of the role that Port Network Authorities will intend to play in this situation. Our ports need new stimuli and renewed awareness of the importance of logistics and intermodality in pursuit of a role at the service of industry and tourism supporting maritime operators who wish to further develop. In this context the Mezzogiorno, which activates about 50% of port traffic of the country and whose two thirds of international trade are carried out by sea, needs to

be put in a significant position with appropriate investments and strategies. Southern Italy boasts a geographic position close to the Suez Canal and on the routes connecting the markets of Northern Europe, the Middle and Far East. This is an important fact to take into account when considering the role that this area can play in terms of economic growth of the country.

This is exactly the scope of SRM's contribution to a deeper understanding of such complex, articulated and constantly changing phenomena. The world of the sea moves at a fast pace and the maritime-economic aspects need continuous monitoring alongside the changes that they can produce. This Report, in fact, is only a part of the several in-depth analyses, papers, interviews that the Observatory on Maritime Transport and Logistics carries out and which it will continue to perform in order to keep the attention high on our maritime transport sector. Also, for this issue of the report, SRM has operated in synergy with national and international centres of study which have used their specific know-how to enrich and further validate the contents of these papers.

SRM is a member of the *Global Shipping Think Tank Alliance* together with 16 other centres of research in Europe, the US and the Far East. We are proud to be the only Italian centre of maritime research, and one of the four European ones to be part of this important network. We have also established relations with the KLU-Kuhne Logistics University of Hamburg, the Universities of Rotterdam and Antwerp and with the OECD. Also noteworthy is another agreement signed by SRM with the Energy Department of the Polytechnic of Turin with which new global energy routes are being analysed.

This year, as a sign of increased prestige for the Report, the research team can pride itself with the presence of two renowned papers elaborated by the Port Network Authorities of the Central Tyrrhenian Sea and Northern Adriatic Sea. These institutions have demonstrated to share our point of view in terms of the messages that this volume intends to send, as illustrated by its title which highlights a growing and increasingly central Mediterranean.

Another strength of this Report is represented by the collaboration with Sea Europe, a network comprising the main European players of the sector of shipbuilding, another significant field of the maritime chain. In conclusion, it seems crucial, for our research policy, to stay connected and to network with other Italian and foreign centres of research but also with operators who can complete the Report with their experiences so as to make this volume a reference publication for the sectors of ports and shipping.

As for the structure of the Report, it is organized as follows:

The first chapter contains an analysis of the current situation with the most important economic data, international and national port traffic with details as to the ports, canal transits, short-sea, and a focus on the Suez Canal and on import-export in our country.

The second chapter takes a closer look at Ro-Ro, one of the main sectors for the Italian maritime world, by providing detailed analyses of Car Carrier vessels, which transport new cars.

After that, the third chapter has been elaborated by a team comprised of members of the Polytechnic of Hong Kong and SRM. This work takes into account current and future scenarios of Global Container Carriers through an analysis of their fleet, orderbook and financial performance while also considering the effects of the IMO Sulphur cap 2020 on reduction of Sulphur emissions from ships, a phenomenon that will significantly reshape

maritime investments. This chapter is closely linked with the fourth one, elaborated by the OECD, about the Big shipping alliances. This topic has long been one of SRM's focus points as this phenomenon is markedly affecting routes and the global logistic situation.

Furthermore, Sea Europe have elaborated the fifth chapter on European industry and maritime technologies, a sector that is amongst the most important ones in the world in terms of aggregate production value (€ 112.5 billion), accounting for over 23% of global production value and generating over 900,000 direct and indirect jobs.

Pino Musolino, President of the Port Network Authority of the Northern Adriatic Sea (Venice and Chioggia) analyses with detail the phenomenon of China's Belt & Road Initiative, focusing on future strategies and impacts in the Mediterranean and in Italy with very interesting considerations and analyses.

In the seventh chapter, Pietro Spirito, President of the Port Network Authority of the Central Tyrrhenian Sea (Naples, Salerno, Castellammare), focuses on the energy future of ports. The energy component is one of the crucial variables for the competitiveness of economic systems and for the structure of international trade. The maritime sector represents an important articulation of it, as a result of the exchange flows that are determined between producer and consumer countries.

The eighth chapter has been elaborated by the SISI (Shanghai International Shipping Institute), one of SRM's partners. This piece of research is mainly focused on Dry Bulk, through the analysis of routes and future prospects in the Far East, as this specific sector is capable of influencing trends in the maritime trade.

Finally, chapter nine has been written by the Consiglio Nazionale dei Dottori Commercialisti (National Council of Accountants) and illustrates the results of the Observatory on balance sheets of maritime businesses. It highlights a fast-paced growth that results in increases of employment (+1.3%) and of revenues (12.6%), figures which seem even more remarkable if compared with the overall growth of turnover of Italian SMEs, which amounted to 5.3% in the same period.

We wish to conclude this introduction to the volume with a special thanks to SRM's researchers and to the partners of this project who demonstrate their faith in our work and support us in this adventure we have embarked upon. A special thanks goes to all the authors who have contributed to adding to the value of this research.

Hoping we have been able to provide factual support to those convinced that the development of the economy of maritime transport and logistics is a priority for our entire country. The challenge is still ongoing.

Massimo DEANDREIS

PART ONE

ECONOMIC AND COMPETITIVENESS SCENARIOS OF MARITIME TRANSPORT

SCENARIO AND DYNAMICS OF GLOBAL MARITIME TRANSPORT**1. FOREWORD**

This chapter is aimed at outlining the international shipping scenario, through an analysis of its dynamics and the factors affecting its evolution. The study will concentrate on the Mediterranean, with a focus on the Suez Canal traffic, and on our country. It should be emphasized that the analysis of shipping requires a vision that cannot be limited to national borders, as this is a global sector currently accounting for 80% of global trade in volume and over 70% in value.

It is difficult to estimate the value of global maritime trade volumes in monetary terms, as figures for trade estimates are traditionally in terms of tonnes or tonne-miles, and are therefore not comparable with monetary-based statistics for the value of the world economy. However, the United Nations Conference on Trade and Development (UNCTAD) estimates that the operation of merchant ships contributes about US \$ 380 billion in freight rates to the global economy, equivalent to about 5% of total world trade¹.

Shipping is part of the global supply chain and for this reason it can be considered a “barometer” of the international economy. Therefore, many factors can influence the trend of shipping: in addition to changes in the international supply and demand for goods and services, processes of fragmentation of production, the development of global value chains, also the characteristics of naval transport, in its triple dimension associated with port infrastructure, ships and routes.

The trend in transport costs, the change in the structure of global trade, the concentration in the transport market and its segmentation must be noticed and analyzed systematically and included in the descriptions of global trade trends. Over the last few years, the macro-political scenario has increasingly contributed to shaping the trend of international trade. China’s Belt and Road Initiative has the potential to generate growth and boost seaborne trade volumes through increased demand for raw materials and semi-finished and finished products to implement infrastructure projects. On the other hand, trade wars, the resurface of nationalism and protectionism, Brexit, as well as geopolitical tensions in the Middle East and Latin America, are generating significant uncertainty in the three main sectors - dry cargo, tanker and container - , which is having an impact on market trends.

Another factor generating great uncertainty is represented by the implications connected to the IMO 2020 regulations that will mark the close on polluting emissions in maritime transport. International law requires that, as of 1 January 2020, fuels used by ships must have a sulfur content of 0.50% against the current 3.50%.

¹ International Chamber of Shipping.

In order to obtain this result, scrubbers (purifying filters) or LNG -liquefied natural gas- as fuel, can be used. Respecting lower limits will have an impact on shipping during 2019 because ships that will have to install the scrubber will have to be temporarily absent from the market to carry out the works.

In a longer-term vision, the future of maritime transport will also be affected by the diffusion of innovation and digitalisation: technology will be the key to higher efficiency and reliability for the ports and terminals sector.

Finally, detailed statistical tables with data related to this sector and topic can be found in the appendices.

2. THE EVOLUTION OF INTERNATIONAL MARITIME TRANSPORT

The world economy performed well in 2018 with a growth of 3.6%, down by only 0.2% on 2017. However, the latest forecasts indicate a slowdown for both 2019 (+3.3%) and 2020 (+3.6%)².

The trend in the economy was different in the various geographical areas. Even among Asian emerging countries, which remain by far the most dynamic and whose GDP is estimated to increase at an overall rate of more than 6% in 2019, there can be found some differences, mainly due to the slight slowdown recorded in China. At the same time, some advanced economies also show signs of deceleration as is the case of Japan and, among European countries, Germany, France and Italy.

As for all the main developed countries, we expect a 2019 with lower growth than 2018.

International seaborne trade gathered momentum in 2017, with volumes expanding by 4.2%. This was the fastest growth in five years and world seaborne trade volumes amounted to 10.7 billion tons. However, the growth of maritime trade in 2018 slowed down, recording + 3.1%.

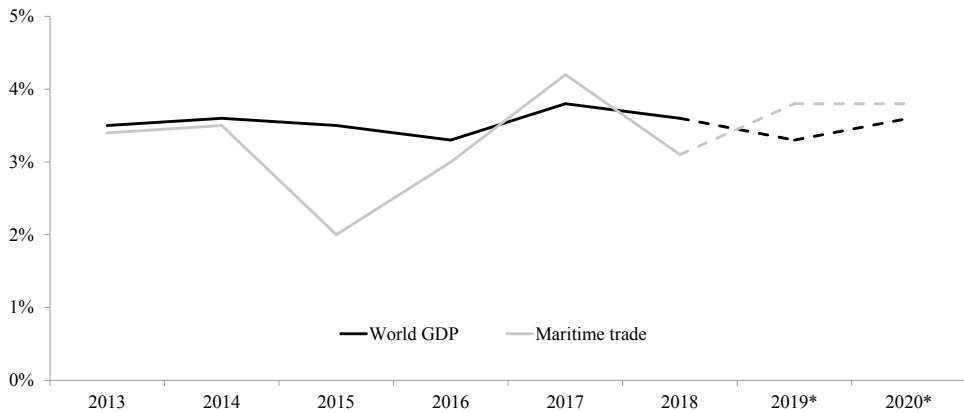
Overall, UNCTAD predictions for seaborne trade are positive, with a potential compound annual growth rate of 3.8% between 2019 and 2023 (between 2005 and 2017 this rate was 3.5%).

Nevertheless, it would be advisable to exercise caution when looking at prospects of the sector and economic trend, given the uncertainty surrounding the sustainability of the recovery. The threat of growing global trade disputes might obscure the prospects for shipping. For instance, trade tensions between China and the US, the world's two largest economies, as well as those between Canada, Mexico, the US and the European Union are a source of uncertainty that weighs on the prospects for shipping.

If we take a closer look at type of goods transported we find out that tanker trade shipments such as crude oil, refined petroleum products and gas accounted for 29.4% (in 1995 this share was 44%), while dry bulk commodities cover 53.5% and the remaining share of 17.1% refers to containerized trade (share more than doubled compared to 1995).

² IMF, World Economic Outlook Database, April 2019.

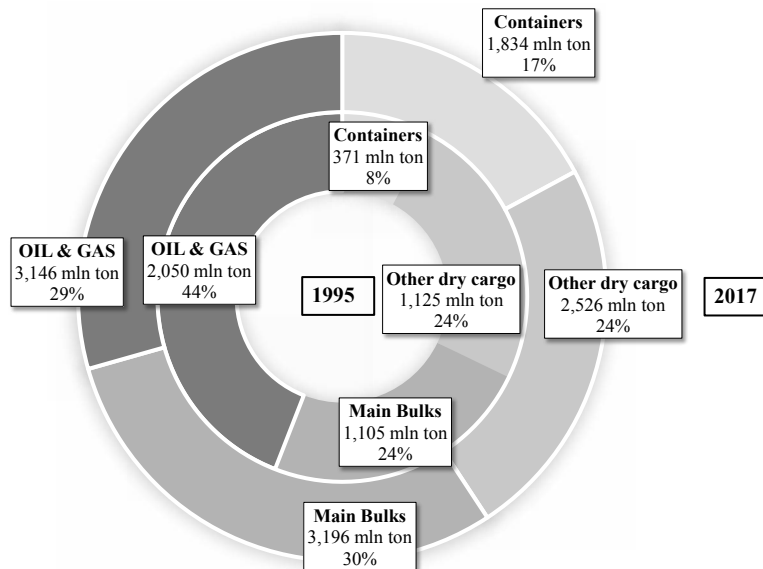
World GDP, international and maritime trade (% growth). 2013-2020



* IMF and UNCTAD estimates.

GRAPH 1 – SOURCE: SRM on BRS Group, FMI and Unctad, 2019

International seaborne trade. Volumes and shares. Comparison 1995-2017



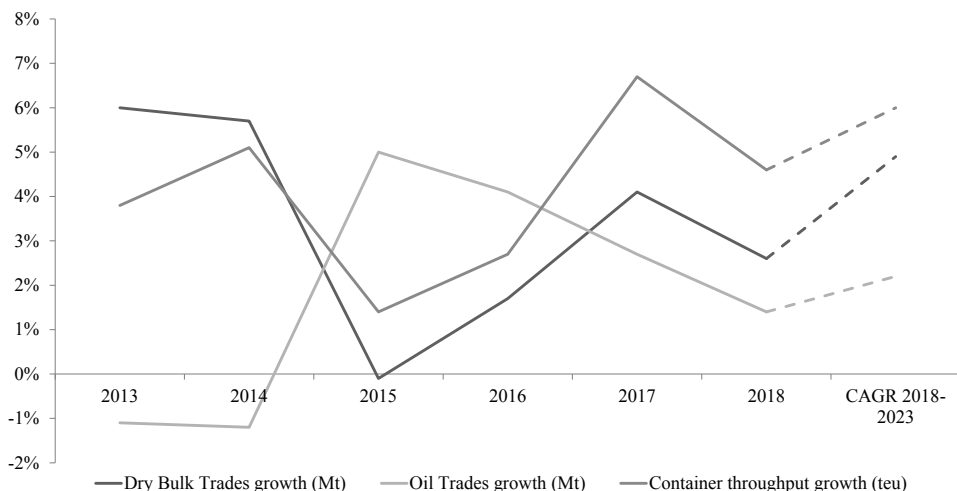
GRAPH 2 – SOURCE: SRM on Unctad, 2019

The graph below shows the growth trend of the main sectors of maritime transport in the last 6 years. 2018 shows a slow growth of all categories. World seaborne trade volumes are expected to expand across all segments by 2023, with containerized trade and major dry

bulk commodities trade witnessing the fastest growth, at the expense of tanker volumes.

As for dry bulk, positive drivers for continued expansion in the short-term include rising South East Asian coal imports, growing demand for high-quality foreign iron ore in China and the positive impact of global economic growth on minor bulk trade. Containerized trade is also expected to continue growing, driven mainly by rising intra-Asian trade volumes and improved East–West main routes flows. Seaborne crude and oil products trade is forecast to continue to grow, albeit at a slower pace, supported to a large extent by increasing energy demand coming from emerging economies and by growth of Middle Eastern and US exports³.

Growth (%) trend of maritime trade. 2013-2018 and 2023 forecasts



Note: the forecasts for the growth of the oil segment are calculated using the average of the growth of crude oil and refined products transport.

GRAPH 3 – SOURCE: SRM on BRS Group and Unctad, 2019

The freight rates reflect the performance of the various commodity markets. As for dry bulk, the Baltic Dry Index showed a recovery in 2018 with an average of 1,352 points versus 1,145 in 2017. The tanker freight rates remained under pressure in 2018. The Baltic Exchange Clean Tanker Index (BCTI), which refers to the transport of refined petroleum products, averaged 579 points compared to 606 in 2017. In the crude sector, the Baltic Dirty Tanker Index (BDTI) recorded an average of 798 in 2018 compared to 787 of the previous year. In the container sector, 2018 was a year of contrasts mainly due to the problem of overcapacity. The fleet grew by 5.7% to reach 22.3 Mteu at the end of the year⁴. Freight rates remained weak, with the average China Containerized Freight Index (CCFI)⁵

³ Sea Europe, 2018 Market Forecast Report.

⁴ Alphaliner, *Weekly newsletter* 1/2019.

⁵ *The China (Export) Containerized Freight Index* is applied as the barometer of the container transport market. It is a composite index that takes into account the freight rates on routes starting

scoring 817.8, down from 820.47 in 2017, as can be seen from the following figure.

*Two-year spot freight rate trend for the CCFI (2017-2019)
China Containerized Freight Index*

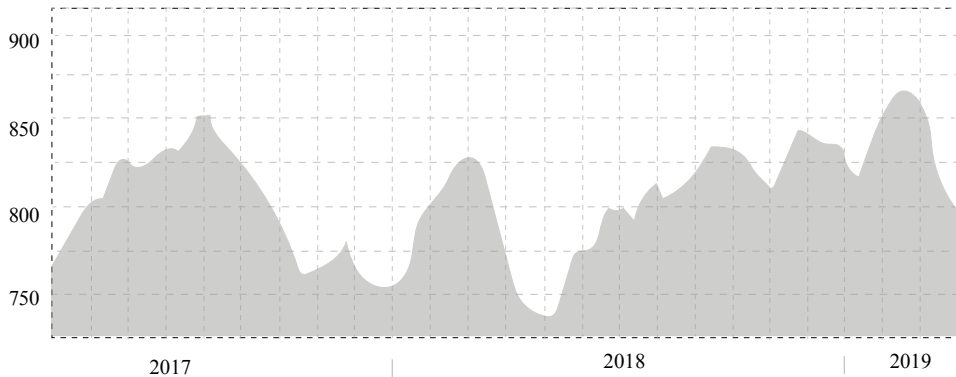


FIGURE 1 – SOURCE: SRM on Shanghai Shipping Exchange

Higher bunker prices contributed to the decrease in the carrier's operating margins. Despite the sharp fall in prices in the fourth quarter of 2018, average annual oil prices went up by almost 30% compared to 2017. This situation led carriers to reduce capacity on various trade routes: the withdrawal of 4 services on the Transpacific route in July 2018 and the temporary suspension of one on Asia-Europe in September contributed to the increase in idle fleet.

It remains to be seen whether freight rates will be affected, with significant uncertainty over the impact of the US-China trade war and the slower growth in global trade volumes. The ongoing struggle to balance supply and demand also continues to be a main driver. While some 1.1 million TEU of newbuilding capacity is due for delivery in 2019, this figure should be tempered by expected slippages in deliveries and by scrapping. Global fleet growth is expected to drop below 3.5% in 2019, which would provide some relief to the oversupplied market. The expected rush to retrofit part of the current fleet with scrubbers before the implementation of the new 2020 IMO Sulphur-cap is expected to result in a reduction of available tonnage during 2019.

The IMO 2020 rule really will be a game changer. By May 2019, the number of SOx scrubbers installed on and ordered for containerships had passed 840 units. Ships fitted or to be fitted with scrubbers now account for 16% of the current fleet in terms of number of ships, and for 36% in terms of teu capacity. In contrast, the take-up of LNG as fuel has remained slow, with only 38 ships in service or on order so far. The relatively high cost of adopting LNG, investments of some \$25M - \$30M per ship, and the yet unproven gas supply infrastructure remain a deterrent for most owners.

at 10 hub ports in China (Dalian, Tianjin, Qingdao, Shanghai, Nanjing, Ningbo, Xiamen, Fuzhou, Shenzhen e Guangzhou) towards South Korea, Japan, Southeast Asia, Australia & New Zealand, the Mediterranean, Europe, East and West Africa, USWC, USEC, South Africa, South America, Gulf / Red Sea.

The cost of installing scrubbers fell rapidly to just \$3-\$5M per unit compared to \$5-\$8M a year ago, the scrubber option has become more attractive for owners⁶.

As for Ro-Ro, 2018 was a very positive year with strong demand and high freight rates. Even for this sector, however, the weakening of the economy, in particular the European one that is the pivot of the sector, alongside other important geopolitical events such as Brexit could have significant effects on future performance.

Non-economic factors continued to affect market conditions and transport activities – the Libyan and Syrian markets have not yet recovered, while the civil war in Yemen and the sanctions on Qatar threaten to destabilise the region for years to come.

2018 was certainly a very eventful year in the Mediterranean region. Operators continued to register very solid cargo volumes in the French, Spanish, Italian and Greek domestic markets, as well as in Turkey's export/import market.

Let us now take a closer look at the various countries. Firstly, the Turkish market, in a year of dramatic changes, was strongly affected by the heavy depreciation of the Turkish lira coupled with an average yearly inflation rate above 16%, both of which took a toll, particularly on import cargo volumes. Secondly, in April, the Danish operator DFDS (Det Forenede Dampskibs-Selskab) finalised the € 950 million acquisition of Turkey's leading ro-ro operator UN Ro-Ro thereby greatly expanding its presence in the Mediterranean market. The Italian market continues to show increasing volumes of goods transported on Ro-Ro ships. Italy is also the world leader in the fleet of ferries and boasts leading operators in the sector including Grimaldi Group, Moby/Tirrenia Group and Grandi Navi Veloci (GNV). Also, MSC took an even more active role as the new partner of the debt-ridden Con-Ro operator Gruppo Messina. Under the agreement, MSC will purchase a 49% stake in Gruppo Messina as well as take a 52% stake in a new company controlling 4 of Messina's 8 large modern Con-Ro ships. MSC also started a new service between major container hub Gioia Tauro and Rades in Tunisia using a Ro-Ro vessel to transport only containers in order to avoid congestion problems affecting container operators in Rades.

This was not the only new service to Tunisia. In May, newcomers ProCargo Line started a dedicated Ro-Ro service between Italy, Malta and Tunisian ports. Otherwise, there were no major changes in services to North African countries due to the relatively low economic activity as well as continued political instability in Libya. MSC launched also a new service from the Continent to West Africa using two large Con-Ro units.

2019 Ro-Ro orders were registered in 2018, compared to 11 in 2017. It is interesting to note that none of the vessels ordered in 2018 have LNG propulsion. Rather, the choice has been to use scrubber technology or burn ultra-low sulphur fuel in Emission Control Areas (ECAs). It is estimated that the large number of vessels ordered in 2018 represent the final batch of the large ordering spree that started 2-3 years ago. By now, most of the major operators are well under way with their fleet rejuvenation programmes and have satisfied most of their capacity needs for the years or even decades to come.

2019 prospects for the Ro-Ro sector are positive, though the industry will clearly be exposed to three major risks: a) the possibility of a modal shift caused by increased bunker costs due to IMO's 2020 sulphur cap; b) declining demand due to a visible economic slowdown in relevant geographical areas; and c) the likely oversupply of tonnage capacity.

⁶ Alphaliner, *Weekly newsletter*, 22/2019

However, the effects of geopolitical dynamics cannot be underestimated. A ‘soft’ Brexit is expected to inspire optimism and restore growth, while a ‘no-deal’ Brexit is almost certainly going to be extremely detrimental to the sector as a whole. If other leading EU nations join the path of recession or economic decline, the negative effect on demand will be aggravated.

3. INFRASTRUCTURE AT THE SERVICE OF SHIPPING: PORTS

After investigating the shipping market - affected by global economy, international trade, geopolitical strategies, environmental regulations and active fleets and orderbook - this scenario analysis intends to focus on infrastructure. As key players in international trade and logistics and critical nodes in global supply chains, seaports continue to underpin globalized production processes, market access and effective integration in the global economy. World seaports are the main infrastructural assets at the service of shipping, and their performance is largely determined by developments in the world economy and trade.

Since the 1980s, the hub of naval transport has shifted from the Atlantic Ocean to the Pacific Ocean and the Mediterranean. First, thanks to Japan’s growing role in world trade, and then in the last two decades, above all thanks to the increasingly significant weight of emerging Asian economies and China in particular. This change can be deduced from the observation of the following chart, which shows the influence of Asia from which 42% of global maritime trade originates and to which 61% is destined.

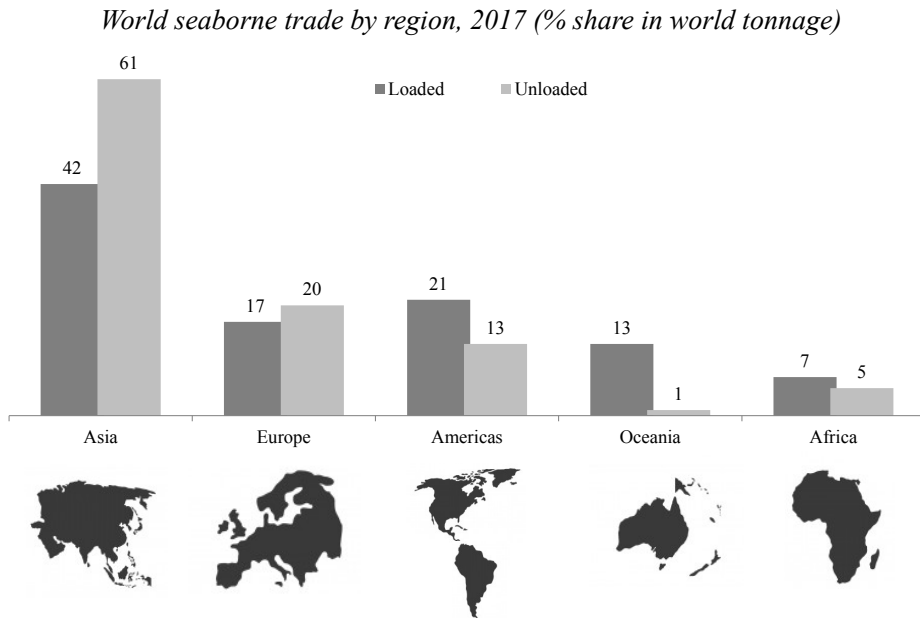


GRAFICO 4 – FONTE: UNCTAD, 2018

Port performance data reflect this situation. The world leader in cargo handling is

the port of Ningbo-Zhoushan in China, with total volumes handled surpassing 1 billion tonnes. Among the TOP 10 global ports just two were not in Asia, as shown in the following table:

Global top 10 ports by cargo throughput (Million tons and annual percentage change)

Rank	Port	Country	2017	2018	Var. 18/17
1	Ningbo-Zhoushan	China	1007	1084	8%
2	Tangshan	China	565	637	13%
3	Singapore	Singapore	627.7	630.1	0%
4	Guangzhou	China	566	613	8%
5	Shanghai	China	462.6	561.3	21%
6	Suzhou	China	608	532	-13%
7	Port Hedland	Australia	505	518	3%
8	Qingdao	China	458	486	6%
9	Dalian	China	451.1	468	4%
10	Rotterdam	Netherlands	469	467.4	0%

TABLE – SOURCE: SRM on ports websites and Chinese Ministry of Transport

Another perspective related to port performance concerns shipping routes.

These are predominantly pendulum-like, meaning they allow a round trip with substantially the same route. In recent years, in addition to the segmentation of operators among the Short Sea (for which the Mediterranean represents an important basin, where Italy has a significant market share) and Deep Sea, the re-opening in June of 2016 of the Panama Canal to large ships, such as the Post-Panamax, and the doubling of a part of the Suez Canal inaugurated in August 2015, predict margins of change compared to the past.

In addition to these innovations, there is the implementation of the Belt & Road Initiative. It involves China, but also 100 other countries across Asia, Europe and Africa, and should increase the use of the Far East Mediterranean route⁷. The effect could be significant because the several Chinese investments in ports and infrastructures of the maritime terminals of many Middle Eastern countries and especially in the Mediterranean ports of Piraeus, Vado Ligure, Port Said, Tanger Med, Haifa and Istanbul and in Northern Europe, particularly in the port of Rotterdam, indicate a very specific interest in developing and upgrading transport routes in the area.

In this context, the growing role of private investments further modified market conditions, which until a few decades ago had considered port infrastructures and also shipping companies as essential assets for the public operator. Now, more and more, the combination of national dimension, port infrastructure and naval fleet appears to have been reduced.

Since over 80% of world merchandise trade in volume terms is handled by ports worldwide, maritime transport has increasingly become an expression of the global supply chain. The strategic importance of well-functioning and efficient ports for growth

⁷ Confetra – SRM (2018), Position paper Belt & Road Initiative.

and development cannot be overemphasized. Global ports cater to ships and cargo across various stages of port-handling operations, starting with the shoreside, to the berth, the yard and the landside for the connection with the global supply chain. Therefore, enhancing port efficiency throughout the various cargo - and vessel - handling phases is crucial for overall efficiency and to ensure that gains achieved by one segment of the maritime logistics chain are not cancelled out by inefficiencies arising elsewhere in the process.

What customers need now is an integrated logistics service that is no longer “port-to-port”, but “door-to-door”. Companies operating in the maritime logistics sector will be able to meet this need by improving connections between ports, motorways, railways, airports and logistics parks. Furthermore, with the continuous development of naval gigantism, commercial alliances and technology for environmental protection, the requirements to be met for the realization of integrated logistic infrastructures are more and more numerous. As mentioned above, the geopolitical choices adopted by the great world powers, first of all the Chinese BRI, are boosting development of logistic infrastructures in the countries of the Mediterranean basin - who are even weaker than those of North-Western Europe - to be able to seize the opportunities for regional development that can be generated from this project. Ports are dealing with the challenges arising from changing dynamics in the liner shipping market, from the need to embrace the technological advances resulting from digitalization, from the obligation to conform to an intensified global sustainability agenda and from the imperative to be competitive and meet the demands of the economy and world trade.

4. THE ORGANIZATION OF WORLD MARITIME TRADE. CONTAINER LINER SERVICES

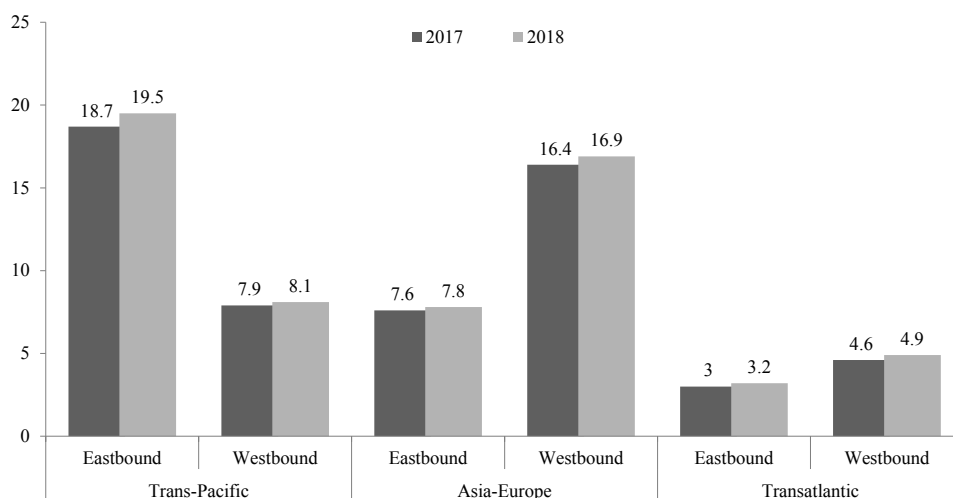
International liner shipping is a sophisticated network of regular services that transport goods from anywhere in the world, to anywhere else in the world at low cost and with greater energy efficiency than any other mode of international transport. It is based on a defined number of departures appropriate to the average flow of traffic expected to be encountered on a defined route, taking into account the possible periodic fluctuations in demand. Liner services are mainly distributed in two business areas: containerized transport and roll-off roll-on transport. The latter will be the subject of a specific chapter of this work which will be focused in particular on the transport of new vehicles by sea. In this scenario, container transport will be analyzed. In the introduction it was mentioned that the share of containerized traffic, in terms of tons, grew from 8% in 1995 to 17% in 2017; In terms of value, this segment weighs much more because it is worth 60% of global maritime trade, which in 2017 amounted to about 12 trillion dollars⁸.

⁸ Statista.

UNCTAD forecasts suggest that this will be the sector that in the five-year period 2018-2023 will record the greatest growth (+ 6.4% compared to the average 4% of overall maritime transport). Other industry analysts such as Drewry estimate that in 2019 containerized transport will increase more moderately, by 4%. However, this is an important growth because it corresponds to around 30 million additional TEUs globally. In any case, there are many elements that can influence these estimates, starting with the US-China trade war, Brexit, etc.

Approximately 500 liner shipping services provide regularly scheduled service between ports along a single trade route or a group of trade routes. Trade growth strengthened on the major East–West trade lanes, namely Asia–Europe, the Trans-Pacific and transatlantic routes. Overall, the Trans-Pacific trade lane remained the busiest, with total volumes reaching 27.6 million TEUs, followed by 24.8 million TEUs on the Asia–Europe route and 8.1 million TEUs on the transatlantic route. Volumes on the Trans-Pacific route (eastbound and westbound) increased by 3.8%, those on the Transatlantic route (eastbound and westbound) grew by 6.6% while flows on the Asia-Europe in both directions went up by 2.9%.

Containerized trade on major East–West trade routes, 2017-2018 (TEUs million)



GRAPH 5 - SOURCE: SRM on UNCTAD, 2018

The Trans-Pacific route is of course also the most sensitive to the effects of the US-China trade war. Import duties for \$200 bn worth of goods from China to the US, spanning over 5,700 product items, were raised from 10% to 25% as of 10 May 2019. China issued its own retaliatory measures on 13 May, imposing new tariffs of between 5% and 25% on \$60 bn of US imports that will take effect from 1 June 2019, covering some 5,000 products.

Containerised cargo volumes in the transpacific trade could see severe reductions in the aftermaths of the tariff hikes. The shock comes just ahead of the traditional summer

peak season, and it could reverse the freight rate increases that carriers have secured for the May 2019 - April 2020 contract season as spot rates could come under pressure from expected lower volumes.

Total containerised exports from China to the US fell by 8.2% in the first quarter of this year. Volumes slowed considerably after a record fourth quarter last year, as shippers front-loaded cargoes ahead of the anticipated tariff increase. In 2018, fourth quarter volumes from China were 19.1% higher than in the same period of 2017⁹.

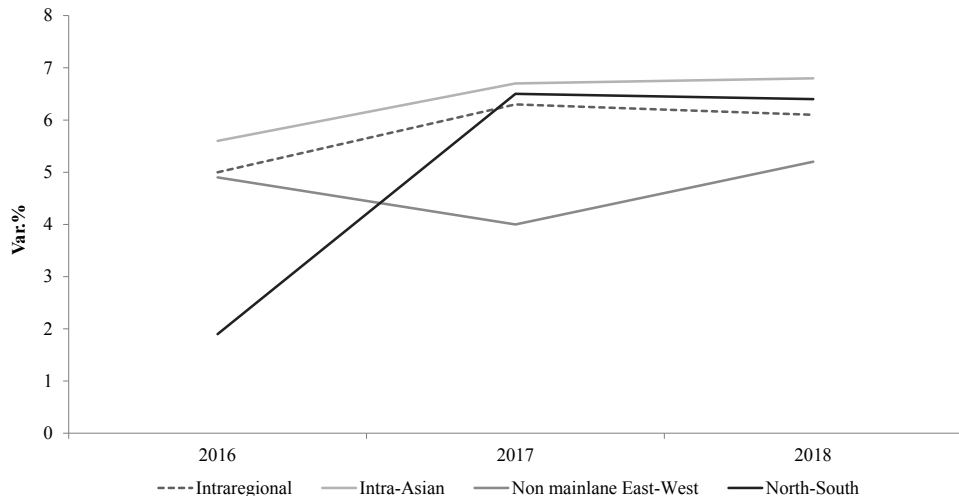
Alphaliner estimates that a further escalation of the US-China trade war, including the potential imposition of new tariffs on the remaining \$300 bn of Chinese exports to the US later this year, could result in a reduction in overall transpacific eastbound volumes of at least 8%. Meanwhile, exports from other Far East origins will not grow sufficiently to offset the expected reduction in cargos from China.

In addition to East-West routes, containerized trade also travels on non-major routes.

On these its growth was accelerated. Robust increase (6.5%) on the North-South trade route (the main ones concern the routes connecting East Asia with Australia, Sub-Saharan Africa and South America) reflected improvements in the commodity price environment and the higher import demand of oil - and commodity - exporting countries. Supported by economic growth in emerging Asian economies, as well as regional integration and global value chains, volumes on the intra-Asian routes picked up, expanding by 6.7%.

Containerized trade on the non-major East-West routes grew by an estimated 4.0 per cent, with varied performances across individual routes; key factors were faster growth on routes within and outside the Indian subcontinent and slower growth on routes within and outside Western Asia.

Containerized trade on non-major routes, 2016-2018



GRAPH 6 – SOURCE: SRM on UNCTAD

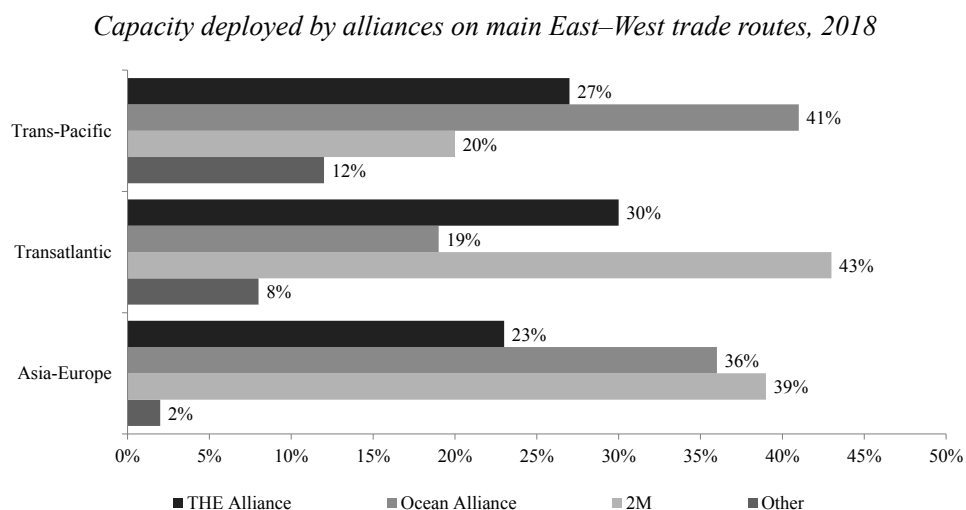
⁹ Alphaliner, *Weekly newsletter*, Volume 2019, Issue 20.

Stabilization of the freight rates trend in container transport can also be achieved thanks to a constant market consolidation, through mergers, acquisitions or alliances, use of increasingly larger vessels, with a capacity of around 20,000-22,000 TEUs, as well as a growing development of e-commerce and digitalization. All together, these factors are shaping the landscape of shipping and container transport and creating new challenges and opportunities for the sector. The result is a highly concentrated market structure, mainly in the main trade routes, where the three alliances collectively account for around 93% of the East–West routes, leaving 7% for the other smaller global and regional carriers.

Today there are three active alliances between the largest companies in the sector:

- Ocean Alliance: includes a European company (CMA CGM) and two Asian companies (Cosco Shipping and Evergreen) and holds 36% of the container shipping market on East–West routes;
- THE Alliance: consisting of a European company (Hapag-Lloyd), three Japanese liners (NYK, MOL and K Line, which in turn generated the ONE alliance) and the Taipei company Yang Ming. This alliance holds a 26% share;
- 2M: made up by Maersk and MSC, it subsequently accepted, as added members, the German companies HMM and Hamburg Sud. It has a 31% share.

The following graph shows in detail the 3 major alliances' shares on the main East–West routes:



GRAPH 7 – SOURCE: SRM on UNCTAD, 2018

The consolidation of the sector continues through mergers and acquisitions or alliances: if in January 2018 70% of the fleet was controlled by the top 15 carriers, in June of the same year the same percentage of vessels was controlled by the top 10 carriers.

Mergers, if well-conceived and accompanied by effective executional strategies, can

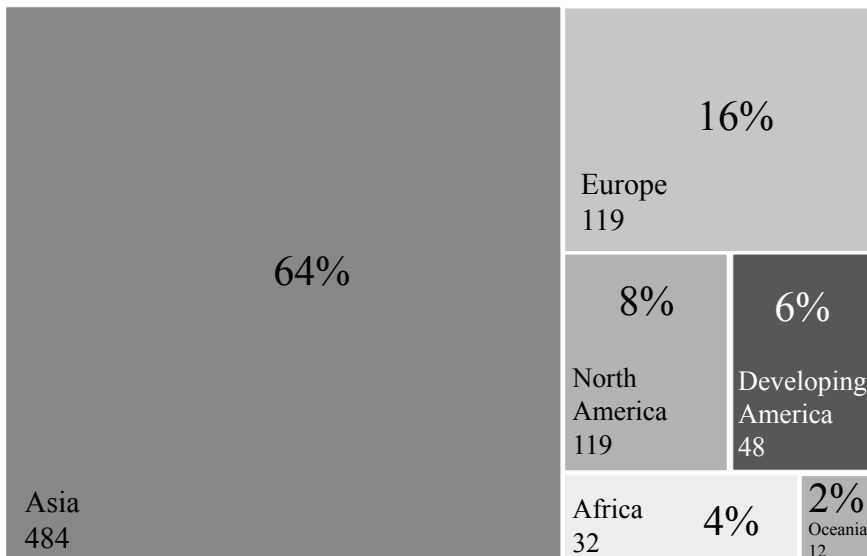
deliver greater value and help carriers improve performance and operational synergies.

For instance, cost synergies from the merger of Hamburg Süd and Maersk are expected to range from \$350 million to \$400 million by 2019, and they will mainly result from increasing integration and optimization of the networks, as well as standardizing procurement procedures.

The impact of increasing consolidation is also perceived by smaller operators that do not belong to an alliance. Their share in deployed capacity is 2% in the Asia–Europe trade routes, 8% in the transatlantic and 12% in the trans-Pacific. However, in many cases, many of these operators have a more regional focus and tend to be more active in smaller markets or individual routes.

In line with trends in global trade and shipping, Asia dominates the container-handling business. The region continued to account for nearly two thirds of the global container port throughput. Approximately 240 million TEUs (out of 752.2 million TEUs handled in the world) were recorded in China, Hong Kong and Taiwan in 2017.

World container port throughput by region, 2017 (million TEUs and percentage share)



GRAPH 8 – SOURCE: SRM on UNCTAD

Also in the container sector data on port performance expressed in TEU reflect the Asian prevalence, as shown in the following table.

Together, they handled an estimated 348 million TEUs in 2018.

Ports and terminals around the world are facing greater risks due to slower global growth, the presence of bigger ships and the consolidation of maritime carriers.

Investments in infrastructure, equipment and automation are expensive and, in many cases, slow. However, ports must protect themselves from the contraction of revenues, from obsolescence and the risk of being excluded from rapidly evolving carrier networks.

TOP 20 global container ports 2014-2018 (TEU, % annual change and rank)

Rank	Port	Country	2014	2015	2016	2017	2018	Var.% 18/17	Var.% 17/16	Var.% 16/15	Var.% 15/14
1	Shanghai	China	35,285,000	36,537,000	37,133,000	40,230,000	42,010,000	4.4%	8.3%	1.6%	3.5%
2	Singapore	Singapore	33,869,000	30,922,400	30,903,644	33,666,556	36,600,000	8.7%	8.9%	-0.1%	-8.7%
3	Ningbo-Zhoushan	China	19,450,000	20,627,000	21,561,000	24,610,000	26,520,000	7.8%	14.1%	4.5%	6.1%
4	Shenzhen	China	24,030,000	24,205,000	23,979,000	25,210,000	25,736,000	2.1%	5.1%	-0.9%	0.7%
5	Guangzhou	China	16,363,000	17,624,900	18,857,700	20,370,000	21,890,000	7.5%	8.0%	7.0%	7.7%
6	Busan	South Korea	18,683,283	19,468,725	19,456,291	20,493,475	21,670,000	5.7%	5.3%	-0.1%	4.2%
7	Hong Kong	China	22,226,000	20,073,000	19,813,000	20,760,000	19,640,000	-5.4%	4.8%	-1.3%	-9.7%
8	Qingdao	China	16,624,000	17,436,000	18,050,000	18,300,000	19,320,000	5.6%	1.4%	3.5%	4.9%
9	Tianjin	China	14,057,000	14,111,000	14,519,000	15,070,000	15,972,000	6.0%	3.8%	2.9%	0.4%
10	Jebel Ali	UAE	15,250,000	15,592,000	14,772,000	15,370,000	14,940,000	-2.8%	4.0%	-5.3%	2.2%
11	Rotterdam	Netherlands	12,300,000	12,234,535	12,385,168	13,734,334	14,480,000	5.4%	10.9%	1.2%	-0.5%
12	Port Klang	Malaysia	10,945,804	11,886,685	13,169,577	11,980,000	12,030,000	0.4%	-9.0%	10.8%	8.6%
13	Antwerp	Belgium	8,977,738	9,653,511	10,037,318	10,450,897	11,020,000	5.4%	4.1%	4.0%	7.5%
14	Xiamen	China	8,600,000	9,182,815	9,613,700	10,380,000	10,702,300	3.1%	8.0%	4.7%	6.8%
15	Kaohsiung	Taiwan	10,590,000	10,264,420	10,464,860	10,270,000	10,445,726	1.7%	-1.9%	2.0%	-3.1%
16	Dalian	China	10,130,000	9,450,000	9,614,000	9,700,000	9,770,000	0.7%	0.9%	1.7%	-6.7%
17	Los Angeles Port	USA	8,340,066	8,160,458	8,856,783	9,343,193	9,458,748	1.2%	5.5%	8.5%	-2.2%
18	Tanjung Pelepas	Malaysia	8,523,935	9,117,025	8,280,710	8,380,000	8,900,000	6.2%	1.2%	-9.2%	7.0%
19	Hamburg	Germany	9,728,666	8,821,481	8,906,817	8,815,469	8,730,000	-1.0%	-1.0%	1.0%	-9.3%
20	Laem Chabang	Thailandia	6,583,165	6,821,335	7,227,430	7,784,498	8,110,000	4.2%	7.7%	6.0%	3.6%
Top 20			310,556,657	312,189,290	317,600,998	334,918,422	347,944,774	3.9%	5.5%	1.7%	0.5%

TABLE 2 – SOURCE: SRM on Ports website

Some analysts, including Drewry, argue that the integration of ports and terminals is now obliged to address the new realities of container shipping. Others add that ports and terminals must look to the hinterland and bond much more to multimodal cargo logistics networks, building new relationships and revenue streams with shippers, 3PLs and other members of the land supply chain. Certainly, the challenges associated with managing the peak loads of mega-ships have already led shippers and terminals to work together much more than in the past. Digitization and automation are destined to play a vital role in securing new revenue, cost savings and greater efficiency. And this before even considering the plethora of new, disruptive digital players that are likely to help reshape the business.

This includes, among other things, a series of new deep-sea freight click-to-collect booking platforms and Uber-type truck capacity management initiatives by unconventional players such as Amazon, which is increasingly focused on logistics and transport.

Despite all the changes taking place, the global container industry is expected to continue to make solid profits.

5. FACTORS CONTRIBUTING TO SHAPING THE MARITIME TRANSPORT SCENARIO: THE IMPACT OF DIGITALISATION AND TECHNOLOGY

Digitization is a key factor with the potential of transforming the maritime transport business and which concerns both ships and handling operations and port management.

By digitalization we mean, in general terms, a combination of different technologies which the shipping industry is increasingly using to improve systems and processes.

More and more, carriers and freight forwarders alike are taking measures to digitalize internal processes, develop integrated IT infrastructures and offer real-time transparency on shipments. As reported by UNCTAD, some argue that technology could save \$300 in customs clearance costs for each consignment, which could potentially generate \$5.4 million in savings on a ship that has a capacity of 18,000 TEUs. Such new technologies relate to the way that ships move and operate, as well as to strategic decision-making and day-to-day operations at offices, and include automated navigation and cargo-tracking systems and digital platforms that facilitate operations, trade and the exchange of data.

They can potentially reduce costs, facilitate interactions between different actors and in general improve the maritime supply chain efficiency.

Automation and unmanned ships offer interesting options related to greater cargo intake, reduced fuel consumption and lower operational expenses such as crew costs. At the same time, as new technologies are incorporated into on-board operations, ships become more complex to operate.

Vessel and cargo-tracking systems are developing quickly. Technological developments can help in generating business intelligence for asset management and optimized operations, for example in the provision of data on fuel consumption and engine performance. Such systems also allow for the identification and monitoring of a ship's position, as well as for the monitoring of other aspects that might be important with regard to manoeuvring and stabilizing route and course, improving security and ensuring the safety of crew.

Combining on-board systems and digital platforms allows vessels and cargo to become a part of the Internet of things. A key challenge is to establish interoperability, so that data can be exchanged seamlessly, at the same time ensuring cybersecurity and the protection of commercially sensitive and private data.

Other technologies of relevance to seaborne trade include robotics, artificial intelligence and additive manufacturing or three-dimensional printing that may facilitate regionalized manufacturing and lead to some reshoring by displacing low-cost labour. 3D printing and robotics may facilitate regionalized manufacturing and lead to some reshoring by displacing low-cost labour. While 3D printing, in particular, is not expected to cause a massive relocation pattern, it may have an incremental impact and affect specific small markets. In time, this technology may lead to less raw materials being used in manufacturing. However, until it becomes widespread and cost-effective, the impact of 3D printing is expected to be marginal – existing estimates suggest that TEU volumes will drop by less than 1% by 2035.

The container shipping companies A.P. Møller-Mærsk, Mediterranean Shipping Company (MSC), Hapag-Lloyd and Ocean Network Express (ONE), all active in the sector of liner shipping, a market in which they are respectively the first, second, fifth and sixth global operators for fleet loading capacity, officially established the Digital Container Shipping Association (DCSA), a non-profit association based in Amsterdam, the Netherlands, which aims to examine, develop, adopt and update IT standards for the creation, transmission and storage of information and documents exchanged between the participants in the supply chain of international containerized maritime transport.

The application of such innovations in ports involves all aspects of a port business, including operations, planning, design of infrastructure development and maintenance. Relevant technologies can help optimize traffic; increase operational efficiency, process transparency and speed; automate processes; and reduce inefficiencies and errors. Practical examples of ways in which the impact of innovative technologies will likely be felt in ports include changes to loading and unloading operations (machine-to-machine communication, platform solutions, robotics and mobile workforces), storage (big data analytics, smart metering and single views of stock) and industrial processing (smart grids, smart energy management, 3D printing, safety analytics and predictive maintenance).

Digitization had already impacted operations of many ports which have changed dramatically over the past few decades. For example, scanning technologies are increasingly being used for security and trade facilitation, while automation is being introduced in various container terminals to improve productivity and efficiency and secure a competitive advantage. The use of robotized and remotely controlled handling systems along with the transition from manual to automated processes is still at relatively early stages of use, as 97% of world container port terminals are not automated. According to Drewry Maritime Research, the share of container terminals that are fully automated is close to 1%, while semi-automated terminals account for 2%. Fully automated terminals are those where the yard stacking and the horizontal transfer between the quay and the yard is automated, while semi-automated terminals are those where only yard stacking is automated.

However, the advantages of automation in ports should be considered within context.

In some cases, there can be a delay in reaching expected productivity levels due to many different innovations coming together without sufficient integration, and a lack of overall controllability. While technology is a key factor, it is not the only parameter influencing terminal productivity. The impacts in terms of a possible reduction in the workforce should not be underestimated.

To sum up, a broad range of technologies with applications in ports and terminals offers an opportunity for port stakeholders to innovate and generate additional value in the form of greater efficiency, enhanced productivity, greater safety and heightened environmental protection. For ports to effectively reap the benefits of digitalization, various concerns will need to be monitored and addressed. These include the potential regionalization of production and trade patterns associated with robotics and 3D printing, potential labour market disruptions, regulatory changes and the need for common standards. To do so, it is essential to promote awareness of the issues at stake, and strengthen partnerships and collaboration mechanisms among all stakeholders.

6. THE GROWING WEIGHT OF THE MEDITERRANEAN IN THE GLOBAL ROUTES AND THE ROLE OF THE NEW SUEZ CANAL

In the scenario just outlined and as regularly highlighted by SRM studies, the Mediterranean plays a strategic role (it concentrates 20% of global shipping) which has been increasingly consolidating due to a series of factors.

On the geo-economic level, the Mediterranean crosses the large Atlantic and Northern European markets on the one hand, and the Asian and African markets on the other. For these reasons, the centrality of this basin in international scenarios is a strong factor of attractiveness for public and private investments in the transport and logistics sector, which continue to grow despite some critical social and political situations. The numerous Chinese investments, alongside those from Turkey, the Emirates and Singapore in ports and maritime terminals of many Mediterranean countries represent a sign of clear interest in developing and upgrading transport routes in the area.

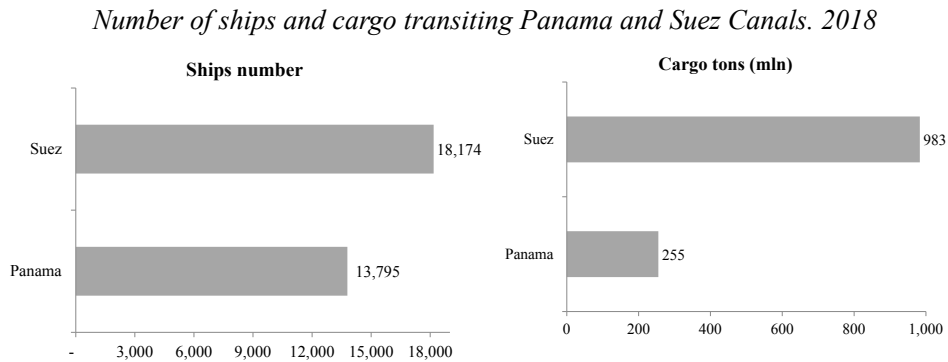
It is widely recognized that the Mediterranean represents a privileged transit route for containerized traffic - it concentrates 27% of the world's liner services - and that it is a very significant area also for Short Sea traffic, in a north-south direction, in particular in Ro-Ro mode. Also, another factor that has greatly contributed to increasing the centrality of the Mediterranean was the enlargement of the Suez Canal - now capable of accommodating large ships simultaneously in both directions, considerably shortening waiting times. This is also the subject of a masterplan, at an advanced stage of implementation, for the development of ports, industrial areas and service centers throughout its course, in order to make the Canal itself not only the traditional East-West transit, but to make it one of the centers of world trade.

The aim of the Egyptian government, pursued also through targeted marketing policies, is to attract traffic by increasing the convenience of transiting even for some routes from Asia to the East Coast of the United States that develop their natural path through Panama.

Some examples of these marketing policies include the 45-55-65% discounts to

containerships on some routes from the East Coast of the Americas and to the South and South East Asia. These rebates shall remain in force until 30/6/2019¹⁰. They might force carriers to choose to lengthen journey times in order to achieve savings.

The following chart compares the number of ships and cargo transited through the Suez and Panama Canals in 2018.



GRAPH 9 - SOURCE: SRM on Panama Canal Authority and Suez Canal Authority, 2019

After the construction of the New Canal, the Egyptian government developed the project in the form of SCZ (Suez Canal Zone), a vast Special Economic Zone around the actual canal whose main aim is to attract foreign capital to develop logistic, industrial and manufacturing activities¹¹.

The Suez Canal remains a strategic crossroads for global merchant maritime traffic as 9% of the world's international trade uses this passage. The growth of goods in transit shows significant values, confirmed also in 2018 when two records were broken, in terms of number of ships (over 18 thousand, + 3.6%) and cargo transported (983.4 million tons, + 8.2%).

Thanks to the enlargement, in 2018 average size of transiting ships grew by 12% on 2014 (the year before this improvement) following the trend of naval gigantism, which is increasingly gaining importance in the shipping sector.

These last phenomena are represented in the following graphs.

¹⁰ Suez Canal Authority Circular 2/2016 (extended up to 30/6/19).

In detail the rebates concern:

1. Container ships coming from port of Norfolk and its northern ports heading to the ports of Port Kelang and its eastern Ports shall be granted a reduction of 45% of the Suez Canal normal tolls.

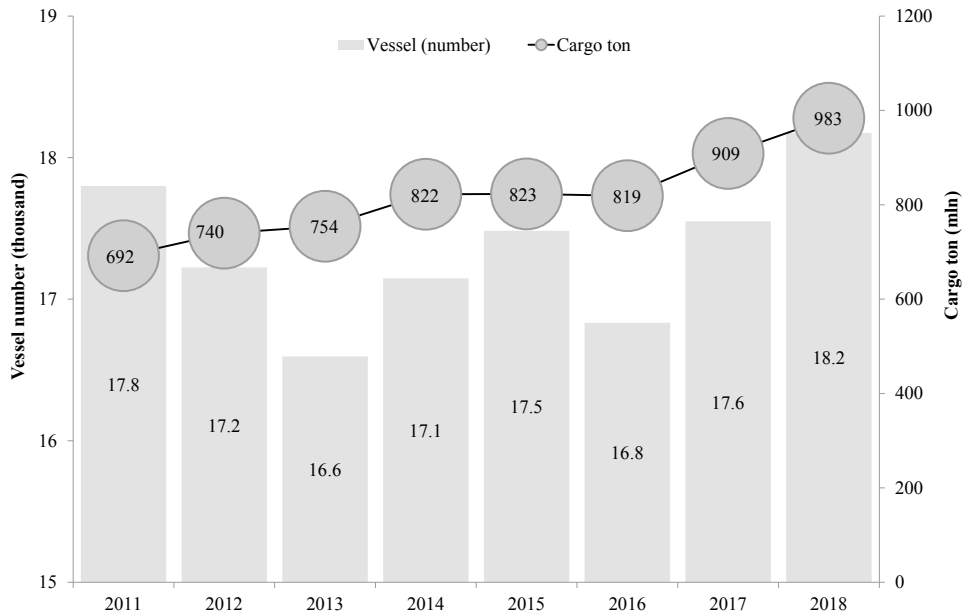
2. Container ships coming from ports south of port of Norfolk heading to:

a) Ports of Port Kelang and its eastern ports shall be granted reduction of 65% of the Suez Canal normal tolls.

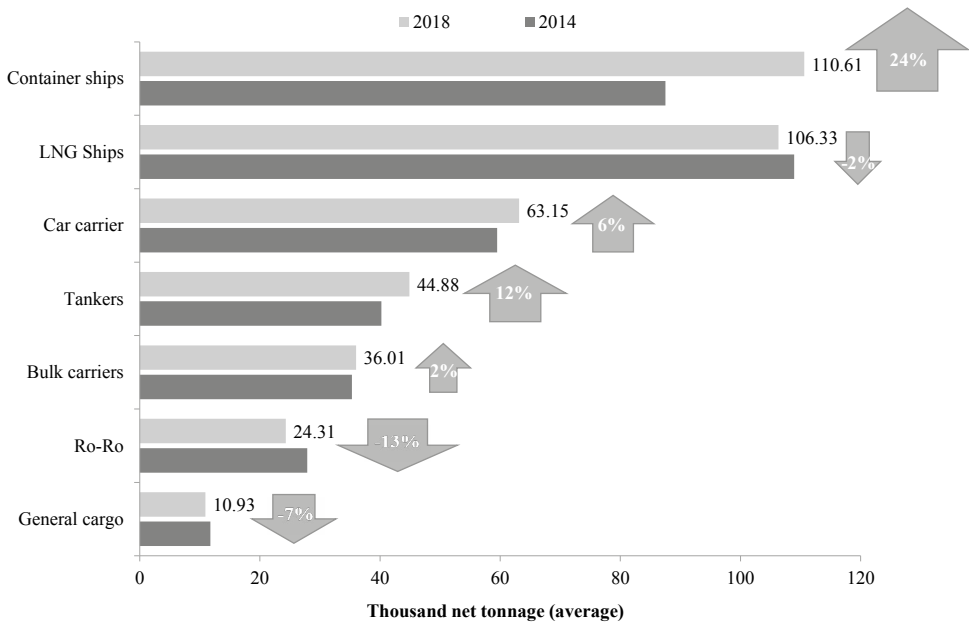
b) Ports of Colombo and its eastern ports located just up to port of "Port Kelang" shall be granted reduction of 55% of Suez Canal normal tolls.

Condition of applying the Circular is that the ship must not call any port in between port of origin and port of destination for commercial purposes.

¹¹ Alexbank, SRM (2018), The Suez Canal after the expansion: Analysis of the traffic, competitiveness indicators, the challenges of the BRI and the role of the Free Zone.

Ships and cargo through the Suez Canal. Trend 2011-2018

GRAPH 10 – SOURCE: SRM on Suez Canal Authority, 2019

Average net ton by ship type. Comparison 2014-2018

GRAPH 11 – SOURCE: SRM on Suez Canal Authority, 2019

Containerships are the most numerous transiting vessels (5,706; +2.5% on 2017).

Transiting goods traffic in 2018 was over 983 million tons, registering a growth equal to 8.2% on 2017 when the previous historical record of cargo loaded on ships transiting the Egyptian Canal had been marked. The new record was set thanks to Southbound goods, which amounted to 524.6 million tons (+9.8%), and Northbound goods, which reached 458.8 million tons (+6.6%), new records that have exceeded both the previous ones registered in 2017.

As for the type of goods in transit, containerized cargo and Oil & Products are confirmed as the largest commodity categories, accounting for 74% of the total. In particular, container cargo accounts for half of all the transiting goods.

These important results were also confirmed in the first 4 months of 2019 which recorded 6038 transit ships (+ 6.7%) transporting 331.6 million tons of cargo (+ 8.9%).

The Suez Canal is therefore the 3rd transit route in the world for Gulf oil and natural gas shipments to Europe and North America. This route accounted for about 9% of the world's seaborne oil trade. In 2018, crude oil and refined products and LNG accounted for 24% and 3% respectively of total Suez cargo measured by net metric tonnage. The 2015 enlargement of the Canal allows more than 60% of all tankers to transit the Canal.

The trend in traffic also shows that the enlargement of the Canal is gradually changing the global structure of maritime transport especially along the East-West route; in the last 11 years traffic from South East Asia to the Med has increased by 37%, a figure that needs to be considered alongside that of traffic to and from the Gulf (+ 77%) where a lot of trade relations are linked to China.

It should also be emphasized what role Mediterranean ports play in terms of handling of goods in transit through the Canal in both directions: ports distributed along the coasts of the basin and divided into West and South-West Med, North Med, Black Sea and East and South East Med represent the origin of 55% of the Southbound cargo and the destination of 55% of the Northbound cargo.

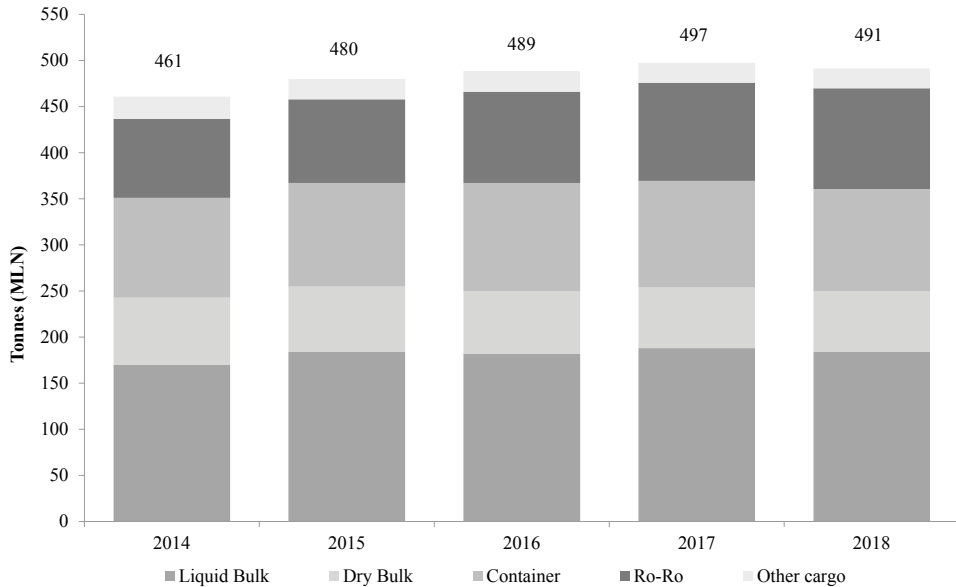
Suez is not only a strategic route for global maritime trade but it also represents a model of a port system that integrates areas dedicated to industrial manufacturing and investments in technology. It is an example from which even our country can learn methods and strategies also for our Special Economic Zones and thus make the Italian port system more competitive.

7. ITALIAN PORTS AS A SUPPORT TO THE COUNTRY'S ECONOMY AND ANALYSIS OF GLOBAL FLOWS

In the Mediterranean, on the Asia-Europe route, which is confirmed as one of the cornerstones of international freight traffic, Italy has a privileged geographical position. In this context, the national port system in 2018 recorded an almost stable trend mainly due to the performance of the Ro-Ro sector. This is related to inter-Mediterranean relations and with the Middle East, which represent a consolidated market with further potential of growth.

Italian ports handled an overall volume of freight traffic equal to 491 million tonnes, a figure equivalent to -1.2% on 2017.

Tonnes of goods handled by the Italian port system. Trend 2014-2018

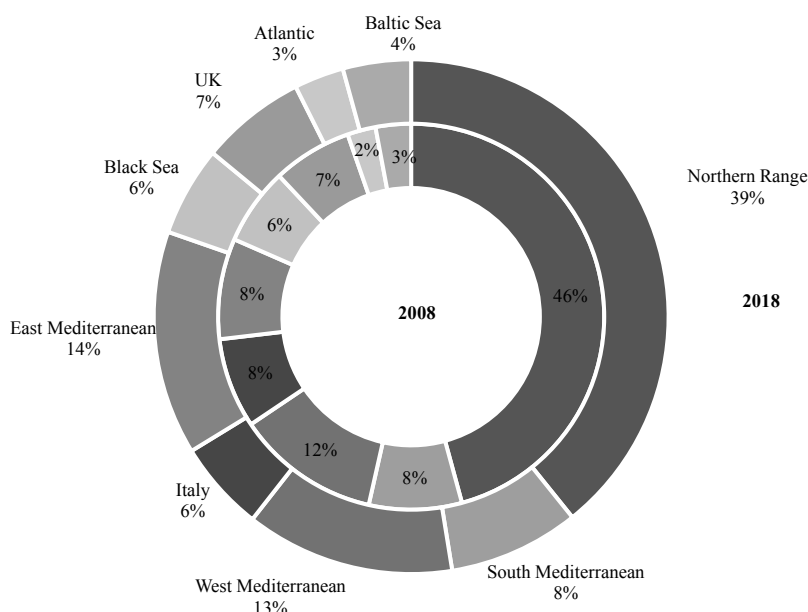


GRAPH 12 – SOURCE: SRM on Assoporti and Port Network Authorities, 2019

It should be noted that container handling remains at around 10.6 million TEUs. In this sector the continuing difficulty of the transshipment is testified by the losses detected by the two hubs of Gioia Tauro and Cagliari, while great gateways such as Naples and Trieste recorded an excellent performance. Other big ports as La Spezia, Livorno and Genoa (despite the tragedy of the Morandi Bridge in August 2018) confirm their traffic.

The difficulties of Italian hubs are also revealed by the fact that while in 2014 they handled 37.5% of the total TEUs handled, in 2018 this percentage dropped to 24.7%.

Performances shown in the container sector suggest that the Italian port system has failed to take advantage of its position in the Mediterranean to attract increasing flows of goods and strengthen its market share. This was mainly due to the supremacy of Northern Range ports, which are currently reaching their saturation level, but also to the strengthening of other ports in the Mediterranean.

Shares of container market by port area (TEU). 2008-2018

Explanatory note: This ring chart compares the market shares, not volumes of port systems. In detail, 100% is the sum of all the shares of the port range starting from the Black Sea and passing through the Med, the Atlantic, the Northern Range and terminating in the Baltic Sea. Italy, despite belonging to the West Bank Med, has been considered separately with the aim of highlighting its share more clearly.

GRAPH 13 – SOURCE: SRM on Port Authority, 2018

The graph above, comparing port performance over a decade, shows how the Mediterranean has gained market share, even compared to the Northern Range, particularly in the Eastern shore, where the weight of Piraeus is strong, and also in the West with the growth of the Spanish port system.

In Alphaliner's world ranking of the top 100 ports for container traffic in 2018, Genoa (in 73rd place), is the first among Italian ports followed by Gioia Tauro in 80th position.

The percentage of transshipments in Genoa is around 13%, so the port is configured as a gateway which, unlike Gioia Tauro, has a hinterland behind it embracing a potential market formed by the Po Valley, South-Eastern France, Switzerland and Southern Germany.

Gioia Tauro is a pure transshipment port (100%) and over the last few years has been suffering from the presence of competitors on the South bank of the Med, of Spanish ports and of Piraeus, the Chinese outpost in Europe. The Calabria hub also suffers from the effects of the new strategies undertaken by carriers which, driven by the need to rationalize and consolidate routes, tend to serve the Mediterranean with dedicated services and to reduce the number of stops in the area for pure transit traffic from Suez.

Moreover, an OECD¹² study also highlights the threat represented by the dependence of hub ports on alliances, which makes them more vulnerable. This is the case of Gioia Tauro which depends only on 2M.

With reference to the Ro-Ro sector, this constitutes a significant element of national portuality. The Italian Port System, due to its central and strategic position, has consolidated and developed its competitive position in the Ro-Ro sector through the provision of high quality and specialized services (especially for various goods), as well as of terminals able to accommodate the increasing shares of rolling goods of the Motorways of the Sea. EU and non-EU road haulage companies have been using Italian ports for years as access routes to the markets of South East Europe, the Middle East, North Africa and the western part of the Mediterranean. In this regard, both the Adriatic ports, in particular Trieste, Ancona, Bari and Brindisi and those of the Tyrrhenian Sea, in particular Genoa, Livorno, Civitavecchia, Naples and Salerno, can count on significant road traffic from countries that overlook the shores of the Mediterranean.

36% of the traffic of rolling stock in transit in Italian ports comes from abroad. This percentage is close to 100% in the ports of the Adriatic shore where cabotage traffic is residual and limited to a few stable lines¹³.

Euro-Mediterranean trade and its development prospects outline a scenario in which, despite the variability that characterizes exchanges with the countries of the southern shores of the Mediterranean, the Italian port system has strengthened its market share.

It is no coincidence that our country is the absolute leader in Europe, for freight transport in SSS both in the Mediterranean Sea and in the Black Sea. Italy also boasts the presence of shipping companies that are among the world leaders in the sector. In 2018, with over 109 million tonnes of goods in Ro-Ro, Italian ports reached their all-time high with a 3% increase on the already impressive result for 2017.

Liquid bulk represents the most important commodity category for Italy in terms of volumes and is therefore very strategic (high income for port activities). In 2018, with a marked prevalence of imports, around 184 million tonnes were moved, and these were mainly related to the demand for refining petroleum products and for energy.

Various non-containerized goods (general cargo) tend to become residual over time but remain vital for the supply chain of various industrial districts. This category includes, for example, the project cargo in which Italy has a leading position on the international scene, with a high progression in terms of the export of technology, know-how and specialization of operators.

Figure 2 shows traffic volumes, categorised by type, managed by the 14 Port Network Authorities and 2 Port Authorities.

¹² Merk. O., *The main global challenges for the port system*, April 2017.

¹³ Confcommercio, ISFORT (2015), *Sviluppo dell'intermodalità*.

Type of goods handled by the 14 Port Network Authorities and 2 Port Authorities in 2018

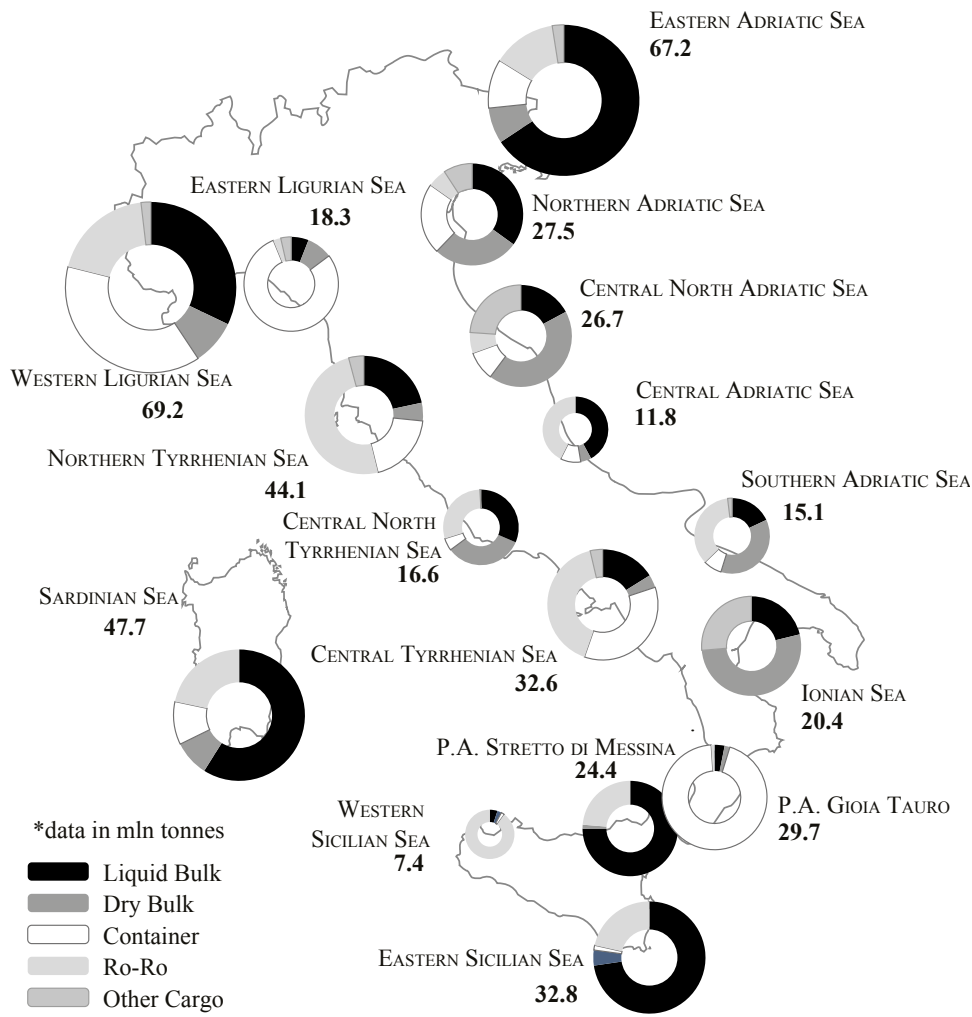


FIGURE 2 – SOURCE: SRM on Assoporti and Port Network Authorities, 2019

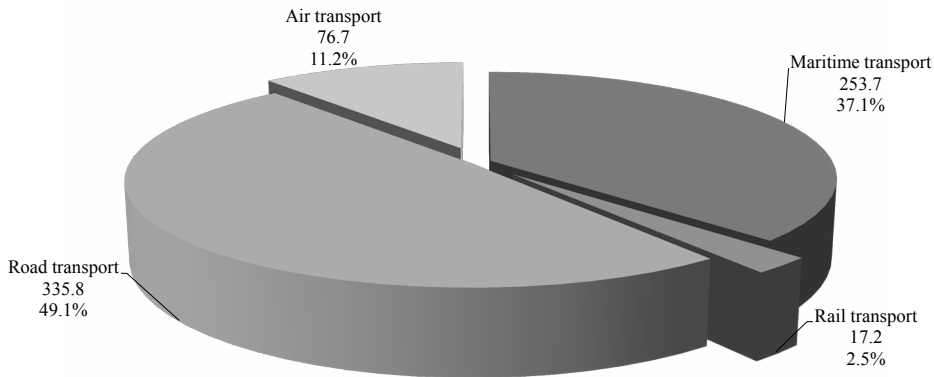
7.1 Focus on Italian Seaborne Import-Export

The analysis of port data shows that Italian ports represent an increasingly significant support to our economy and to the internationalization of companies.

In 2018, Italian seaborne trade was € 253.7 bn, recording a 6.3% increase on the previous year. Of these, €132.5 bn are in import (+ 8.6%) and 121.2 in exports (+ 3.8%).

37% of Italy's import-export is carried out by ship, as indicated in the chart below.

Import-Export by mode of transport (€bn and %). 2018

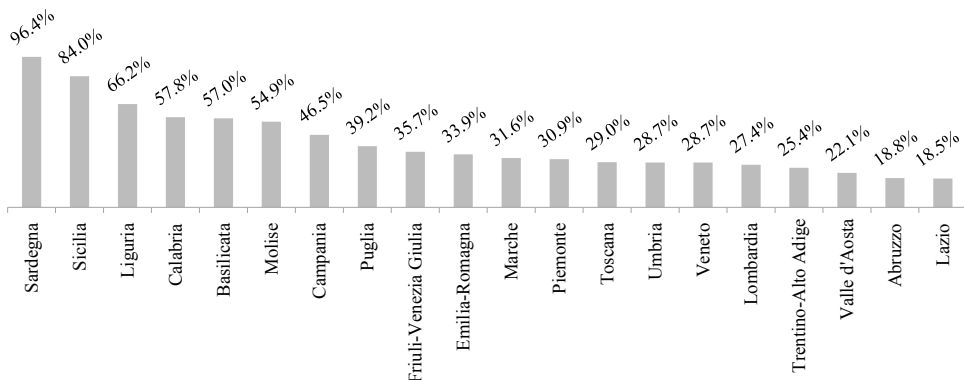


* Transport modes statistically identified were considered. “Not declared” and “Other means of transport” were excluded.

GRAPH 14 - SOURCE: SRM on Istat Coeweb, 2019

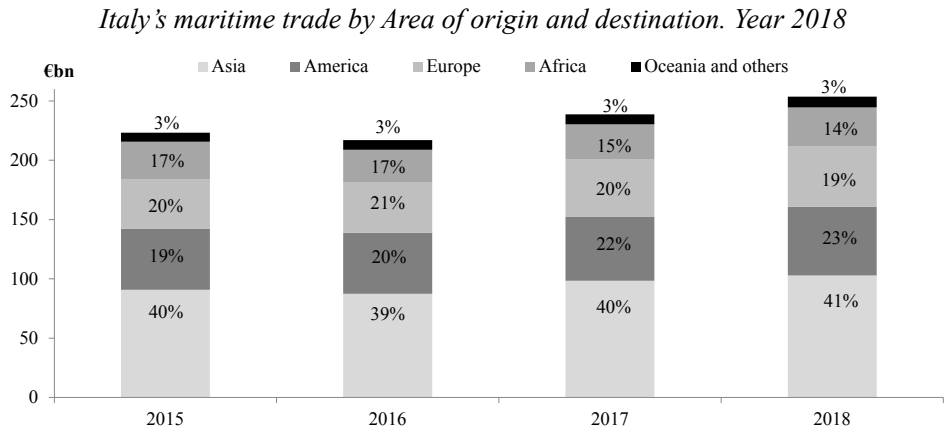
If we take a closer look at individual territories we can see that the weight of maritime transport varies across the different regions, as shown in the graph below.

Italian maritime export by region: percentage market share of the total. 2018



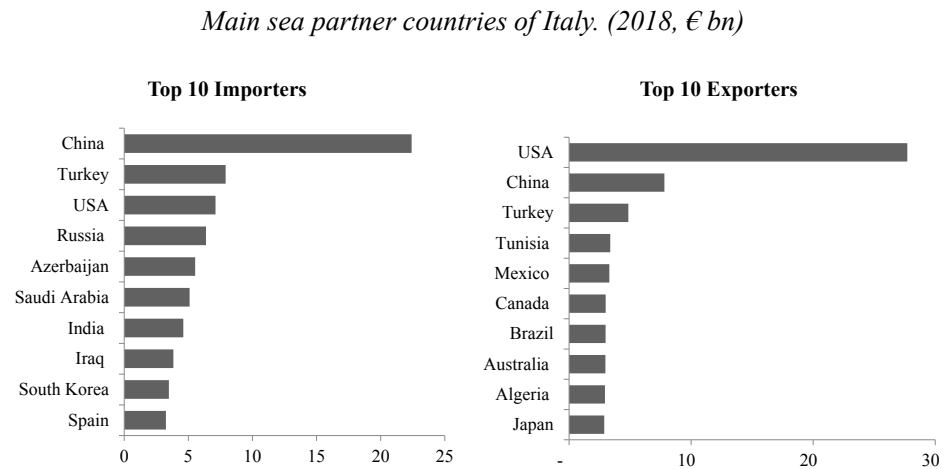
GRAPH 15 - SOURCE: SRM on Istat Coeweb, 2019

With reference to the geographical areas of our trade partners, the following graph shows the trend of Italian maritime import-export with the indication of the reference areas, from which we can deduce the significant role of Asia.



GRAPH 16 - SOURCE: SRM on Istat Coeweb, 2019

In particular, a closer analysis of the top 10 countries from which Italy imported and the first 10 countries to which it exported by sea in 2018 shows the importance of China as the main supplier country, accounting for 17% of all Italian import by sea (€22.4 billion). Our first customer country is the United States which draws 23% of our seaborne exports with €27.7 billion. Overall, the Top 10 suppliers represent 53% of Italian maritime imports and the Top 10 customers 51% of exports.

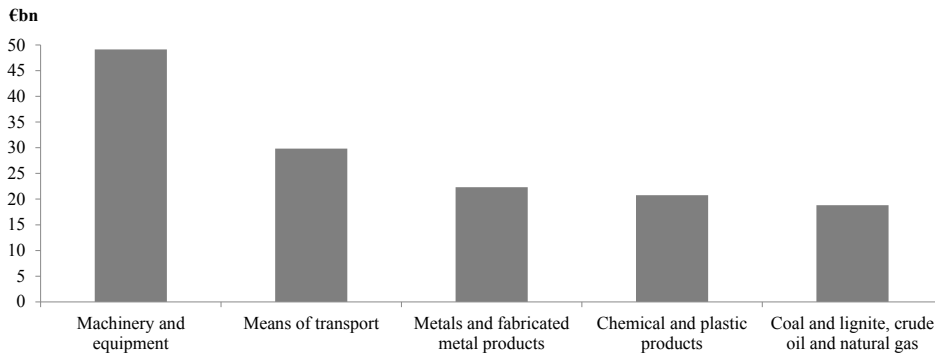


GRAPH 17 - SOURCE: SRM on Istat-Coeweb, 2019

As for goods traded by sea, the following graph shows the prevalence of machinery

and mechanical equipment with €49 bn, followed by means of transport with €30 bn, and finally by metals, chemicals and oil.

Main commodity categories of Italy's maritime trades 2018



GRAPH 18 - SOURCE: SRM on Istat Coeweb, 2019

8. CONCLUSIONS

In line with projected growth in the world economy, international merchandise trade and seaborne shipments, prospects for global port-handling activity remain positive overall. The outlook on the supply side is also favourable, as the global port infrastructure market is expected to record the highest gains between 2017 and 2025, primarily owing to increased trade volumes and infrastructural development in emerging developing Asian countries. An immediate concern is represented by the US-China trade war involving the two largest economies in the world and the emergence of inward-oriented policies and protectionism.

Volumes handled represent a widely used indicator usually providing insights into the functioning of a port and into their ability to attract business. Since flows of goods are largely influenced by variations of demand, port volumes help understand the situation of the global economy while providing information as to the potential needs in terms of transport infrastructure and investment requirements. As such, volumes handled in terms of all types of goods, can be used as a significantly reliable economic indicator. If we take a closer look at 2018 data, we can find out that the biggest port volumes (including both containers and bulk) in the world are concentrated in Asia, an area that has been showing significant growth.

The current global situation of port operations is characterized by increased competition, above all in the container sector where the decisions made by alliances in terms of capacity deployed and the suitability of port infrastructure can determine the future of a container terminal. The phenomenon of gigantism and the constant quest for efficiency of all players are pushing towards increased investments aimed at accommodating bigger ships and higher volumes, probably to the detriment of port operators' profit margins. To this end, an increasingly important role has been taken on by cooperation agreements between port

authorities, terminal operators, shipping companies and the local business associations.

The analysis of the impact of market concentration and of the deployment of alliances on the relationship between ports and carriers is relevant. Areas of intervention include the impact on the selection of stopovers, the configuration of maritime transport networks, the distribution of costs and benefits between carriers and ports and the concessions of container terminals in view of the fact that Shipping companies often have investments in terminal operations.

More than ever, ports and terminals around the world need to re-evaluate their role in global supply and logistics chains and prepare to deal with the changes brought about by the accelerated growth of technological advances with potentially profound impacts. It is important for ports and terminals to seek effective ways to embrace the new technologies so as to remain competitive and avoid the risk of marginalization in today's highly competitive port industry.

Enhancing port and terminal performance in all market sectors is increasingly recognized as critical for port planning, investment and strategic positioning, as well as for meeting globally established sustainability benchmarks and objectives. In this context, the port industry and other port stakeholders should work together to identify and enable key levers for improving port productivity, profitability and operational efficiencies. Governments should ensure that policy and regulatory frameworks are supportive and flexible.

To this end, the role of innovation and digitalization is crucial. For instance, the 5G revolution currently being implemented will ensure the necessary level of automation and artificial intelligence to fulfil growing operative demand. The connectivity and speed offered by 5G, which allows to transfer data safely in milliseconds, might encourage a digital transformation in containerized maritime transport by connecting ports and logistic companies safely as the first step of the way towards a smarter distribution chain.

Big corporations like Amazon have shaped customers' expectations in terms of speed of delivery, which means that ports investing in their own procedures and ensuring a good environment for goods to be dispatched before these enter the wider distribution chain, are also investing to pursue many other activities. At the same time, ports who do not keep up with this trend risk being cut out of the market.

Innovation, digitalization, e-commerce, streamlining of small transports, cloud computing, big data, Internet of Things, 3D printing alongside the use of satellite technology for tracking routes and safety at sea, can all have advantages but may also lead to inequality in the process of their appropriation.

In these terms, the idea of port-centred logistics is advancing and will have a key role in the future also due to changes in the structure of production costs owing to robotization and automation.

Recent news about Maersk Line and CMA CGM signing agreements with Chinese online giant Alibaba anticipate interesting times for the relationships, roles and entries in the new digital container economy.

Also, the announcement that CMA CGM and COSCO will use the Ocean Alliance to 'strengthen their strategic cooperation on port operations and investments', alongside important moves made by groups of terminal operators such as DP World, may lead us to blur the traditional borders between the descriptions of forwarders, logistic services

providers, carriers and ports. A similar situation to the one just outlined can be found in the Mediterranean which continues to strengthen its centrality on deep-sea transport routes of goods, also thanks to the Suez Canal constantly breaking records in terms of traffic of goods and ships. The Mediterranean basin is also important for short-sea transport, a sector where Italy could benefit from several opportunities and take advantage of its significant position in Ro-Ro. As a matter of fact, our country is leader, in terms of number of ships and tonnage, in the global fleet of Ro-Ro cargo and passenger/cargo vessels. Besides point-to-point relations, it is necessary to analyze the potential of traffic triangulations also with regards to other Mediterranean countries such as France and Spain from whom the port system can attract volumes originated by production regions along Mediterranean coasts. Furthermore, the growth of intra-Mediterranean exchange, in spite of the crisis that hit the area and the decline in oil products trade, suggests to strengthen relations with countries on the South and South-East shores.

As far as Italy is concerned, port volumes depict the picture of a country that is becoming a gateway providing support to the needs of its territory and businesses. Our country can take advantage of development opportunities thanks to its geographical position because it is located in a key position with regards to infrastructural projects that China is implementing in Europe. The BRI in fact, comprises a maritime route reaching Italian waters and China, which is already present in Liguria with a significant participation in the container terminal of Vado Ligure, has shown interest in the ports of Genoa-Savona and Trieste. This Italian centrality has been highlighted by the widely discussed MoU on the BRI between Italy and China during the first visit of president Xi Jinping in Italy in March 2019. One of the aims stated by the Italian government for this MoU is the idea of opening the way to new Chinese infrastructural investments to complete the country's efforts towards increased connectivity in Europe and in the world.

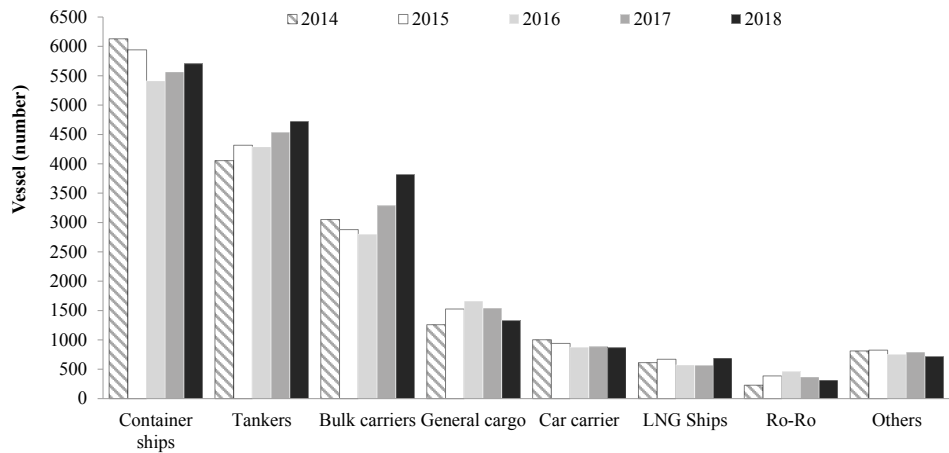
Improving our infrastructures in order to reduce the gap is important if we want to take advantage of market opportunities. Also, it will be important to reach the right integration between deep sea and short sea. The development of integrated transport is closely linked to the existence of an infrastructural network capable of organizing with efficiency and effectiveness the complex logistic process relating to the transport system and to the services linked to goods handling.

In this sense, there is an increasingly higher need for policies and regulatory frameworks to provide flexibility and support while allowing our ports to develop logistic-industrial activities supporting the ones purely related to ports. This seems to be the aim of the new regulations on SEZ and SLZ, areas linked to ports where manufacturing and industrial activities are carried out alongside logistic functions with value added, encouraged by tax discounts and streamlining of bureaucracy for flows of export, re-export and import. These zones represent a challenge and an opportunity for the Italian economy and logistics¹⁴.

¹⁴ SRM (2019), *SEZ-Special Economic Zones in the Mezzogiorno: Features of current situation, summary framework, strengths and implementation status*.

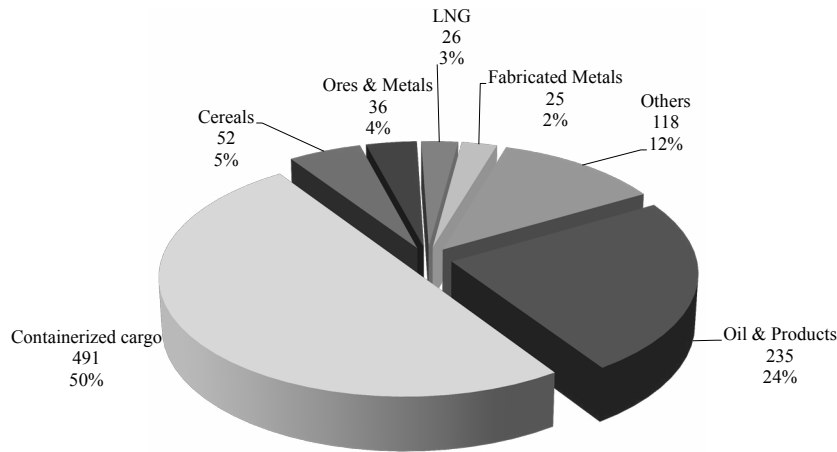
DEEP SEA SHIPPING

Suez Canal traffic by Ship type. 2014-2018



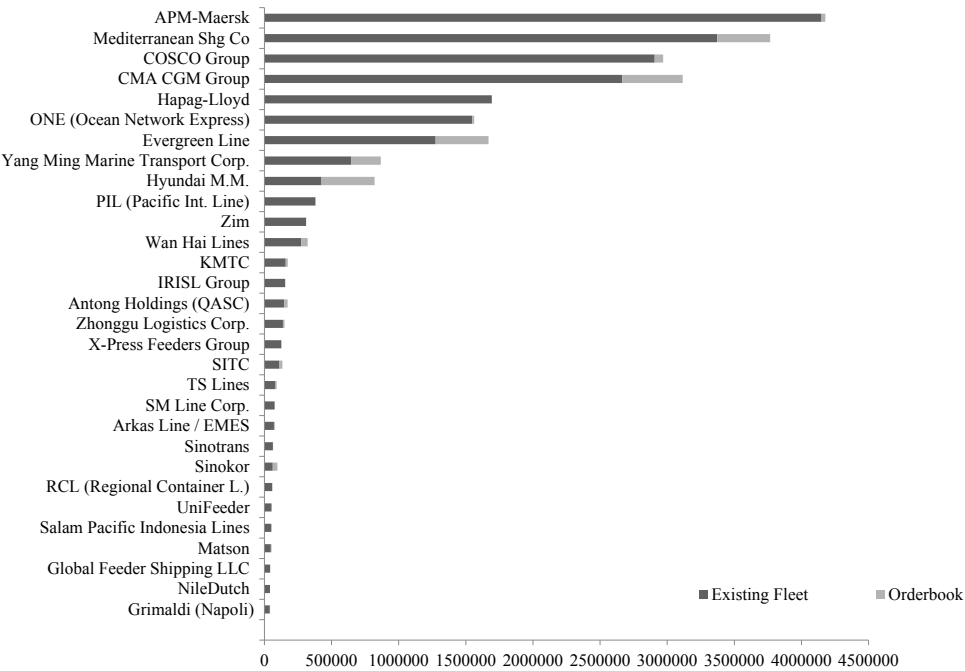
GRAPH 1 - SOURCE: SRM on Suez Canal Authority data, 2019

Suez Canal traffic by Cargo type (million tons and %). 2018



GRAPH 2 - SOURCE: SRM on Suez Canal Authority data, 2019

Size of the cellular fleet. Top 30 global carriers. March 2019



GRAPH 3 - SOURCE: Alphaliner, 2019

Cellular fleet growth forecast 2018-2022 (based on orderbook as at 01 February 2019)

SUMMARY

The fleet has risen by 5.8% during 2019

The fleet should rise by 3.2% during 2019, 3.5% during 2020 and 0.6% during 2021

The average growth for the three years from 1/1/2018 to 1/1/2021 stands at 2.4%.

Fleet as at	31 Dec 2018		31 Dec 2019		31 Dec 2020		31 Dec 2021		31 Dec 2022		Rise p.a. (3 years)
	ships	teu	ships	teu	ships	teu	ships	teu	ships	teu	
TEU nominal											teu terms
18000-23000	92	1,808,559	113	2,258,949	135	2,765,649	137	2,811,849	137	2,811,849	15.80%
15200-17999	34	571,375	54	908,265	54	908,265	54	908,265	54	908,265	16.70%
12500-15199	237	3,253,587	242	3,331,093	256	3,534,547	269	3,725,311	271	3,755,567	4.60%
10000-12499	160	1,707,703	164	1,753,101	180	1,942,001	194	2,108,801	194	2,108,801	7.30%
7500-9999	480	4,228,654	480	4,236,454	480	4,236,454	480	4,236,454	480	4,236,454	0.10%
5100-7499	456	2,832,080	454	2,820,638	454	2,820,638	454	2,820,638	454	2,820,638	-0.10%
4000-5099	641	2,905,500	641	2,905,500	641	2,905,500	641	2,905,500	641	2,905,500	2.00%
3000-3999	245	851,765	251	872,987	255	885,259	261	903,475	261	903,475	5.20%
2000-2999	664	1,689,771	700	1,783,089	742	1,891,821	774	1,968,325	778	1,976,477	4.70%
1500-1999	591	1,014,554	626	1,077,686	663	1,145,148	673	1,163,440	675	1,167,040	2.50%
1000-1499	711	818,382	730	840,715	749	862,818	765	881,712	765	881,712	0.80%
500-999	777	576,280	796	589,681	798	590,681	798	590,681	798	590,681	-0.10%
100-499	196	62,865	195	62,649	196	62,769	196	62,769	196	62,769	4.00%
TOTAL	5,284	22,321,075	5,446	23,440,807	5,603	24,551,550	5,696	25,087,220	5,704	25,129,228	
TOTAL after Exp. Scrap/Slip	5,284	22,321,075	5,378	23,026,887	5,453	23,837,630	5,546	23,973,300	5,484	23,765,308	
Rise 12 months	2018>	5.80%	2019 >	3.20%	2020 >	3.50%	2021 >	0.60%	2022 >	-0.90%	

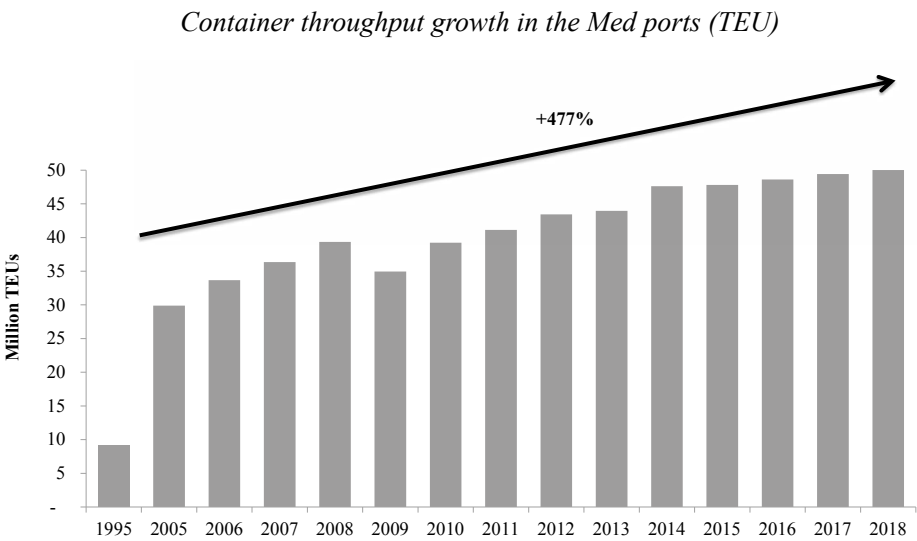
Rise p.a. (3 years) represents the average per annum growth during the three years 2018-2019-2020.

TABLE 1 - SOURCE: SRM on Alphaliner data, 2019

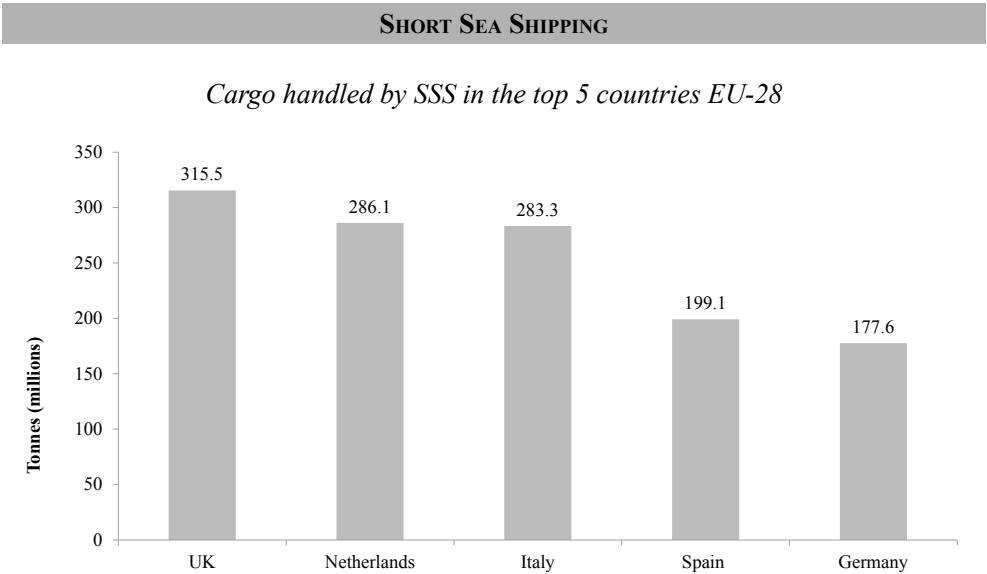
Top 30 ports in EU and Med (TEU). 2008 and 2018

Rank		2018	2008
1	Rotterdam	14,512,661	10,784,000
2	Antwerp	11,100,408	8,663,000
3	Hamburg	8,730,000	9,737,000
4	Bremen	5,483,222	5,448,000
5	Valencia	5,182,665	3,602,000
6	Piraeus	4,908,000	434,000
7	Algeciras	4,772,504	3,327,000
8	Felixstowe	<i>3,800,000</i>	3,131,620
9	Barcelona	3,472,879	2,569,000
10	Tanger Med	3,472,451	921,000
11	Marsaxlokk	3,310,000	2,330,000
12	Ambarli	3,170,000	2,262,000
13	Port Said	3,050,000	3,258,000
14	Le Havre	2,884,000	2,450,000
15	Genova	2,609,138	1,766,605
16	Gioia Tauro	2,328,218	3,467,824
17	St. Petersburg	2,130,721	1,983,000
18	Southampton	<i>1,970,000</i>	1,616,750
19	Gdansk	1,948,974	185,661
20	Sines PSA	1,750,445	230,000
21	Mersin	1,722,000	868,000
28	London	<i>1,700,000</i>	962,460
22	Alexandria	<i>1,608,288</i>	1,259,000
27	<i>Izmir</i>	<i>1,600,000</i>	<i>895,000</i>
23	Zeebrugge	1,580,000	2,210,000
24	La Spezia	1,485,623	1,246,139
25	Ashood	1,477,000	828,000
26	Haifa	1,469,000	1,251,000
29	Marseille	<i>1,400,000</i>	851,000
30	Beirut	1,305,755	945,134
Top 30		105,933,952	79,482,193
% of the total			
	Italy	6.1%	8.2%
	Northern Range	41.8%	49.4%
	North Africa	7.7%	6.8%
	Spain	12.7%	11.9%
	UK	7.1%	7.2%
<i>2017 data are in Italic</i>			

TABLE 2 - SOURCE: SRM on Port Authorities

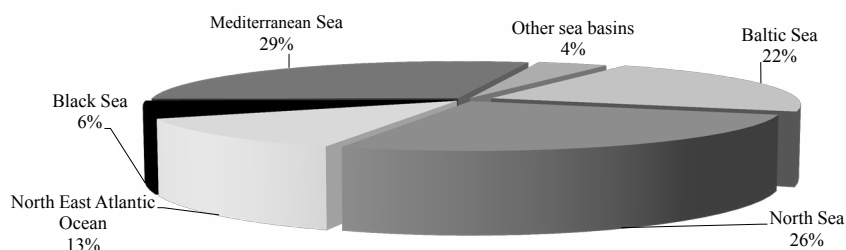


GRAPH 4 - SOURCE: SRM on Port Authorities, 2019



GRAPH 5 - SOURCE: SRM on Eurostat, 2019 – data at 2016

Target areas of SSS goods in the EU28



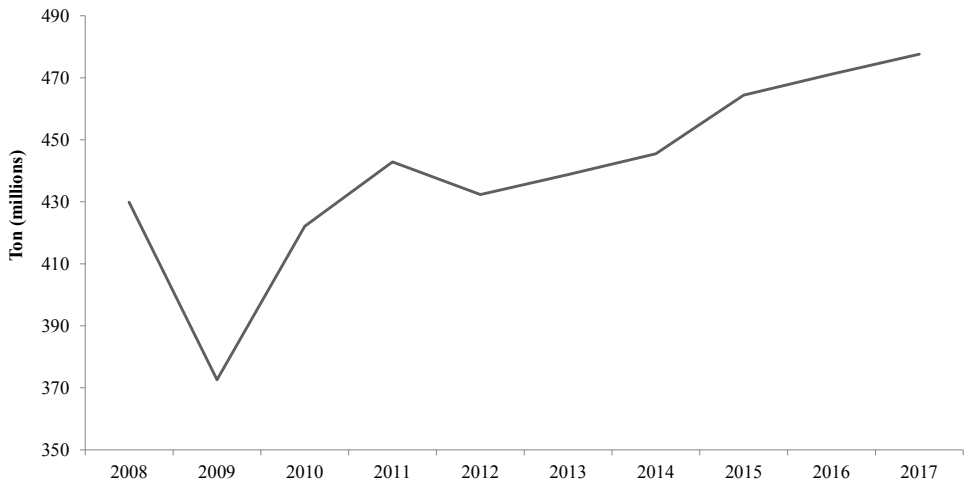
GRAPH 6 - SOURCE: SRM on Eurostat, 2019 – data at 2016

SSS of goods by reporting country and sea region of partner ports (gross weight of goods in thousand tonnes)

Sea Basin	Total	Baltic Sea	North Sea	North East Atlantic Ocean	Black Sea	Mediterranean Sea	Other sea basins
EU28	1,855,568	449,502	542,107	260,937	130,829	610,715	87,417
Belgium	143,174	24,787	44,468	22,828	3,149	45,457	2,485
Bulgaria	23,166	196	997	769	9,081	11,296	829
Denmark	74,368	36,862	30,266	1,639	446	1,562	4,272
Germany	177,605	95,312	55,927	11,903	1,257	11,775	1,888
Estonia	22,854	15,194	5,251	1,326	48	669	366
Ireland	41,200	1,134	16,481	22,315	168	687	414
Greece	100,860	656	5,857	1,200	16,219	75,962	966
Spain	199,107	10,236	28,670	45,091	10,396	99,542	12,536
France	164,699	12,862	33,125	48,682	13,136	45,337	11,830
Croatia	12,921	441	68	63	3,607	8,726	15
Italy	283,293	7,804	6,753	3,805	39,488	218,434	7,009
Cyprus	8,318	24	1,181	113	624	6,374	2
Latvia	50,137	15,577	23,201	4,195	156	6,958	52
Lithuania	32,955	20,566	7,894	2,250	147	2,067	32
Malta	3,483	8	182	39	54	3,199	0
Netherlands	286,148	89,414	84,593	27,323	13,786	31,861	39,171
Poland	55,407	24,865	19,573	2,862	266	7,291	550
Portugal	46,738	3,544	9,411	14,608	3,789	15,129	257
Romania	31,833	291	1,981	1,854	12,055	15,644	9
Slovenia	11,683	603	131	137	540	10,271	-
Finland	91,645	51,000	31,846	2,848	344	3,334	2,273
Sweden	153,063	89,011	52,257	6,733	227	5,510	1,258
UK	315,485	28,105	168,518	96,651	1,931	27,967	1,202
Norway	154,451	19,807	112,133	13,836	936	2,580	5,159
Turkey	268,491	7,409	22,589	9,202	77,472	145,542	12,043

TABLE 3 - SOURCE: SRM on Eurostat, 2019 – data at 2016

Gross weight of seaborne goods handled by Roll-on/Roll off in EU28 ports (million tonnes). 2008-2017



GRAPH 7 - SOURCE: SRM on Eurostat, 2019

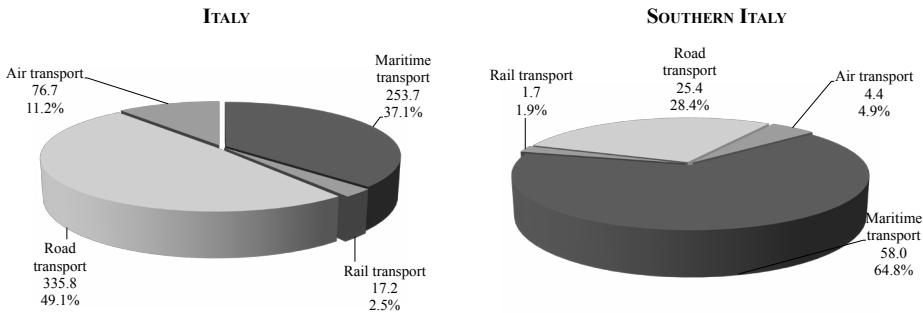
INTERNATIONAL TRADE RELATIONS

Italian maritime import-export. 2008-2018



GRAPH 8 - SOURCE: SRM on Istat Coeweb, 2019

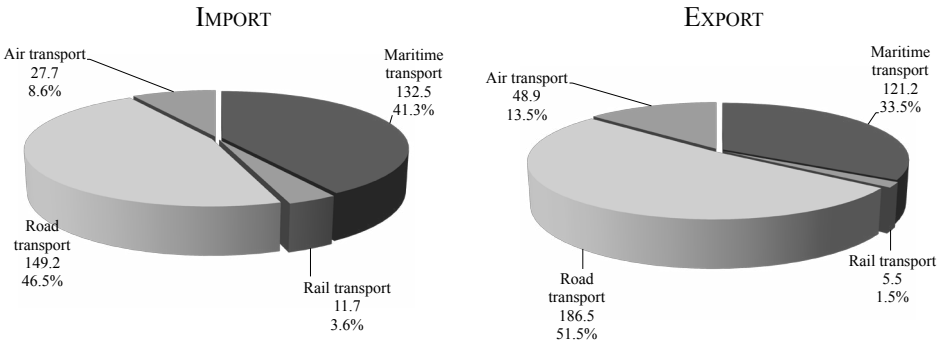
Import - export by mode of transport (data in € billion and %). 2018



* Transport modes statistically identified were considered. “Not declared” and “Other means of transport” were excluded.

GRAPH 9 - SOURCE: SRM on Istat Coeweb, 2019

Italian import - export by mode of transport (data in € billion and %). 2018



GRAPH 10 - SOURCE: SRM on Istat Coeweb, 2019

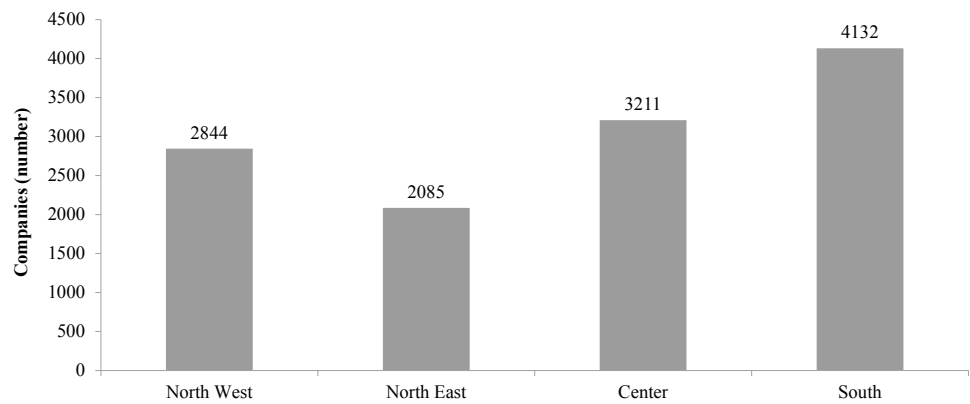
Italian maritime trade: world partners top ten. 2018



GRAPH 11 - SOURCE: SRM on Istat Coeweb, 2019

COMPANIES OF THE ITALIAN MARITIME CLUSTER

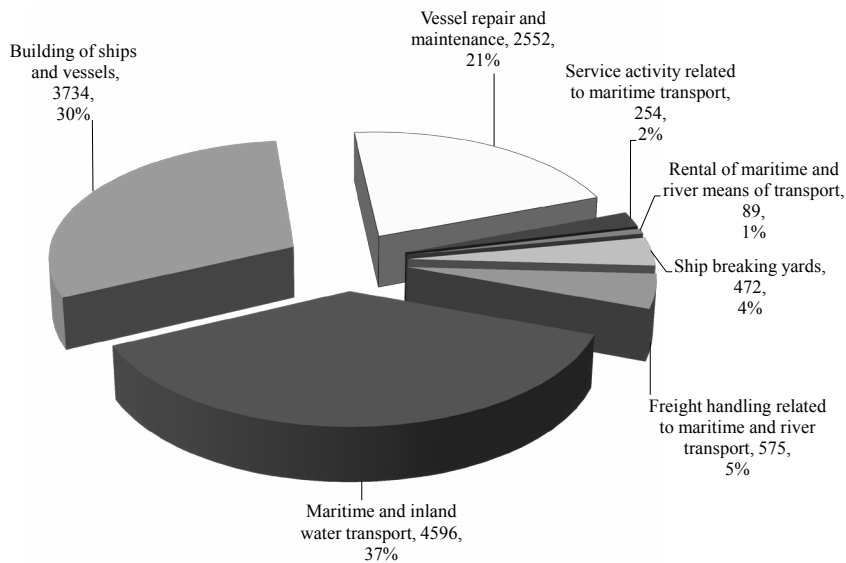
Companies of the maritime cluster by macroarea



*Data at December 31, 2018.

GRAPH 12 - SOURCE: SRM on Unioncamere, 2019

Companies of the maritime cluster sorted by business sector (number and percentage)



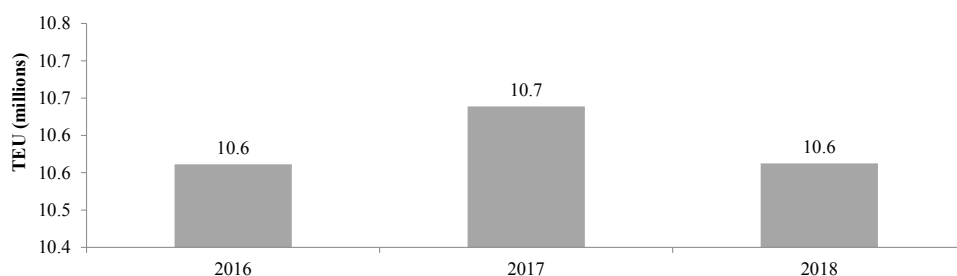
*Data at December 31, 2018.

GRAPH 13 - SOURCE: SRM on Unioncamere, 2019

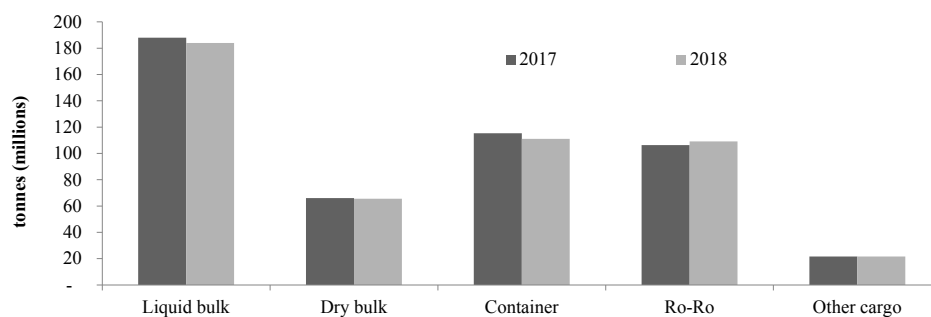
Italian merchant fleet (2016-2017)

Ships of 100 gt and over	31.12.2017		31.12.2016		Var. 2017/2016	
	N.	000 gt	N.	000 gt	N.	gt
Liquid cargo ships	247	4,163	254	4,258	-2.8%	-2.2%
Dry cargo ships	180	6,714	185	6,826	-2.7%	-1.6%
Mixed and passenger ships	426	4,757	436	4,734	-2.3%	0.5%
Obo Carriers	-	-	1	33	-	-
Auxiliary services ships	595	689	598	698	-1%	-1%
Total	1,448	16,323	1,474	16,549	-1.8%	-1.4%

TABLE 4 - SOURCE: SRM on Confitarma, 2018

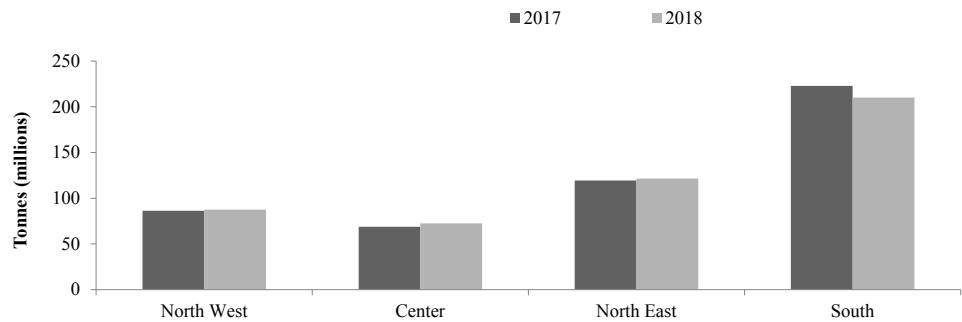
THE ITALIAN PORT SYSTEM PERFORMANCE*The Italian port system's container throughput (TEU). 2016-2018*

GRAPH 14 - SOURCE: SRM on Assoporti, 2019

Type of cargo handled by the Italian port system. 2017-2018

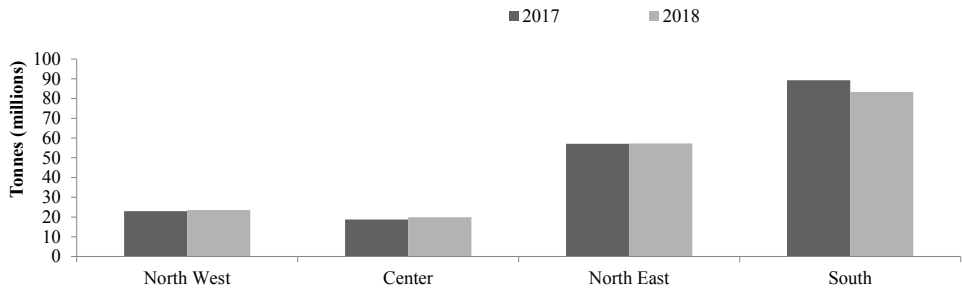
GRAPH 15 - SOURCE: SRM on Assoporti, 2019

Total cargo handled by macroarea. 2017-2018



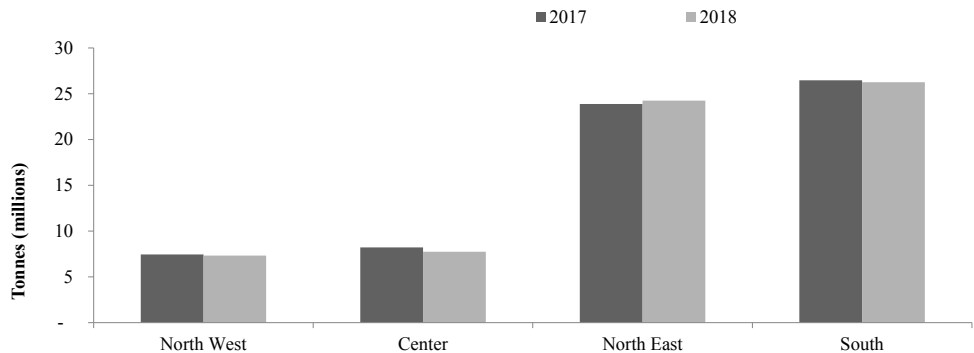
GRAPH 16 - SOURCE: SRM on Assoporti, 2019

Liquid bulk handled by macroarea. 2017-2018

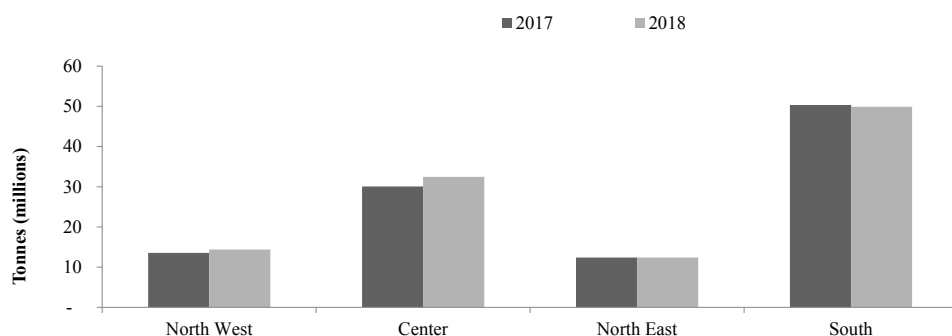


GRAPH 17 - SOURCE: SRM on Assoporti, 2019

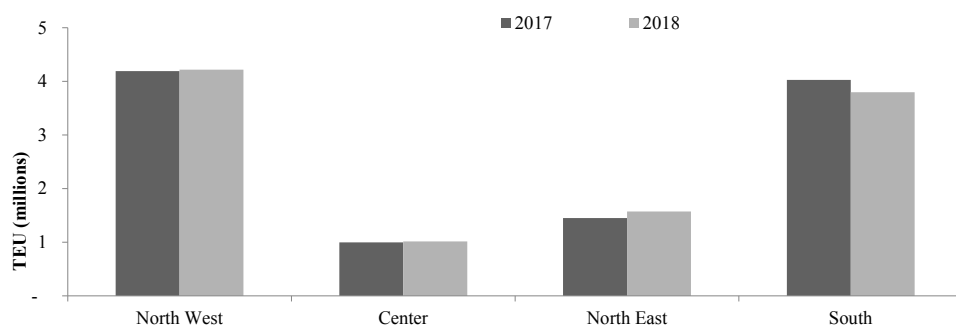
Dry bulk handled by macroarea. 2017-2018



GRAPH 18 - SOURCE: SRM on Assoporti, 2019

Ro-Ro handled by macroarea. 2017-2018

GRAPH 19 - SOURCE: SRM on Assoporti, 2019

TEUs handled by macroarea. 2017-2018

GRAPH 19 - SOURCE: SRM on Assoporti, 2019

Italian ports total throughput (Tonnes). 2016-2018 and var % 2017-2018

Port Network Authority/Port	2016	2017	2018	Var 2018-2017
Western Ligurian Sea	62,573,799	68,052,439	69,155,456	1.6%
Genoa	49,829,585	54,185,150	54,264,054	0.1%
Savona - Vado	12,744,214	13,867,289	14,891,402	7.4%
Eastern Ligurian Sea	17,499,186	18,260,066	18,276,676	0.1%
La Spezia	13,315,806	15,980,341	15,780,540	-1.3%
Marina di Carrara	4,183,380	2,279,725	2,496,136	9.5%
Northern Tyrrhenian Sea	32,066,494	41,070,163	44,081,063	7.3%
Leghorn	32,066,494	33,702,171	36,558,305	8.5%
Piombino	--	4,787,206	4,759,912	-0.6%
Portoferraio-Rio Marina-Cavo	15,238,399	2,580,786	2,762,846	7.1%
C.N. Tyrrhenian Sea	16,706,230	16,690,280	16,605,819	-0.5%
Civitavecchia, Fiumicino, Gaeta	16,706,230	16,690,280	16,605,819	-0.5%

Port Network Authority/Port	2016	2017	2018	Var 2018-2017
Central Tyrrhenian Sea	34,150,782	32,497,196	32,597,901	0.3%
Naples	20,992,466	17,297,554	17,680,576	2.2%
Salerno	13,158,316	15,199,642	14,917,325	-1.9%
Sea of Sardinia	59,150,328	49,705,169	47,666,955	-4.1%
Cagliari	46,165,381	37,900,249	35,922,468	-5.2%
Olbia	5,524,839	5,558,355	5,558,355	0.0%
Porto Torres	5,663,511	3,632,356	3,524,789	-3.0%
Golfo Aranci	198,286	127,678	125,330	-1.8%
Oristano	1,419,791	1,532,854	1,571,355	2.5%
Portovesme	178,520	953,677	964,658	1.2%
A.P Gioia Tauro	38,079,539	32,826,810	29,662,813	1.2%
Gioia Tauro	38,079,539	32,290,933	29,169,464	-9.6%
Crotone	--	320,237	228,754	-9.7%
Conigliano	--	215,640	264,595	-28.6%
Messina-Milazzo	22,816,131	26,087,041	24,431,458	22.7%
Eastern Sea of Sicily	38,702,470	36,112,274	32,810,274	-6.3%
Augusta	30,818,808	27,394,177	24,192,868	-9.1%
Catania	7,883,662	8,718,097	8,617,406	-11.7%
Western Sea of Sicily	6,725,833	6,980,467	7,377,290	-1.2%
Palermo - Termini Imerese	6,725,833	6,980,467	7,377,290	5.7%
Eastern Adriatic Sea	69,767,615	66,580,865	67,213,780	5.7%
Trieste	63,119,416	61,947,454	62,676,502	1.0%
Monfalcone	6,648,199	4,633,411	4,537,278	1.2%
Northern Adriatic Sea	20,702,885	26,274,624	27,510,278	-2.1%
Venice	18,766,839	25,134,624	26,495,278	4.7%
Chioggia	1,936,046	1,140,000	1,015,000	5.4%
Central North Adriatic Sea	17,655,758	26,513,570	26,684,341	-11.0%
Ravenna	17,655,758	26,513,570	26,684,341	0.6%
Central Adriatic Sea	15,212,806	11,038,100	11,832,439	0.6%
Ancona	15,212,806	11,038,100	10,819,087	7.2%
Ortona Pesaro	--	--	1,013,352	-2.0%
Southern Adriatic Sea	21,007,120	17,026,208	15,050,362	-11.6%
Bari	8,038,597	5,664,136	5,489,085	-3.1%
Barletta	1,127,644	912,023	876,425	-3.9%
Brindisi	8,760,728	9,507,508	7,859,503	-17.3%
Manfredonia	2,876,230	569,329	439,650	-22.8%
Monopoli	203,921	373,212	385,699	3.3%
Ionian Sea	24,668,850	21,648,288	20,433,435	-5.6%
Taranto	24,668,850	21,648,288	20,433,435	-5.6%
ITALY	488,517,369	497,363,560	491,390,340	-1.2%

TABLE 5 - SOURCE: SRM on Assoporti, 2019

Italian ports container throughput (TEU). 2016-2018 and var % 2017-2018

Port Network Authority	2016	2017	2018	Var 2018-2017
West Ligurian Sea	2,352,511	2,666,244	2,674,404	0.3%
Genoa	2,297,917	2,622,187	2,609,138	-0.5%
Savona - Vado	54,594	44,057	65,266	48.1%
Eastern Ligurian Sea	1,305,205	1,526,023	1,543,622	1.2%
La Spezia	1,272,425	1,473,571	1,485,623	0.8%
Marina di Carrara	32,780	52,452	57,999	10.6%
Northern Tyrrhenian Sea	800,475	734,085	748,024	1.9%
Leghorn	800,475	734,085	748,024	1.9%
Central North Tyrrhenian Sea	74,208	94,401	108,402	14.8%
Civitavecchia, Fiumicino, Gaeta	74,208	94,401	108,402	14.8%
Central Tyrrhenian Sea	872,053	980,039	1,036,548	5.8%
Naples	483,481	509,876	583,361	14.4%
Salerno	388,572	470,163	453,187	-3.6%
Sea of Sardinia	723,037	463,939	288,794	-37.8%
Cagliari	723,037	463,939	288,794	-37.8%
A.P Gioia Tauro	2,797,070	2,448,569	2,328,218	-4.9%
Gioia Tauro	2,797,070	2,448,569	2,328,218	-4.9%
Eastern Sea of Sicily	49,198	50,111	59,764	19.3%
Catania	49,198	50,111	59,764	19.3%
Western Sea of Sicily	12,160	13,310	15,962	19.9%
Palermo - Termini Imerese	12,160	13,310	15,962	19.9%
Eastern Adriatic Sea	487,442	617,019	726,514	17.7%
Trieste	486,462	616,153	725,426	17.7%
Monfalcone	980	866	1,088	25.6%
Northern Adriatic Sea	605,875	611,383	632,250	3.4%
Venice	605,875	611,383	632,250	3.4%
Central North Adriatic Sea	234,511	223,369	216,320	-3.2%
Ravenna	234,511	223,369	216,320	-3.2%
Central Adriatic Sea	185,846	168,372	159,061	-5.5%
Ancona	185,846	168,372	159,061	-5.5%
Southern Adriatic Sea	73,450	69,801	68,287	-2.2%
Bari	71,593	68,695	68,262	-0.6%
Brindisi-Manfredonia	1,857	1,106	25	-97.7%
Ionian Sea	375	-	-	n.d.
Taranto	375	-	-	n.d.
ITALY	10,573,416	10,666,665	10,606,170	-0.6%

TABLE 6 - SOURCE: SRM on Assoporti, 2019

Italian ports Ro-Ro throughput (Tonnes). 2016-2018 and var % 2017-2018

Port Network Authority	2016	2017	2018	Var 2018-2017
West Ligurian Sea	11,435,448	13,088,596	13,815,905	5.6%
Genoa	8,594,711	9,269,077	9,609,582	3.7%
Savona - Vado	2,840,737	3,819,519	4,206,323	10.1%
Eastern Ligurian Sea	278,828	476,940	580,709	21.8%
Marina di Carrara	278,828	476,940	580,709	21.8%
Northern Tyrrhenian Sea	19,009,823	20,409,216	22,171,749	8.6%
Leghorn	12,413,062	14,420,456	15,953,171	10.6%
Piombino	3,771,424	3,407,974	3,455,732	1.4%
Portoferraio-Rio Marina-Cavo	2,825,337	2,580,786	2,762,846	7.1%
Central North Tyrrhenian Sea	4,778,668	4,929,732	5,484,400	11.3%
Civitavecchia, Fiumicino, Gaeta	4,778,668	4,929,732	5,484,400	11.3%
Central Tyrrhenian Sea	12,850,790	13,913,134	13,369,460	-3.9%
Naples	5,903,741	5,759,513	5,400,253	-6.2%
Salerno	6,947,049	8,153,621	7,969,207	-2.3%
Sea of Sardinia	9,791,976	10,557,971	10,601,897	0.4%
Cagliari	3,974,366	4,125,380	4,097,468	-0.7%
Olbia	4,451,531	4,912,787	4,912,787	0.0%
Porto Torres	1,193,438	1,391,820	1,466,312	5.4%
Golfo Aranci+Oristano+S.Teresa	172,641	127,984	125,330	-2.1%
A.P Gioia Tauro	43,108	175,550	298,448	70.0%
Gioia Tauro	43,108	175,550	298,448	70.0%
Messina-Milazzo	5,943,203	5,657,180	5,793,292	2.4%
Eastern Sea of Sicily	7,018,110	7,755,859	7,623,470	-1.7%
Catania	7,018,110	7,755,859	7,623,470	-1.7%
Western Sea of Sicily	5,846,162	6,278,724	6,555,481	4.4%
Palermo - Termini Imerese	5,846,162	6,278,724	6,555,481	4.4%
Eastern Adriatic Sea	8,743,104	9,118,869	8,882,758	-2.6%
Trieste	8,467,518	8,843,960	8,650,105	-2.2%
Monfalcone	275,586	274,909	232,653	-15.4%
Northern Adriatic Sea	1,052,207	1,523,663	1,841,491	20.9%
Venice	1,052,207	1,523,663	1,841,491	20.9%
Central North Adriatic Sea	1,876,677	1,756,614	1,662,011	-5.4%
Ravenna	1,876,677	1,756,614	1,662,011	-5.4%
Central Adriatic Sea	4,473,609	4,706,345	4,783,208	1.6%
Ancona+ Ortona	4,473,609	4,706,345	4,783,208	1.6%
Southern Adriatic Sea	5,516,199	5,979,425	5,638,324	-5.7%
Bari	2,790,874	3,165,112	3,293,056	4.0%
Brindisi	2,725,325	2,814,313	2,345,268	-16.7%
Ionian Sea	24,147	2,387	--	--
Taranto	24,147	2,387	--	--
ITALY	98,682,059	106,330,205	109,102,603	2.6%

TABLE 7 - SOURCE: SRM on Assoporti, 2019

*Italian ports cruise passengers (number). 2016-2018
and var % 2017-2018*

Port Network Authority	2016	2017	2018	Var 2018-2017
West Ligurian Sea	1,927,612	1,779,631	1,859,885	4.5%
Genoa	1,017,368	925,188	1,011,398	9.3%
Savona - Vado	910,244	854,443	848,487	-0.7%
Eastern Ligurian Sea	523,191	472,764	495,186	4.7%
La Spezia	507,531	454,954	471,652	3.7%
Marina di Carrara	15,660	17,810	23,534	32.1%
Northern Tyrrhenian Sea	852,958	734,499	825,310	12.4%
Leghorn	807,935	698,780	786,136	12.5%
Piombino	1,947	5,895	12,759	116.4%
Portoferraio-Rio Marina-Cavo	43,076	29,824	26,415	-11.4%
Central North Tyrrhenian Sea	2,341,552	2,208,836	2,444,200	10.7%
Civitavecchia, Fiumicino, Gaeta	2,341,552	2,208,836	2,444,200	10.7%
Central Tyrrhenian Sea	1,417,546	993,073	1,141,686	15.0%
Naples	1,306,151	927,458	1,068,797	15.2%
Salerno	111,395	65,615	72,889	11.1%
Sea of Sardinia	468,543	564,041	513,962	-8.9%
Cagliari	258,066	430,534	394,697	-8.3%
Olbia	193,750	96,024	110,501	15.1%
Porto Torres	14,066	35,901	8,467	-76.4%
Golfo Aranci	2,570	1,110	209	-81.2%
Oristano	91	472	88	-81.4%
A.P Gioia Tauro	13,737	6,696	8,463	26.4%
Crotone	9,015	4,141	6,483	56.6%
Conigliano	4,722	2,555	1,980	-22.5%
Messina-Milazzo	370,014	390,196	372,365	-4.6%
Eastern Sea of Sicily	101,042	67,235	123,985	84.4%
Catania	101,042	67,235	123,985	84.4%
Western Sea of Sicily	510,078	459,229	577,934	25.8%
Palermo - Termini Imerese	510,078	459,229	577,934	25.8%
Eastern Adriatic Sea	134,401	112,266	68,815	-38.7%
Trieste	134,401	112,266	68,815	-38.7%
Northern Adriatic Sea	1,625,850	1,445,067	1,579,246	9.3%
Venice	1,625,850	1,445,067	1,579,246	9.3%
Central North Adriatic Sea	45,617	50,133	18,068	-64.0%
Ravenna	45,617	50,133	18,068	-64.0%
Central Adriatic Sea	54,901	52,086	68,775	32.0%

Port Network Authority	2016	2017	2018	Var 2018-2017
Ancona+Ortona	54,901	52,086	68,775	32.0%
Southern Adriatic Sea	406,290	507,246	678,230	33.7%
Bari+Manfredonia	400,875	397,588	573,191	44.2%
Brindisi	5,270	109,008	104,085	-4.5%
Monopoli	145	650	954	46.8%
Ionian Sea	-	8,546	658	-92.3%
Taranto	-	8,546	658	-92.3%
ITALY	10,793,332	9,851,544	10,776,768	9.4%

TABLE 8 - SOURCE: SRM on Assoport, 2019

MARITIME TRANSPORT OF VEHICLES AND THE ROLE OF TERMINALS IN THE AUTOMOTIVE CHAIN. STRATEGIES AND INVESTMENTS FOR DEVELOPMENT IN EUROPE AND ITALY

1. FOREWORD

This chapter provides an overview of the global situation of maritime transport of vehicles with data and information on the volumes, routes and port-logistic activities connected to these.

To this end, it will be illustrated which strategies carriers are deploying in order to face the new challenges of the market while keeping efficiency at the centre of their attention. Based on these data, some forecasts will be elaborated on trade flows and routes along which this kind of traffic is currently concentrating.

After that, an analysis will be provided about the maritime nodes of transport of vehicles (specialized port terminals) with a description of their functional organization, infrastructure features and players involved, whose efficiency has become a competitive advantage for all the businesses making up the chain. Such analyses will make it possible to list the competitiveness factors of maritime Ro-Ro terminals which should be enhanced in order to maximize productivity, efficiency and therefore profitability while adapting to the changes that are currently affecting the situation of maritime transport of vehicles, especially in the Mediterranean.

Finally, an in-depth analysis of port performance in the sector of new cars has been carried out with regards to the main global, European and Italian ports and this is followed by an investigation into the key weaknesses that emerged and the strategies and entrepreneurial initiatives that are being implemented to make improvements while adjusting to the new market dynamics.

2. SITUATION OF THE GLOBAL MARITIME TRANSPORT OF VEHICLES

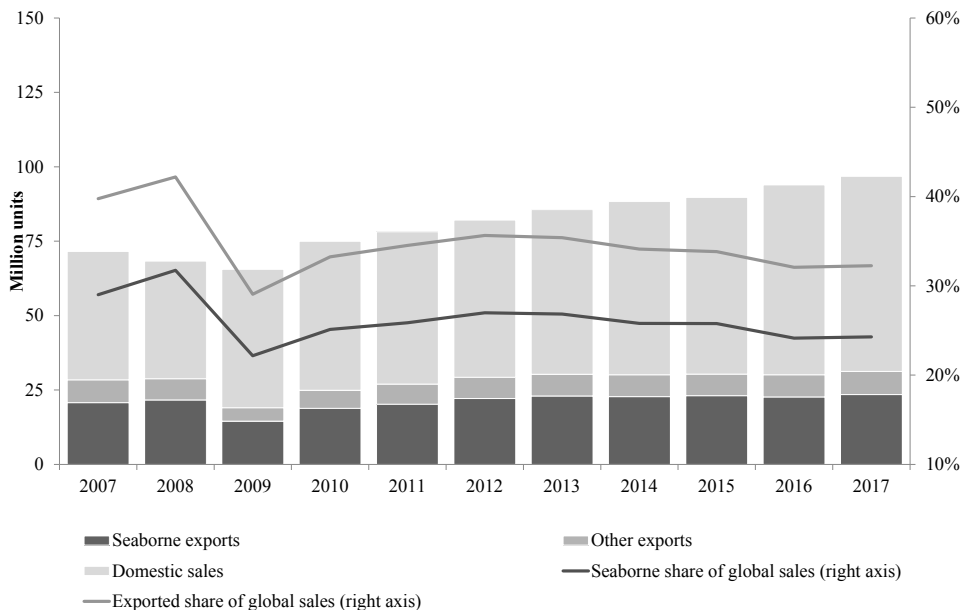
The world automotive industry is growing significantly with medium-term forecasts indicating an average annual increase rate between 2.9% and 3.4% for the period 2018-2022. This kind of development of the automotive industry has significant consequences on trade (export-import) and, in particular, shows some impact on maritime transport in terms of logistics.

Indeed, new vehicles¹ manufactured and sold globally amounted to over 96 million

¹ In their definition of vehicle trade, in addition to cars, Drewry have included High & Heavy vehicles. These include not only buses and trucks, but also specialized vehicles ranging from mining machinery (dump trucks, excavators, crushers, etc.), to agricultural machinery (tractors, harvesting machines, etc.) and equipment for construction (cranes, excavators, etc.) as well as special vehicles

in 2018, showing a slight decrease on 2017 (-0.5%) when this figure was 96.8 million and included both internal sales and exports. The total number of export vehicles was 31.2 million. In the world, maritime transport is the preferred mode used for exports and in fact the share of new vehicles transported via sea is 75%, equal to 23.5 million units, +3.7% on the previous year. If we take into account seaborne exports on total production this share goes down to 24.3% because the total volume also considers domestic sales carried out in the same production countries.

*Vehicles sold in the world (million units) and percentage share of maritime transport.
2007-2017*



GRAPH 1 – SOURCE: Drewry Maritime Research, 2018

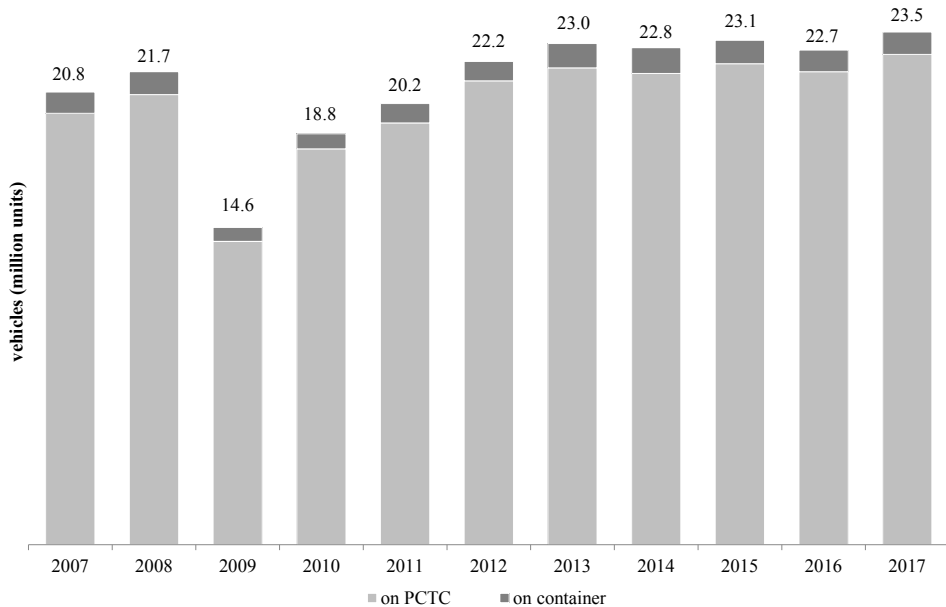
Only a small part of this maritime traffic is containerized while 96% (22.5 million units) travels on dedicated vessels named Pure Car Carriers (PCC) and Pure Car and Truck Carriers (PCTC). The volumes handled by these ships grew by an average annual rate of 1.3% in the period 2007-2017.

In 2017, maritime transport grew by 3.7%, a higher rate than that of global vehicle sales which was 3.1%.

One of the reasons underlying the growth of this mode of car transport is that, even to overseas ports, it does not affect product cost too much (on average between 1 and 3% of the car price tag- also depending on the capacity of the ship)².

such as ambulances. A minority of these vehicles, such as dump trucks, are sometimes partially dismantled and then shipped as breakbulks. Second-hand vehicles were also included in Drewry's analysis of commercial volumes.

² Grimaldi Lines estimates.

Maritime transport of vehicles. 2007-2017*

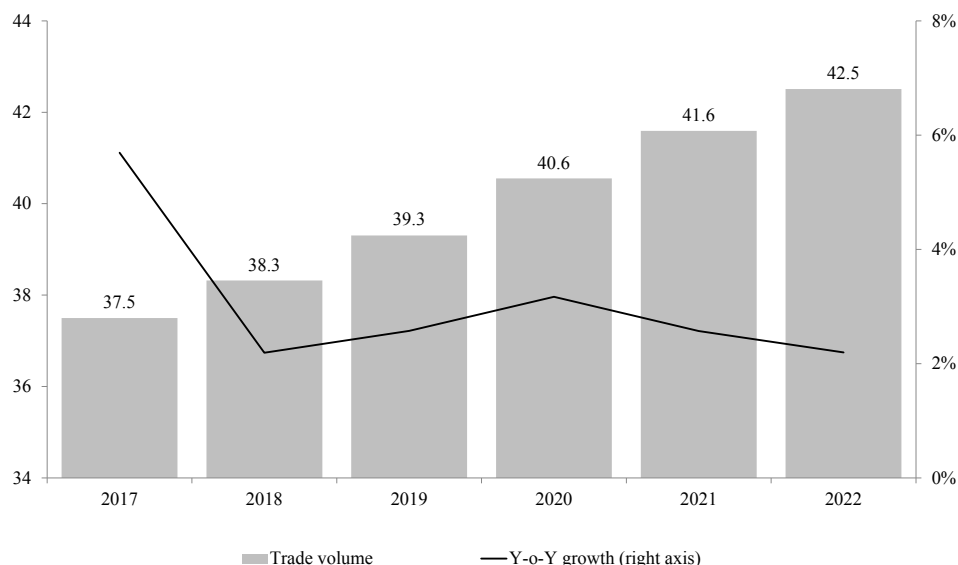
*Including intra-regional but not intra-Europe traffic, high and heavy and special vehicles.

GRAPH 2 – SOURCE: Drewry Maritime Research, 2018

The development of maritime transport of new vehicles follows the market trend and therefore the economic trend. Trade growth continues to be supported by strong sales in mature markets, but in recent years it has been the emerging markets that have shown greater momentum in demand. The latter have unexpressed potential, which allows them to accelerate domestic production rapidly, which in the short term jeopardizes trade growth. In the long term, however, it is expected that the trade of vehicles will continue to increase, but the change with respect to the past consists in reducing shipping distances as a consequence of the new production locations. The positive forecasts for the growth of vehicles trade are based on the consideration that with the increase in purchasing power in emerging markets, consumers also expect wider choice. However, not all markets are large enough to accommodate each Original Equipment Manufacturer (OEM) to create local production and each plant produces only a limited number of models. This implies that imports will continue to grow even in emerging markets and therefore the larger regions that host large domestic production can at the same time play the role of major exporters and major importers.

Forecasts for 2022 confirm an overall annual average growth in the maritime trade of vehicles of 2.5%, a figure led by an increase in volumes from Asia to Europe (+2.7% annual average) but more importantly by the growth of Intra-Asian trade (+4.2% annual average equal to 1.9 million CEU). The graph below illustrates growth forecasts of the maritime transport of vehicles:

*Forecasts on the global maritime trade of vehicles
(million CEU – Car Equivalent Unit). 2017-2022*



GRAPH 3 – SOURCE: Drewry Maritime Research, 2018

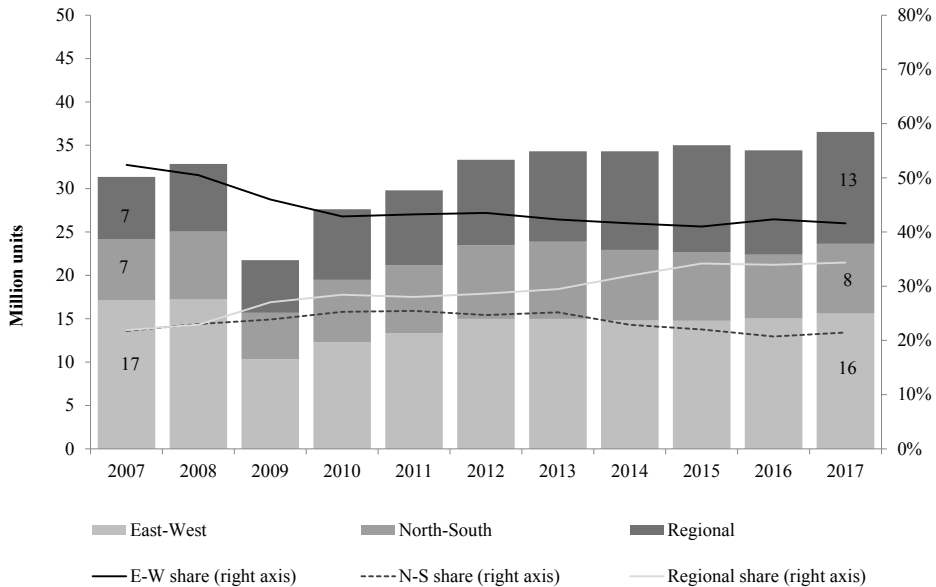
3. MARITIME TRADE FLOWS OF THE AUTOMOTIVE. EVOLUTION OF GLOBAL ROUTES

In terms of maritime transport, growth in emerging markets has brought higher fragmentation of the routes with a certain level of drainage of traffic from the busiest ones to new lines characterized by shorter distances. In fact, as highlighted also in the graph below, it is mainly short-haul regional trade that continues to show the most marked growth. This evolution of routes is explained also by a carrier's need to optimize their network through a reduction of the impact of trade unbalances (empty runs) and thanks to the choice of new operating models comprised of triangulation between countries and concatenation of routes, in some cases providing services throughout the world.

Over the last 10 years global economic dynamics and the most effective strategies deployed by businesses have brought about some changes in the transport of vehicles, new maritime routes have been launched while old ones have undergone transformation and reached new balances. East-West routes, which ten years ago attracted more than half of the volumes of world trade in vehicles, not only lost market share (from over 52% in 2007 to 42% in 2017) but showed also a decrease in absolute volumes, which declined at an average rate of -0.9% per year (15.6 million vehicles in 2017, 1.5 million less than in 2007). North-South routes (the main ones: Latin America, Sub-Saharan Africa, Oceania) attracted 8 million vehicles, equal to 21.5% of global maritime trade, and finally, the weight of regional routes (Intra-NAFTA / USMCA, Intra-Med, Intra-Asia, Intra-Latin America excluding Mexico) was 34.4% with 12.9 million.

The graph below illustrates the evolution of global routes in the 2007-2017 period.

Volumes of vehicles trade along the main routes (million units and percentage)



GRAPH 4 – SOURCE: Drewry Maritime Research, 2018

Along the East-West direction three main global routes can be identified: Asia-Europe-Asia, Transpacific and Transatlantic (see table 1 below for trends and forecasts).

The Asia-Europe-Asia is the major one in terms of transport of vehicles, if both directions are taken into account.

As for the westbound direction, from Asia to Europe and the Med, in 2017 the total volume of CEU was 3.8 million, approximately half of the 6.6 million CEU recorded in 2007, when this route was the busiest in terms of long-haul transport of vehicles. Several factors contributed to reducing flows along this route, amongst which the war in Syria and lower sales in North Africa due to the Arab Spring and Morocco's increase in internal production. Besides these, the weight of Russia's weaker internal economy needs to be considered as almost half of the decline in vehicles trade from Asia to Europe can be explained by a reduction in exports from South Korea and Japan towards Russia, most of which were made up of second-hand vehicles. Exports from South Korea and Japan continue to account for 70% of volumes transiting westbound through the Suez Canal. Along the same route but Eastbound (Europe to Asia) volumes have shown an average annual increase of 6.1% over the last decade, which made it possible to reach 2.6 million CEU. This trend is mainly dependent on an increase in Chinese imports of German luxury cars.

The Transpacific route, considered in both directions, is the second in the world. Nevertheless, if unidirectional Eastbound flows are considered, it is the busiest in the

world in terms of long-haul transport of vehicles. Asian exports towards North America have continued to grow thanks to the solid American automotive market and reached 4.8 million CEU in 2017.

This peak in sales in North America has contributed to an increase in incoming volumes thus widening the imbalance in transpacific and transatlantic traffic flows. Exports from Japan and South Korea account for over 90% of the volumes directed mainly to the US, while the remaining part regards exports to Thailand and China. Eastbound volumes are forecast to decline at an average annual rate of 2% until 2022, since production capacity in the US and Mexico continues to grow. Moreover, the new trade war between the US and China is forcing Asian exporters to investigate opportunities offered by other markets.

*Trade of vehicles along the East-West routes (million CEU).
2007-2017 and forecasts until 2022*

	Asia to Europe	Europe to Asia	Total Asia-Europe	Transpacific Eastbound	Transpacific Westbound	Total Transpacific	Transatlantic Eastbound	Transatlantic Westbound	Total Transatlantic
2007	6.6	1.7	8.3	5.2	0.2	5.4	1.7	1.7	3.4
2008	6.7	1.8	8.5	4.8	0.3	5.0	2.1	1.6	3.6
2009	3.6	1.6	5.1	2.9	0.2	3.1	1.1	1.0	2.1
2010	4.3	1.6	5.9	3.6	0.3	3.9	1.3	1.3	2.5
2011	4.4	2.1	6.5	3.5	0.4	3.9	1.5	1.4	2.9
2012	4.5	2.3	6.8	4.2	0.5	4.7	1.8	1.7	3.5
2013	4.2	2.5	6.7	4.2	0.6	4.7	1.8	1.8	3.6
2014	4.0	2.5	6.6	4.1	0.7	4.8	1.6	1.8	3.4
2015	3.4	2.6	5.9	4.6	0.6	5.2	1.5	2.2	3.6
2016	3.6	2.6	6.1	4.8	0.6	5.4	1.4	2.1	3.5
2017	3.8	2.6	6.4	4.8	0.6	5.5	1.4	2.3	3.7
Average Change up to 2022 (%)	2.70	2.90		-2.00	-1.40		1.50	-0.80	

TABLE 1 – SOURCE: SRM on Drewry Maritime Research, 2018

Westbound Transpacific trade is still marginal, representing only 2% of long-haul global volumes. Similarly to the trade between Europe and Asia, Chinese imports have played a key role on this route since the beginning of the current decade. These are mainly comprised of shipments from the US which is now the second major exporter of cars to China, after Japan and before Germany. As far as the transatlantic route is concerned, trade is smaller than on any of the major East-West global routes.

Mainly thanks to increasingly higher sales of German luxury cars, sales of vehicles in the US have pushed westbound volumes (from Europe and the Med to the American continent) until their figure reached a peak of 2.3 million CEU in 2017, after hitting a low of 1 million in 2009. The current volumes are forecast to decrease at an average annual rate of 0.8% until 2022 as it is estimated that there will be an increase in North American production capacity and a decline in demand.

Eastbound volumes (from the American continent to Europe and the Med) are mainly made up of US exports towards the EU and the Middle East.

It has been estimated that US exports to Europe will decrease while the EU will import more significantly from Mexico, a country that is currently trying to diversify its exports by reducing its dependence on the US market.

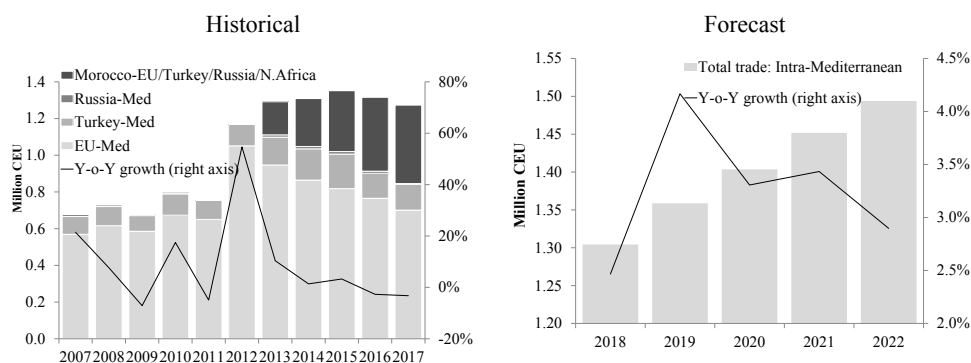
Regional routes. Intra-Med area

As for regional routes and with the aim of highlighting competitive consequences for Italy, it is interesting to look more closely at volumes and dynamics of vehicles trade in the Intra-Med area. In fact these volumes, not including intra-EU transports and transshipments, have shown a 3% decrease for the second consecutive year reaching 1.3 million CEU in 2017. Nevertheless, since 2013 Morocco has partially made up for this loss by increasing production to supply the EU market, which led the North African country to account for 33% of vehicles traded in the Mediterranean in 2017. The main export markets for Morocco are France (31%), Spain (10%) and Italy (9%).

The growth forecasts for trade in the region are increasingly solid because Morocco is becoming an important automotive producer as it now exports about twice as many cars as South Africa. Turkish exports should show slower growth.

Overall, vehicle sales in the area are already showing an upward trend for 2018, confirmed by the forecasts for 2022, which estimate an average annual growth rate of 3.3%.

*Intra-Mediterranean vehicle trade volumes 2007-2017
(million CEU) and 2022 forecasts*



GRAPH 5 – SOURCE: Drewry Maritime Research, 2018

Within the Mediterranean area, this analysis is even more detailed as in the macro-category of motor vehicles transport there is a tendency to highlight the main links provided by car carrier ships for the transport of newly-built motor vehicles. These are characterized by routes connecting several countries that usually stretch beyond the boundaries of the Mediterranean and they are mostly ‘round trip’, with origin and final destination in the North Sea.

Main car carrier links in the Mediterranean and Northern Europe

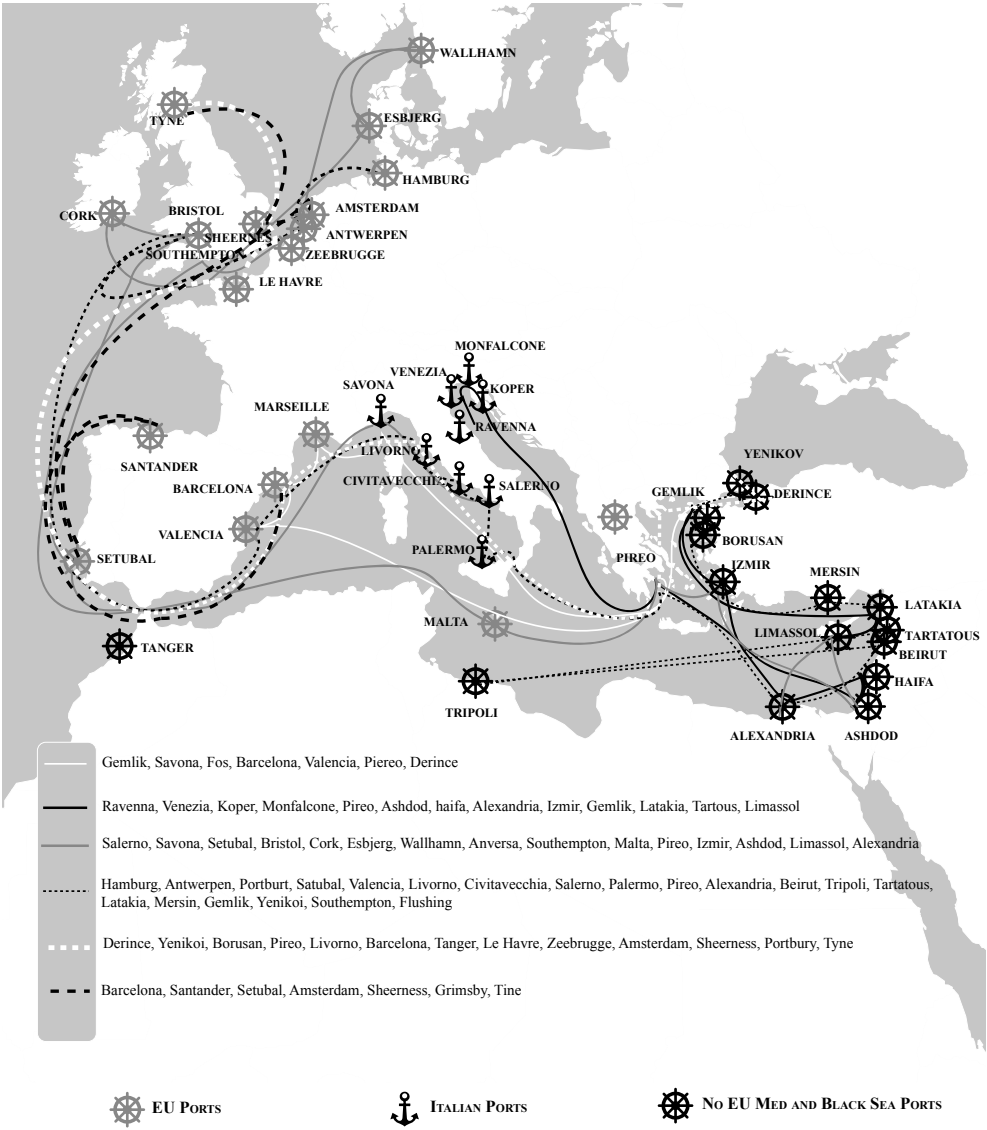


FIGURE 1— SOURCE: SRM on TLS Europe, 2016

There are two main operators dealing with the transport of newly built cars in the Mediterranean: the Italian Grimaldi Lines and Brussels-based Euromarine Logistics (EML), a joint venture project between Mitsui OSK Lines and Hoegh Autoliners AS.

Main car carrier operators and services in the Mediterranean and Northern Europe

OPERATOR		SERVICES		
Type		Load		Ports of call
1	Grimaldi Lines Euro Med Service Connection Northern Europe – Mediterranean Area	Weekly ship type Car Carrier - Container -RoRo	Cars, vans and others, containers.	Salerno, Savona (IT), Setubal (PT), Bristol (UK), Cork (IE), Esbjerg (DK), Wallhamn (SE), Antwerp (BE), Southampton (UK), Malta (MT), Piraeus (GR), Izmir (TR), Ashdod (IL), Limassol (CY), Alexandria (EG).
2	Grimaldi Lines Euro Aegian Service Connection Northern Europe – Mediterranean Area	Bi-weekly Ship type Car Carrier	Newly built cars, vans, other types of wheeled vehicles	Hamburg (DE), Antwerp (BE), Portbury (UK), Setubal (PT), Valencia (ES), Livorno, Civitavecchia, Salerno, Palermo (IT), Piraeus (GR), Alexandria (EG), Beirut (LB), Tripoli (LY), Tartous, Latakia (SY), Mersin (TR), Gemlik (TR), Yenikoy (TR), Southampton (UK) e Flushing (UK).
3	Grimaldi Lines Adriatic Service Connection Northern Adriatic – West Med	Weekly Ship Type Ro/Ro- Multipurpose	Cars, vans, wheeled vehicles and containers	Ravenna, Venezia (IT), Koper (SL), Monfalcone (IT), Piraeus (GR), Ashdod, Haifa (IL), Alexandria (EG), Izmir, Gemlik (TR), Latakia, Tartous (SY), Limassol(CY)
4	Grimaldi Lines West-East Med Connection West-East Med	Weekly Ship type Car Carrier	Cars, vans and other wheeled vehicles	Gemlik TR), Savona (IT), Fos (FR), Barcelona, Valencia (ES), Piraeus (GR), Derince (TR).
5	Euro Marine Logistics (EML) Connection North Continental (MT) - East Med	Weekly Ship type Ro-Ro / Car Carrier	Newly built vehicles and other RoRo Project cargo	Dernice, Yenikoy, Borusan (TR), Piraeus (GR), Livorno (IT), Barcelona (ES), Tangier (MA), Le Havre (FR), Zeebrugge (BE), Amsterdam (NL), Sheerness, Portbury, Tyne (UK).
6	Euro Marine Logistics (EML) Connection North Continental (MT) - West Med	Weekly Ship type Ro-Ro / Car Carrier	Newly built vehicles and other RoRo Project cargo	Barcelona, Santander (ES), Setubal (PT), Amsterdam (NL), Sheerness, Grimsby, Tyne (UK).

TABELLA 2 - FONTE: TLS Europe, 2016

4. THE ROLE OF RO-RO PORT TERMINALS IN THE AUTOMOTIVE SUPPLY CHAIN MANAGEMENT

In light of the above, Ro-Ro terminals are also taking on a key role in terms of logistic competitiveness because they can provide value-added services. Nowadays in the distribution of new vehicles, operation and productivity gains derive more frequently from the added value obtained at the terminals rather than from the efficiency of the modes of transport used because they allow to achieve economies of purpose and scale.

In order to improve productivity gains in motor vehicle distribution operations, it is very important to understand why and how outgoing goods (new cars) move and how they are managed until they reach the end customer. The logistics of the automotive supply chain has the advantage of producing a high added value in cascade since it is articulated on a dense network of interchange nodes, transporter trains, maxi-ocean vessels or for Short Sea transport, terminals, equipped parking lots, specialized hubs. Within these nodes, the maritime automotive terminal has an important function in the management and coordination of finished vehicle flows, as it provides the link between maritime transport and the inland areas while, in most cases, taking on a function which can be defined as “buffer”. That is, it becomes the “logistic node” in which it is possible to absorb the effects of a non-perfect synchrony between the delivery of vehicles in the port and their loading on export ships or, if in import, the arrival of the vehicles in port and untimely loading of the same on other modes, ie trucks and railways.

Using the maritime mode for the transport of new vehicles evidently promotes economies of scale, considering the large quantities of goods handled. Terminals can also allow economies of scope³ if they are able to provide value-added services such as storage with pre-delivery inspections (PDI) and postponement customization; all this represents an emerging paradigm in the automotive Supply Chain Management (SCM).

Postponement customization is based on the principle of creating design and building products based on the end customer’s demand through common platforms, components or modules, but this process does not take place until the final market destination is reached and/or until the customer’s requirements are known. In the automotive supply chain, postponement is a vital element to encourage maximum product customization while making operations more cost-effective.

Postponement strategies also have other advantages. First, they allow you to limit the total supply level because the inventory can be kept at a generic level, as there will be fewer stock-keeping⁴ variants. Secondly, since the inventory is generic, its flexibility is greater, which means that the same components, modules or platforms can be incorporated into a variety of final products, thus achieving mass customization and therefore at lower costs. Thirdly, forecasting is simpler at the generic level than at the level of finished items. This last point is particularly relevant in global markets where

³ Mendonça, M.C., Dias, J.C.Q., (2007), Postponement in the logistical systems of new automobiles marketed in Portugal: the Brands and quality. *Total Quality Management & Business Excellence* 18 (6), 691–696.

⁴ In inventory management, a stock keeping unit (SKU) is a specific item for sale that can be found in a specific position. In an inventory, the SKU represents the least aggregated level. Each product can be available in several variations in terms of size, model or colour. In this case, position is one but the product will have several SKU

local forecasts are generally less accurate than those forecast for the global volume, which translates into a higher-level offer of varieties at a lower total cost, allowing swift logistics in car distribution.

It seems clear that smart automotive terminals may represent new logistic ideas in the field of distribution of finished vehicles and thus for the whole automotive sector.

In order to perform this function, the terminal needs to work in different directions simultaneously. On the one hand, it needs to build good trade partnerships with traditional stakeholders like shipping liners, logistic operators, inspectorates, truck drivers, rail operators while on the other, it needs to start partnerships with manufacturers, salespeople and car dealers.

Increasing productivity in maritime automotive terminals by making operations more cost-effective becomes a key strategy for the whole automotive supply chain.

In this sense, it is necessary to take into account factors that may potentially represent issues in the integration of port terminals into the supply chain, with the aim of finding room for improvement. Such problems can be both internal and external with regards to Supply Chain Management.

In order to guarantee the smooth running of the supply chain the terminal needs to concentrate its actions mainly on the measures that it can keep under control. Also, it is necessary to follow up on the reduction of the impact of detrimental external factors since these could result in the creation of internal limiting factors in the long run.

Furthermore, it needs to be considered that a Ro-Ro liner tends to handle both semi-trailers and new cars. This is important to take into account because both types of goods tend to travel together on the national routes of the Motorways of the Sea and on vessels sailing to and from Spain and Turkey. On the other hand, when sailing on ocean routes, new cars travel on Car Carrier ships.

The technical difference between the two modes of maritime management of Ro-Ro traffic lies in the different height of the decks and in the use of different measurements in the calculations of space available on ship. In fact, on services of the Motorways of the Sea linear meters are calculated and it is possible to operate with a higher degree of flexibility than on Car Carriers.

The transport of semitrailers, by integrating one intermodal service with the transport of new cars, allows the shipowner to handle volumes of goods with a better management of spaces.

This technical condition has implications for the management of loading and unloading operations because these two flows need to be selected and directed to the most suitable spaces in the port after the ship has arrived.

In particular, semitrailers need to be sent towards road network junctions while new cars require adequate spaces for storage where they often undergo value-added operations and services.

The need to assess appropriateness of logistic structures is therefore functional to:

1. Monitoring the ability to attract new traffic, including potential transits (interchange and transshipment);
2. Avoiding congestion of available facilities (quays and inland logistic facilities)
3. Indirectly limiting the logistic appeal of other nearby competitor areas;
4. Maximizing flows with the aim of limiting the risk that ships leave a port empty

- (import-export balance, shipowner's business risk);
- 5. Evaluate infrastructure implementations with an eye to reducing the risk of excess capacity in times when the market is weak;
- 6. Diversifying modes of transport for the connection with internal logistic facilities and with road and railway networks;
- 7. Complying with administrative obligations and customs clearance.

5. IMPORT-EXPORT OF NEW VEHICLES THROUGH THE MAIN GLOBAL, EUROPEAN AND ITALIAN PORTS. TRAFFIC VOLUMES AND NEW BALANCES

As can be clearly seen, not all ports possess the appropriate means to deal with the handling of vehicles because these are high-value-added goods in need for specific intermodal Ro-Ro terminals, namely specialized ports that can be equipped with one or more terminals for vehicles, some of whose can be dedicated to specific car manufacturers.

Over the last few years, a higher number of ports in emerging countries has opened to this sector and in some cases the volumes reached have been so high that direct services were put in place by carriers. European ports are certainly the most important in terms of cars but in the last decade their presence in the top 20 world's ports went down from 13 to 9, which confirms the scenario forecast above.

A similar tendency has been recorded in the American continent, where US ports have lost market shares despite high volumes imported and Veracruz, in spite of its problems with capacity, has become the biggest automotive port in the region, while US imports from Mexico continue to grow.

The Far East is nevertheless the area that underwent the most significant change. Japan used to be the leader in this kind of traffic whereas the situation is different now: Nagoya is still in third place but only two other Japanese ports can be found in the top 20. This was mainly due to increasing localization of Original Equipment Manufacturers (OEM) in other Asian regions. In fact, other Far East ports have currently gained a place in the world's ranking.

Although Chinese exports have not equaled previous forecasts and a significant share of vehicles has been transported in containers, imports of German luxury cars alongside Short Sea Shipping and transshipment volumes have increased. Both Shanghai and Tianjin are now amongst the top 20 vehicle ports. Another port that grew significantly was Laem Chabang, and Thailand has become one of the main destinations for Japanese OEM seeking a regional productive basis.

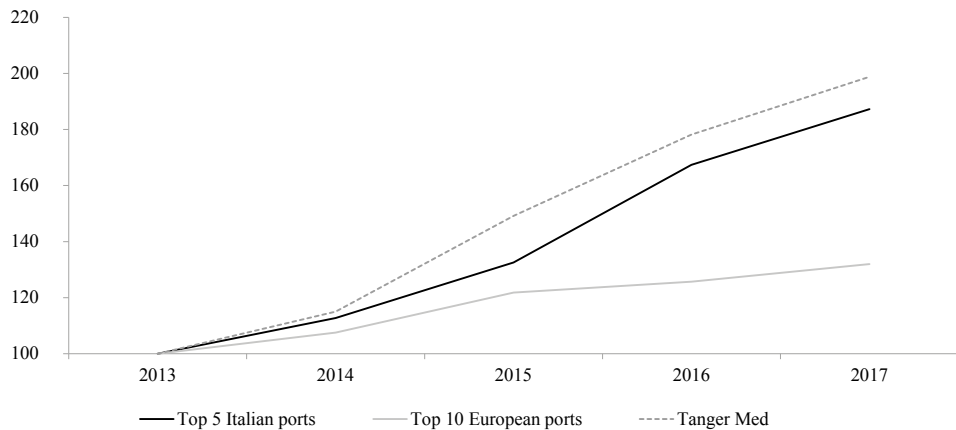
South Korea also has two of its ports in the top 20, which have been supported by a sharp increase of global brands like KIA and Hyundai. Singapore has strengthened its position thanks to intensified transshipment activities towards ASEAN and Middle East destinations. Volumes in Melbourne have benefited from higher imports while national production has ended.

Dubai and Jeddah are important transshipment hubs for the Middle East and East Africa, although a significant percentage of cars, including second-hand vehicles, arrives in containers.

Top 15 Global Vehicle ports 2017 (million units)

In the global ranking top 20 vehicle ports, the ones illustrated in this figure are followed by: Valencia/Sagunto, Koper, Tanjin, Yokohama and Melbourne.

FIGURE 3 - SOURCE: SRM elaboration on Drewry, 2018

New cars traffic growth in the top 10 European, top 5 Italian ports and Tanger Med

Number of new cars handled in 2013= 100

Top 5 Italian ports: Livorno, Gioia Tauro, Salerno, Civitavecchia, Savona; Top 10 European (not including the Italians): Zeebrugge, Bremerhaven, Emden, Grimsby, Antwerp, Southampton, Barcelona, Valencia, Koper, Bristol.

GRAPH 6 – SOURCE: SRM ON PORT AUTHORITIES, 2018

As far as Europe is concerned, where ports are amongst the most important in the world by volume of vehicles, growth in 2017 was supported by transshipment: many of the main hubs are in this continent and benefit from a fully developed network of Short Sea Shipping.

In order to reach the present paper's objective, it is now necessary to move on to an in-depth analysis of the sector of new cars handled in ports, which represents the core business of European production. With the aim of understanding the way in which this type of traffic is developing, the graph 6 takes into account the last five years and compares annual growth of the top 10 European ports, the top 5 Italian ports and Tanger Med, considered the major automotive port of the Southern shore of the Mediterranean.

The port volumes analyzed in this graph confirm the significant increase of the Moroccan port (over 430,000 vehicles in 2017) and the importance of this kind of traffic for Italian ports (1.7 million for the top 5) which, in the period analyzed, strengthened their upward trend. The top 10 European ports also show an increase although at a slower pace, probably due to the fact that they already demonstrated remarkable figures (12.8 million).

In Europe there can be found most of the logistic platforms for customization services of cars alongside the main assembly or production plants which encourage maritime imports and exports in the ports of the continent. Moreover, the most important car manufacturers are located in Europe: VW, Audi, Skoda, Seat, Opel, Renault, Fiat, Citroen, Ford, Nissan, Suzuki, Mitsubishi, Seat, Volvo, Daimler Chrysler, BMW, Toyota, Honda and others. In European ports, the main activity is represented by Short Sea Shipping of cars assembled in plants located in inland areas of ports which are close to the plants that use their infrastructure (for exports) and at the same time near the markets (imports) that they serve.

Most of the European ports offer logistic activities, pre delivery inspection (PDI) and repair of damage occurred during transport or stowage. These facilities can also perform postponement operations based on the manufacturer's policies and sometimes they also fulfil requests from important clients.

The table below collates data gathered by different sources and provides information on annual volumes of new cars transferred in the main European ports in 2017 alongside car manufacturers and terminal operators that operate in each port.

Economic, social and geopolitical dynamics currently affecting many European countries are inevitably influencing port handling of vehicles and they have created new opportunities of trade with emerging countries such as North Africa, Russia and Iran.

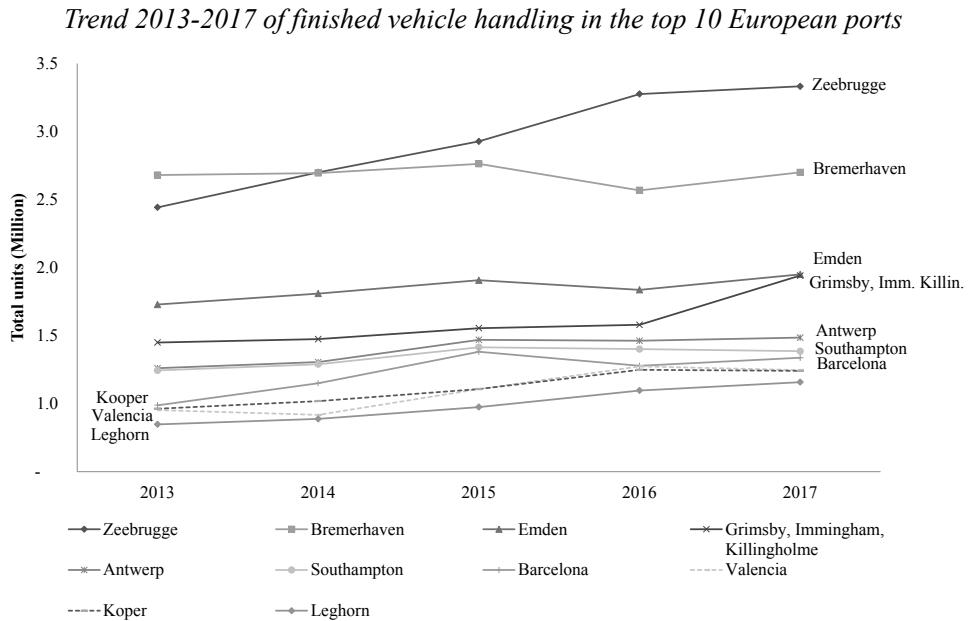
On the other hand, trade policies in the US and Brexit represent factors creating uncertainty and so do the battles of port workers in Spain, which have caused delays and inconveniences in a growing market.

Volumes of new cars handled in the top 10 European ports in 2017

Rank	Port	Country	Top Carmakers	Terminal operators	Annual cars Imports	Annual cars Exports	Total 2017	Share on EU market
1	Zeebrugge	BE	Mercedes-Benz, PSA Group, Toyota Group	C.Ro, ICO, Toyota, WWL	1,292,506	1,539,639	2,832,145	17.0%
2	Bremerhaven	DE	BMW, Daimler, Volkswagen Group	BLG Automobile Logistics	640,000	1,560,000	2,200,000	13.2%
3	Emden	DE	VW Group (Audi, Porsche, Skoda, VW)	Autoport Emden, EVAG	340,000	1,110,000	1,450,000	8.7%
4	Grimsby, Immingham, Killingholme	UK	Kia, Toyota, VW Group	ABP, GBA, C.Ro, BCA, DFDS, Gefco	1,199,481	241,919	1,441,400	8.7%
5	Antwerp	BE	Mazda, Fiat, Ford, Opel	ICO, Grimaldi	529,147	456,177	985,324	5.9%
6	Southampton	UK	Jaguar Land Rover, BMW, Honda, Ford, Renault Nissan	ABP, Ford, Group Cat, ICO, WWL	354,400	531,600	886,000	5.3%
7	Barcelona	ES	VW Group (inc. Seat and Audi), Renault-Nissan, Mazda	Autoterminal, Grimaldi, Setram, Terminal Port Nou	238,723	598,899	837,622	5.0%
8	Valencia	ES	Toyota, Ford, Fiat	Ford, Valencia Terminal Europa	254,304	492,582	746,886	4.5%
9	Koper	SI	VW Group, Hyundai Kia, Renault Dacia, Daimler, Ford	Luka Koper	302,894	438,359	741,253	4.5%
10	Leghorn	IT	PSA Group, Hyundai Kia, Renault, FCA Group, Daimler	Sealiv, Autotrade Logistics, Sintermar			658,051	4.0%

TABLE 3 – SOURCE: Finished Vehicle Logistics April-June 2018 and SRM

European ports have followed a growing trend over the last few years, as illustrated by the graph below indicating the trend of the top 10 European ports analyzed above.

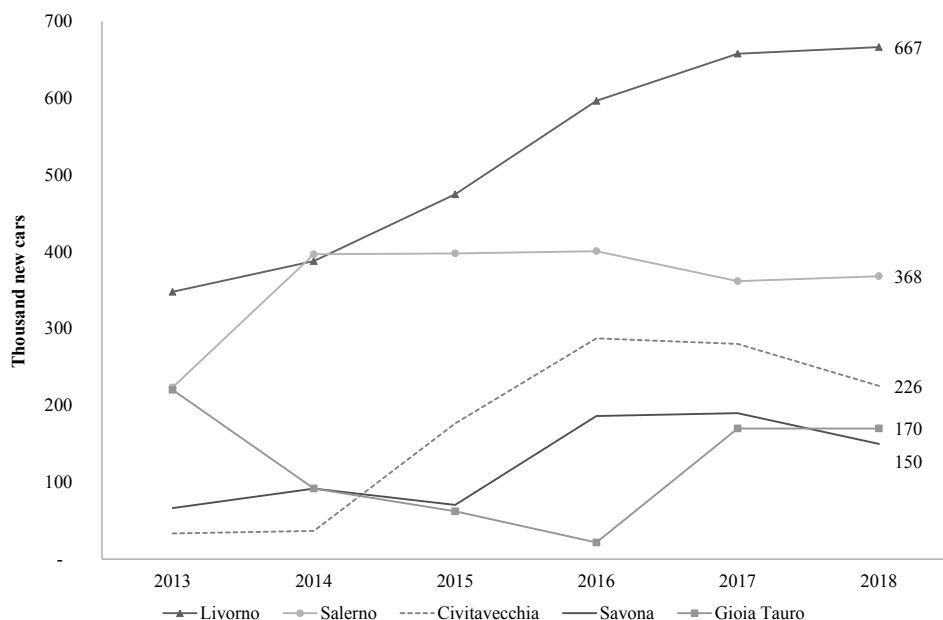


GRAPH 7 - SOURCE: SRM on Finished Vehicle Logistics, Port Network Authorities websites

The analysis then goes on to take a closer look at the handling of this type of goods in our country where the Ro-Ro mode of transport is very important: in 2018 it reached 109 million tons, 22% of the total, and it is significantly growing. In the last 3 years it has shown a 11% increase.

Italy is the third EU 28 country, after the United Kingdom and the Netherlands, for the movement of rolling cargo in Short Sea Shipping: the transport of new cars on Car Carriers falls into this category.

From the analysis of the volumes moved by European ports, it emerged that the main ports specialized in this type of traffic are located in Northern Europe with only 4 overlooking the Mediterranean and among these we can find Livorno, the main Italian port holding the 10th position in Europe. The graph below shows the trend of the Top 5 Italian ports for the transport of new cars, showing a fluctuating trend for all except Livorno, which shows a growing trend throughout the analyzed period, as well as a movement of new cars well above other ports.

Handling of new cars in the top 5 Italian ports 2013-2018

GRAPH 8 - SOURCE: SRM on Port Network Authorities

6. EXPANSION STRATEGIES AND INVESTMENTS FOR THE COMPETITIVENESS OF TERMINALS

Growing market demand alongside strategies deployed by carriers with the aim of reshaping routes and increasing transshipment are putting pressure on automotive maritime terminals.

Many ports are increasingly being used also as storage lots which has made space availability a sensitive issue for the development of future traffic. Terminal operators, especially in the US and Europe, are currently being pressured to increase capacity of the existing facilities. In a moment when strong markets push import volumes, OEM are increasing their use of maritime terminals as storage yards to allow higher flexibility in the relocation of unsold volumes or to avoid double handling at inland terminals.

Dwell times have grown, especially in Europe where land availability is limited.

Furthermore, an increase in the number of markets served by the main ports is intensifying pressure as this affects the number of port calls.

Also, diversification of products is contributing to an increase in the number of ports of call: having several different models of the same vehicle, sometimes even with different lengths, makes handling, storage and loading more complicated and this tendency does not seem to have reached an end, since the strategy followed by the main OEM appears to confirm their presence in all sectors and models. Another factor contributing to the increase of difficulties is the growing popularity of electric vehicles which require

investments in dedicated areas for storage and charging. With the limited availability of space in many mature markets, we are witnessing investments in multi-storey car parks in ports, despite their higher price tags. Multi-storey car parks are already available in Zeebrugge, Bremerhaven, Barcelona and Singapore. Others are under development or planned as those by Grimaldi in Valencia and Salerno and ABP in Southampton. Another way to tackle this problem has been the development of off-dock inland storage facilities.

It now seems appropriate and interesting to illustrate the other main strategies followed by the major European Ro-Ro ports in order to face the different pressures of the market⁵.

A closer look at the operating planning of infrastructure development in Northern Europe and the Mediterranean reveals that many significant ports are making efforts to invest with the aim of meeting the growth forecasts of Ro-Ro flows.

In Zeebrugge, the main Belgian port, International Car Operator (ICO), member of NYK group, completed a 30 Hectares expansion of storage yards in 2017 and is planning a further 30 hectares to be completed in 2018.

Wallenius Wilhelmsen Logistics (WWL) recently signed a concession agreement with the port of Zeebrugge to manage 49 hectares of areas located in the inland port thus doubling the capacity of its terminal, with a forecast investment of \$ 20 million.

In the port of Bremerhaven in Germany, the second in the world by vehicle handling, volumes exceeded forecasts in 2017 and congestion problems were encountered due to inappropriate planning.

The vulnerability of this port is particularly significant and in fact an order by Cooper (about 200,000 Daimler cars) has been transferred to Southern Europe. This relocation seems to have cut the maritime journey by 7 sailing days.

Nevertheless, exclusive logistic operator BLG has been adding capacity by planning a new multi-storey parking and strengthening rail access.

On the North-Western shore of the Mediterranean, in Spain, Valencia is benefiting from railway infrastructure implementations for finished vehicles. In fact, this port showed a 15% increase of the railway mode and forecasts indicate that there will be a further growth of night rail services which make it possible to handle trains around the clock.

Across its three ports (Valencia, Sagunto and Gandia), the Port Authority has almost 1 million square meters dedicated to the handling of vehicles of which 560,000 square meters located in Sagunto where Ford has moved a significant part of its traffic.

Apart from this, a further 40,000 square meters in Sagunto will be dedicated to the traffic of new vehicles and € 31 million worth of investments will be made to connect the port to the Spanish railway network between 2017 and 2021.

The port of Valencia has 412,000 square meters dedicated to the handling of vehicles and in 2018 Grimaldi planned to build a vertical storage unit for 11,000 cars.

Similarly to the case of Valencia, new rail connections have contributed to increasing traffic also in the port of Barcelona: the growth of rail activities to and from central Europe has made this port the intermodal railway port of Southern Europe.

⁵ Sources informing the following analysis include the European Vehicle Ports Survey 2017 published in Finished Vehicle Logistics, April-June 2018 and ports websites.

The port has built three new 600-metre railway lines which will be expanded to reach the length of 750 metres.

Similar plans to increase capacity are currently being developed in Turkey. In fact, there is an expansion project in Autoport (Yeniköy) in the North-eastern region of Kocaeli, which handles 20% of finished vehicles traffic through Turkish ports. Autoport is increasing space availability by adding capacity for 11,000 units and is working on a pre-delivery inspection project (PDI) which will make it possible to handle 100,000 units per year. Such new capacity is expected to start functioning in 2019.

As for Great Britain, the Ro-Ro port of Southampton has completed Multi-Deck Storage facilities (MDS), in particular the sixth and seventh car park which cost £ 25 million (\$ 35.6 million) and contributed a further 8,000 parking spaces. In October 2018 works started to build the eighth MDS facility thanks to an investment of \$ 15 million which will provide 3,000 spaces thus bringing the total capacity of the site to over 60,000 spaces.

Also Italian ports are looking into options to expand space availability and handle a growing number of vehicles. Similarly to what happens in the rest of Europe, in our country ports are required to provide more sophisticated services and serve as distribution and storage centres because it is necessary to avoid double handling in a secondary inland terminal and because this allows more flexibility in the relocation towards other markets of unsold volumes. All of this ultimately results in ports being obliged to increase space availability.

BLG, which was previously mentioned with regard to Bremerhaven, also manages the car terminal in the port of Gioia Tauro in Italy which in 2017 showed a dramatic increase with a total of 170,000 vehicles handled mainly thanks to the fact that it became the reference port for FCA (Fiat Chrysler Automobiles) to ship its vehicles to international markets. The other operator, Grimaldi, manages the whole chain from the factory to the end market.

In 2016, Automar Logistics, part of Grimaldi Group, purchased a 50% share of BLG's vehicle terminal.

The subsequent growth resulted in the need for more space and better rail connections with the inland areas and the company has implemented a rail service between FCA plant in Melfi and the car terminal in Gioia Tauro.

In Salerno, Grimaldi Group purchased new inland spaces totaling 100,000 square metres with the aim of building silos for new cars with an investment of € 15 million.

In Livorno, the first Italian port and the 10th in the European ranking, Grimaldi Group is the main operator and intends to fulfil demand for new spaces by renting or buying new areas through subsidiary Sintermar (50% joint venture with Neri Group). The current 370,000 square metres will be brought to 500,000 with an investment of approximately € 20 million.

Particularly significant is also the investment that Grimaldi made in December 2017 in the port of Savona (where it calls about 800 times a year with car carriers and motorways of the sea) with the purchase of Marittima Spedizioni which controls Savona Terminal Auto. This has started works for the expansion of the parking silo (€ 7.5 million of investment) which will be completed in 2018. This new facility will increase Savona's port capacity from the current 140,000 units to 230,000 per year.

The most recent investment (April 2019) is the one in Piombino where a 50% joint venture Onorato-Altman named “Manta Logistics” will invest € 17 million to complete a car terminal of 300,000 square metres with forecast movement of 230,000 cars directed towards the Mediterranean, which will create 80,000 jobs. This will be a hub dedicated to receiving new cars coming from Central-Eastern Europe through trains and trucks of the German logistic group Altman.

This analysis highlights that types of actions are mainly focused on the following:

1. Building new inland areas (storage yards).
2. Implementing new railway facilities with terminals, railway lines and electrified lines.
3. Vertical development of yards with MDS facilities for the storage of new cars.
4. Optimization of existing spaces with relevant specialization of inland quays.
5. Renovation of disused industrial areas for value added logistics.

Another significant factor in the choices of port development is the bureaucratic profile of the investor and of the owner of the area where the investment takes place. In particular, it is important to take into account whether the investor is a private business or a public institution as this will affect financial evaluations. Similarly, the fact that the manager is public or private will have a different impact on the concession or letting contract.

7. CONCLUSIONS

The global context, despite changes in the economic balance of the different players of the automotive sector (relocation of production, locations of OEM, strategies of reduction of routes for carriers and transshipment), is demonstrating generalized growth in the maritime mode of transport of vehicles which currently concentrates 75% of vehicles exported in the world.

This highlights the fact that new market dynamics alongside port-logistics players’ strategies are favoring the sea as privileged means for the transport of vehicles and pushing on terminals as rings of a chain where efficiency is becoming a factor of competitiveness for the whole automotive industry.

Therefore, specialized ports for this kind of traffic need to prepare by taking into account 2022 forecasts which confirm growth in overall demand (+2.5%) which will be more marked on shorter routes like the Intra-Regional and in particular the Intra-Med for which the forecast indicates a 3.3% increase.

It has been illustrated that greater use of transshipment and short routes chosen by carriers have resulted in port volumes growing more significantly than route volumes, which has affected terminal operations. Port management teams are deploying strategies and planning activities to fulfil not only growing demand but also the new needs of the market, namely accommodating a wide range of products and providing multiple value-added services. Increasing productivity of the automotive terminals by making them more cost-effective becomes a key strategy also for the whole automobile industry because in the distribution of finished vehicles revenues are more frequently obtained from the

value added at terminal level rather than from the efficiency of the transport mode which may allow to reach economies of scale and scope. The Italian ports hereby analyzed, similarly to the major European ones, are fulfilling these needs through investments in new areas, infrastructure and services. They have some important consequences, but some significant effects are obtained also through aspects of port organization.

As this analysis has shown, many ports in Europe and other areas are trying to enhance factors of competitiveness with the aim of making the terminal more smoothly integrated in the chain. Such factors, as highlighted in this paper, can be summarized as follows:

- a) Ro-Ro terminals are equipped with storage yards for cars functioning as buffer zones to help supply and demand meet. With the aim of increasing their availability of space some ports are also building multi-storey parking lots. On the one hand, market pressure urges terminals to expand such areas to fulfil growing demand while on the other, it is necessary that car volumes in stock and dwell times are kept as low as possible in order to maximize productivity of the whole chain. This function is extremely important in port terminals called by routes with a big trade imbalance such as the Transpacific. To this end, the strategies used by carriers aimed at fighting the diseconomies of trade imbalances – such as triangulations or concatenations of routes – help the smooth running of terminals because they contribute to balancing import-export flows. Nevertheless, it must be considered that this kind of goods poses problems because, for example, in multipurpose ports automotive terminals cannot operate beside other facilities handling polluting goods such as coal or liquid bulk due to potential damage that could be made to new cars' painting.
- b) Logistic platforms for postponed customization tend to be located inside Ro-Ro port terminals as Port Authorities give these terminals to logistic operators or consortium of companies (logistic operators, a shipowner and a maritime shipping liner or land railway and/or a road haulier) that have negotiated the distribution of cars with a particular car manufacturer. This solution seems to offer stability and contributes to an environment that is more manageable for all the stakeholders.
- c) The presence in the terminal of integrated logistics services providers (3pl) makes it possible to simultaneously manage an integrated group of activities, from leaving the production plant until operations of transport. These operators are certified by manufacturers to perform pre-delivery inspections (PDI), repairs and customization or postponement operations (specific painting, optional extras, etc.). This solution offers significant reduction of costs because the investment made by manufacturers and port operators is not repeated by a big group of dealers scattered across a region but is located in the port. These players' activity, for example in import, includes operations on cars because if a damage is found after transport this is immediately repaired before the car is moved to the parking area. Some days later, the region's main dealer (gatherer of all orders from the individual dealers) places an order with these platforms in Ro-Ro ports. If no special requirements have been set by the customer (color, model etc.) the car is sent to PDI for inspection and then the logistic operator sends it to the car dealer

(the logistic operator of the Ro-Ro port terminal is responsible for transport operations) through road haulage in a d2d operation. Within a few hours or one day the car is delivered to the customer. If a customization operation is necessary, the order can generally be executed in two days.

- d) Most of the ports hereby analyzed aim to reach some sort of balance between costs of import and export and number of cars. A balanced situation results in the most effective reduction of transport costs for all stakeholders: importers, exporters and car manufacturers.

In light of the aforementioned factors of competitiveness, it has been observed that the strategic management of the supply chain follows a pattern that seems particularly beneficial if distribution to the end customer is performed by the port logistic operator within the terminal who takes on a key role in the chain. Other factors can contribute to higher productivity of the supply chain, namely proximity of big car plants with special railway connections balancing maritime transport and reducing both import and export costs while minimizing return transport without load. Transport modes (road haulage and railway) from car plants to logistic platforms for distribution and postponement tend to minimize empty runs thanks to imported cars in Ro-Ro terminals. Also, there are no additional waiting times as storage and PDI occur in port facilities.

Finally, it is also important to further develop intermodal transport so as to meet the different stakeholders' needs in the terminal trying to make use of different transport modes to and from the port.

CURRENT AND FUTURE SCENARIO FOR SHIPPING COMPANIES

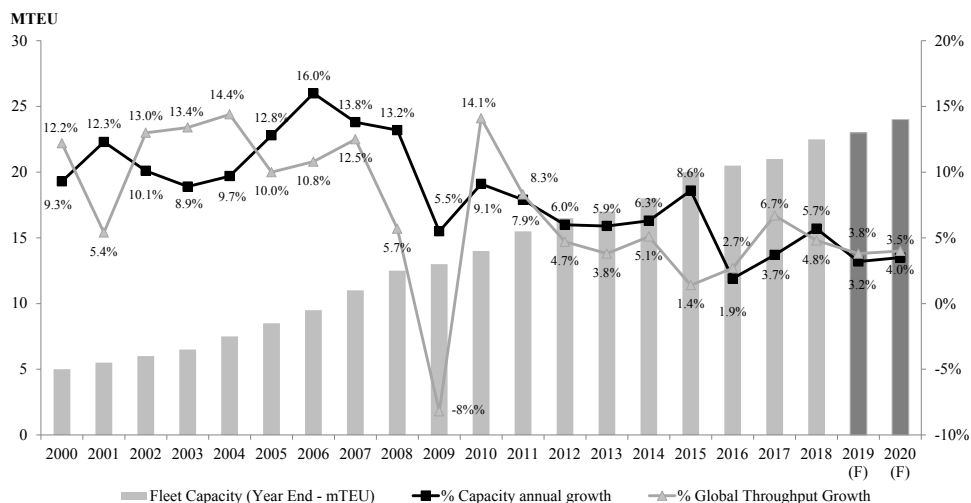
1. GLOBAL ACTIVE AND IDLE FLEET

The global containership fleet grew by 5.7% to reach 22 million TEU at the end of 2018, according to Alphaliner figures. Forecasts see a further increase in Cellular Fleet capacity to reach almost 24 million TEU in 2020.

The global fleet included 5,285 ships with a capacity of 22.4 million TEU as at 1 Feb 2019. The orderbook reached 2,655 TEU, 11.8% of current fleet. Of the 22.4 million TEU of capacity, almost 50% are concentrated on ships with size ranging between 4,000 and 10,000 TEU and almost 15% on the 12,500-15,200 size range. Orderbook capacity breakdown confirms the rising importance of mega-ships: 36% of Orderbook capacity is relative to ships with a 18,000-21,000 TEU size. No orderbook for ships with a size between 4,000 and 10,000 TEU. So the role of megaship in the global fleet capacity is to grow even more. In 2000 cellular ships had an average size of 2,600 TEU; ten years later in 2010 average ship size was 4,700 TEU (2,100 TEU more). In 2018 it exceeded 5,100 TEU and due to an orderbook much more oriented towards megaships, the average size is expected to grow even more in 2018 and 2019, exceeding 5,300 TEU.

A glance at historical data on orderbook gives us some ideas about the trend in 1) global activity (or throughput) in the container transport sector; 2) carriers' mood about the present time and their expectation on future activities.

Cellular Fleet Growth vs Global Throughput



GRAPH 1 - SOURCE: SRM elaboration on Alphaliner

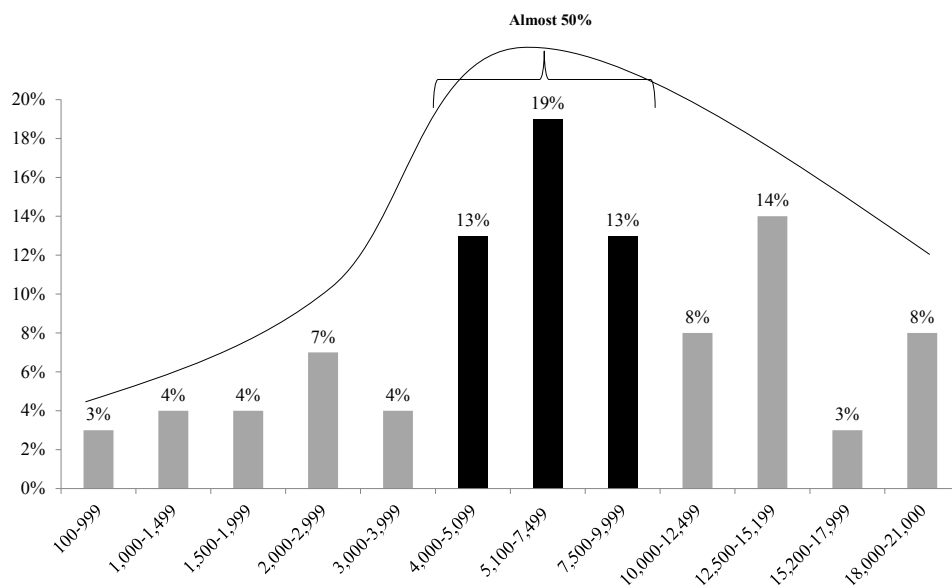
The *orderbook-to-fleet ratio* reached its peak in 2008 at 22% just before the economic crisis occurred. Then the ratio fell down to set at around 10% in 2018. Before the 2009 economic crisis global throughput grew at a rate above 10% in many years; after 2009 it was around or below 5% in many years and is going to set at around 4% in 2019 and 2020.

Liner Fleet as at 1 February 2019

	01-Feb-19
No. of cellular ships (units)	5,285
Total cellular capacity (kTEU)	22,437
Year-on-year increase (%)	5.1%
Chartered fleet (%)	53.9%
Cellular fleet as % of liner total	98.2%
Cellular fleet idle (%)	2.8%
Orderbook (mTEU)	2,655
Orderbook as % of current fleet	11.8%

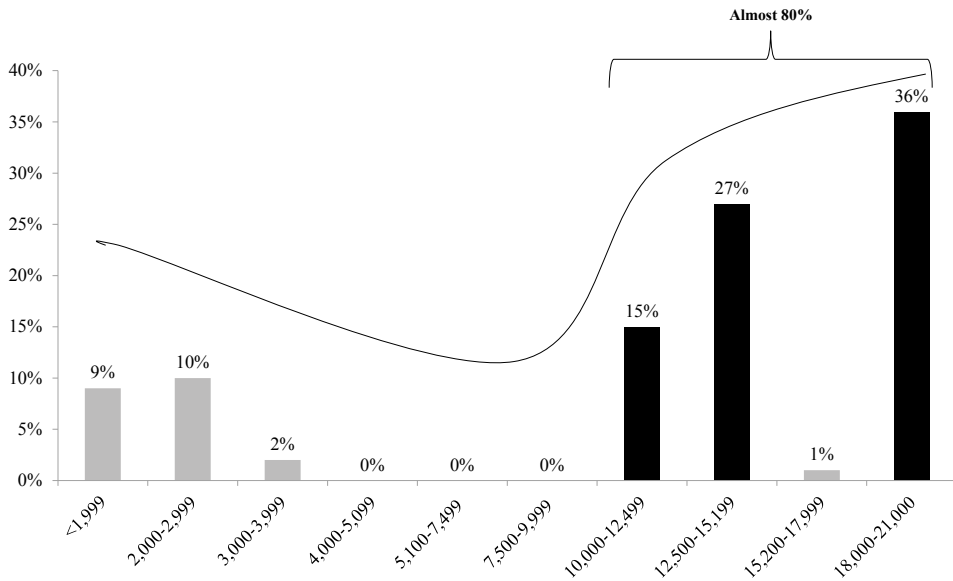
TABLE 1 - SOURCE: SRM elaboration on Alphaliner

Fleet Capacity Breakdown by TEU size range (% of TEU)



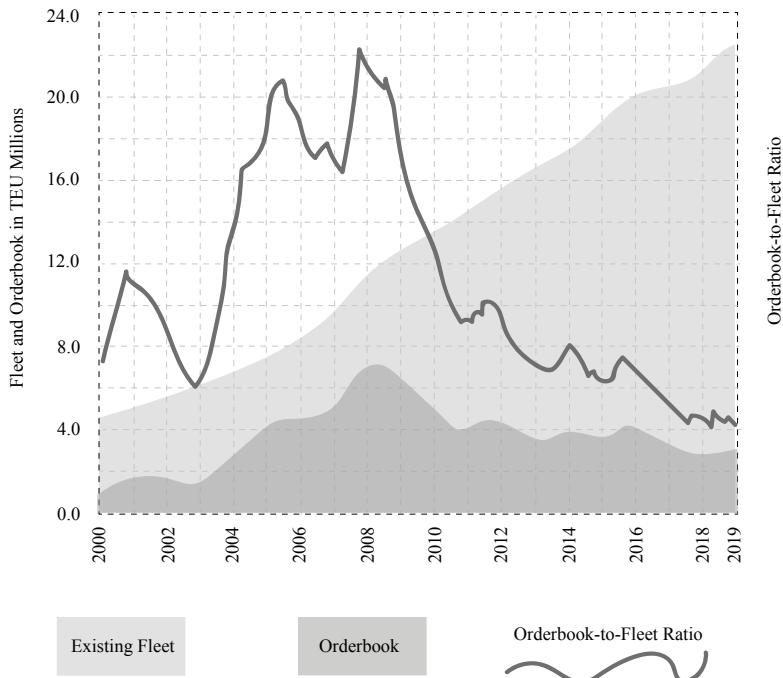
GRAPH 2 – SOURCE: SRM elaboration on Alphaliner (February 2019)

Orderbook Fleet Capacity Breakdown by TEU size range (% of TEU)



GRAPH 3 - SOURCE: SRM elaboration on Alphaliner (February 2019)

Orderbook-to-Fleet Development 2000-2019 (Cellular ships only)



GRAPH 4 - SOURCE: SRM on Alphaliner (February 2019)

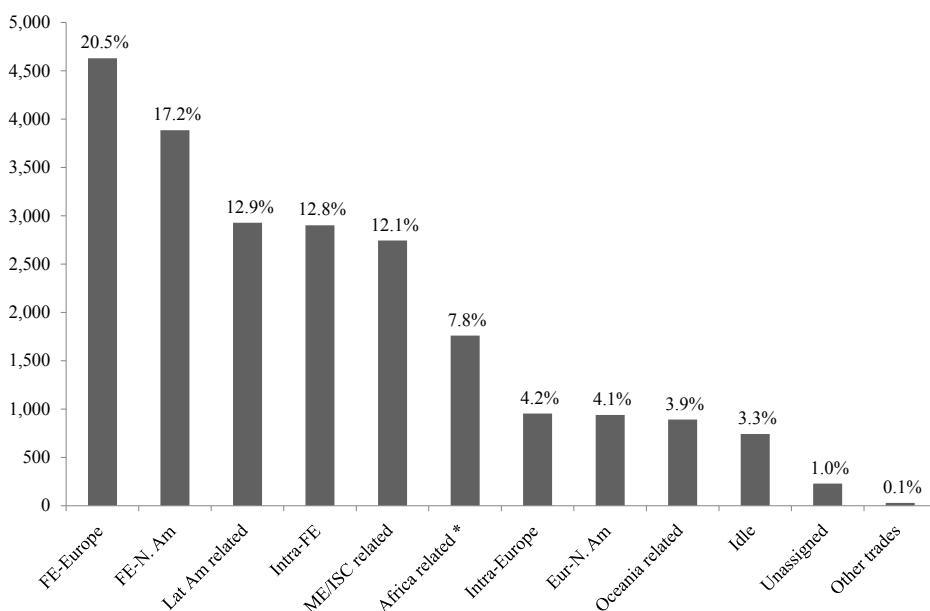
As at February 2019 of the over 22 million TEU of capacity deployed, 20.5% (4.6m) are in the Far East–Europe trade, 17.2% (3.9m) in the Far East–North America, 12.9% in Latin American and related trade, 12.8% (2.9m) in the intra Far East trade, 12.1% (2.7m) in the Middle East related trade and 7.8% (1.7m) in the Africa related trade.

The Far East–North America tradelane with 467 thousand TEU is the one with the highest weekly capacity deployed, followed by Far East–Europe with 426 thousand TEU. While the Far East–North America and the Far East–Europe tradelanes weekly capacity deployed have followed an almost stable upward trend over the last year (2018) with a year-on-year change of 4.7% and 4.5% respectively as at February 2019. The Europe–North America tradelane has recorded a more unstable pattern, although the year on year percentage change was 2.9% as at February. The idle containership capacity edged up to 207 units for 654,000 TEU as at 4 February 2019, or 2.9% of the total cellular fleet. Such a percentage reached its lowest level in February 2018 at 0.9%, then it has recorded a steady increase up to 2.9% in February 2019 (2% more year on year).

The weak demand for ships has permeated across all fleets segments, including the larger sizes, with 12 units of more-than-7,500 TEU currently (February 2019) unemployed. However, the highest increases of idle ships have been recorded in the 1,000-1,999 TEU size but increases have been recorded also in the other size ranges.

To complete the general scenario on the shipping sector, let's have a look on the regional trend for global throughput. While North Europe and North America lost percentage share between 2000 and 2018, China and Hong Kong gained market from 16.9% to 33.2% at the expense of all the other regions except for Africa.

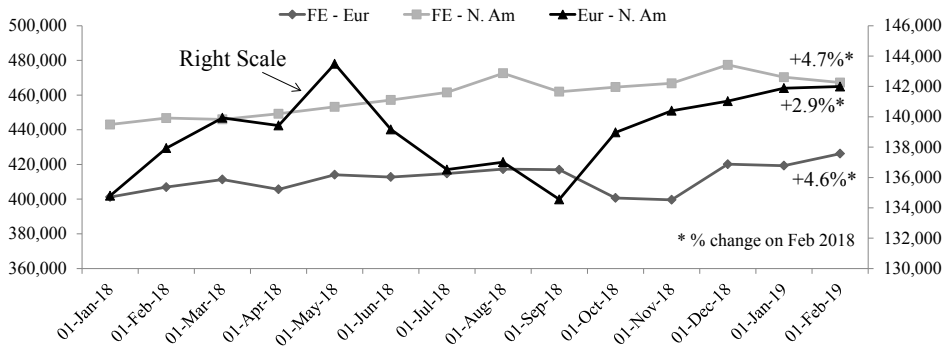
Global Capacity Deployment Breakdown by Trade (% of TEU)



*Africa related refers to Sub-Saharan Africa.

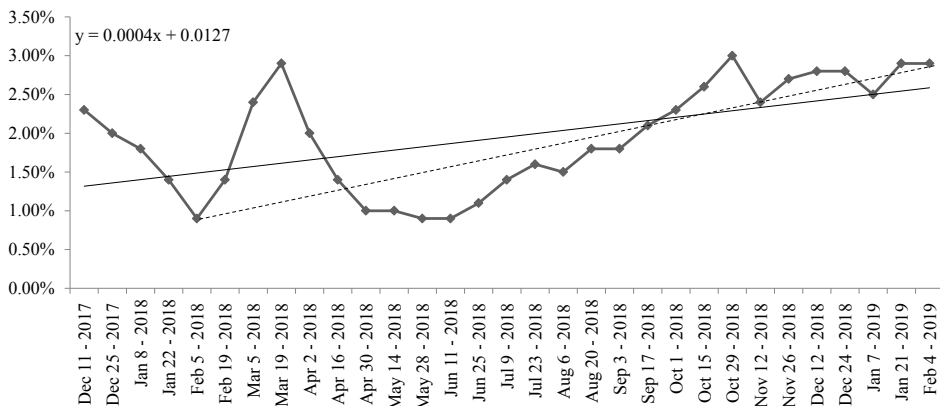
GRAPH 5 - SOURCE: SRM elaboration on Alphaliner (February 2019)

Weekly Capacity Deployed on Main East-West Tradelanes (TEU)



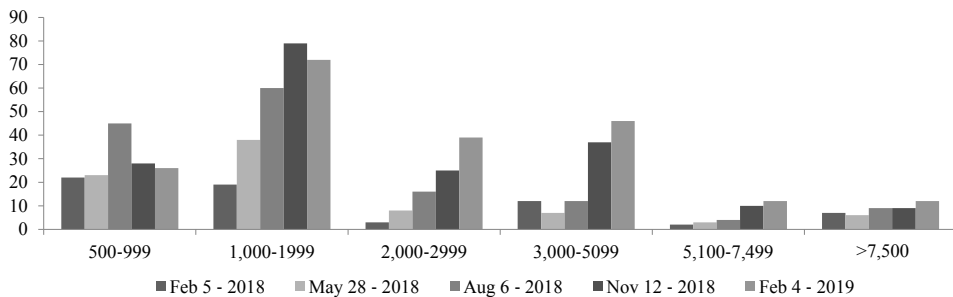
GRAPH 6 – SOURCE: SRM elaboration on Alphaliner

Idle TEU As % of cellular fleet



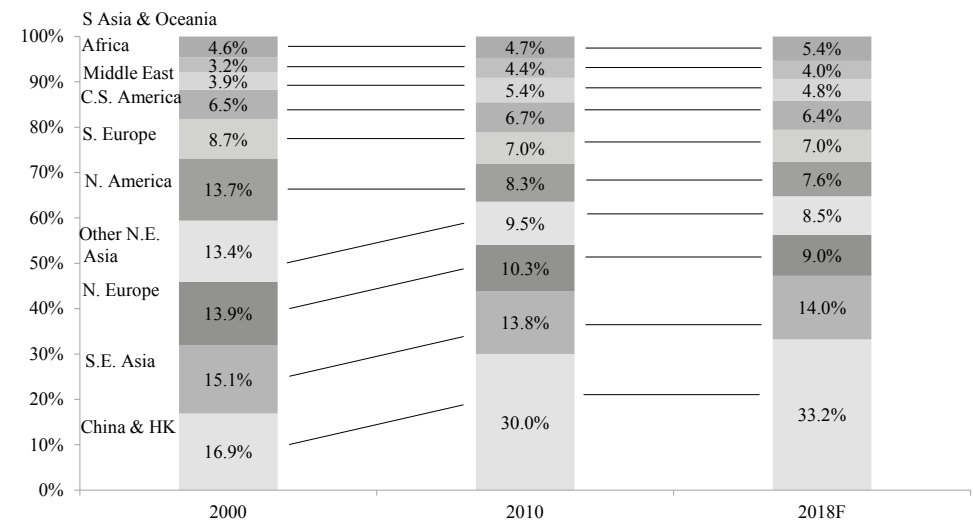
GRAPH 7 – SOURCE: SRM elaboration on Alphaliner

Units of Idle ships for vessel size (TEU)



GRAPH 8 – SOURCE: SRM elaboration on Alphaliner

Regional Share of Global Container Activity - Global Port Throughput breakdown



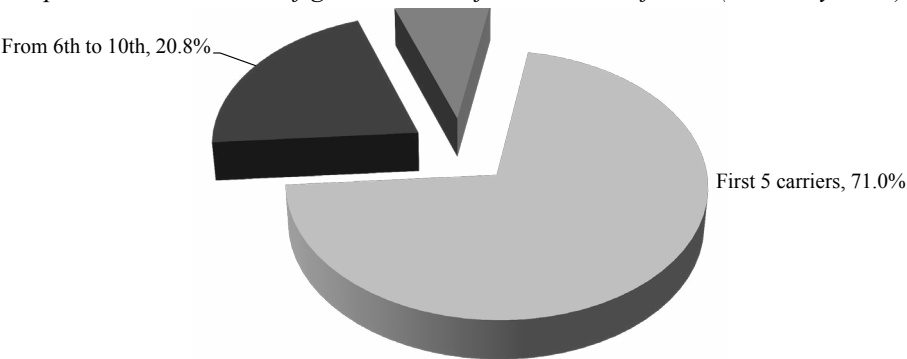
GRAPH 9 – SOURCE: SRM elaboration on Alphaliner

2. TOP 10 CARRIERS: FLEETS AND FINANCIALS

2.1 Top 10 Carriers: fleets

The shipping market is concentrated in the hands of a few carriers. More specifically the top 5 carriers hold 71% of global current fleet in terms of TEU. If we add 5 carriers more, the top 10 carriers hold more than 90% of the current fleet.

Top 10 Carriers: share of global current fleet in terms of TEU (February 2019)



GRAPH 10 – Source: SRM elaboration on Alphaliner

APM-Maersk leads the table with more than 4m TEU of capacity, followed by MSC (3.3m TEU), COSCO group (2.8m TEU), CMA CGM group (2.6m TEU) and Hapag-Lloyd (1.6m TEU). COSCO group, Evergreen and HMM are the carriers with the highest percentage growth in the last year (respectively +50.6%, +13.6% and +22.6%).

If we take a decade as a period of analysis, COSCO group (+460%, more than 5 times bigger than 2009) and Hapag-Lloyd (+220%) are the carriers with the highest growth in their fleet capacity. CMA CGM Group follows with a +160% increase between 2009 and 2019.

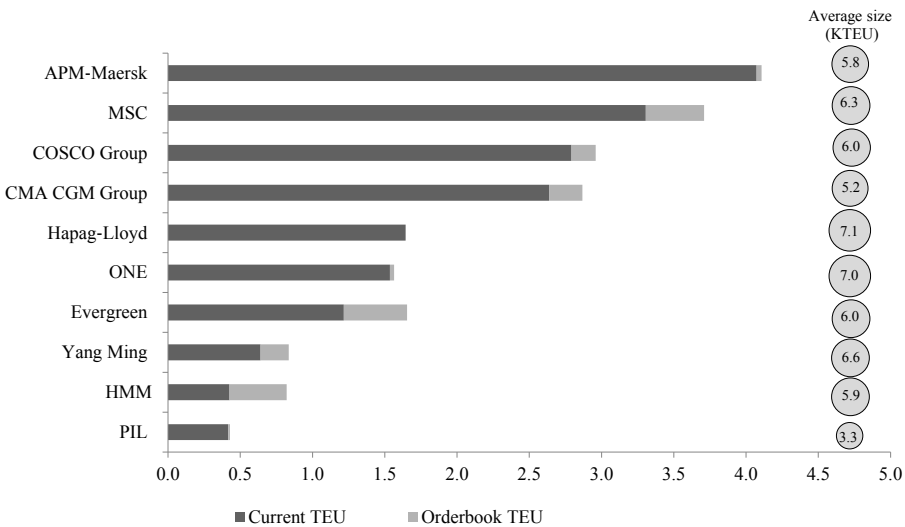
Top 10 Carriers: current TEU and percentage change

	Operated Fleet (mTEU) as at February 2019	Change Feb 2019 vs Feb 2018 (%)	Change 2019 vs 2009 (%)
APM-Maersk	4.07	-3.3	100
MSC	3.30	3.8	120
COSCO Group	2.79	50.6	460
CMA CGM Group	2.64	3.6	160
Hapag-Lloyd	1.64	6.1	220
ONE	1.53	2.4	33
Evergreen	1.22	13.6	100
Yang Ming	0.64	7.2	113
HMM	0.42	22.6	68
PIL	0.42	5.1	121

TABLE 2 - SOURCE: SRM elaboration on Alphaliner

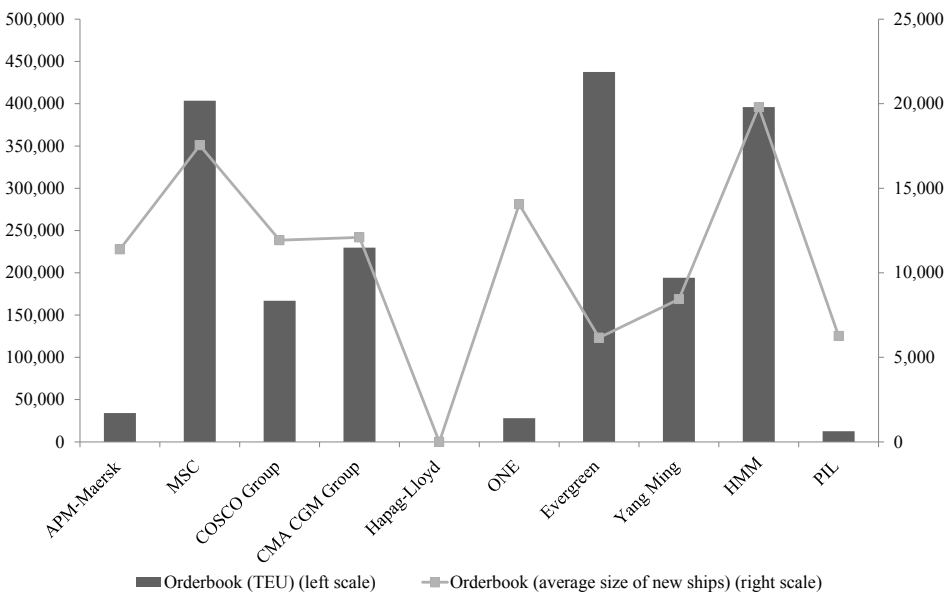
The analysis of the orderbook in terms of TEU is interesting. We can see that while orderbook for APM-Maersk is not very big as at February 2019 (just 3 ships accounting for 34,160 TEU), it is bigger for MSC (23 big ships with a 430,552 TEU additional capacity, about 17,000 TEU for ship on average). COSCO Group and CMA CGM Group are also investing, respectively with 14 ships more (equivalent to 166,951 TEU more) and 19 ships more (229,752 TEU more). Big orders also for Evergreen, Yang Ming and HMM. In particular, while Evergreen is investing in smaller ships (its orderbook includes 71 ships with an additional capacity of 437,580, about 6,000 TEU for ships on average), Yang Ming is investing in medium-size ships (23 ships with an additional capacity of 194,110 TEU, about 8,000 TEU on average) and HMM in very large ships (20 ships more with an additional capacity of 396,000 TEU, 19,800 TEU for ship on average). Anyway, at the moment APM-Maersk is the carrier with the highest percentage of ultra-large vessels (more than 18,000 TEU) (15% of its Fleet capacity), while CMA CGM Group is the one with the highest percentage of very-very large vessels (between 15,000 and 18,000 TEU) (8%). Yang Ming is the carrier with the highest percentage of very large vessels (10,000-15,000 TEU) (41% of its fleet) and Evergreen shows the biggest percentage as for the 7,500-10,000 category (28%). HMM has the biggest percentage of 5,100-7,500 TEU ships (24%) and 3,000-5,100 TEU ships (29%).

Top 10 Carriers: current TEU, Orderbook TEU (in millions) and average size of vessels (in thousands)(February 2019)



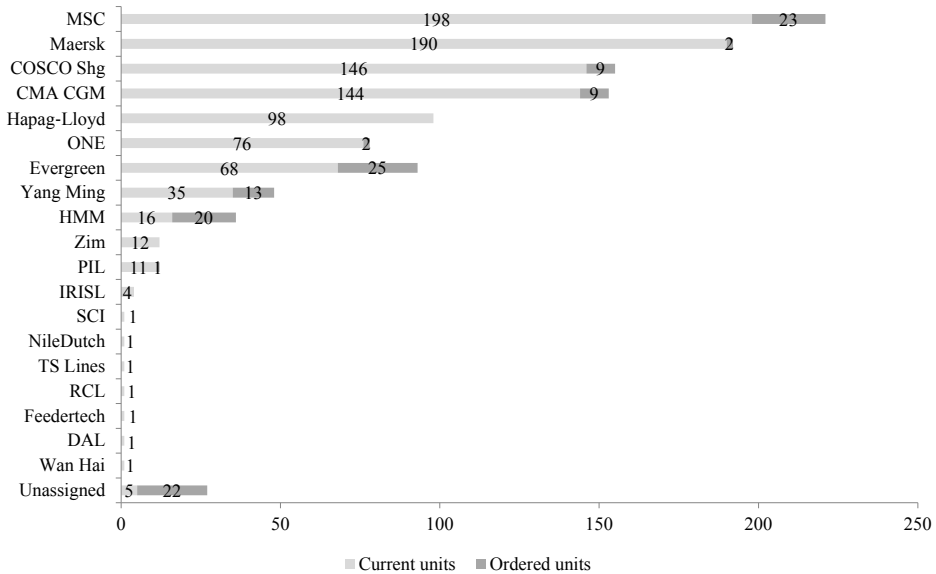
GRAPH 11 – SOURCE: SRM elaboration on Alphaliner

Top 10 Carriers: Orderbook TEU and average size of new vessels (February 2019)



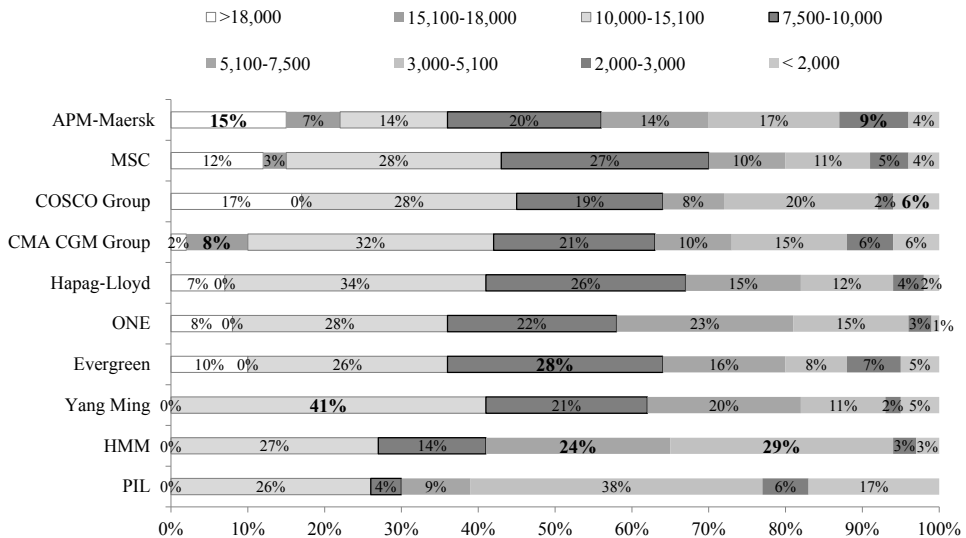
GRAPH 12 – SOURCE: SRM elaboration on Alphaliner

*VLCS Deployment by Carrier Vessels above 7,500 TEU only
(No. of units) (February 2019)*



GRAPH 13 – SOURCE: SRM elaboration on Alphaliner

Main Carriers breakdown of operated capacity by TEU size range (February 2019)



In bold type the highest percentage for the size class.

GRAPH 14 – SOURCE: SRM elaboration on Alphaliner

2.2 Financial results

This paragraph analysis top 10 carriers economic performances as for 2017 and 2018 as a whole and then clusters each carrier based on their revenue share and their growth in 2018. As data were not available for some companies, the total value of revenues of top 10 carriers is an estimate both for 2017 and 2018 based on available data. In 2018 it has been estimated a total revenue of about \$145bn, a 25.3% increase compared with \$115bn in 2017. As a result also revenue per TEU has increased.

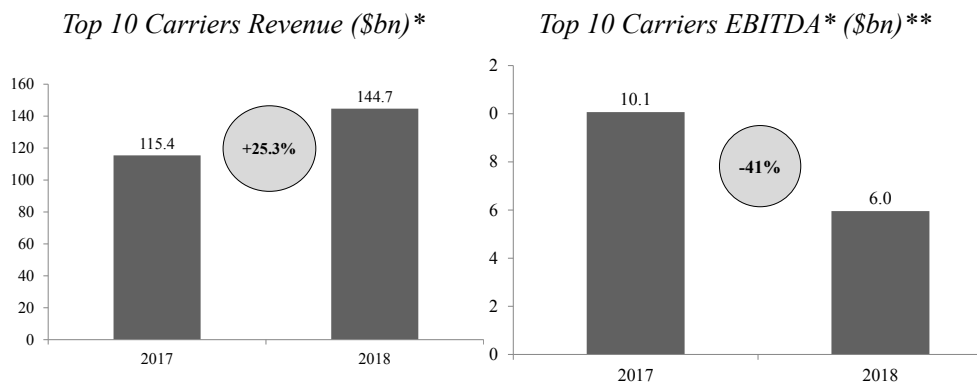
In 2018 carriers recorded on average a revenue of about \$7,700 per TEU, \$1,600 more than in 2017.

While top 10 carriers are on the growth in terms of revenue, they are on the downturn in terms of economic margin. In fact total Earning Before Interests, Taxes, Depreciation and Amortization (EBITDA) is estimated to be \$6bn, a 41% decrease compared to \$10.1bn in 2017.

As a consequence EBITDA, as percentage of Revenue moved to 4.1% in 2018, down from 8.7% in 2017, while Net Profit moved to -0.1% in 2018, down from 1.8% in 2017.

The economic pattern described above is better clear if we analysis quarterly data of top 10 carriers as a whole.

Revenues graph is on the rise: it was about \$15bn in the 1st quarter of 2017 and more than \$20bn in the latest quarters. On the other hand EBITDA quarterly data reached a peak of about \$2.2bn in the 3rd quarter of 2017, falling down at around \$1bn in the quarters of 2018. It is clear that the drop in operating margins is mainly the result of the increase in bunker price that has caused an increase in shipping expenses.



*Data for MSC and ONE are estimated. 2018 is estimated based on first 3 quarters data.

GRAPH 15 — SOURCE: SRM elaboration on Alphaliner

* Earning Before Interests, Taxes, Depreciation and Amortization.

**Data for MSC and ONE are estimated. 2018 is estimated based on first 3 quarters data.

GRAPH 16 — SOURCE: SRM elaboration on Alphaliner

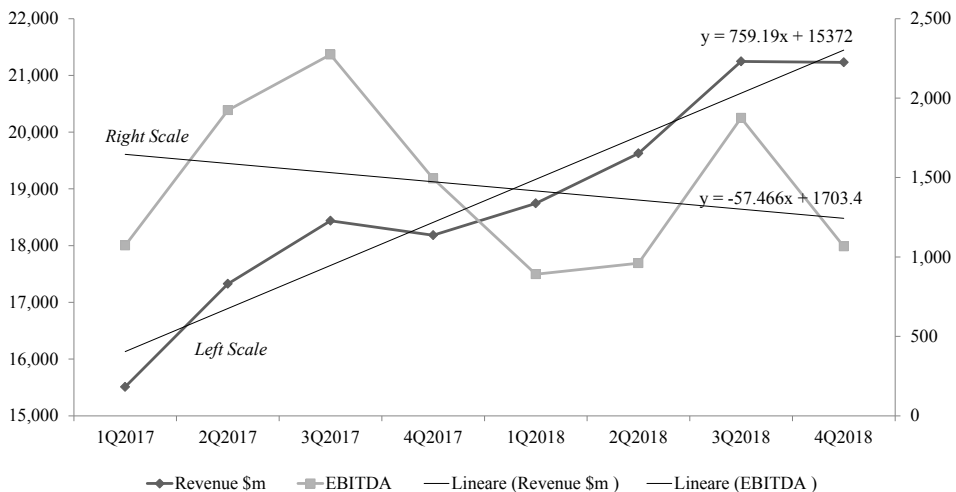
*Top 10 Carriers Economics**

	2017	2018	change
Revenues (\$bn)	115.4	144.7	25.4%
Revenues/TEU (\$)	6,182.9	7,750.9	\$1,568
EBITDA (\$bn)	10.1	6.0	-40.8%
EBITDA Margin %	8.7%	4.1%	-4.6%
Net Profit Margin %**	1.8%	-0.1%	-1.9%

* Data for MSC and ONE are estimated. 2018 is estimated based on first 3 quarters data.

** Excluded HMM (for its too big losses), MSC and ONE (as data were not available).

TABLE 3 – SOURCE: SRM elaboration on Alphaliner

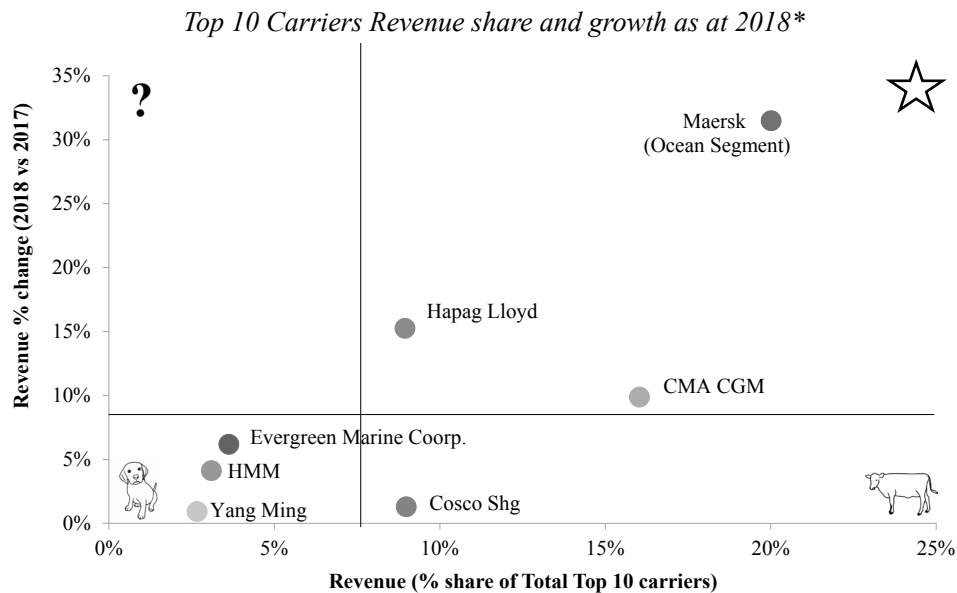
*Top 10 Carriers Revenue and EBITDA by quarter (\$m)**

*Data for 4th quarter are estimated.

GRAPH 17 – SOURCE: SRM elaboration on Alphaliner

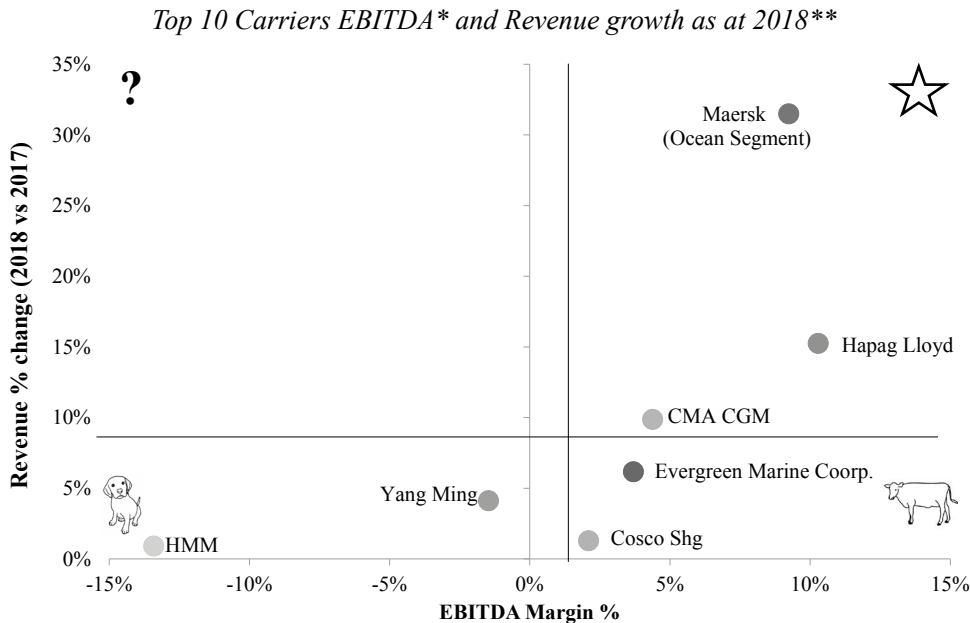
This paragraph is going to close by comparing top 10 carriers on the Boston Consulting Group Matrix. This model was original thought for products, by clustering them based on their market share and their percentage growth. But the same logic can be easily extended to companies. So when a company shows better than average share of market and growth, it falls in the top-right corner (or “star” corner). Such a company is like a star, it has a good share of the market and is still on the growth. Maersk, Hapag Loyd and CMA CGM are in this corner. On the upper-left corner, we find “Question-mark” companies, which are on the growth, but with a little market share. A lot of companies are on the bottom left part of the matrix (dog), with low growth and market share. On the bottom right, there are companies with a low percentage growth and a big market share.

A similar analysis has been carried out as for Revenue growth and EBITDA. So instead of market share we assess the company based on their economic soundness.



*Data are not available for MSC and ONE.

GRAPH 18 – SOURCE: SRM elaboration on Alphaliner



* EBITDA Margin as % of Revenue.

** Data are not available for MSC and ONE.

GRAPH 19 – SOURCE: SRM elaboration on Alphaliner

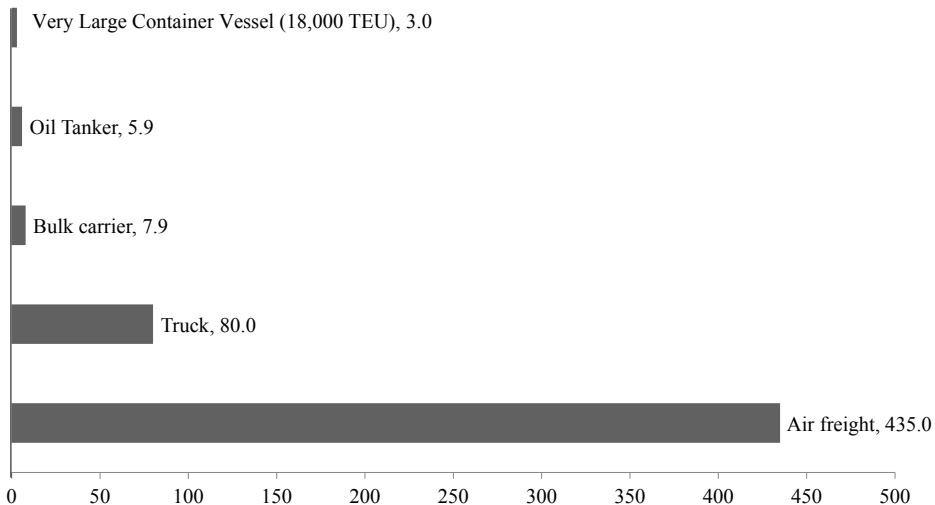
3. IMO 2020: EFFECTS ON SHIPPING STRATEGIES

The main type of “bunker” oil for ships is heavy fuel oil, derived as a residue from crude oil distillation. It contains *sulphur* which, following combustion in the engine, ends up in ship emissions. Sulphur oxides (SOx) are harmful to human health, and in the atmosphere, SOx can lead to acid rain, which can harm crops, forests and aquatic species, and contributes to the acidification of the oceans.

IMO regulations to reduce sulphur oxides (SOx) emissions from ships first came into force in 2005, under Annex VI of the *International Convention for the Prevention of Pollution from Ships* (known as the MARPOL Convention). Since then, the limits on sulphur oxides have been progressively tightened. From 1 January 2020, the limit for sulphur in fuel oil used on board ships operating outside designated emission control areas will be reduced to 0.50% m/m (mass by mass).

Maritime transport emits around 1,000 million tonnes of CO₂ annually and is responsible for about 2.5% of global greenhouse gas emissions (3rd IMO GHG study). Shipping emissions are predicted to increase between 50% and 250% by 2050 – depending on future economic and energy developments. In terms of CO₂ emissions per tonne of cargo transported in one mile, shipping is recognised as the most efficient form of commercial transport. IMO regulations on energy efficiency support the demand for ever greener and cleaner shipping. A ship which is more energy efficient burns less fuel so emits less air pollution.

*Comparison of Typical CO₂ emissions between modes of transports
(grams per tonne-km)*



GRAPH 20 – SOURCE: SRM elaboration on IMO GHG study (2009)

3.1 The new limits in Sulphur emissions: tools and sanctions

For ships operating outside designated emission control areas the current limit for sulphur content of ships' fuel oil is 3.50% m/m (mass by mass). The new limit will be 0.50% m/m which will apply on and after 1 January 2020.

There is an even stricter limit of 0.10% m/m already in effect in *Emission Control Areas* (ECAs) which have been established by IMO. This 0.10% m/m limit applies in the four established ECAs: the Baltic Sea area; the North Sea area; the North American area (covering designated coastal areas off the United States and Canada); and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands).

Fuel oil providers already supply fuel oil which meets the 0.10% m/m limit (such as marine distillate and ultra-low sulphur fuel oil blends) to ships which require this fuel to trade in the ECAs.

In order to meet IMO requirements, there are essentially three alternatives for ships:

1. *Use fuel oil with enough low levels of Sulphur.* Refineries may blend fuel oil with a high (non-compliant) sulphur content with fuel oil with a sulphur content lower than the required sulphur content to achieve a compliant fuel oil.
2. *Use scrubbers.* Some ships may limit the air pollutants by installing exhaust gas cleaning systems, also known as "scrubbers". This is accepted by flag States as an alternative means to meet the sulphur limit requirement. These scrubbers are designed to remove sulphur oxides from the ship's engine and boiler exhaust gases. So a ship fitted with a scrubber can use heavy fuel oil, since the sulphur oxides emissions will be reduced to a level equivalent to the required fuel oil sulphur limit.
3. *Use different fuels.* Ships can have engines which can use different fuels, which may contain low or zero sulphur, for example, liquefied natural gas, or biofuels. However, it's estimated there will only be enough LNG to cover 10% of the required shipping fuel by 2040.

To assist ship operators and owners to plan ahead for the 0.50% sulphur 2020 limit, the MEPC has approved guidance on ship implementation planning. The guidance is part of a set of guidelines being developed by IMO for consistent implementation of the MARPOL regulation coming into effect from 1 January 2020.

All sizes of ships will need to use fuel oil that meets the 0.50% limit from 1 January 2020. And there are no possibilities of delay for the deadline.

Ships taking on fuel oil for use on board must obtain a bunker delivery note, which states the sulphur content of the fuel oil supplied. Samples may be taken for verification. Ships must be issued with an *International Air Pollution Prevention* (IAPP) Certificate by their Flag State. This certificate includes a section stating that the ship uses fuel oil with a Sulphur content that does not exceed the applicable limit value as documented by bunker delivery notes or uses an approved equivalent arrangement. Port and coastal States can use port State control to verify that the ship is compliant. They could also use surveillance, for example air surveillance to assess smoke plumes, and other techniques to identify potential violations.

Sanctions are established by individual Parties to MARPOL, as flag and port States.

IMO does not set fines of sanctions - it is down to the individual State Party.

Implementation is the remit and responsibility of the Administrations (flag States and port/coastal States). Ensuring the consistent and effective implementation of the 2020 0.50% m/m sulphur limit is a high priority.

IMO'S Sub-Committee on *Pollution Prevention and Response* (PPR) has been developing guidance to ensure consistent implementation of the 0.50% m/m sulphur limit. The ship implementation planning guidance includes sections on:

- risk assessment and mitigation plan (impact of new fuels);
- fuel oil system modifications and tank cleaning (if needed);
- fuel oil capacity and segregation capability;
- procurement of compliant fuel;
- fuel oil changeover plan (conventional residual fuel oils to 0.50% sulphur compliant fuel oil);
- documentation and reporting.

The latest figures showed that the yearly average sulphur content of the residual fuel oils tested in 2017 was 2.54%. The worldwide average sulphur content for distillate fuel in 2017 was 0.08%.

3.2 *The new limits in sulphur emissions: the effects on bunker costs*

The new standards for Sulphur emissions is going to have different effects on various sectors, in particular on *refiners, shipping companies* and *scrubber producers*.

Refiners

Even though most industry players can expect to increase their costs, refiners who are already capable of processing low-sulfur oil will benefit from IMO 2020. In particular, refineries in China and the U.S. can take advantage of their advanced systems to generate environmentally-friendly and low-sulfur distillates. Big oil refineries in the U.S. Gulf Coast see the opportunity to make more profits from the expected high demand for low sulfur fuels.

Shipping companies

The overall shipping capacity will likely remain the same when the IMO deadline arrives. With the looming shortage of low-sulfur fuel and the high cost of converting to a liquefied natural gas (LNG) system, more carriers will install scrubbers to remain compliant with the IMO 2020 rules. In some cases, the IMO 2020 regulation may actually increase capacity as ship line producers aim to create new eco-friendly vessels to enter the market.

According to industry estimates, more than 90% of the global vessel fleet will be relying on compliant fuels when the sulphur rules step into force on 1 January 2020.

According to a study released by Goldman Sachs (*The IMO 2020: Global Shipping's Blue Sky Moment; May 2018*), In a full compliance scenario, the total impact to consumer

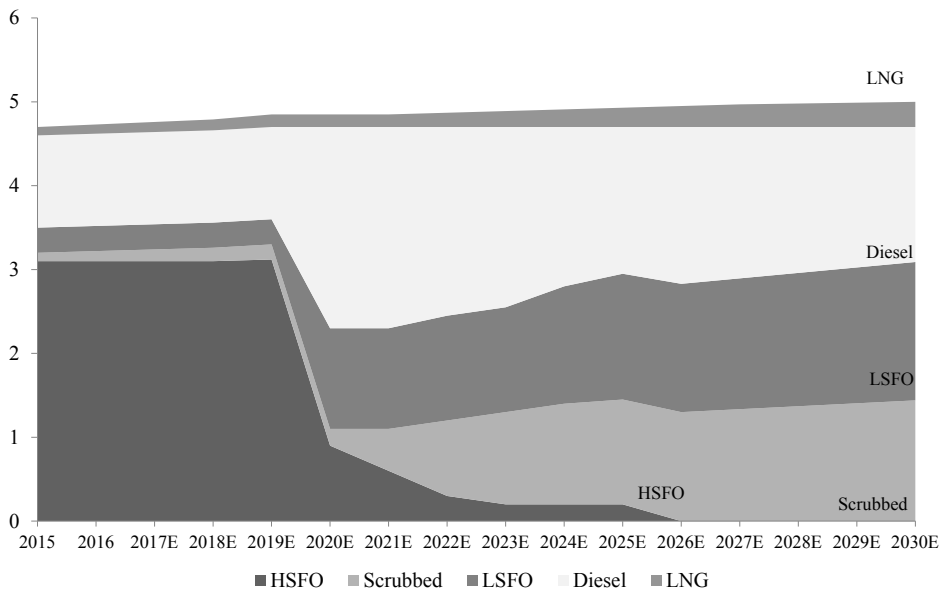
wallets in 2020 could be around \$240 bn, which may largely transfer to the pockets of refiners: \$200 bn will come from higher fuel retail price and \$40 bn from the higher Marine freight due to the higher cost ships are going to face and pass on the customers. \$80bn revenue will be under threat for heavy sour crude oil producers, so that 70% of the benefits will occur to complex refiners, able to shift from High Sulphur Fuel Oil (HSFO) to Low Sulphur Fuel Oil (LSFO).

In order to cover these additional costs, many carriers such as Maersk, CMA, CGM, and MSC announced bunker surcharges and so costs for compliance will have to be passed on to customers/trade. This will result in freight rate increases of between 5 to 10%, depending on the tradelane.

Scrubbers

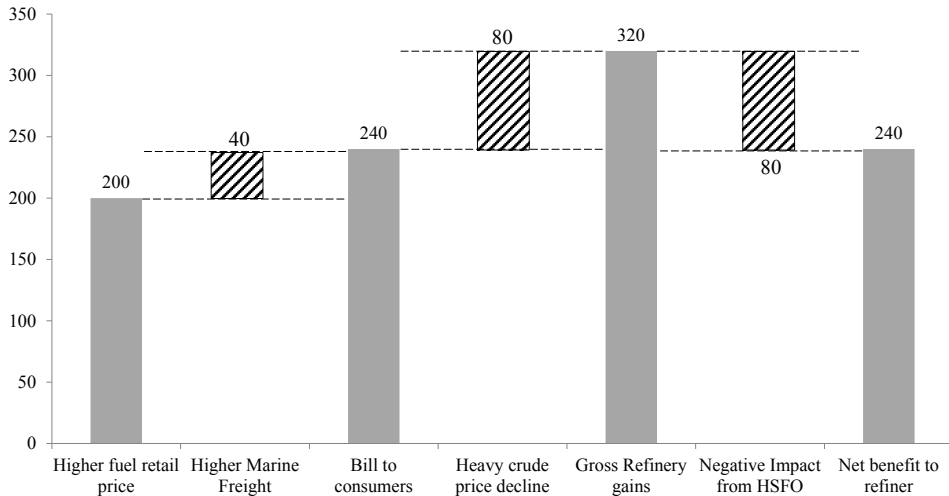
According to the Goldman Sachs study (May 2018) mentioned above, 5,000 ships could install scrubbers by 2025 which represents a revenue pool of \$15 bn. A current payback period of scrubber installation of 4 years (relative to using compliant fuel in 2020) has been estimated. It is expected scrubber installation to pick up from 2020 as payback period may fall to 2 years based on the current forward diesel-HSFO spread, and expect scrubber penetration in ships to be 4%/18% by 2020/25.

IMO 2020 sulphur cap: from high sulphur towards clean fuels in marine industry (mn bpd)



GRAPH 21 – SOURCE: SRM elaboration on Goldman Sachs (May 2018)

Net transfer of \$240bn from consumers to refiners in 2020 due to IMO sulphur cap in a 100% compliance scenario, (\$ bn)



GRAPH 22 – SOURCE: SRM elaboration on Goldman Sachs (May 2018)

4. SHIPPING SECTOR FUTURE SCENARIO

In liner shipping market, there are four very distinctive trends in the past decade: (1) Increasing number of larger ships in the main trade routes; (2) more capacity in the hands of fewer shipping companies; (3) alliances dominating major routes; (4) and low industry profit margins over a long time.

As of the start of 2019, 90 out of 92 containerships larger than 18000 TEUs are used in FE-Europe route; between 15,200 and 17,999, only 1 used in FE-N. America route, and 31 on the FE-Europe. These large ships can enjoy scale economies, which gives the owner cost advantage in the competitive market. When the demand is high, having large ships can translate to high earnings. However, when the demand is low, to fill up the large ships is difficult. This created a huge downward force on the market freight rate and made the smaller shipping companies difficult to survive. As a result, many merge and acquisitions happened in the market, which made the large shipping companies larger. In addition, to make better use of the large ships, most of the operators on the major routes formed alliances. Now, only 3% of the capacity in the FE-Europe route is not controlled by three alliances. For FE-N. Am route, the non-allianced capacity is 18%, as HMM just exited from the 2M Alliance. These alliances made the level of competition in these routes unprecedentedly high for two reasons. First, they all use large mega containerships and can offer lower freight rate due to their low average cost. Second, the alliance is formed using Vessel Sharing Agreement (VSA). In VSA, the members are still responsible to negotiate with their own customers on pricing. As the service quality

of different members using the same ship are essentially the same, price cutting become the only way to compete with each other.

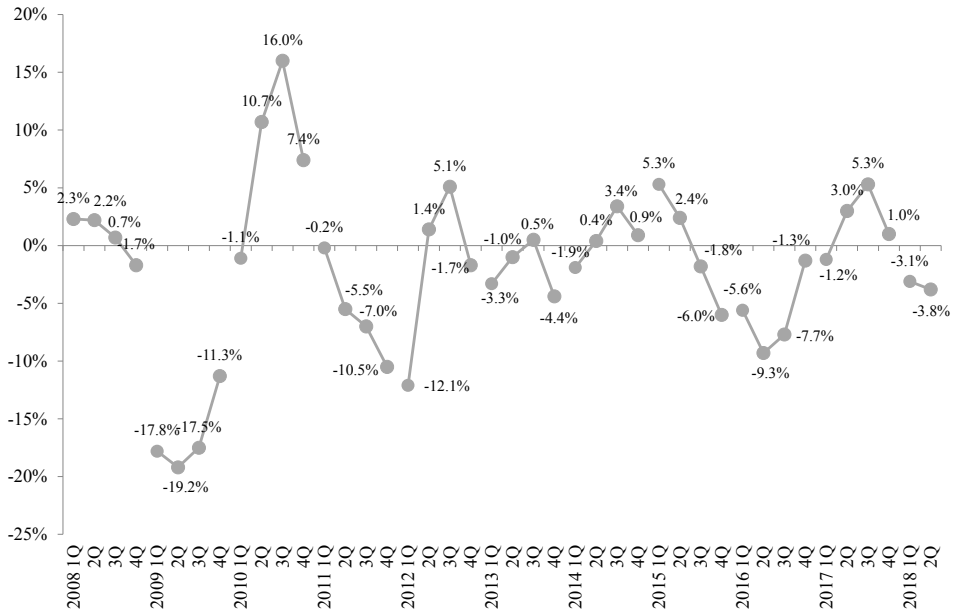
Number of ships by size on different routes (as of 01-01-2019)

	100-999	1,000-1,999	2,000-2,999	3,000-3,999	4,000-5,099	5,100-7,499	7,500-9,999	10,000-12,499	12,500-15,199	15,200-17,999	>18,000
Eur-N. Am	0	5	15	18	80	28	32	0	0	0	0
FE-N. Am	0	1	8	0	40	120	160	51	67	1	0
FE-Europe	0	0	0	0	15	17	28	20	115	31	90
ME/ISC related	32	116	59	16	57	108	87	27	29	0	0
Africa related	40	71	110	70	119	17	41	4	4	0	0
Lat Am related	50	106	120	57	41	61	113	55	10	0	0
Oceania related	19	31	15	21	65	56	9	0	0	0	0
Intra-FE	577	640	237	35	164	15	0	0	0	0	0
Intra-Europe	194	234	55	11	23	20	5	0	0	0	0
Other trades	3	4	5	1	0	0	0	0	0	0	0
Unassigned	10	8	5	5	2	9	5	3	3	0	2
Idle	48	86	35	11	35	5	0	0	9	2	0
Total	973	1302	664	245	641	456	480	160	237	34	92

TABLE 2 - SOURCE: Alphaliner monthly monitor (January 2019)

The high competition in the major trade routes amid the sluggish world economy has created big problem for the companies in these routes. The following graph summarizes the average quarterly operating margins of the main carriers from 2008 to the first half of 2018. Among the total 42 quarters, only 17 of them are positive. In other word, about 60% of the time the industry is having negative operating margin! According to an estimate by McKinsey & Co, the overcapacity in liner shipping has destroyed USD 110 billion of shareholder value¹ in the past 21 years! Nevertheless shipping cycle is unavoidable in the industry, and shipping companies are prepared to suffer temporally losses. However, if the industry has more negative periods than the positive ones, it has to change. Otherwise, investors will lose their interest, more public/government support is required, merge and acquisition will happen. Some may leave the market, actively or involuntarily. Those who stay may have to stick together to avoid the chill in the long winter nights of shipping market!

¹ <https://seanews.co.uk/shipping/container/liner-shipping-ma-destroyed-usd-110bn-of-shareholder-value-in-21-years-report/>

Average carrier quarterly operating margins from 2008

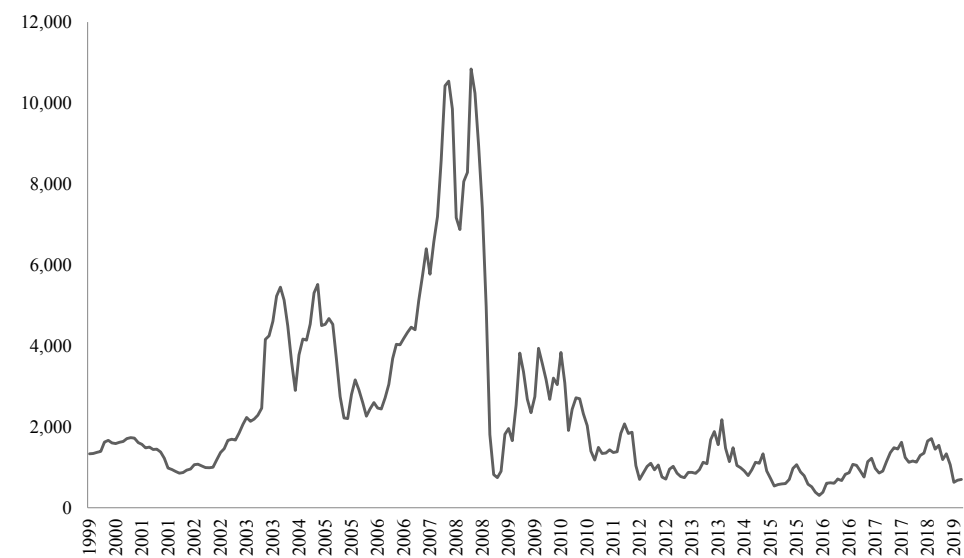
Average of CMA CGM (incl APL to 2Q 2016), CSCL (to 1Q2016), EMC, Hanjin (to 3Q 2016), Hapag-Lloyd (incl CSAV to 2014), HMM, Maersk, ONE (from 2Q 2018, formerly KL, MOL, NYK), WHL, YML, Zim.

GRAPH 23 - SOURCE: Alphaliner monthly monitor (January 2019)

Looking back, the situations after 2008 is not much worse than that before 2003. Examining the Baltic Dry Index (BDI), the barometer of the shipping industry, the low market index after 2012 is like that before 2003. As the following graph shows, there is no much difference between the shipping market after 2012 and those before 2003, except that the current index is obviously lower. This general decreasing in the shipping freight rates is attributable to the technology improvement in shipping. With larger ships, better management, better information, the cost of maritime transportation decreases over time. Therefore, even the demand increases from to (Graph 25) the long-term equilibrium prices will decrease.

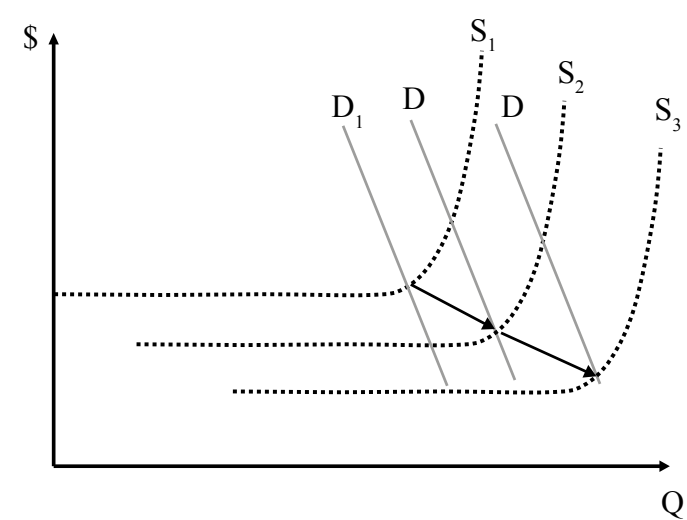
In the past two decades, the most obvious technology progress in shipping is the increase in shipsize. The container ships have experienced the fastest increase in size, followed by Bulk carriers and Tankers. This continuous growth in ship size is the result of the ship-owners' continuous pursue of Economies of Scale, and the increase demand in international trade. Bigger ships enable the owner to enjoy lower average cost, to offer a lower freight rate, and to be more competitive in the market.

The BDI from 1985 to 2018



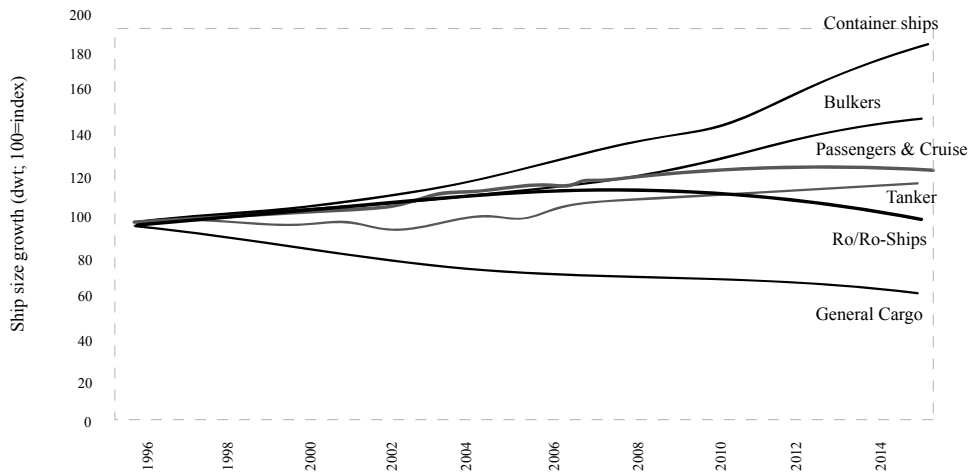
GRAPH 24 - SOURCE: BDI index

Illustration on the impacts of technology progress on shipping freight rates



GRAPH 25 - SOURCE: Meifeng Luo elaboration

Evolution of ship sizes from 1996 to 2015



GRAPH 26 - SOURCE: The impact of Mega-ships, ITF, OECD

The benefits of large ships can only be realized when the demand is high. However, the uncertainty in the world economy and the conflicts between US and China foretells a gloomy future for world economy. Every shipping company that has owned large mega ships is facing a common difficulty: most of them can only be deployed in the major east-west route, and they all have difficulty to fill these ships. This easy way to use larger ships to increase market competitiveness, which has been used effectively in the shipping industry for many years, cannot continue. Currently, most of the major liner shipping operators have formed alliances, to make better use of the large ships. However, they are also actively seeking new ways to reduce cost.

Looking into the future, the shipping industry may transform in following directions:

(1) *Digitization*: further efficiency increases and cost reduction.

Shipping industry is very traditional. Most of the new development in IT technologies have not applied in shipping. Now, many have realized the huge inefficiencies in the current practice. Below are two examples provided by the industry leaders in the 1st International Shipping Technology and Internet Conference held in Shenzhen at February 28, 2018:

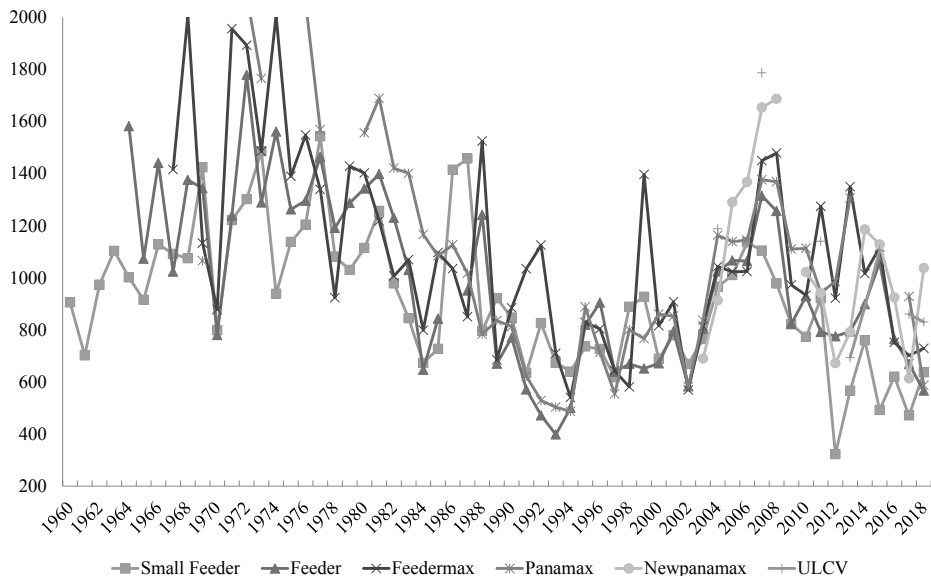
- The founder and CEO of Buyco, Mr. Carl Lauron pointed out the huge inefficiency in the current container freight contracting process. To fill in a large containership with 7000 contracts (Bill of Lading), the total admin time can amount to about four centuries, because 50% of the Bill of Ladings are paper based, and it could involve 10-20 different companies and 200 emails per shipment.
- The CEO of NYSHEX also pointed out that the current practice in container freight forwarding has resulted in a total of US\$23 billion losses, due to the cancel booking/no show, blank sailing and unreliable supply chain.

- This huge inefficiency provides a huge incentive for shipping companies to use advanced technology in further cost reduction in shipping. Many freight forwarding companies has already started the transformation process. In addition to the freight forwarders, there are also many other shipping companies started to work with the IT companies, to explore the possibility for further cost reduction. Maersk, OOCL, MOL all have partnered with IT companies to develop the application of AI in shipping process. OOCL, for example, has partnered with Microsoft Research Asia (MSRA) to apply AI solution in liner network optimization, which could lead to \$10 million annual savings in operation cost, according to James Henderson (Apr 27, 2018).

(2) *Shorter shipbuilding lag*: less volatility in freight rates

Shipbuilding lag, the time from ordering to delivery, are affected by both technology progress and shipping market condition. Generally, the shipbuilding lags are getting shorter in the past (Figure 5), except for the period of 2003-2008, when the demand for shipping is unexpectedly high. The shorter shipbuilding lag can shorten the shipping cycle. When ships need less time to build, the freight rate will take less time to adjust when demand changes. This can reduce the volatility of the freight rates. Similar situation also exists in bulker sector. For example, according the IHS ship register database, an ore carrier of 325,963 DWT ordered on January 12, 2018 by Vale SA, is due to deliver at June 1, 2019. It only take 505 days to build such a large double haul ship. Ships of such size usually needs more than three years to construct.

Change of average shipbuilding lag (days) for containerships



GRAPH 27 – SOURCE: IHS PC

(3) *Government subsidy*: increase the level of competition

Shipping subsidies have a long history (1933). It was popular because ships in commerce is a very important supplement to the navy or government service vessels. Now, such function gradually fade away in the world merchant fleet, but government subsidies still exist.

Today, such subsidies can have many forms, as income, tax breaks, and regulatory policies. The subsidies can directed to build new ships in a particular country, owned and crewed by a specific nationals, or to help their shipping companies when they suffer from operation losses.

The impact of such subsidies varies. As pointed out by Red Arrow Logistics², it can undermine the shipping industry, as it can “encourage companies to build ships which are -not needed, for companies who were not profitable and who do not have a profitable business model.-”. Thus, subsidies can increase the chance for the industry to be overcapacity, encourage inefficiency in shipping process, and nullify the function of the invisible hand.

(4) *Uncertain world economy*: Having large containerships may not be a plus.

The BDI index is not only the thermometer for dry bulk shipping industry, but also treated as an indicator for future global economy. When people have confidence that the market will expand, they will purchase more raw materials to prepare for the production infrastructure and facility. Thus, the demand for raw material import will increase. The current low BDI index is at historical low level. Also, according to the news from CNBC, Union Bank of Switzerland (UBS) predicated that the global growth will be lower in 2019³. The main factors are tighter monetary policy, the gloomy global equity markets, and the trade wars. In the long run, when China diverts away from manufacture oriented economy, and the world put more emphasize on the service economy, the demand for shipping may stay at low level.

When trade growth stands still, the increase in containership size will also halt. Furthermore, the companies that have already owned Ultra Large Container Vessels (ULCV) will feel increasingly difficult to make full use of them. The possibility to form bigger alliance is a no-pass, as regulatory bodies already concerned about its impact on market efficiency. With the uncertain global economy, it will be very challenge for those companies operating on the major trade routes.

In summary, the future shipping market will back to the normal period before 2003, with lower freight rate, shorter shipping cycle, and mediocre return. Development and application of new technology in shipping will become the main stream for shipping companies to enhance its market competitiveness. The most fitted will survive. The remaining will be those who can use the most updated technology to provide the most efficient and needed support to the global logistics services.

² <https://www.redarrowlogistics.com/industry-news/government-subsidies-undermine-shipping/>

³ <https://www.cnbc.com/2019/01/02/ubs-2019-outlook-global-growth-to-slow-in-2019.html>

1. ANALYSIS OF THE PHENOMENON

Global alliances have become a dominant feature of container shipping. They are cooperation agreements between container lines (carriers) on operational matters. Alliances usually consist of a series of agreements with global coverage on sharing vessels and slots on these vessels. The aim of such alliances is to achieve economies of scale and wider service coverage.

Whereas the early generations of global alliances that emerged in the mid-1990s provided a vehicle for cooperation between smaller carriers, alliances are nowadays cooperation tools for the largest container lines: the three global alliances (2M, Ocean and THE Alliance) that are operational since April 2017 regroup the eight largest container carriers of the world (Table 1).

Three global container shipping alliances and their members, November 2018

Alliance	Carriers
2M	Maersk, MSC
Ocean Alliance	CMA CGM, Cosco, Evergreen
THE Alliance	Hapag Lloyd, ONE, Yang Ming

TABLE 1 - SOURCE: ITF, 2018

These three alliances represent around 80% of overall container trade and operate around 95% of the total ship capacity on East-West trade lanes, such as Asia-Med (Figure 1), where the major containerised flows occur.

Alliances have allowed carriers to acquire and operate mega-ships, reducing unit costs. Without alliances certain carriers would not have been able to acquire mega-ships. As it is the ordering of mega-ships that has fuelled overcapacity, there is a link between alliances and overcapacity. Alliances have also made the maritime transport offer more uniform and limited the possibilities of carriers to differentiate themselves.

Alliances have contributed to lower service frequencies (Figure 2), fewer direct port-to-port connections (Figure 3), declining schedule reliability and longer waiting times. This has increased total transport times and delivery uncertainty for various shippers, leading to higher inventory and buffer costs.

Moreover, alliances have proved to be inherently instable: considering that all major carriers are in alliances, changes in one alliance can have an impact on the whole sector.

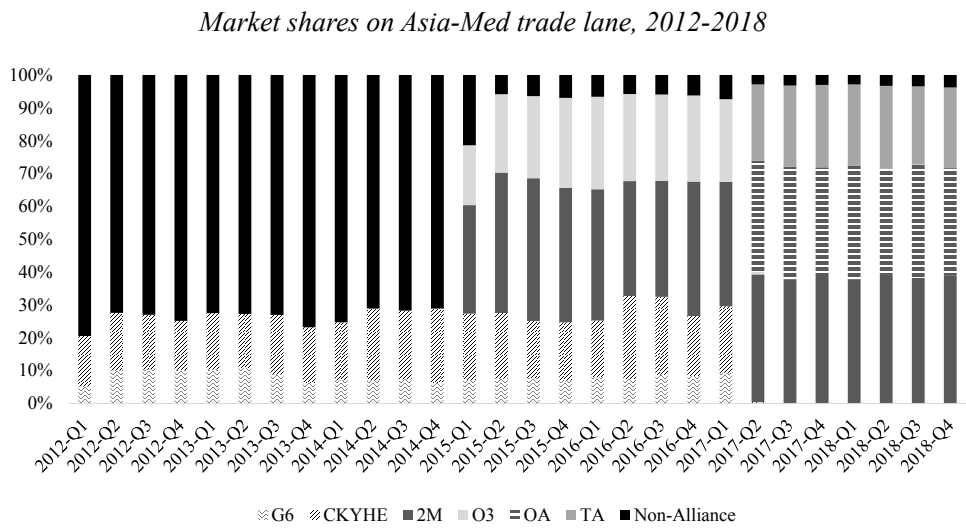


FIGURE 1 - SOURCE: ITF 2019

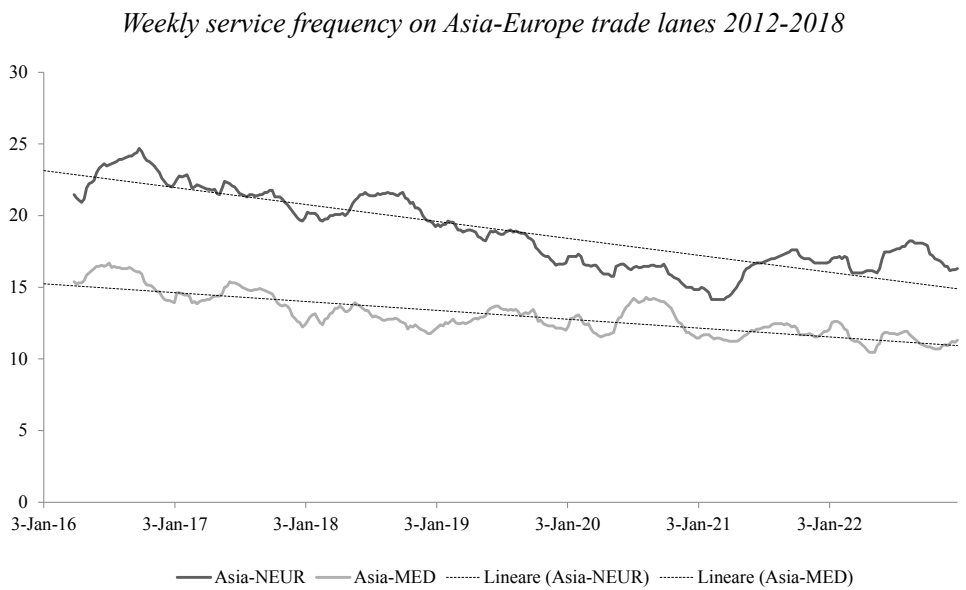


FIGURE 2 - SOURCE: ITF 2019

Several impacts of alliances on the transport system as a whole can be identified. They contribute to concentration of port networks and bigger cargo shifts from one port to another when alliances change port networks. Within ports, the buying power of the alliance carriers can create destructive competition between terminal operators and between other port service providers such as towage companies. This can lower the rates of return on investment for the port industry, results in the decline of smaller container

ports and the disappearance of smaller independent terminal operators, as well as towage companies. A particular concern is that alliances and alliance carriers frequently exert strong pressure for publicly funded infrastructure upgrades to be undertaken to support the use of megaships, while these expenditures often prove to be uneconomic, either due to shifting demand for port services or the monopsony power exercised by the alliances. Although overcapacity in the liner sector has lowered freight rates, these cost savings are partly offset by a number of additional costs for shippers. Moreover, by limiting shipping options, alliances have frustrated the risk diversification strategies of shippers and freight forwarders.

Distinct port pairs on Asia-Med services 2012-2018

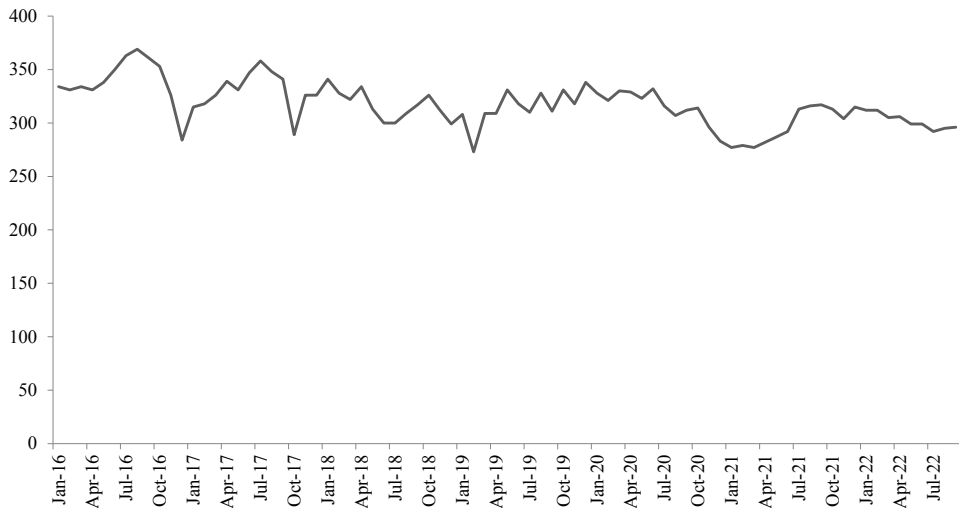


FIGURE 3 - SOURCE: ITF 2019

Alliances could raise competition concerns in what has become a concentrated market. The top four carriers accounted for 60% of the global container shipping market in 2018. The market share of the biggest carrier (19%) is larger than the market share of any global liner alliance before 2012, which signifies the different character of current alliances.

Global alliances give more market power to carriers and have several implications. First, they represent barriers to entry on East-West trades: only the largest companies would be able to compete on price for Asia-Europe services outside an alliance structure. Second, alliances could function as vehicles for collusion between carriers, as they provide carriers with in-depth insights on the cost structures of their competitors. Thirdly, alliances give very considerable bargaining power – “monopsony power” – to carriers in regard to ports and terminals. The result can be declining rates for port services, carriers requesting additional public infrastructure, and vertical integration by carriers, in particular in terminal operations. Consequently, the market share of carrier-dominated terminal operators has increased from 18% in 2001 to 38% in 2016. (Figure 5).

This could raise competition concerns if dedicated terminals exclude other carriers and if carriers’ terminal investments raise entry costs that make container shipping a less contestable market.

Capacity market shares global carriers (1998-2018)

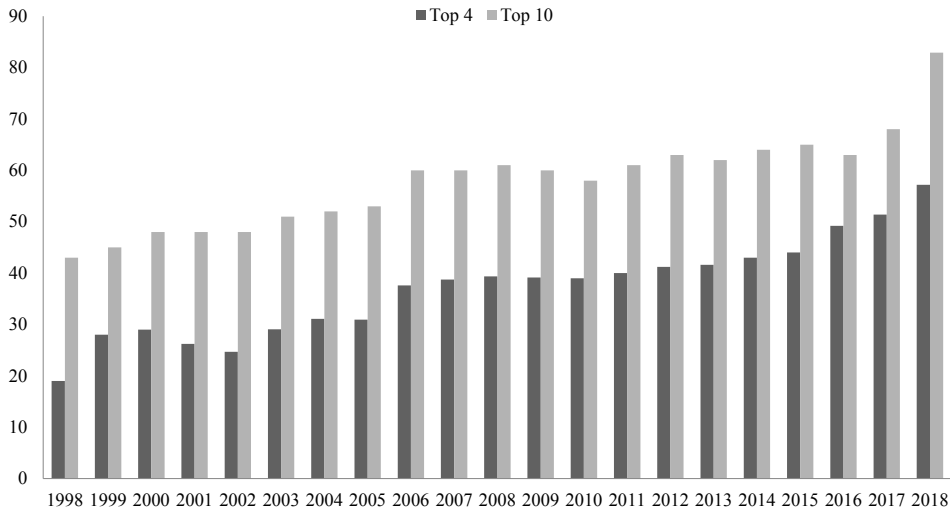


FIGURE 4 - SOURCE: ITF, 2018

Types of terminal operators (2001-2016)

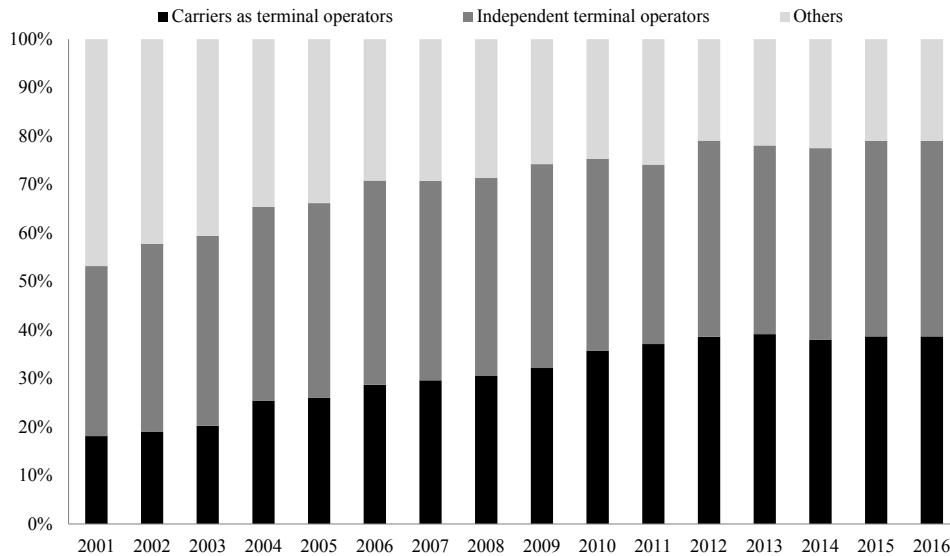


FIGURE 5 - SOURCE: ITF, 2018

The first generations of alliances allowed smaller carriers to achieve economies of scale, based on complementarity between them, and as such increased shipping options. The current three alliances are not serving the smaller carriers but each brings together two to three very large carriers that would be able to offer most of their services outside an alliance. Contrary to some transport sectors – e.g. aviation - economies of scale in container shipping can also be achieved via mergers and acquisitions – or via the organic growth of carriers increasing market shares.

Over the last decades, the EU has acted to remove the sectoral exemption from competition policy long enjoyed by liner conferences. However, the remaining block exemptions for alliances have enabled a rapid evolution of these arrangements and the industry has, as a result, recently reached a position of high concentration when assessed on key measures. One could wonder if there are still welfare benefits from maintaining block exemptions.

2. RECOMMENDATIONS

1. Adopt a presumption toward repeal of shipping-specific block exemptions from competition law.

Liner shipping does not have unique characteristics that justify exemptions from competition law, either for conferences or for alliances. In line with the global long-term trend to dismantle sector-specific exemptions from competition law and in line with OECD regulatory principles, generic antitrust rules should apply to all agreements between liner shipping companies, as for any other industry, with regard to the cooperation that is allowed. Countries where “conferences” are still allowed should reconsider their position. In light of the longer-term trend toward the removal of block exemptions in the shipping industry, the European Commission should carefully consider allowing the EU Consortia Block Exemption Regulation to expire in April 2020, as currently scheduled, rather than extending it. A repeal of block exemptions is unlikely to result in the termination of current and future alliances, as these could still be authorised under competition law on a case-by-case basis. However, it would ensure greater scrutiny of individual alliances and thus more effectively deter any anticompetitive conduct in the sector. In order to maintain legal certainty, the European Commission could provide temporary guidelines on how to treat liner shipping in EU antitrust law. If the block exemption is extended, its scope should be limited, in particular by introducing a provision to consult maritime transport stakeholders and by excluding joint purchasing by alliances.

2. Improve project appraisal for port and hinterland infrastructure and adopt common principles for port pricing

Much of the investment required to upgrade ports to handle mega-ships is publicly funded, either directly or indirectly. It is essential that these public expenditures be based on sound economic assessments and that risk-minimisation strategies are in place. New port and hinterland transport projects should be based on sound projections of cargo flows, particularly from shippers. Demands from carriers for new facilities should be

supported by enforceable commitments from their side to actually use these, to minimise the risk that publicly financed ports will be underused. In the European Union, this could be achieved by imposing stricter conditions on funding for port projects using EU- funds and those of the European Investment Bank. This could form part of the conditions governing EU member states' state aid for port infrastructure. The adoption of common principles for port pricing – ideally at a global level but at least at regional level - could help to offset the monopsony power of alliances and support sound project analysis in cases where new facilities are proposed to accommodate mega-ships.

3. Establish more coherent ports policies to clarify roles and reduce risk of creating over-capacity

Governments should define clearly which ports are expected to service mega-ships and which ports have different roles. A reduction in the number of EU “core ports” in the Trans-European Network as part of the elaboration of a clearer and more detailed port strategy would also reduce over-capacity risks in respect of container ports for mega-ships. Cooperation between ports also provides a potentially significant source of countervailing power in a context of the rapidly increasing concentration of the shipping industry resulting from the growth of liner shipping alliances. Various governments, such as those of the US, Japan and China, have facilitated such cooperation by stimulating mergers of public port authorities and allowing port alliances. Within ports, collaboration between terminals could improve the efficiency of the maritime supply chain, subject to the constraints of competition policy. Governments could consider how – and under which circumstances – they could allow facility sharing in ports, without introducing new sector-specific block exemptions from competition law. The potential role of such co-operation arrangements is likely to be greater in contexts where block exemptions for liner shipping have not been eliminated. More collaboration between the different stakeholders in the maritime logistics chain could also help to reduce the inefficiencies in the whole chain.

THE MARITIME TECHNOLOGY INDUSTRY IN EUROPE: CURRENT STATE AND PERSPECTIVES

1. DEFINING THE “MARITIME TECHNOLOGY INDUSTRY” AND ITS MAIN PLAYERS

The European maritime technology industry encompasses all the enterprises involved in the design, construction, maintenance and repair of all types of ships and other maritime structures, including the complete supply chain of systems, equipment and services as well as research and educational institutions. Shipyards and maritime equipment manufacturers can be considered as the main players within the maritime technology industry.

The European maritime technology industry is currently the global leader in terms of aggregated production value, despite the level of shipbuilding production in tonnage terms is lower than its Asian competitors¹. With a calculated total value of 112.5 billion Euro, the EU currently represents over 23% of the global production value for maritime technology, while total employment (direct and indirect) is estimated to exceed 900.000 jobs.

European Shipyards

The European Shipbuilding industry, including the Ship Maintenance, Repair and Conversion sector, is currently composed of approximately 300 shipyards specialised in building and repairing the most complex and technologically advanced civil and naval ships and other hardware for maritime applications. 80% of European shipyards can be considered ‘small to medium’ (building ships of 60-150 meters) while the remaining ones can be defined as ‘large’. European shipyards generate today a production value of approximately EUR 31 billion yearly and employ more than 250,000 direct jobs in Europe.

Over the last fifteen years, European shipbuilding has evolved from the building of steel-intensive merchant ship types, such as tankers, bulkers and containerships, to complex vessel types and structures. Today European yards are world leaders in the construction of cruise ships and are global leading players in the production of the most advanced ferries, offshore supply vessels, research vessels, workboats, fishing vessels, dredgers, tugs and other non-cargo carrying ships, including sophisticated naval ships.

¹ “Study on New Trends in Globalisation in Shipbuilding and Marine Supplies – Consequences for European Industrial and Trade Policy”, BALance Technology Consulting (2017).

The complexity of the high-tech ship types built in Europe

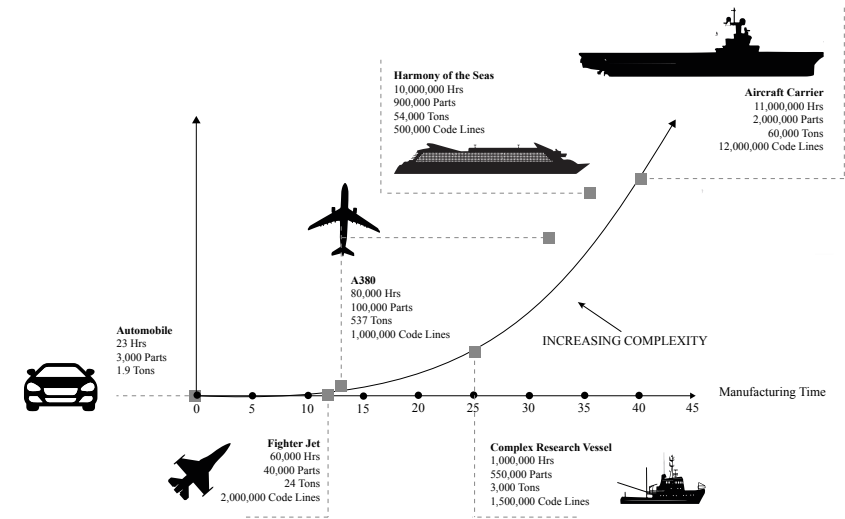
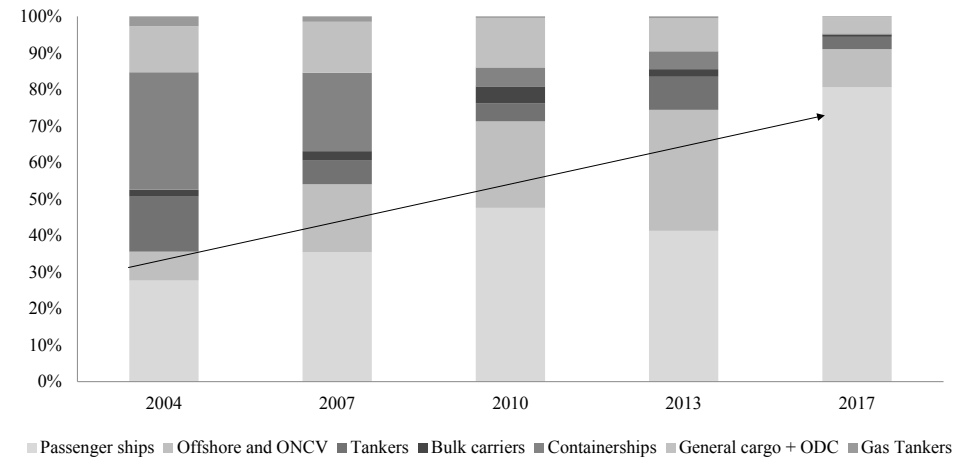


FIGURE 1 - SOURCE: SRM on SEA Europe

The picture below shows the evolution of the European Shipbuilding Orderbook by product segment and the progressive specialisation of European shipyards in high-tech, complex vessels types. Such specialisation was a result of a continued investment in research, innovation and development as well as in a skilled workforce, which allowed the sector to stay ahead global and fierce competition from non-EU Shipyards. Very few sectors have experienced such a rapid and drastic change in their product portfolios over a such a relatively short time period.

Specialisation of European Shipyards in high-tech vessel types – Evolution of the European Shipbuilding Orderbook by vessel type (in Compensated Gross Tonnage, CGT)



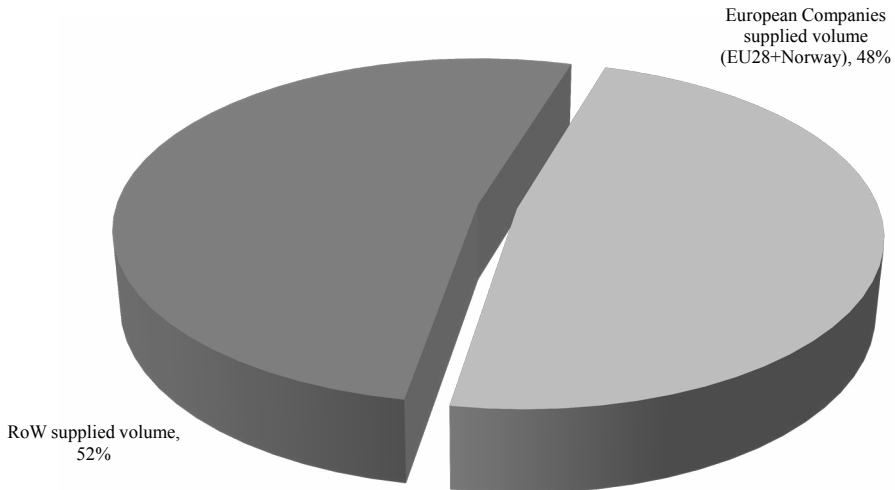
GRAPH 1 - SOURCE: SEA Europe based on IHS Fairplay data

European maritime equipment manufacturers and suppliers

Maritime equipment manufacturers and suppliers deliver materials, systems, and equipment; act as service providers in engineering and consulting; or are integrated as subcontractors in pre-product manufacturing and assembly. The industry provides a very wide range of supplies, from 5mm titanium bolts to 50-Megawatt diesel generators with everything in between, for an equally diverse range of vessel types and sizes. Such supplies can account for 70-75 of the value of a ship (80% in case of high-tech, complex ship types built in Europe such as cruise ships).

The maritime equipment suppliers may serve the shipyards in their national markets, but also other national markets such as the shipowners, the Navies, or the offshore operators directly, as well and foreign shipyards and customers. So, in addition to domestic production, they provide products and services for the international market through export sales.

Equipment Suppliers Market Shares Global production volume average=125.5bn



GRAPH 2 - SOURCE: SEA Europe based on BALance Technology Consulting

The maritime equipment industry is characterized by its heterogeneity due to diversified markets, firms' varying sizes and degrees of specialization, and diverse customer bases. Basically, it is possible to distinguish between 1st tier and 2nd tier suppliers. While 1st tier suppliers directly produce equipment (i.e. for shipyards), 2nd tier suppliers are responsible for manufacturing components utilized by 1st tier suppliers and can, therefore, be considered as sub-suppliers.

With an overall production volume of €44.5 billion per annum (p.a.), the 1st tier of the shipbuilding supply chain engages more than 231,000 employees in more than 28,000 enterprises across Europe, mainly Small and Medium Enterprises (SMEs).

The economic strength of the 1st tier suppliers within European shipbuilding supply chain is responsible for a powerful group of sub-suppliers in the 2nd tier of shipbuilding supply chain which is estimated to generate a total production value of €26.8 billion and additional 109 000 employees.

Currently, European manufacturers are world leaders in the production of advanced and technology intensive maritime equipment and sophisticated marine engineering solutions, holding almost 50% of the worldwide market shares.

Other players: Design offices, research centres and classification societies

Design offices can act as independent companies collaborating with the shipyards in specific projects. But in many cases, these offices are integrated with the shipyards to develop a ship design that matches the operational criteria set by either the yard or the owner. This is a crucial phase to ensure the vessel's operational efficiency.

The design offices, research institutes, classification societies and Research & Development (R&D) and design divisions of other actors along the value chain play a very important role in certain innovations (e.g. hull design). Designers also increasingly cooperate with marine equipment manufacturers to take part in joint development projects.

In some cases, classification societies also play an important role in the design and building phases by providing their technical expertise, which can be used for pre-project consulting to assist in building a vessel and establishing and approving safety and security standards. Classification societies are important because they set standards and supervise rules in the shipbuilding industry. In principle, classification societies check whether the products and systems aboard a ship comply or not. They set and apply technical standards relating to the design and construction of ship and carry out extensive surveys of ships and their main systems.

2. THE ROLE OF EUROPEAN MARITIME TECHNOLOGY IN EUROPE

The European coastline is approximately 136,000 km and the oceans and seas are an integral part of the continent's traditional maritime orientation and a source of new opportunities for the future. For generations the European seas have inspired exploration and the development of breakthrough innovations in order to harness its potential.

Mankind's use of the sea is broad and includes maritime transport, the enabler of global trade; offshore oil & gas, the back-bone of energy supply in an economy which is still largely based on hydro-carbons; aquaculture activities, an essential source of protein for a growing world population; maritime tourism; marine renewable energy; coastal protection and land reclamation; off-shore mining; floating structures and factories; and various aspects of maritime and marine research.

In this regard, Europe can be proud of its outstanding ability to design, manufacture and build the full range of high-tech vessels and maritime structures which meet the most stringent safety and technical requirements, allowing the continent to engage in global trade, exploit resources and when the necessity has arisen, defend its strategic interests.

The European maritime technology industry is indeed at the core of the “blue economy”, providing the technologies and know-how to develop sustainable and safe maritime activities, and is a key player for achieving the goals of the Europe 2020 Strategy of “Smart”, “Sustainable” and “Inclusive” Growth.

Smart

Continuous investments in Research, Development and Innovation from the maritime technology sector are amongst the highest in Europe, notably 9% of the sector’s turnover. The sector also heavily invests in a highly skilled workforce: 80% of the sector’s employees have a technical university or a vocational education and training (VET) background and white-collar workers, doing administrative, management, financing or other tasks, account for approximately 15% of the total staff. The Maritime technology industry is, furthermore, working to maximise the potential of digital technologies for its products and production processes and thereby contributes to Europe’s smart growth and knowledge-based economy. Finally, the ships built in Europe and the equipment produced in Europe contribute to making shipping and logistical operations smarter by enabling a better connection between the ships themselves (“smart” shipping) and between ships and shore-based activities (“smart ports”, “smart infrastructure” and “smart logistics”).

Sustainable

European companies develop the most efficient and advanced technologies in the market to reduce pollution from ships, to limit ships’ accidents, and to reduce the environmental impact of shipping (decarbonisation of shipping). The Maritime technology sector is also key in exploiting the promising potential of Blue Economy activities in a sustainable manner, for example through the production, transmission and storage of offshore renewable energies (offshore wind, ocean energies, etc.). In doing so, the maritime technology industry in Europe is not only key in fulfilling Europe’s environmental agenda; its technologies and structures are also key for developing Europe’s Energy Union and putting Europe’s Blue Economy agenda into practice.

Inclusive

The sector has a very employment multiplier in the regions in which its activities are allocated. It is estimated that one job in the shipyard on average generates 4 to 7 additional jobs in the regional economy. The sector is thus key for the economic growth, employment and welfare of European regions. It equally contributes to the EU’s cohesion policy, provides sustainable and safe vessels and technologies for the movement of people and goods to and from the peripheral maritime regions. 80% of the maritime regions consider “maritime” as a key priority under their Smart Specialisation Strategy, which guides investments related to regional policy. Most of these regions identify “marine renewable energies, shipbuilding, advanced materials and manufacturing processes” as a key priority.

Finally, European naval industries are key providers of the appropriate equipment and platforms for ensuring the protection of Europe’s coastlines. European naval yards and equipment manufacturers have proven to be world leaders in functionality, quality and value in terms of exports volume in international naval markets.

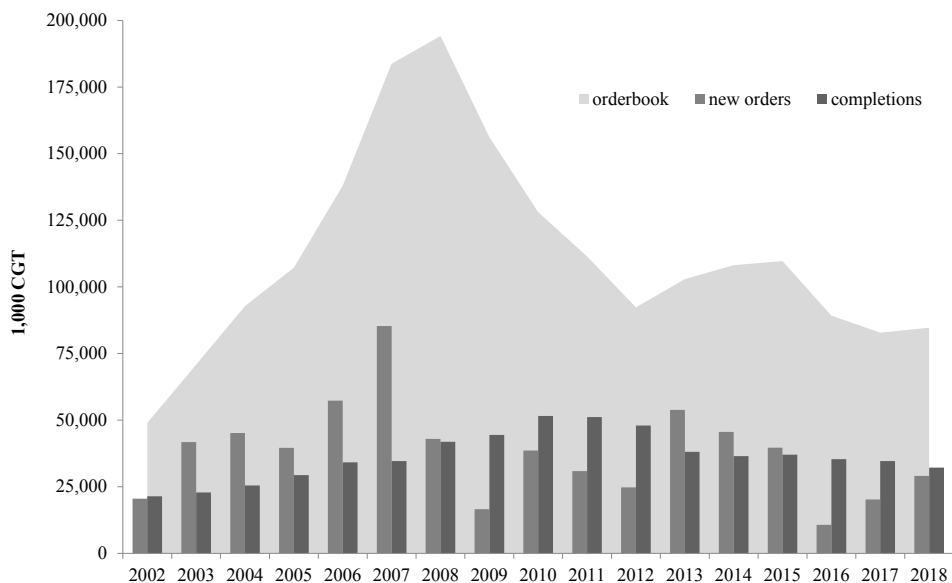
Europe’s naval shipyards and naval equipment manufacturers contribute to the European Common Security and Defence Policy (CSDP) and enable Europe to develop state of the art industrial and technical capabilities and competences that

guarantee Europe's safety and security. They also enable Europe to take a leading role in (international) peace-keeping operations, conflict prevention and, ultimately, in strengthening international security. Naval ships and naval equipment are also important for European coastguard operations

3. GLOBAL AND REGIONAL MARKET DEVELOPMENTS

In recent years, global shipping and shipbuilding experienced a particularly long downward cycle phase. For almost 10 years the global fleet has been growing faster than seaborne trade. Many shipping markets have built up significant overcapacity and despite much intensified scrapping activity and capacity absorption through slow steaming, freight and charter rates have declined. The poor earning situation of shipping companies has brought down the investment capacity and increased price pressure in the market.

Global Commercial Shipbuilding Activity in Compensated Gross Tonnage (CGT)

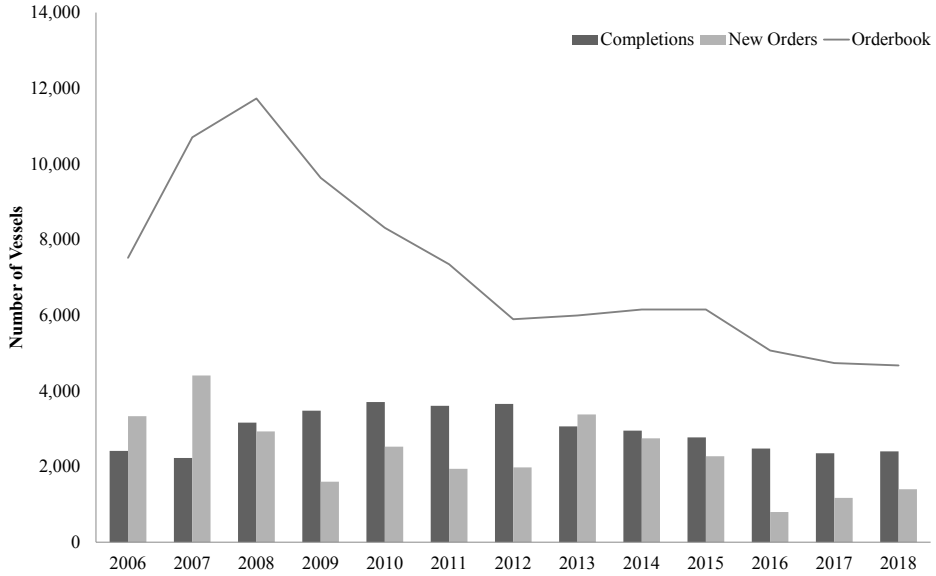


GRAPH 3 - SOURCE: SEA Europe based on IHS Fairplay data, end 2018

However, the picture changes if we look at the global commercial shipbuilding activity expressed in number of vessels (instead of compensated gross tonnage): the order intake increases only marginally compared to 2017 levels while the global orderbook continues its decline trend. This is explained by the fact that the vast majority of new orders placed in 2018 were for higher tonnage, higher value-added ship units (such as LNG tankers).

The persistently low numbers of units ordered continue to negatively impact the supply chain of equipment manufacturers serving the global shipbuilding market.

Global Commercial Shipbuilding Activity in Number of Vessels

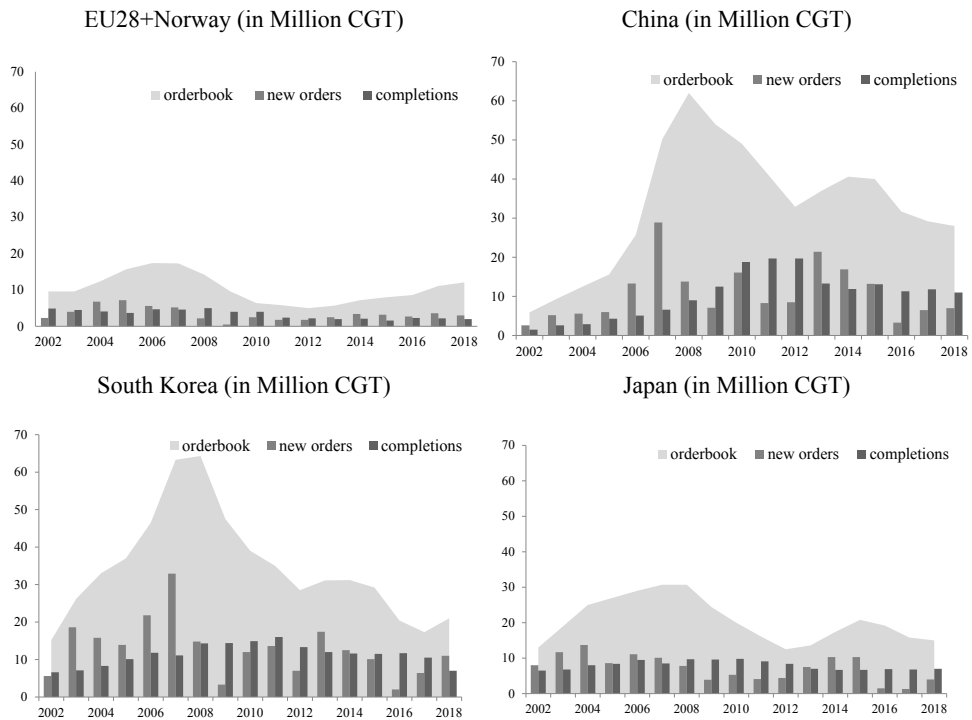


GRAPH 4 - SOURCE: SEA Europe based on IHS Fairplay data, end 2018

Since the record low levels of 2016, ordering at South Korean yards increased significantly mainly driven by a recovery in some newbuilding market segments (LNG carriers and container carrier ships) and a strong government response to the shipbuilding market downturn. In 2018 the volume of new orders placed at South Korean shipyards surpassed the level of ship completions for the first time since 2014. As a result, South Korea was able to regain the lion's share in global shipbuilding contracting activity both in Compensated Gross Tonnage (CGT) and in order value terms (reaching approximately 40% of the world market of newbuilding orders), surpassing China (25%) and followed by Japan (16%) and Europe (14%).

In China, the newbuilding orders almost doubled compared to the 2016 levels while the amount of completions remained fairly stable. As a result, the orderbook of Chinese shipyards continued to decrease while still ranking first at global level in compensated gross tonnage (32% world market share) followed by Korea (25%), Japan (18%) and EU 28+Norway (15%). With respect to ship types, bulk carriers, oil tankers and containerships still dominate as the key export products at Chinese shipyards. In 2018 Japanese shipyards experienced an increase in the amount of newbuilding orders received, inverting the downward trend started in 2015.

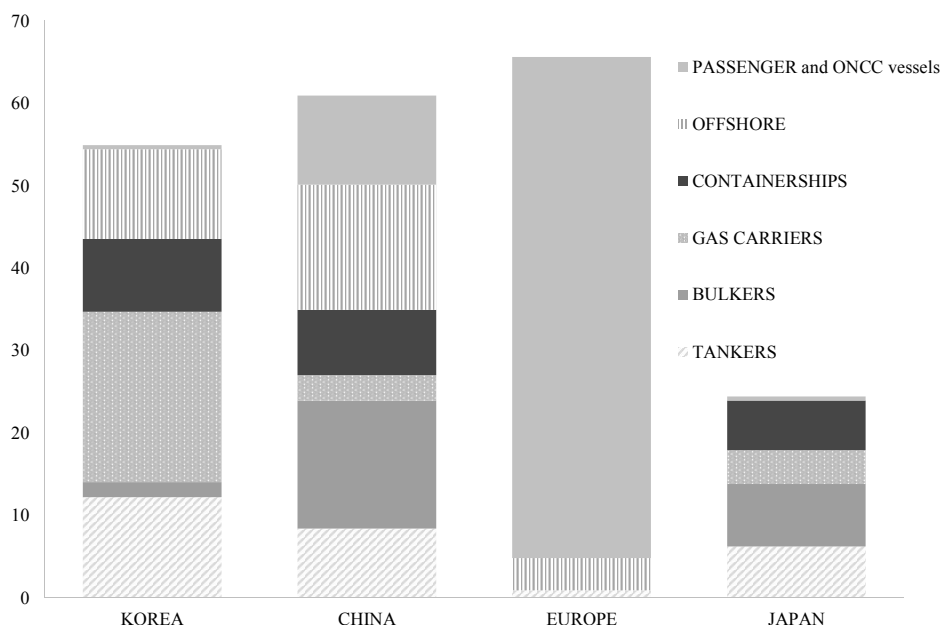
Global Commercial Shipbuilding Activity per Geographical Areas



GRAPH 5 - SOURCE: SEA Europe based on IHS Fairplay data, end 2018

Europe's shipbuilding orderbook continued to grow in 2018 (for the 6th consecutive year). However, contracting levels at European shipyards have decreased compared to the year before, particularly in value terms due to the smaller size of units ordered. Europe still leads the world commercial orderbook in value terms (30%).

According to Clarksons, contracts placed at European yards had a combined estimated investment value of \$13.2bn, accounting for 20% of global investment in 2018. In contrast with its Asian competitors, European yards continued to harvest the benefits of their specialisation and successful focus on high tech niche markets benefiting from the continued extraordinary cruise ordering boom and healthy ordering for other specialised non cargo-carrying vessels (ONCC).

World Commercial Orderbook in \$ Billion (end 2018)

GRAPH 6 - SOURCE: SEA Europe based on Clarksons' Research data (World Shipyard Monitor)

4. FUTURE TRENDS AND OPPORTUNITIES: MAINTAINING LEADERSHIP IN COMPLEX SHIP TYPES AND SOPHISTICATED TECHNOLOGY SOLUTIONS, PREPARING THE MARITIME TRANSPORT OF THE FUTURE AND UNTAPPING NEW MARKETS

Despite signs of gradual improvement in the global shipbuilding and shipping market conditions, challenges remain in the short to medium term due to persisting overcapacity in most segments and uncertainty in the economic outlook. Global economic growth has been revised downward in almost all G20 countries, with large revisions of the euro area in both 2019 and 2020. There is still high global policy uncertainty with ongoing trade tensions which leads to a further erosion of business and consumer confidence and all of these is contributing to the slowdown.

Some major global societal trends have been identified which create important challenges for the entire maritime industry but also offer potentially substantial opportunities, while there is a growing awareness of the vast potential that the sea has to offer which can translate into new growth opportunities. The Secretary-General of the International Maritime Organisation (IMO) Kitack Lim stated that “shipping will change in the coming 10 years more than it has during the past 100 years”, due the greening and digitalization of the industry.

Confronted with these challenges, goals and needs, the European Waterborne

Technology Platform², (Waterborne TP) has developed a Strategic Research Agenda³ based on ambitious vision and on a series of cross-sectoral missions in order to enable the transformation of Waterborne transport, blue growth activities and the integration of shipping and inland navigation into seamless port and logistics operations.

For the European maritime technology industry, the following challenges and opportunities will be of key importance in the years ahead:

Enhancing the environmental performance of shipping

Over the last decades, maritime transport has been at the core of political and societal debates to significantly reduce its environmental footprint. Several regulatory measures have already been imposed through international and European legislation to reduce emissions of sulphur oxides (SOx) and oxides of nitrogen (NOx). Shipping's greenhouse gas (GHG) emissions and the associated climate impact were subject to intense debate within the International Maritime Organisation (IMO). In April 2018, the IMO adopted an initial strategy aimed at reducing the total annual Greenhouse Gas emissions by at least 50% by 2050 compared to the 2008 level of emissions. Moreover, the IMO Ballast Water Management Convention (BWMC), adopted in 2014 to prevent the spread of harmful aquatic organisms from one region to the other through the release of ships' ballast water, entered into force on 8 September 2017. The Convention prescribes that ships must adhere to certain discharge standards through the use of a ballast water system before the deadline of 8 September 2024.

The European maritime technology sector has played a crucial role in developing and producing equipment and technological solutions that allowed shipping to significantly reduce its environmental footprint. European maritime equipment producers, for instance, developed exhaust gas cleaning systems (commonly known as “scrubbers”) and technologies to reduce SOx emissions from ships as well as ballast water management systems to be installed onboard to limit the adverse impact from invasive species from the marine environment. European shipyards have been furthermore instrumental in stopping the “chicken and egg” debate on Liquefied Natural Gas (LNG) for ships by deciding to build LNG-powered cruises or passenger ships or to convert existing fossil fuelled ships with LNG propulsion.

In 2018 EU shipyards and maritime technology producers were world leaders in LNG fuelled ships and alternative fuel engines and systems with a total aggregated portfolio in excess of € 15 Billion. European manufacturers are world leaders in the area of ballast water management systems – both in terms of quality and in terms of reliability –making continuous, substantial investments in research and development activities. The global

² Waterborne TP has been set up as an industry-oriented Technology Platform to establish a continuous dialogue between all waterborne stakeholders, such as classification societies, energy companies, infrastructural companies, environmental non-profit organisations, manufacturers, research institutes, shipyards, ship-owners, waterway and port operators, universities, fisheries and citizen associations, as well as European Institutions and Member States. For more information: <https://www.waterborne.eu/>

³ Waterborne Strategic Research Agenda for the European Waterborne Sector (January 2019): https://www.waterborne.eu/media/35860/190121-waterborne_sra_web_final.pdf

ballast water treatment systems market is likely to reach \$106.3 billion by 2024 and there is a huge potential for European manufacturers of such systems to benefit from such estimated market growth potential. Despite these significant efforts from the Waterborne sector in general, and the European maritime technology sector, additional initiatives and significant investment in research, development and innovation will be required to ensure that shipping really becomes environmental neutral by 2030 or 2050.

To meet global decarbonisation targets as well as the international regulations, current technologies will have to undergo major modifications and new innovative solutions will have to be established. The European maritime technology sector has the ambition to build by 2050 economically competitive ships that can eliminate all harmful emissions to air (including pollution and greenhouse gas emissions), water and noise from shipping. This will enable the shipping sector to exceed the IMO greenhouse gas emission reduction goals while allowing the maritime technology sector to preserve its global leading position in green waterborne technology providing new highly qualified jobs and stimulating overall growth.

Digitalisation, Automation, Connectivity

Digitalisation and enhanced data flows will connect ships, ports and infrastructure and improve logistic flows. Becoming part of the interconnect mobility system, connected and automated waterborne transport has the potential to increase safety as well as environmental footprint. There is however a clear difference between connected transport and automated transport and when it concerns automation there are various levels of automation envisaged according to different ship's types and trades.

The Waterborne sector will gradually evolve from ships with automated processes and decision support with qualified seafarers on boards to autonomous ship able to make decisions and determine actions by itself. Increasing automation in waterborne operations will trigger the need for new training programs developing new competencies e.g. for the crew, staff of shore support centres, employees of maritime technology companies, requiring a transformation of skills needed in maritime and inland navigation. However, autonomous shipping would not necessarily mean that the vessel will be unmanned at all time. A differentiation should be furthermore made between ship-to-ship communication and ship-to-shore communication. The interaction between ships should be carefully assessed in order to prevent any disruption on communication, considering that data will have to be exchanged between ships regardless of their degree of autonomy.

Communication systems between autonomous ships and authorities need to be properly developed according to different situations (open sea, coastal navigation, port approach) to increase the overall safety and security reducing the burden of bureaucratic procedures. Ultimately, autonomous shipping is not about trajectory but knowledge of the ship's surrounding environment. The main challenge will be to certify safety-critical use of technology giving the ships the knowledge context/situational awareness in which they evolve.

Increased use of digital tools in the maritime industry is also leading to an increased cyber threat due to the greater exposure of important and sensitive information. The reduction of vulnerability of Information and Communication Technology (ICT) systems

will be therefore critical to the safe and successful operations of remote and autonomous ships allowing the waterborne sector transformation into connected shipping. A common share of best practices and lessons learned between industry and government on counter-measures to reduce the vulnerability to cyber-attacks will be the most effective way to increase the resilience of the entire sector. Whilst the existing international regulatory framework could be adapted up to remotely controlled ship, a new dedicated IMO instrument would need to be elaborated to encompass the challenges around fully autonomous vessels. When addressing MASS (Maritime Autonomous Surface Ships) operations, the IMO needs to consider a timely adaptation of its regulatory framework to embrace the technology developments. Future autonomous shipping will be possible through a worldwide distributed network ensuring one common control which has to be achieved through international cooperation. Ideally, a European strategy vision ‘Developing a smart inland/maritime transport ecosystem’ should proactively support the development of fast enabling national legislation to allow autonomy – and to create international projects for autonomous tests between several EU member states and to foster development of distributed network for short sea shipping and inland navigation (as already initiated through the EU Vessel Traffic Management Information System’s assessment). The European maritime technology sector is a worldwide frontrunner in developing the technology and solutions to enable connected and automated waterborne transport. The existing business opportunities for maritime and ICT industries can boost Europe’s competitiveness, provided that a worldwide Intellectual Property (IP) rights protected, cyber safe and equal level-playing field is established. Significant investments in digitalization and automation of shipbuilding processes secured competitiveness of EU shipyards in high tech market segments. With former standard ship-types becoming more intelligent, Europe can potentially again become competitive compared to Asian (non-EU) shipyards in the full portfolio if processes and facilities will be further developed for all ship-types.

New Markets: Emerging “Blue Growth” activities

The Organisation for Economic Cooperation and Development (OECD) has predicted that by 2030 many ocean-based industries have the potential to outperform the global economy as a whole, both in terms of value added and employment. The output of the global ocean economy is estimated at EUR 1.3 trillion today but could be more than double by 2030. Moreover, the scarcity of resources onshore is prompting the need to significantly develop industrial activities at sea. These businesses will be as diverse as renewable energies, aggregate mining, shallow & deep-sea mining, offshore oil & gas, desalination, aquaculture, fish farming, etc.

Renewable energy sources

EU energy and environmental policies aim to rely more on renewable energy sources, given the expected population growth in coastal areas, saturation of the shore and climate change. By 2030, renewable energies should represent 27% of the European energy mix. In addition to the contribution to the long-term objectives of the EU with respect to the reduction of greenhouse gas emissions, the target of self-sufficiency and

reduced dependency towards volatile and unsecured energy sources is a strong identified trend that will lead to an acceleration of renewable energy deployment. In the next two decades, renewable energy will be one of the world's fastest-growing energy sources, increasing at over 5% per year.

Marine Renewable Energies (MRE)

Marine Renewable Energies (MRE) is a major constituent of this, and there will be an increasing market for energy devices for wave, wind (both floating or gravity-based), tidal current and Ocean Thermal Energy Conversion along with vessels to support maintenance and monitoring of these devices. The development of marine renewable energies will help reduce the EU's dependency on fossil fuels to produce electricity and reinforce its energy security. This aspect could prove to be particularly important for island states and regions where ocean energy can contribute towards energy self-sufficiency and replace high-cost electricity produced by diesel power stations. All the available technologies will have to contribute toward achieving this ambition, which shall allow Europe to keep its leadership in this field. In 2030, marine renewable energies will have started their commercial deployment phase, with a forecast 100 Mega-Watt plus installed for wave power and tidal current power alone.

Strong growth in offshore wind markets is expected both in short and long-term. The average annual growth rate for new installations in the next decade is expected to be above 15%. In Europe, a tripling of capacity between 2020 and 2030 is expected. The market for offshore wind support or service operation vessels is also growing. Around 10-12 vessels have been ordered since 2013, 2-3 per year (> 80 metres), but this will most likely increase from 2020 and beyond. Development of offshore projects further from shore with increased turbine capacities will be a trend. Greater distance from shore normally leads to deeper waters, where new foundation solutions are required. This will also have an impact on vessel size, requirements and capacities.

Offshore biomass production and desalination

Among other marine resources, offshore biomass production and desalination will become other key drivers. These two industrial offshore developments will support human shore-based activities concentration, with less and less area dedicated to agriculture and more and more to clean water requirements.

Aquaculture

These trends are also being observed in aquaculture. Continuously expanding, it is expected that aquaculture production in Europe will nearly double to reach 4.5 million tons of food production by 2030 and increase by 50% the number of workers directly employed, reaching 150,000 in direct workforce and 100,000 indirectly involved. This is being realised through a continuous modernisation of this industry. Current farms are already installed further out at sea and require even more advanced technologies. Automation, monitoring systems and advanced processing machine have started being used or entering the market.

Mutualisation and Colocation

The separate development of these industries brings along another trend. The development of new offshore activities is looking towards the mutualisation of costs through the utilisation of multi-use offshore platforms. This will lead to even more complex systems of systems at sea that will have to be appropriately handled by a competent workforce. Be it for Marine Renewable Energies, Aquaculture or other related activities, it is expected that there will be a sharp increase in the demand for specific or cross-sectoral new vessels and advanced technologies capable of working more cost efficiently in deeper, further waters and in adverse environmental conditions.

Oceanographic Research

The existing fleet of research vessels (government and private (energy industry)) will need replacing: almost half of the existing fleet of close to 800 research vessels is 30 years of age or older. Over a quarter of the existing fleet dates from the 1960s and 1970s. Due to the government budget constraints in mature western economies, it is highly likely that existing research vessels will be replaced by fewer but larger and more capable research vessels. Newly emerging economic powers of China, India and some South America countries are expected to invest in expanding of their oceanographic research fleets as they venture out further in the quest for energy sources and other raw materials while Russia will need to replace about half of its existing fleet in the next decade.

The Arctic Dimension

As global temperatures rise, the Arctic areas of the world are opening up to shipping and exploration and extraction of natural resources (oil and gas in particular). Considering the ageing nature of the current fleet, the demand for icebreaking vessels is expected to increase in the decade to come. Further vessels will be needed to guide ships through the Northern Passage and to pave the way for offshore energy operations. Icebreaking offshore support vessels and icebreaking construction vessels are expected to see increasing demand. The oil and gas reserves in Arctic areas are located under ice-covered, deep water, and extraction will have to take place in very harsh conditions. Hence, Arctic offshore energy operations will require top-of-the-range vessels. Icebreakers have seen significant technology developments in recent years. (e.g. building of the first LNG powered Icebreakers). The sustainable development and exploitation of all these “Blue Growth” activities for Europe and worldwide will therefore require the continuous development of innovative and complex technology solutions, potentially allowing the European maritime technology industry to consolidate its global technological leadership position.

Background Note: SEA Europe represents close to 100% of the European shipbuilding industry in 16 nations, encompassing the production, maintenance, repair and conversion of all types of ships and floating structures, commercial as well as naval, including the full supply chain with the various producers of maritime systems, equipment material, and services. For further information please visit www.seaeurope.eu

PART TWO

NEW TRENDS AND NEW PHENOMENA

THE BELT AND ROAD INITIATIVE: ANALYSIS OF A GEO-STRATEGIC PHENOMENON AND REFLECTIONS ON THE ROLE OF ITALY AND OF ITS PORT SYSTEM

1. FOREWORD

In September 2013 the global situation of connectivity networks and logistic chains was shaken by a project that gradually monopolized the debate almost in every corner of the world. Initially called OBOR (One Belt One Road), it was subsequently renamed Belt and Road Initiative in 2017, mainly to benefit the English-speaking public, the Chinese name has remained 一带一路, meaning one belt one road. This great geopolitical and commercial project launched by Xi Jinping in Kazakhstan has restored the splendors of the ancient trade routes that connected the East and the West of the world once named Silk Roads¹.

Much has already been said and written on this topic, especially following the Chinese president's visit in Italy in March 2019, which provided the opportunity to sign a Memorandum of Understanding including several collateral agreements ranging from infrastructure and transport to exchange of data and know-how and included trade agreements and partnership projects in the fields of research and industry.

Before discussing the core of this paper, it seems necessary to briefly outline the reasons that led to the initial design, development and expansion of the BRI, which is already encompassing more than 100 countries² and seems bound to involve many more.

2. INTERNAL POLITICS REASONS

The BRI is comprised of a complex series of economic, financial and geopolitical initiatives, which have different final objectives depending on their geographic area of reference and with regards to the broader goals pursued by each of these. Also, the BRI represents a dynamic ecosystem, meaning that it is not a closed and pre-established set of projects but rather an umbrella container under which single actions or projects can be placed or removed also in a subsequent moment and in a progressive manner.

In this sense, what was initially conceived in the biennium 2013-2015 as a project mainly aimed at improving infrastructure linked to international trade has evolved into a tool for the expansion of the Chinese influence even in a cultural sense, which is exemplified by the support provided to research and development initiatives as well as to

¹ Nevertheless, this term was introduced in 1877 by the German geographer Ferdinand Von Richtofen. For an overview of current BRI projects, see also: https://www.merics.org/sites/default/files/2018-06/MERICS_Silk_Road_v8.jpg

² <http://china-trade-research.hktdc.com/business-news/article/The-Belt-and-Road-Initiative/The-Belt-and-Road-Initiative-Country-Profiles/obor/en/1/1X000000/1X0A3610.htm>

projects linked to educational exchanges, above all in emerging countries³.

The main reasons of internal politics that underlie the launch of such a big global intervention can be summarised as follows⁴.

a) the creation of new markets for the increasing Chinese exports, especially in South East Asia. A reason that also explains the significant Chinese investments in Africa as well as the expansion of the BRI's influence to Latin America.

b) Strengthening connectivity with the aim of channelling the Chinese industrial surplus, which needs high levels of production in order to maintain and foster the income of a Chinese middle class that is becoming increasingly changing and self-aware. Without the maintenance of such levels of income, some socially destabilizing phenomena could occur, and these would have detrimental consequences to the Chinese political leadership which seeks to maintain power in the hands of the CPC (Communist Party of China).

c) In the West of the country, poorer and less developed than the flourishing coastal areas, the necessary infrastructural process is favoured by huge state investments in all sorts of works, with particular attention to railways. This is the reason why so much attention is paid to the creation of railroads for goods from China to Eurasia⁵, which are also significantly subsidized through public funds from China itself, given the relative lack of competitiveness from other freight transport systems. Building infrastructures in an area also means being able to control the relative territory with more capillarity, one of the reasons why the departure hub of Chinese trains to the west is located in the provinces of Shaanxi and Xinjiang, particularly unstable from the political point of view and therefore more in need of special attention.

d) Consolidation and insurance of stable and economical energy supply lines. China is one of the most energy-intensive countries in the world and in order to stock up with these sources it needs to develop, build and define agreements to be able to buy them at low cost and with a high level of certainty about the purchase and transport costs. In this sense, the vast investments in the "Stan" areas are justified, particularly in some countries on which much of the supply of natural gas depends⁶.

e) Providing the national currency, the renminbi, with a status of international currency that is exchanged - within the limited autonomy allowed by the central government in the foreign exchange market - or even used as a reserve. To this end, the creation of complex financial ecosystems to support the BRI investments in the world guarantees the possibility of helping the currency gain weight and credibility, to the detriment of much more esteemed ones, such as the Dollar or the Euro.

f) Another less known but nevertheless important factor influencing this investment in infrastructure is the reduction of transport costs for the movement of Chinese goods⁷.

g) Another aspect, perhaps not too widely analysed but rather important in the

³ <http://dailyactive.info/index.php/2019/03/25/kenya-and-china-to-sign-three-agreements-and-two-mou-worth-shs-300-million-dollars/>

⁴ A wider and more detailed overview can be found in Amighini A., "Towards a new Geography of Trade?" – in "China's Belt and Road: a game changer" - ISPI 2017

⁵ <https://gbtimes.com/china-sends-a-record-6300-cargo-trains-to-europe-in-2018>

⁶ <https://thediplomat.com/2018/11/central-asia-gassing-up-china/>

⁷ Continental China, according to the Logistics Performance Index, ranks 26th in the world. <https://lpi.worldbank.org/international/global>

Chinese perspective, is represented by the project of global geopolitical redesign that is useful for China to project its aspirations to become both a global power in competition with the US and the EU and an undisputed regional power in the Indo-Pacific area.

As highlighted by Xi Jinping himself in October 2017 during the 19th CPC National Congress: “This new era will be an era of building on past successes to further advance our cause, and of continuing in a new historical context to strive for the success of socialism with Chinese characteristics. It will be an era of securing a decisive victory in building a moderately prosperous society in all respects... an era that sees China moving closer to center stage and making greater contributions to mankind”.⁸

3. GEOPOLITICAL REASONS

Following the assumptions illustrated above, it is now necessary to analyse the geopolitical aspect in more detail.

Since 1978, when it re-opened to the world, China has maintained moderation and modesty in foreign politics.

Its pathway into the global economy peaked with the moment when it joined the WTO in November 2001, which resulted in a 200% increase of Chinese international exchanges compared to 1978⁹.

It should also be noted, however, that this adhesion was not “automatic” but gradual and mediated, with the guarantee of an initial period of break during which China enjoyed the benefits of belonging to the WTO without having to adapt its economic and productive system to the rules of the game followed by the other players.

In this sense, the progressively produced imbalances have in fact led to a heavy distortion in the evolution of the dynamics of global trade. And also the recent commercial battle, started by the American administration, can be read as a belated and sparse attempt to rebalance this situation; an attempt which, however, is based on absolutely valid assumptions and motivations.

In order to further develop the topic of the importance of the geopolitical projection of the current Chinese actions, it is worth starting from the words of Deng, author of the modernization process of the country following the season of Maoist orthodoxy, according to whom it was necessary “to keep a low profile” (*tao guang yang hui*), in order to make the country and its economy grow as long as the right moment to raise one’s head had not come. This moment actually seems to have arrived, at least in the perception and intentions of the current Chinese ruling class.

The current slogan has in fact changed to “striving for achievements” (*di li fen jin*)¹⁰.

This change of pace, although inconspicuous in the eyes of most, has involved and still entails an action in Chinese foreign policy that not only aims to build a more stable

⁸ http://www.chinadaily.com.cn/china/19thcpcnationalcongress/2017-11/04/content_34115212.htm

⁹ Amighini A. “China, Champion of (which) globalisation?”, pag. 17, ISPI.

¹⁰ http://www.chinadaily.com.cn/china/2017-10/24/content_33637824.htm

and favourable environment to its own development, but also to proactively shape an international order, on a regional scale first and then on the global one, with the aim of ensuring greater protection of Chinese national strategic interests.

The BRI therefore becomes a necessary tool to apply this new pro-activity on an international scale.

The so-called theory of the Chinese String of Pearls¹¹ that is currently developing in the South China Sea, in the South East of Asia and in the whole Indo-Pacific area is mainly supported by initiatives linked to the BRI.

This theory describes the Chinese actions in the area and represents an explanation of the possible reasons underpinning China's building initiatives of ports in some strategic places (choke points). All of these seem to be done with the main aim of expanding China's influence in the area and make it the most powerful country of South-East Asia while limiting India's claims over the region and challenging the domination of the US.

Economic and financial support for the planning, construction and management of infrastructures along the String of Pearls is clearly an operational priority for China, if the goal is precisely the realization of a stable geopolitical presence in the area and beyond, given that along trade routes and controlling certain choke points (such as Djibouti or Hambantota¹²), it is possible to influence the economies and traffic flows of a significant portion of the planet, with very heavy repercussions for the Mediterranean and surrounding countries.

Moreover, a strong policy of support to infrastructure also sustained by a system of Chinese loans and FDIs has further strengthened relationships between receiving countries and China.

Although the so called debt trap¹³ theory is not hereby held in full, it is nevertheless true that many operations carried out in emerging countries and within transition economies have made these countries dependent on Chinese financial institutions and, in some instances, have had direct consequences on the receiving countries freedom of choice in terms of planning and management of their supply chains¹⁴.

¹¹ This expression was first introduced by consulting firm Booz Allen Hamilton, contractor of the Department of Defense, in a report commissioned by the former secretary of defense Donald Rumsfeld.

¹² A more in-depth analysis of this can be found in J. Hillman "Influence and Infrastructure: The Strategic Stakes of Foreign Projects" in <https://www.csis.org/analysis/influence-and-infrastructure-strategic-stakes-foreign-projects..>

¹³ https://www.washingtonpost.com/news/global-opinions/wp/2018/08/27/chinas-debt-traps-around-the-world-are-a-trademark-of-its-imperialist-ambitions/?noredirect=on&utm_term=.5a12aeaa1cb

¹⁴ https://amp.scmp.com/news/china/diplomacy/article/3002957/ethiopia-talks-china-ease-serious-debt-pressure-tied-new-silk?__twitter_impression=true

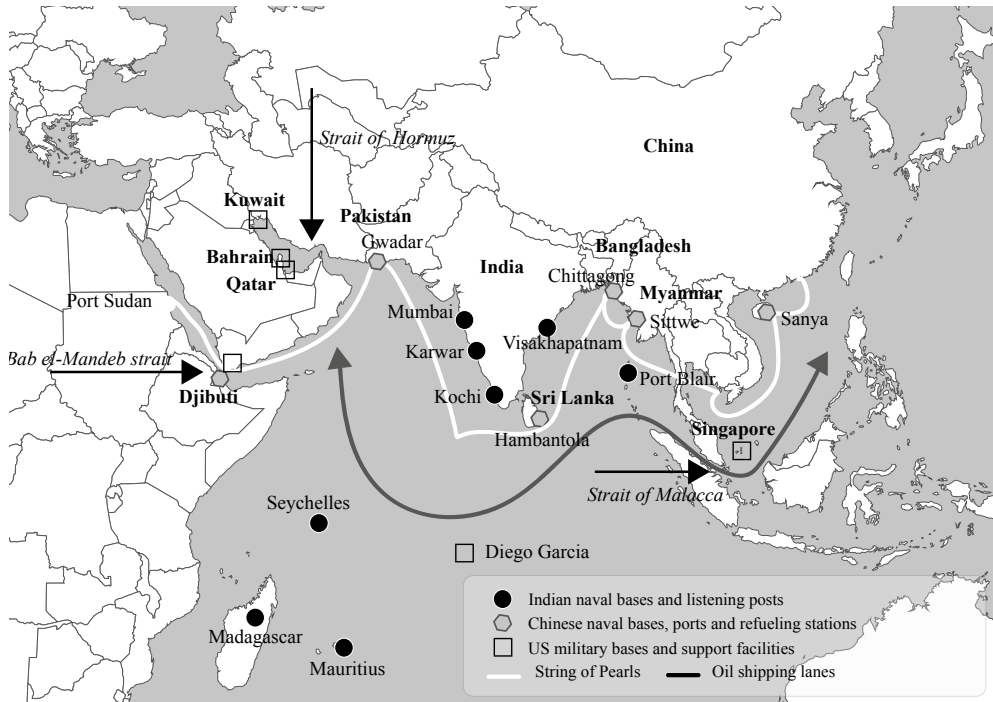
Indian and Chinese influence in the Indian Ocean

FIGURE 1 - SOURCE: SRM elaboration on GIS Geopolitical Intelligence Service

For instance, the huge debt of Pakistan (involved in the CPEC corridor that also touches the warm waters of Gwadar) is negatively influencing the country's future autonomy. Other examples of this phenomenon are Sri Lanka, Kenya and Ethiopia where policies of uncritical enthusiasm towards BRI projects have caused significant transfers of strategic control over crucial infrastructures such as ports, airports, railways and roads¹⁵. The fact that countries controlling infrastructures and nodes of transport networks can influence another country's choices is not a discovery of XXI century's geopolitics.

An analysis of the situation outlined above must also take into account another aspect represented by the solvency of the contracting parties of these loans, alongside the stability of the Chinese financial system. In 2017, most of the Chinese investments concentrated on African and South-East Asian countries. Out of all the participants to the BRI in these regions, 27 sovereign debts have been deemed 'junk' by three different rating agencies while another group of 14 do not even qualify for a rating. There is a clear risk represented by the fact that Chinese banking and financial institutions are currently

¹⁵ <https://www.businessdailyafrica.com/analysis/ideas/Opportunities-risks-in-China-silk-road-for-Africa/4259414-5049864-view-asAMP-mlbioc/index.html>

taking on the burden of funding through under-performing assets which, in the medium-long term, might add up to the list of internal non-performing assets and therefore cause a collapse of the whole Chinese banking system, which will have disastrous consequences on international markets¹⁶.

Chinese policies and decisions appear to be guided more significantly by geopolitical reasons than by real intentions of obtaining returns on investments. In the long term, this strategy might make the whole global economy vulnerable to unprecedented turbulences.

Also, the consequences on logistic and value chains could be so big that it is currently impossible to measure their impact with precision.¹⁷

4. THE MEDITERRANEAN WITHIN THE BRI CONTEXT

In this economic-financial context of investments and geopolitics, the Mediterranean has reacquired a central role in the development of trade exchanges and routes, after about five centuries where it was unimportant.

The doubling of the Suez Canal carried out in record-breaking times by Egypt, alongside increases in traffic volumes coming from China and other countries along the Maritime Silk Road, have put the Mare Nostrum back in the centre of global maps.

The Chinese investment in Piraeus mainly serves the following purpose: guaranteeing control of many traffic routes developed within the BRI and directed towards the Mediterranean basin and Europe. In terms of its geographic position, in fact, Greece offers the chance to control traffic to/from the Black Sea and the routes of the East while providing the ideal transshipment hub for transoceanic container lines whose loads could not possibly reach the North Adriatic were it not for the transfer on smaller ships more compatible with infrastructure requirements and economic dynamics of the carriers.

As recently highlighted by an Assoporti report, the centrality of the Mediterranean is definitely an attractive factor for public and private investments in key sectors of transport and logistics. In this sense, it is noteworthy to highlight a phenomenon of rebalance in oceanic routes. While in 1995 transpacific routes accounted for 53% of global transits and Asia-Europe 27%, in 2015 these percentages had changed to 45% and 42% respectively¹⁸.

Over the last few years, China has invested heavily in the development of port infrastructures in the Mediterranean. Besides the aforementioned investment in Piraeus, other initiatives have been carried out in Cherchell (Algeria), Port Said and Alexandria (Egypt), Ashdod and Haifa (Israel), Kumport and Ambarli terminals (Turkey), not to mention other ventures completed or ongoing in the Italian ports of Savona, Trieste, Genoa and Venice¹⁹.

There is undoubtedly a direct correlation between these investments and the

¹⁶ https://www2.deloitte.com/content/dam/insights/us/articles/4406_Belt-and-road-initiative/4406_Embracing-the-BRI-ecosystem.pdf page 10 onwards.

¹⁷ <https://foreignpolicy.com/2018/12/06/bri-china-belt-road-initiative-blunder/>

¹⁸ Assoporti, "Il Mar Mediterraneo, scenari geostrategici della portualità italiana nel quadrante Mediterraneo-Mar Nero", O. Giannotti, A. Giordano, 2018.

¹⁹ <https://www.merics.org/en/blog/china-drops-anchor-mediterranean-ports>

importance represented by the European market to Chinese interests. The EU is in fact the biggest trade partner for China and reducing transport costs and times represents a priority, considering that 80% of trade between these two areas is carried out by sea²⁰.

The fact that most of these investments are made through SOEs and the close relationship that even private businesses maintain with the government in China should raise doubts and fears, due to the power of influence and control that such investments can produce with regards to the freedom of choice in the countries where this money is deployed. In this sense, we have already witnessed many discouraging interventions by the US, as was the case in Haifa for example, where the American Department of Defense has questioned the legitimacy of the \$2 billion Chinese investment made through SIPG in the local port. The main objection being that this kind of infrastructure is currently used as a port of call for American Navy ships sailing the Mediterranean²¹.

It seems clear that, besides fostering international trade, the control of ports as infrastructures allows to gain some deeper and wider know-how in terms of useful data about the logistics and economies of the local territories where the ports are in operation. This makes it possible to obtain greater control and supervision over value chains that are wider than those merely connected with port traffic throughput.

China's global port investment

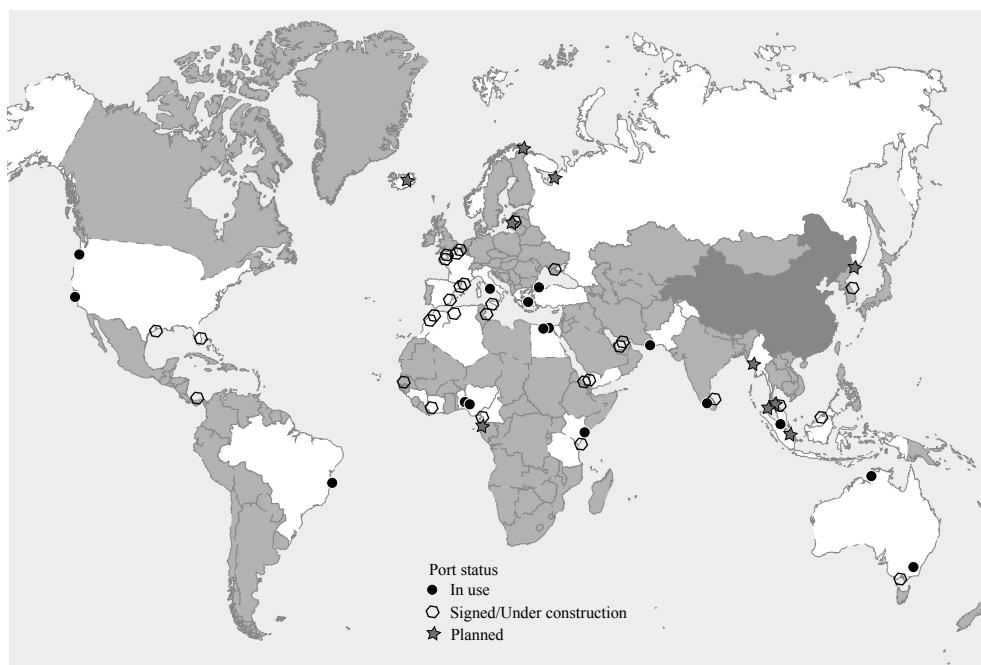


FIGURE 2 - SOURCE: SRM elaboration on The Economist Intelligence Unit

²⁰ https://www.ifri.org/sites/default/files/atoms/files/ekman_china_mediterranean_2018_v2.pdf.

²¹ <https://www.scmp.com/news/china/diplomacy/article/2178382/israel-reviews-2015-haifa-investment-deal-china-washington>

5. THE ROLE OF ITALY

In this global context, it is obviously necessary to consider the opportunities and risks for a small country like Italy. In the narrative built by China, the historical relationship between our two countries provides the cultural framework for a story-telling linked to the idea of the modern Silk Road. On our end, this also puts us in a privileged position at the centre of wider and more complex dynamics than we could ever imagine. Therefore, it currently seems of utmost importance to find the way to play this game while maximizing advantages and minimizing risks.

It is undoubtedly true that Xi Jinping's visit in March 2019 represented a highly symbolic event and the subsequent signing of the Memorandum of Understanding to join the BRI puts our country in a privileged position compared to other regional players. Besides what has been said on the media, though, the practical side of these agreements is still far from creating some value added for our own productive and economic system, both within and outside the BRI.

The announced interest of potential Chinese players willing to invest in the ports of Genoa and Trieste seems bound to clash with a reality made of Italian and European bureaucracy with stringent requirements and norms such as those contained in the Code of Tenders (in Italian: Codice degli Appalti) and the ones regarding transparency, advertisements and respect of the competitors. Therefore, the MOUs just signed have high symbolic value but still bear limited practical consequences.

It is nevertheless possible to use the topic of the BRI in a useful way for our country without letting the heat of the moment get in the way of practical reflections. To this end, two actions are necessary, in order to take a significant cultural leap forward, and these involve institutional players alongside private stakeholders, which need to act as representatives of the productive and entrepreneurial system.

5.1 An overview of the current situation in terms of infrastructure and connectivity

Before discussing what actions are necessary, what needs to be built and how much money is necessary to invest, we need to answer a question: do we have a clear picture of the connectivity offered by Italy in the European and global context? In other words, what is our country's offer in terms of infrastructure and to what extent are we using the existing infrastructure?

A tendency towards cultural localism can be observed in Italy still today, perhaps a reminiscence of the medieval situation with many small republics and kingdoms, where each port and logistic system tends to be considered in terms of its local or regional importance. In the past, this kind of perspective led to the creation of many different transport systems with their relative costs in terms of building and maintenance and without a clear and in-depth analysis of their value in the fulfillment of demand.

In the short term, these types of operation can create value for the local territory but in the long run such infrastructures become liabilities, as they need to function at all costs, regardless of good principles of common sense and economic efficiency.

Ports and interports are infrastructures that need to provide services. In other words, they do not possess any intrinsic value but play a role once they can guarantee the

creation of value through the provision of services and advantages to companies (cost and efficiency of transport, reduction of costs, proximity to productive and industrial clusters, to name just a few). We therefore need not consider these infrastructures through the lens of building enterprises but through that of wise infrastructure managers and logistic services experts.

Such a pathway has been at least partially started by the National Strategic Plan for portuality and logistics, a reform that outlined development routes based on increased efficiency and rational management of resources. To this end, another important body is the National Conference of Presidents of Port Network Authorities which is supposed to coordinate the planning and design of port and dry-port infrastructure with an enlarged vision. All of this is mainly aimed at fostering collaboration in the pursuit of the national interest rather than competition between individual single territories.

However, even before thinking about the creation of future infrastructures, it would be necessary to carry out a detailed survey of the current infrastructure offer and the relative rate of exploitation / use. In other words, we need to understand what we currently have, verify its congruity with current and future growth trends and work to maximize the output of the existing infrastructure. Only once this has been done can we think of what to build, check for any shortcomings and identify where they are, to remedy existing distortions.

The question whether Italy at this time has an excess or a lack of docks, for example, cannot be easily answered as there are no real scientific data that allow the decision maker, at whatever level they are, to respond with precision in order to make decisions based on truthful data and not following the often transient sensitivities of individual territories.

A clear example of this is represented by our infrastructure dedicated to the transshipment of containers. In a highly competitive and aggressive market, where we currently have difficulties in exploiting the full potential of our ports, some argue that there are sound prospects of profit to make if only investments are made in this sector²².

The same reflections can be applied to other types of traffic, such as Ro-Ro and bulk, where higher coordination on a national level would allow to fully exploit existing infrastructures by rationalizing their use and making operations more efficient in the ports that are dedicated to these kinds of traffic.

As a consequence, it would also be necessary to take a step forward and check the way in which different ports and interports are connected and what are the main traffic routes on land or waterborne inland communication. In fact, it is important to ensure that docks are exploited efficiently but this would be useless if there were bottle necks in dry-port areas or along the interconnecting infrastructures between ports and productive districts.

²² <https://palermo.gds.it/articoli/economia/2019/03/13/fare-di-palermo-il-primo-porto-hub-deuropa-il-progetto-da-5-miliardi-che-fa-gola-ai-cinesi-dc8feb28-e0eb-491d-885e-8f4264d8b1ab/>

5.2 *A long-term industrial and development plan*

As was stated above, port infrastructures provide services, but users/clients of such services are factories or companies that produce, the backbone of our beloved Made in Italy which is mainly based on highly-skilled manufacture.

If we do not have a clear long-term strategy about the way in which future industrial clusters will develop, if we do not know what kind of industrial development we want to give our country, in which sectors it will be necessary to invest, research and develop, then it is impossible to establish how and where to create a new infrastructure or improve an existing one.

Therefore, it is paramount to take a step forward, now more than ever, and envision a productive future for the whole country. Producers and all the other players involved should start talks and studies over the implementation of a big long-term industrial and development plan that looks at least thirty years into the future as this is the necessary timespan to ensure the development and use of our infrastructures.

In a context of scarce resources, times where public money could be spent on useless or unprofitable projects are long gone and future investments will have to focus on generating services and create the value they are supposed to create rather than leave a burden of debt behind them.

It may sound like a paradox, but it is China that is leading the way, as the infrastructure plan named BRI was accompanied by a production plan called ‘Made in China 2025’. The two levels seem to be strictly connected and tend to develop simultaneously in order to guarantee a future of prosperity with an objective set for 2049, the year when celebrations will be held for the 100th anniversary of the PRC.

6. CONCLUSIONS

This paper has analysed what the BRI is and its meaning in terms of Chinese interests before considering this project’s potential consequences for the global economy and traffic. Finally, we attempted an in-depth discussion of the less visible aspects of the Chinese strategy above all in terms of geopolitics and reshaping of global balances.

Nonetheless, some issues are yet to be solved if we want Europe and Italy to be able to face the challenges of the future.

It is crucial and unavoidable to plan a careful analysis of our national infrastructures and clearly define national ports’ complementarity and logistic strategies, with an eye to future developments in terms of exports and a long-term industrial plan that takes into account significant factors for our country such as high value added manufacturing.

In order to better define this long-term strategy two more variables need to be taken into account: a) the progressive development of technologic innovation and digitalization and b) the need for new forms of financial planning and access to resources.

Technologic innovation is a dynamic process involving both means and ways of transport and logistics as well as the communication between different pieces of machinery. In this sense, recent progress made in the propulsion of means of transport, often fueled by renewable energies and increasingly more powerful, alongside the so

called internet of things (communication between machines) represent significant elements in the performance of a survey of national infrastructures and in the design of a long-term industrial plan.

Similarly, if we intend to modernize our current logistic and infrastructural situation, it will be necessary to identify the economic resources and the financial planning tools needed to support such efforts. In particular, it might also be necessary to resist the temptation to build huge infrastructure at all costs.

As for economic resources, given a national scarcity mainly due to the negative condition of our public balance caused by high debt to GDP ratio, it is necessary to carry out an accurate analysis of logistic and infrastructural needs. At the same time, we should also ask Europe for bigger efforts as these have so far focused on the Northern Range and partially neglected the Mediterranean area and Italy. The good news is that our country still has time to influence the next CEF.

As regards the financial planning tools, we need to acknowledge that Italy experiences significant delays in the implementation of Public-Private Partnerships which remain a potentially useful instrument if used with their main aim in mind, namely unburdening the state of the financial 'weight' of an infrastructure and allowing a private business to obtain a fair return on investment.

It is extremely important to take into consideration all these elements as important topics that need to be discussed so as to let Italy and Europe guarantee sensible growth of its productive and manufacturing network. At the same time, though, these topics represent a necessary discussion if we want to face and win the challenges coming from the Silk Road. In this sense, the stimuli coming from the BRI can be considered healthy and important because they force us to raise the level of analysis and debate, otherwise we will be left out of the global dynamics, now more than ever interconnected and reciprocally conditioned.

The Belt and Road Initiative represents an opportunity to demonstrate that Italy is present on the global stage and that our country is ready to play an important role, without subordination but also with no intention of being what we are not. In this sense, the game is still open and needs to be played for the common good of our times but more importantly for the wealth and growth of the future generations of Italians.

THE ENERGY FUTURE OF PORTS AND MARITIME ROUTES

1. THE ROLE OF ENERGY LOGISTICS IN MARITIME ECONOMY

The energy dimension is one of the crucial variables for the competitiveness of economic systems and for the structure of international trade. The maritime sector represents a significant articulation of this dimension, due to the exchange flows that are established between producing and consuming countries.

Ports enter this competitive game as one of the main junctions for the exchange and distribution of energy products. Their role as logistic hinge within the structure of the energy market also characterizes the infrastructural organization of sea ports, which play a significant role in the value chain of the entire energy supply chain.

While the phenomenon of containerization continues to catalyze the discussion on the structure of the maritime and port market, it must be emphasized that the procurement, storage and distribution of energy products has always been one of the mainstays of the sea economy, in addition to being one of the fundamental matrices of exchange between ports and territory.

The different phases of the energy market, and the dominant characteristics of raw materials over time, have obviously influenced the organization of logistics and infrastructure, even within port systems.

In the history of the past century, oil has been the dominant source of supply, so the ports have been used, in the first industrialized countries, initially as a site for the refining plants and then with globalization, the refineries have relocated mainly in developing countries, as storage depots for distribution.

Oil remains the main energy source even though, as we will see later, a diversification phase has begun which is inevitably leading to a process of transformation in the flows and processes in the market of raw materials.

Therefore, ports have always played a primary role in the scenario of energy logistics, which continues today to constitute one of the factors of strategic competitiveness for the functioning of industrial economies.

First of all, ports have ensured that the manufacturing system and urban communities have at their disposal the indispensable energy supply for productive activities and daily life; but then they also provided the terminal for the supply of maritime fleets, which are increasingly more important for the intensification of international trade and for the constant growth of passenger and freight traffic.

2. THE DIFFICULT ENERGY TRANSITION

Oil, which had replaced coal - the driving force behind early industrialization - has been paired by methane, which gradually assumed a significant role of strategic

importance although failing to undermine the still dominant weight of petroleum.

The two oil crises of the 1970s, and the instability of oil prices, had already led to focus more attention on the reduction of the dependence on a single dominant energy source. Initially, this reflection was guided by economic and geopolitical considerations.

More recently, thanks to increased awareness that energy and transport are decisive elements in pollution and in the risk of ecosystem alteration, increasingly significant developments are being generated towards the growth of alternative energy sources, with public and policy makers' attention directed towards environmental protection.

The conversion of the civil and industrial apparatus towards the use of energy sources with a lower environmental impact concerns all the production, consumption and distribution functions, both in land and maritime logistics.

According to these strategic orientations, which modify the coordinates of the organization of the economy, energy infrastructures and networks (even those present in ports) must gradually adapt following these guidelines.

On the one hand, it is necessary to respond to the diversification of energy sources and on the other to the different fuels of transport vehicles, whose motorization is moving towards less polluting fuels. The scenario that is emerging does not yet present stable certainties of a strategic framework on the dominant situation that will be determined by future choices.

We are witnessing a transition that takes place as a result of interventions, essentially of a regulatory and institutional nature, intended to modify production guidelines and consumption habits. The results of this transition do not yet allow us to draw a univocal picture of the consequences that will be determined over the next few decades.

3. THE CHINESE INDUSTRIAL DEVELOPMENT AND ITS CONSEQUENCES ON ENERGY POLICIES

Not all countries are experiencing the same kind of transformation in terms of energy demand. For instance, economies with mature industrialization have long been implementing programmes aimed at reducing their dependence on oil while recently developed economies, which will produce the highest increase of demand in the years to come, will continue to base their energy demand on oil.

If we take a look at the situation in Asia, the aforementioned direction appears clear. As Fabio Indeo states, "in 2017 China became the biggest country for oil imports (8.4 million barrels per day)... According to forecasts from the International Energy Agency, in 2040 the dependence on oil imports will reach 80% (now it is 69%)"¹. Therefore, forecasts indicate oil imports demand reaching 13 million barrels per day.

Over half of Chinese oil imports come from OPEC countries (mainly Saudi Arabia and other monarchies of the Gulf), while African countries (in particular Angola) account for 20%. Routes for the import of energy are extremely delicate from the point of view of strategy. These, in fact, are itineraries that need to be kept safe in order to ensure the continuous maintenance of energy functions and fulfil energy demand which will

¹ Indeo F., "Energia e geopolitica lungo la Via della Seta", Bressan M. e Davignoni D., "Le nuove Vie della Seta e il ruolo dell'Italia", Pacini Editore, 2018.

continue to follow an upward trend: 80% of oil & gas imports reach China via maritime routes.

Moreover, such connecting routes pass through delicate chokepoints in terms of terrorism, piracy and geopolitical balances, such as the Suez Canal and the Strait of Malacca.

With the aim of diversifying risks and geographical areas of supply, over the last few years trade agreements have been signed between Russia and China on energy products. As a consequence, Russia has been China's main oil supplier since 2016 with 1.2 million barrels per day.

A 30-year agreement has also been signed by the aforementioned countries regarding the supply of natural gas with amounts reaching 38 GMC per year from 2020. This figure means that 25% of future Chinese imports of gas will be provided by Russia through land corridors.

Another measure aimed at reducing dependence on seaborne energy imports is represented by the agreements signed by China with Kazakhstan (oil) and Turkmenistan (natural gas).

Therefore, when analyzing the picture of the *Belt and Road Initiative* (BRI) we shall not limit ourselves to its transport infrastructure but extend it to energy infrastructure and telecommunications. These are the three prospects making up the entire project in its complexity.

4. THE RECONVERSION OF ENERGY CONSUMPTION

The change in the global energy framework implies modernization and adjustment also in the architecture of port infrastructures, such as to be able to sustain a conversion of energy consumption towards greater environmental sustainability.

This topic is now unavoidable for the international community, and the public is not the only one demanding it.

What is certain is that it is no longer sustainable to maintain an energy structure that has led to an alteration of the environment that risks producing irreversible consequences for the conditions of livability on the planet. As a result of this awareness, prescriptive regulations have been introduced about the characteristics of motorization of vehicles, first with regard to land transport, and then, more recently, also towards maritime vessels, with the aim of reducing polluting emissions, to favor the conversion of the transport system towards environmentally friendly solutions.

This dimension concerns both the ground infrastructures for storage and distribution and the supply of the energy sources necessary for navigation. The parameters on the pollution generated by ships will have to be reduced by 2020 due to the constraints on emissions that have been established by the International Maritime Organization (IMO).

"In a sector that produces 2.2% of global emissions, pressure is growing on the maritime industry to adopt more environmentally friendly fuels"². Therefore, if on the

² Esau S., "*The future of the shipping sector: an overview of the LNG bunkering market*", dattiloscritto, 2018.

one hand maritime transport is a primary strategic factor for energy logistics, on the other hand vessels represent a primary component of demand, guiding the evolution of this market in the coming years with its own choices.

The interaction between availability of infrastructures on the ground in ports and the characteristics of the motorization of ships constitutes the inevitable interlocking that must be taken into account to carry out renovation projects that are capable of effectively generating a structural advantage and some added value.

Sustainability, as well as competitiveness, of economic systems and the maritime economy will also depend on the choices that will be made on energy infrastructure. Pipelines, gas pipelines, storage units in ports represent primary factors of strategic organization in the construction and implementation of energy policies.

Without distribution networks that allow the logistical organization of new sources with less environmental impact, it becomes difficult to pursue the objectives of diversification and reduction of dependence on the most polluting sources.

5. THE ENERGY CONTEXT IN THE MEDITERRANEAN

In the Mediterranean basin, the energy issue has been playing a role of strategic importance, both for the presence in the region of significant oil and gas fields, and for the maritime transport network that has always been functional to ensure the supplies needed for the recipient countries.

It should be emphasized that 30% of the liquid bulk maritime flows pass through the Mediterranean, constituting one of the most significant articulations of the maritime economy, in a value chain that starts from the places of production and, through transport, reaches the places of consumption.

An essential part of geopolitics and geostrategy has been played around the theme of energy resources and the control of these fundamental raw materials in the different areas of international politics, particularly in the Middle-East, and more generally in the Mediterranean basin.

Also from this point of view, the Suez Canal has been playing an essential role in the past decades, ensuring the transit of liquid bulk towards European and Asian markets. The certainty of the security in the trade of energy raw materials has always been one of the fundamental issues for the balance of international politics in this geographic area.

In addition to being a key area for energy production of gas and oil, “from an energy point of view, the Mediterranean region is third after China and the United States in terms of total energy consumption and CO₂ emissions”³.

Therefore, one of the most important games for economic reconversion and reorganization of the global energy market is played within the Mediterranean area, not only on the supply side but also on the demand side.

We are currently witnessing a differentiated scenario, in which the trading lots between countries facing the Mare Nostrum are significant, and also different from one another.

³ ICom, “*The Mediterranean gateway to the Energy Union*”, November 2017.

In summary, European countries facing the Mediterranean, the Balkan area and Turkey are highly dependent on energy imports, while the Middle East and North Africa (MENA) region as a whole is a net exporter, mainly thanks to the contributions of Libya and Algeria.

Maritime connections and fixed connection infrastructures represent the two ways through which the exchange of energy products takes place on a supranational scale. Wherever flows reach high economies of scale - mainly over medium-haul distances - the advantages of investing in oil and gas pipelines emerge.

The connection networks, organized to ensure the supply of energy products from producing to consumer countries, constitute the backbone that allows the functioning of the industrial and civil economy. It was precisely in this direction that relations between the two shores of the Mediterranean developed.

“Energy is a fundamental component of the economic relationship between the European Union and the southern Mediterranean countries. This dates back to the 1960s, when discussions began on the first large-scale infrastructure in the Mediterranean region - a gas pipeline that connected Algeria to Italy through Tunisia. Since then more than 6,000 km of gas pipelines have been built across the Mediterranean, to connect Algeria with Spain and Italy, and Libya with Italy”⁴.

The construction of energy networks played an extremely important role in the articulation of economic and political relations with the European Economic Community during the delicate transition phase towards the consolidation of the independence of North African countries, in the decades immediately following the Second World War.

“Energy ties between the two shores of the Mediterranean have been and remain fundamental. What is now better envisaged than a few years ago is the complementarity of relations between the two and the need to converge on complementary interests”⁵.

At the beginning of the new millennium, an attempt was made to replicate the successful formula implemented in the case of gas pipelines by widening the Mediterranean cooperation in the sector of renewable energies, through two projects based on wind and solar energy.

However, these two initiatives failed mainly due to the high cost of electricity generation and the lack of adequate interconnection systems between the South and the North of the Mediterranean.

This experience should lead new development projects on alternative energy sources away from exports to Europe, and towards the fulfillment of the growing energy needs of southern Mediterranean countries.

Moreover, between 2000 and 2015, the demand for electricity in southern Mediterranean countries has more than doubled. Right from 2015, following the Paris agreement to mitigate climate change, on the one hand each country must define specific targets to reduce greenhouse gas emissions and on the other hand significant financial resources have been put in place to support developing countries in their effort to reduce

⁴ Tagliapietra S., “*The Euro-Mediterranean energy relationship: a fresh perspective*”, PolicyBrief, Issue 4, October 2018, p. 2.

⁵ Bianchi M., Colantoni L., Sartori N., Moisseron J.Y., Guesmi K., (2018), *Assessing European energy and industrial policies and investments in the Southern Mediterranean region from a bottom up perspective*, Medreset working paper 34.

emissions. The European Union, with € 20.2 billion in 2016, is the most important contributor to this line of financing.

Europe, on the other hand, has equipped itself with a strategy to build a trans-European network of connections in order to consolidate an integrated energy market: nine priority corridors and three priority thematic areas have been defined, with an allocation of EU funds of € 5.35 billion in the period 2014-2020.

Part of this trans-European interconnection program also covers the southern front of the Mediterranean basin, to consolidate connections in particular to the Balkans and North Africa.

In the oil and gas sectors, market forces play a primary role. These markets are also going through a phase of profound reconfiguration. The organization and operation of the infrastructural connection networks is a strategic element for the structure and prospects of energy exchanges.

As for the gas sector, the Mediterranean market can be divided into three corridors: western, eastern and central. The western area includes Algeria as a supplier and Spain, Portugal and France as consumer countries. In the central area, consumer countries (Italy and the Balkans) are interconnected, while the main exporting countries are Algeria and Libya, along with Tunisia.

In the eastern area there is the lowest degree of interconnection through primary infrastructures, with the inevitable consequence of a greater need for maritime connections.

The two main gas markets in the region (Egypt and Turkey) are not interconnected.

6. THE DRIVING ROLE OF LIQUEFIED NATURAL GAS

During the most recent phase, while gas has assumed growing strategic importance, also due to the ongoing investments at a supranational level for the construction of new gas pipelines, liquefied natural gas (LNG) is emerging as a new energy source with characteristics of use potentially interesting also for the maritime sector.

LNG has reached adequate technological maturity for heavy ground vehicles (trucks and buses) and for large ships, allowing the large-scale distribution of this energy source. The economic and ecological advantages for a consistent development of LNG on an international scale appear to be clear if looked at from a future perspective.

Despite the fall in oil prices after 2014, LNG retains a significant financial and environmental advantage over traditional sources, especially due to increasingly stringent regulatory constraints, which tend to reward energy sources with less negative impact on the environment.

Furthermore, with the recovery of oil price expected in the coming years, LNG can play a role of increasing importance: it is a natural gas - consisting mainly of methane which is liquefied through a series of cooling and condensation processes.

In suitable temperature conditions, around -160 °C, LNG can be stored in liquid form in special containers and transported anywhere, even in areas not reached by the methane network (in the mountains, in the countryside and on islands).

During the liquefaction process its volume is reduced by as much as 600 times,

which makes it possible to store a big quantity of energy in a small space. This element, evidently, represents one of the potential competitive advantages of LNG over other energy sources, from the point of view of the logistical structure.

LNG has great potential for use both in the civil sector (industrial and domestic uses) and as fuel for maritime and land transport. It is an energy source with low environmental impact: it eliminates particulate emissions and significantly reduces CO₂ emissions.

This is a relatively new product for our country, and a market in full growth on an international scale. The LNG end-use supply chain has already taken its first steps in the Italian context.

Important developments are expected with the implementation of the European Directive on the increase of alternative fuels, whereby liquefied gases - LPG and LNG - are indicated as strategic products to achieve real sustainable development of all the States of the European Union.

As for land transport, it is China that has led the way in the development of this fuel: today more than 90% of LNG land filling stations are located in the Asian giant's territory. This result has been achieved thanks to industrial policy interventions and an incentive system that led to the conversion of heavy land traffic towards LNG until 2015.

In the maritime transport sector, on the other hand, so far it has been Northern Europe that has significantly seized the opportunities for diversification allowed by this energy source⁶.

It is worth underlining that for ships LNG ensures a lower level of operating costs compared to other solutions, and this aspect obviously determines a competitive advantage that will certainly be considered in the choices that will be made on the motorization characteristics necessary to ensure compliance with environmental emissions.

The construction of a network of deposits for LNG starting from ports - which constitute the necessary entrance door for the import of this energy source - represents one of the qualifying elements of the national energy plan, and of the community planning guidelines regarding energy.

Some concrete steps in this direction have been taken also in our country. Oristano and Ravenna will be the first storage facilities to be built. Also, as envisaged by the national energy plan, the port of Naples is a candidate to become one of the eight strategic locations for storage.

Already today, the Neapolitan port is an essential junction for energy distribution in Southern regions within a vast area: annual maritime traffic flows of liquid bulk reach about four million tons of oil and one million ton of gas.

In 2017 the Port Network Authority of the Central Tyrrhenian Sea carried out a pre-feasibility study for the construction of an LNG storage depot, with the collaboration of the University of Campania.

Timeliness will be a decisive variable for the success of this energy conversion operation. Shipowners, especially in the cruise sector, are ordering bifuel-powered ships, which are also compatible with LNG. Even in the container ship sector, the choice of bifuel power begins to be taken into consideration.

⁶ EnergyLab, *"LNG as a fuel, a solution to the tightening of environmental rules and regulations in the transport sector"*, November 2017.

A similar and possibly even more marked transformation process is currently occurring in haulage fleets but without an appropriate distribution network on the whole national territory, which necessarily needs to start off in ports, this will be implemented with some delay in Italy.

Our country has so far lost competitiveness precisely because it has not been able to implement reconversion processes in a timely manner compared to the evolution of the international context. Also, in terms of the diversification of energy sources and the creation of a more environmentally friendly system of consumption, we risk creating a huge gap between choices of strategic interest and operating reality.

We must ensure that this is not the case, by putting in place an extraordinary initiative that demonstrates the ability to execute. We live in a moment in which it seems easier to express interdiction energies towards industrial development rather than developing concrete initiatives to support transformation processes. With this approach, however, we will not go very far, and the economic stagnation we are currently going through will risk becoming structural.

7. OTHER ACTIONS AIMED AT INCREASING ENERGY EFFICIENCY IN PORTS

Ports are not just a logistic hub for the storage and distribution of energy products: they can play a positive role in consumption and positively affect the environment also through other interventions. A front that certainly deserves commitment and planning concerns the implementation of energy efficiency measures, together with possible measures for reducing the pollution of ships docked in ports.

From this point of view, the ports, intended as infrastructures, can and must contribute to making the common lighting systems adequate, to operate where possible with interventions for diversifying energy sources while promoting the spread of solar or wind power plants, wherever convenient and environmentally compatible.

Much has been discussed on the subject of dockside electrification, but so far little has been achieved. Only when you put together all the components necessary to square the circle, can you align the wills to build a project that is actually feasible and effective.

To achieve concrete objectives in this respect, shipping companies, energy suppliers and public authorities must be brought together at a work table.

Only a concerted and synergistic action between these different subjects can determine a positive result, which is inevitably the result of a convergence between different dimensions that must find a balance point.

The shipping company must commit to equipping its vehicles for electric power and investing to build converters on quays. The energy supplier must undertake to provide rates at a competitive price for the success of the project. The public authority must work to recognize an ecobonus for the shipping company that makes the operation sustainable.

Clearly, in this scheme, it is necessary to find the point of equilibrium between economic return and environmental benefits. According to the analyses carried out, this condition certainly presents itself when the ships are stopped at the dock during the night, since the energy tariff has a value compatible with the success of the operation.

A different situation can be found during daylight hours, when the electricity tariff is

much higher, making it more difficult to reach a balance point that makes the operation economically sustainable. In this case, the regulator should intervene in order to provide a value of the electricity tariff appropriate to the feasibility of the project.

As has been analysed, ports play a key role in the organization of energy markets. Alongside coast depots in fact, they make up an important part of the whole chain's logistic articulation because they represent the connection between production and consumption areas. Also, ports can play a role of optimization and efficiency in terms of energy consumption of the maritime infrastructure.

Alongside ports, the balance between maritime and land routes also becomes important for the distribution of energy products: the implementation of new oil & gas pipelines networks will certainly be one of the most significant investments in the future, above all in the Asian context. As for maritime routes, and in particular for long-haul connections, the ability to ensure safety and steady operations becomes crucial.

Paying attention to the dynamics that will develop in the next few years on the side of reorganization of energy sources, with the relative consequences in terms of logistics, is one of the mainstays of the future of ports and of the network of maritime and land connections.

INTERNATIONAL DRY BULK SHIPPING TREND IN CHINA'S PERSPECTIVE

1. FOREWORD

China has gradually become a big energy and resource user in the global scale into the 20th century. China's iron ore and coal imports are taking rapidly rising shares in global seaborne trade, with "China factors" getting predominant for determining the global dry bulk market. In recent years, the shipping industry has been suffering, and China's dry bulk shipping market is also changing quietly. This article analyzes the changes of China factors and the resulting impact on the global shipping market from perspectives of industrial chain structures of various cargoes.

The years-lasting economic downturn following the financial crisis led to sustained lack of consumer demand, falling major bulk prices and a rise of trade protectionism.

The global import and export trade volumes fell across the board. The trends of global seaborne shipping and global economic and trade converged with each other, with the former by a wider margin. After 2016, the global economic recovery continued, the international dry bulk shipping trade maintained steadily rising growth, and the market entered a period of long-term recovery and adjustment. The seaborne dry bulk trade volume recorded around 5.206 billion tonnes in 2018, a year-on-year increase of 2.1%, about 1.993 billion tonnes of which was contributed by China.

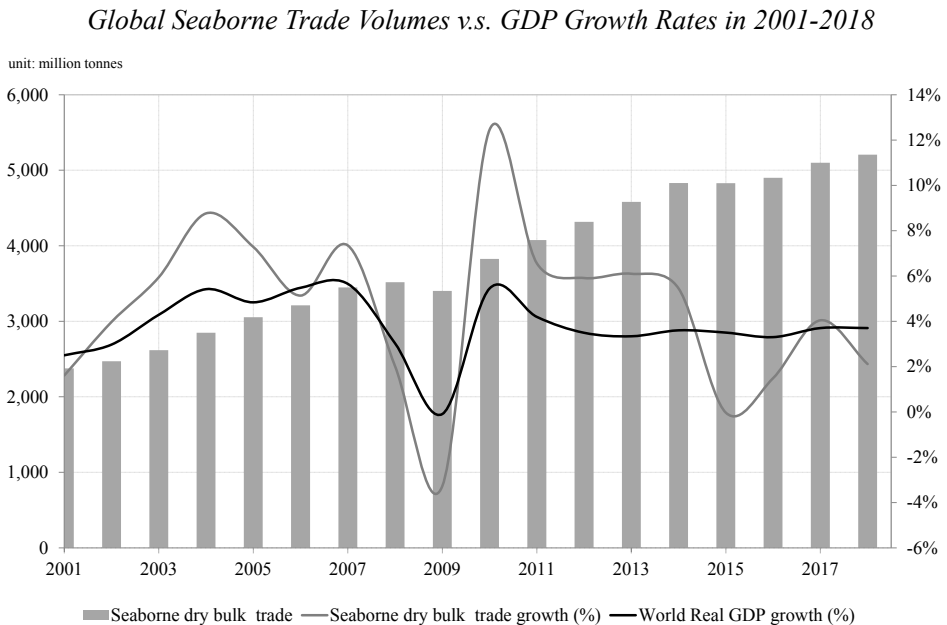


FIGURE 1 - DATA SOURCE: Clarksons, prepared by the Shanghai International Shipping Institute

In the past decade or so, China's seaborne trade volume has been taking a rising share in the global total, though the share in 2018 fell slightly to 38.2% compared with 2017. Specifically, seaborne iron ore trade volume accounted for 71% of the global total, that of coal accounted for 19.4%, and grain, 22%.

*China's Seaborne Dry Bulk Trade
Volumes and Shares in Global Market in 2001-2018*

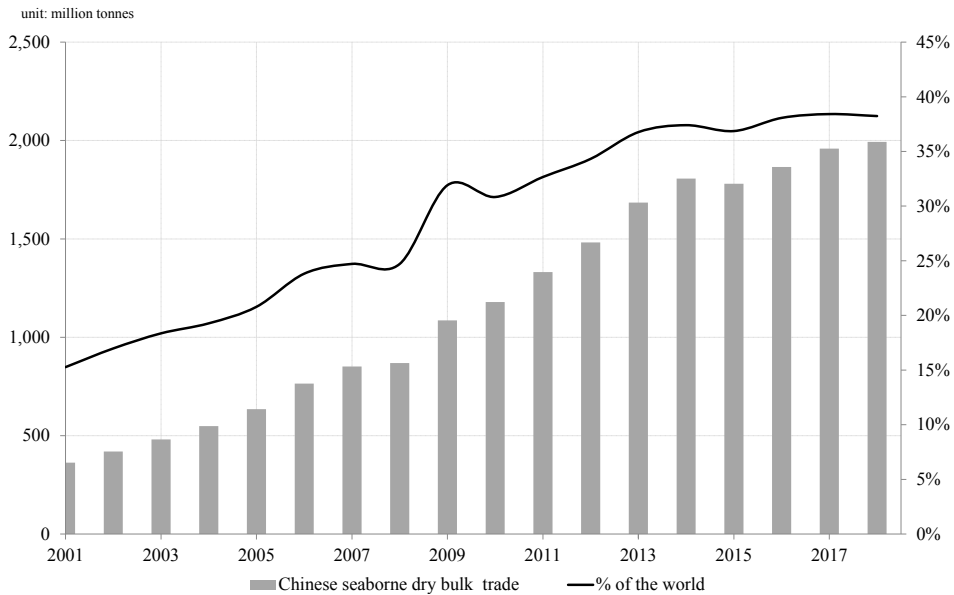


FIGURE 2 - DATA SOURCE: Clarksons, prepared by the Shanghai International Shipping Institute

2. SUPPLY AND DEMAND OF STEEL INDUSTRIAL CHAIN AND DRY BULK TRADE

Steel Production

China's steel production surpassed Japan in 1996, and then recorded 152 million tonnes in 2002, making China the biggest steel producer in the world followed by the 12-nation EU. After the financial crisis, China's crude steel production growth plummeted. However, China's iron ore imports soared because of the investment boom in infrastructure projects in the country propelled by Chinese government's 4 trillion yuan of investment proposal during 2009-2010. At the end of 2010, China's manufacturing and real estate industries developed in leaps and bounds, with the floor area and newly constructed area skyrocketing year-on-year.

China's domestic steel prices also stayed buoyant, and ports' imported iron ore inventories began to climb. Since 2015, China's economy has entered a new stage,

featuring dramatic slowdown in fixed asset investment growth, and the power pushing demand for steel products lost steam significantly. The “supply-side structural reform” has been carried out step by step to improve supply efficiency and supply system quality, which has greatly trimmed the crude steel production in China.

In recent years, with the closeout of the “substandard steel” capacity, the reform dividend became visible, as evidenced by the improving profit rate of the steel industry, and the climbing utilization of steel capacity. The crude steel production in 2018 reached 928 million tonnes.

*Fixed Asset Investment
Growth and Crude Steel Production Growth in 2001-2018*

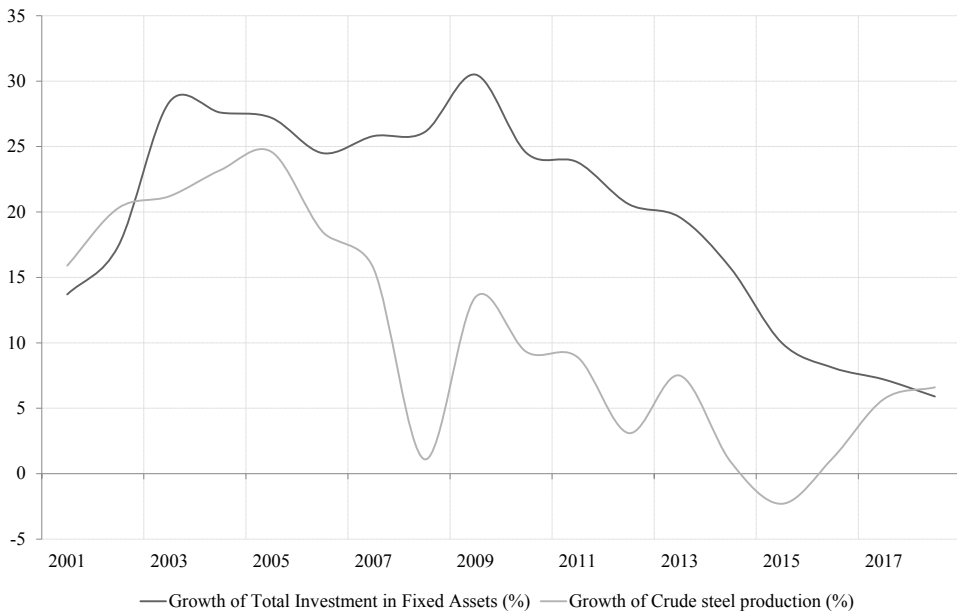


FIGURE 3 - DATA SOURCE: National Bureau of Statistics of China, prepared by the Shanghai International Shipping Institute

Since the beginning of the autumn of 2017, environmental protection production restriction has been carried out in various places in the heating season. In autumn and winter of 2017, the production limit of pig iron is about 51 million tons, and that of steel is about 50 million tons.

The productivity utilization rate of blast furnaces in 163 steel mills across the country has dropped sharply to a historical low of 71%.

With China's continued effort in implementing environmental protection and production curtailment policies and the three-year plan to fight air pollution, the production curtailment expanded to more regions and such actions for the purpose of environmental protection have become routines. However, the production curtailment in the autumn and winter of 2018/19 fell short of expectations. Overall, the 2018/19 autumn

and winter curtailment cut 280,000 t, around 34%, of crude steel production on average per day. The production curtailment was eased to a certain extent. Meanwhile, steel mills have become accustomed to the curtailment pattern, with the monthly average crude steel production fluctuating up and production rebounding sharply.

The cumulative production of China's pig iron was 708 million t from January to November 2018, up by 2.4% year-on-year. The production of crude steel was 857 million t, a substantial increase of 6.7% year-on-year, the growth rate increasing by 3.5 percentage points year-on-year and hitting a high since 2014. The steel production was 1.01 billion t, surging by 8.3% year-on-year, the growth rate rising by 7.2 percentage points.

Growth rates of pig iron and crude steel production are differentiated primarily because of the increases in scrap ratio and production of electric furnace steel. The proportion of scrap in China's converters was only 18% before 2017, and the proportion of scrap in steel mills in 2018 was already increased to around 30%.

Increased production of electric arc furnaces is another driver of China's crude steel production. Benefiting from the cost advantage of scrap steel and the increased profit per ton of steel, production of an increasing amount of electric-arc furnaces continued to be restarted or newly launched.

In 2018, newly-produced electric arc furnaces approximated 15.55 million t. Meanwhile, capacity utilization of independent electric arc furnaces was significantly improved, with the average capacity utilization rising from the 50% in 2017 to 63% in 2018. Production capacity was better unleashed and leveraged. In addition, technical transformation of old and outdated electric arc furnaces also contributed to the faster production increase.

Consumption

As the market demand unleashed from the removal of the substandard steel capacity become included in statistics, the apparent consumption of iron and steel of China in 2018 was on a constant rise, but at a lower growth rate.

The apparent consumption of China's steel from January to November 2018 was 807 million t, rising by 8.8% year-on-year, yet the growth rate being 2.5 percentage points lower year-on-year. The apparent consumption of crude steel in China increased from 170 million tonnes in 2001 to 870 million tonnes in 2018(Jan-Nov), reaching a historical high, with the domestic self-sufficiency rate exceeding 98%.

The downstream demand for steel was primarily from the construction industry which directly drove 57% of steel consumption. The industry also pushed indirect steel consumption by engineering machinery, heavy trucks and home appliances among others.

The demand of machinery industry contributed 17% of steel consumption, and the automobile industry, 9%. In this sense, the construction industry acts as a dominant steel consumer, with infrastructure and real estate being major players.

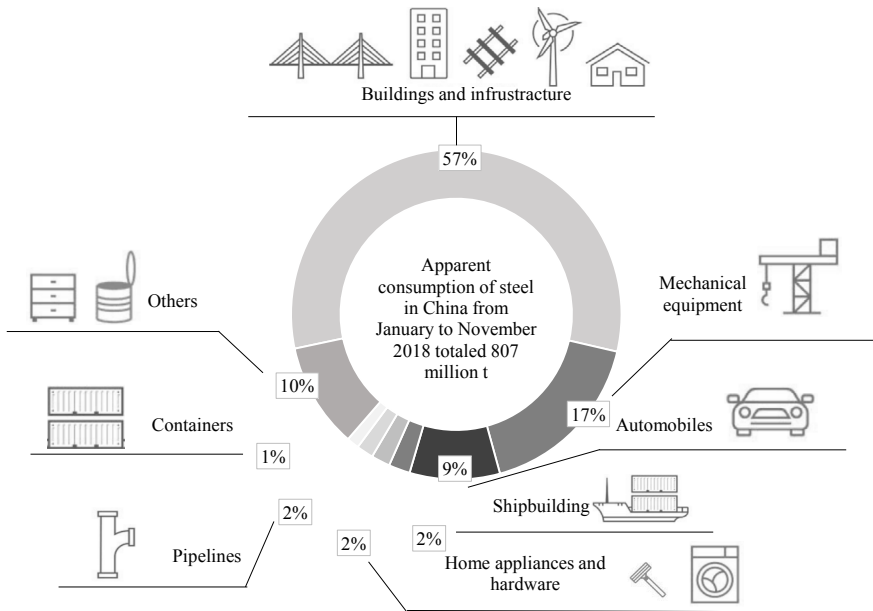
Projected Steel Consumption Structure for China in 2018 (Jan-Nov)

FIGURE 4 - DATA SOURCE: Mysteel.com.cn, World Steel Association (WSA), prepared by the Shanghai International Shipping Institute

Industry specific, real estate has become a top driving force for China's fixed asset investment to sustain growth in 2018. The real estate destocking campaign in 2017 produced a pronounced effect, with real estate companies pushing sales to raise cash.

In 2018, the tight financing constraints forced real estate developers to sustain liquidity through quick turnover and pre-sales, and the growth rate of new construction projects stayed high. Subject to the impact from local liquidation of claims and fiscal expenditure declines in 2018, the PPP policies were tightened and the investment growth in fixed assets (excluding farmers) and infrastructure stepped down. The cumulative growth rate of infrastructure investment in 2018 was only 3.8%, much lower than the 19% in the same period last year. Machinery was the second largest source of end-use demand for steel, and the prosperity of development played an important role to steel consumption.

The steel consumption experienced explosive growth in 2017 thanks to the high growth of construction investment and industry updates and replacement. The steel consumption in 2018 continued the growth, yet the growth rates of production of most machinery categories fell from high levels.

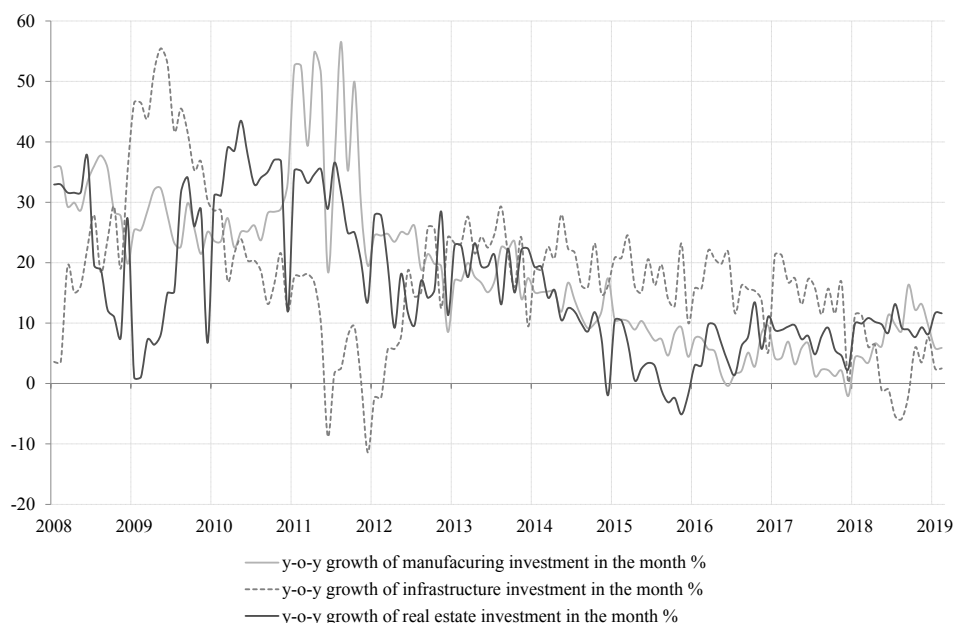
Industry-specific Growth of Fixed Asset Investment

FIGURE 5 - DATA SOURCE: Northeast Securities, prepared by the Shanghai International Shipping Institute

Iron ore import and steel export

In the context of the economic growth, the rising steel production, and the low iron ore grades in domestic market, China's seaborne imports of iron ores have climbed from 91 million tonnes in 2001 to 1.058 billion tonnes in 2017. As environmental policies got tightened and steel mill profits were substantially improved, the domestic demand for high-grade imported iron ores kept rising to improve production efficiency. Meanwhile, following the depletion of intermediate frequency furnaces, the supply of scrap steel increased, driving up the scrap ratio in steel mills and the steelmaking capacity of electric-arc furnaces. China's crude steel production increased by 6.6% in 2018, but the seaborne imports of iron ores fell by 1% year-on-year to 1.047 billion tonnes.

China's "Belt and Road" initiative is accelerating the formation of a new trade route in Eurasia and further speeding up infrastructure construction along the route. Among the current 1,000-plus ongoing projects, more than 400 are empowered by China's investment or technologies, with infrastructure projects accounting for 66%. Southeast Asia has become a key destination of investment flows for the steel industry in 2018, enabling a small rise in steel exports from China to Southeast Asia following the slump in 2017. From January to November 2018, China's steel exports to Southeast Asia totaled 22.23 million t, up by 1.7% year-on-year. Specifically, steel exports to Thailand reached 3.23 million t, a substantial increase of 10.3% year-on-year. Steel exports to Myanmar reached 1.55 million t, an increase of 5.5% year-on-year. But steel exports to Vietnam amounted to 6.46 million t, down by 10.7% year-on-year.

Steel Exports from China to Southeast Asia in the Month and y-o-y Growth in 2015-2018

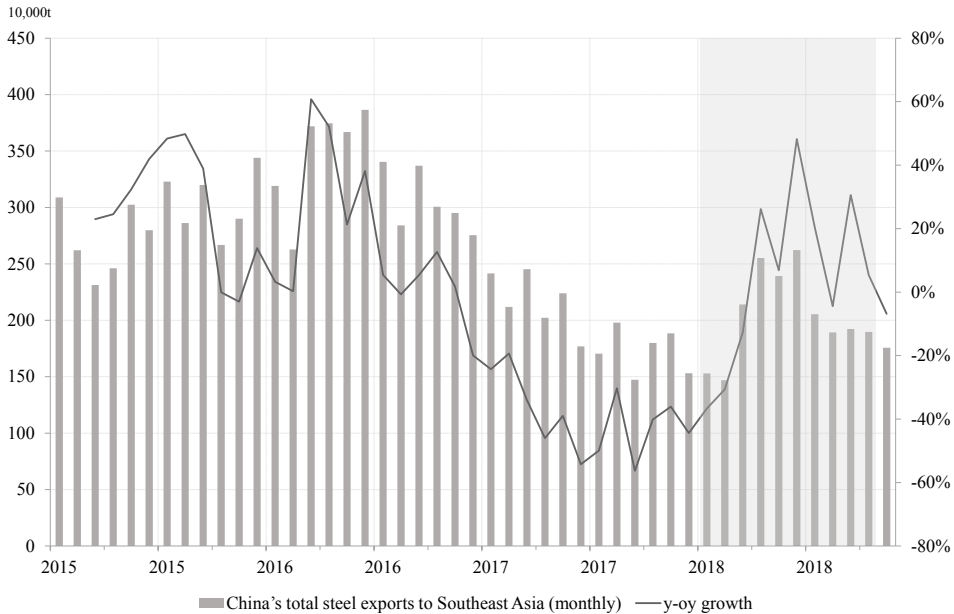


FIGURE 6 - DATA SOURCE: General Administration of Customs, prepared by the Shanghai International Shipping Institute

Chinese government removed the provisional duties for exports of rods and bars, deformed steel bars and wire rods and reduced the provisional duties for exports of some iron and steel products starting January 1, 2018, to encourage steel exports. However, the de-capacity and environmental protection moves and production curtailment in the country made the domestic steel prices stay high for a long time. As a result, enterprises were reluctant to export steel products. Adding to the situation the surging production in other countries in the world, the steel demand growth failed to cover the supply increase. From January to November 2018, China exported 63.78 t of steel products, declining by 8.4% year-on-year. Despite the year-on-year decrease of steel exports, the decrease rate was slowed greatly, indicating the stabilizing iron and steel export trade.

3. SUPPLY AND DEMAND OF COAL INDUSTRIAL CHAIN AND COAL IMPORTS

China's coal was in oversupply before 2002. To enhance the competitiveness of coal in the international market and ease the production and operation difficulties in the industry, the country appropriately tuned up the export tax rebate rate for coal. After China's entry into the WTO, coal demand began to rise. Starting 2004, the government gradually lowered the export tax rebate rate and trialed export quota management. China abolished its coal import tariff in 2018, and shifted from a net coal exporter to a net

importer in the next year. The period of 2002-2011 is a "golden decade" for the coal industry. In 2014, China canceled the zero import tariffs for various coal types, and restored the MFN tariff rate. Meanwhile, it put forward requirements on the quality of imported coal, encouraging the import of high-quality coal and strictly curbing the import of low-quality coal.

Starting 2017, China introduced multiple policies to implement dynamic control on coal imports. In the next year, China's coal imports totaled 280 million tonnes, a year-on-year growth rate of 3.9%. Boosted by favorable factors such as China's vigorous elimination of backward capacity, optimization of coal production structures and speedup of high-quality capacity unleashing in 2018, China's raw coal production by industries of above a designated scale continued to grow, with China's raw coal production standing at 3.68 billion tonnes, up 4.43% year-on-year.

China's Coal Imports and Exports in 2001-2018

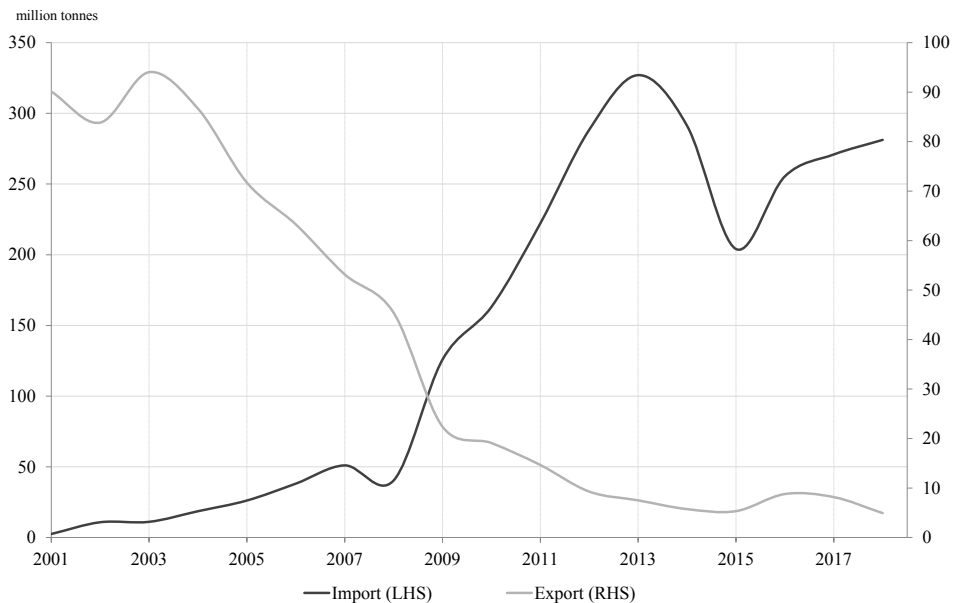


FIGURE 7 - DATA SOURCE: National Bureau of Statistics of China, General Administration of Customs of China, prepared by the Shanghai International Shipping Institute

China's imported coal primarily comes from 28 countries and regions around the world. Indonesia, Australia, Mongolia and Russia contributed 96% of coal imports to China. Indonesia was China's largest source of thermal coal imports, and Australia was China's largest source of coking coal imports.

Coal-fired power generation, steel, chemicals and building materials are four biggest users of coal in China. Despite China's promotion of coal use trimming and replacement since 2016, the energy consumption in the country in 2018 continued the growth from 2017, by virtue of the favorable macroeconomic stability and the rapid rise of power consumption across all social sectors, and witnessed positive growth for two years in a

row. According to estimates, China's coal consumption edged up by 1% in 2018.

Specifically, the power industry consumed about 2.1 billion tonnes of coal in the year, the steel industry consumed 620 million tonnes, the building materials industry consumed 500 million tonnes, the chemicals industry consumed 280 million tonnes, and the other industries consumed about 60 million tonnes less of coal.

Structure of China's Coal Imports by Region in 2018

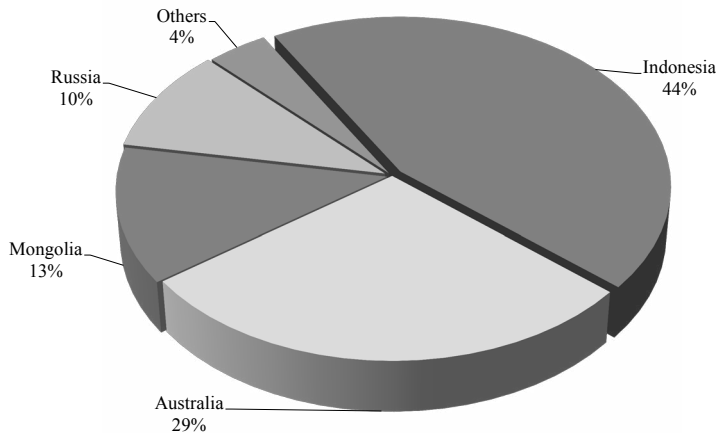


FIGURE 8 - SOURCE: Guotai Junan Securities

Industry specific, in terms of coal for power purposes, the power consumption growth across all social sectors exceeded expectations. In 2018, the total thermal power generation increased by 6.0% year-on-year, with the growth rate rising by 1.4 percentage points year-on-year. In addition, power plants adopted a high inventory strategy, and the inventory stayed high throughout the year.

The number of supply-available days with the coal inventory in the six major power plants rose from 13.8 days to 28.2 days. In the steel industry, the technical improvement brought about reduction in power coal consumption. Meanwhile, the surging utilization of electric-arc furnace capacity brought down the unit coal consumption, slowing down the coal consumption growth of the steel industry. In terms of coal for chemical purposes, as the oil price soared, more coal chemical projects were put into production, driving up coal consumption. The chemical industry consumed 212 million tonnes of coal in the first three quarters, an increase of 10.26 million tonnes, or 5.1%, year-on-year.

4. GRAIN AND MINOR BULKS IMPORTS AND EXPORTS

China is a big agricultural country and a populous country with high production, high consumption and high imports of grain. Main grain imported to China include

soybeans, corn, rice and wheat. Specifically, China tuned down its tariffs on imported soybeans in 1996 with no tariff quota imposed. As a result, China's soybean imports started to surge. China's soybean consumption was 111 million tonnes in 2017, with 95.53 million tonnes imported, the dependence on imports being as high as 86.2%. The United States, Brazil and Argentina were main sources of soybean imports for China. Affected by Sino-US trade frictions, the US soybean exports amounted to 47 million t, down by 12% year-on-year, and its total cereal exports were roughly the same as the previous year. China's soybean imports amounted to 88.03 million t, down by 8% year-on-year, and its total grain imports were 107 million t, down by 7% year-on-year. Major grain producers increased their soybean imports from Brazil and Russia to close up the gap. China imports 68 million tons of soybeans from Brazil, which account for 75% of the total imports. Brazil's soybean exports reached a record high of 83.6 million tons in 2018, and strong demand from the mainland of China was the main driving force.

In terms of minor bulks, aluminium materials won wide application in construction, electric vehicle manufacturing, electronics, mechanical equipment and other fields by virtue of their light weights, low prices and recyclability with the tailwind of China's energy conservation and environment protection move, and market demand continued to grow. China has become the world's biggest producer and consumer of aluminium products. The global bauxite trade flow pattern is changing. In the past two years, with China's "Belt and Road" Initiative benefiting African countries and driving the prosperity of mining development in Guinea, Guinea's production has risen sharply in 2017. Meanwhile, the "SMB-Winning Consortium", following the two-year three-phase infrastructure construction, has gradually opened up the China-Guinea bauxite transportation route. Guinea has surpassed Australia to become China's largest source of imported aluminium, taking a market share of nearly 45%.

Prospect

Iron ore: China's steel demand growth is expected to slow down as China's real estate experienced flameout, the infrastructure construction bottomed down and the manufacturing demand faced downside, if no new incentive policies are rolled out. Meanwhile, the fading marginal effects of de-capacity and production curtailment, coupled with the expected liberation of some effective capacity, may drive up supply for steel mills and hence force down steel materials prices. The tumbling profit margins kept a majority of steel mills in operation in low inventories. As China's environmental policies continue their assertiveness, the ratio of long-process scraps may go up, while the capacity of short-process electric furnace refineries may increase, which will negatively impact the raw materials demand for steel mills and cut down iron ore consumption. China's demand for imported iron ores may further shrink.

Coal: China's macroeconomic stability remained unchanged and the coal balance will continue. However, Shandong and Henan among other places have introduced reduction or replacement plans for coal consumption. The import restriction policy will greatly affect the import landscape in 2019.

Grain and minor bulks: During the soybean planting period in South America, the Sino-US soybean trade is difficult to be replaced. Besides, Chinese and the US state

leaders have reached a consensus after the meeting in Argentina in December. China will immediately put into practice the matters of consensus in agricultural products, energy and automobiles sectors. The Sino-US soybean trade will gain speed for recovery in the short term. In terms of bauxite, China's aluminium consumption will maintain its growing momentum, and China's investment cooperation with Guinea will gain speed. Chinese companies will successively put their bauxite and alumina investment projects in Guinea into operation, and the bauxite trade between the two sides will continue to develop at a high speed.

OBSERVATORY ON CORPORATE BALANCE SHEETS IN THE MARITIME CLUSTER

1. FOREWORD

The maritime cluster as productive system of the sea is identified with certain sectors of the so called “Economy of the Sea” or “Blue Economy”, mainly represented by the shipyard industry, transport and logistics.

Several studies with partly different methodologies and boundaries propose quantity studies of economic units, volumes of employment, value added and economic multipliers of expense and investments in the economy of the sea¹.

This paper illustrates the first results of a research project started by the Fondazione Nazionale di Ricerca dei Commercialisti (National Research Foundation of Accountants) within the observatory on corporate balance sheets in the maritime cluster. This research was promoted and supported by the National Council of Accountants and Auditors within the project “attività di impresa” established to strengthen and widen the contents of the profession of accountants.

The main indicators and indexes of corporate balance sheets will be illustrated, namely Italian ‘SPA’ (Join Stock Company), ‘SRL’ (Limited Liability Company) and cooperatives operating in the maritime cluster. Also, an analysis of the sector trend will be performed based on data extracted from balances of years 2016-2017 with a comparison to 2008 in order to gauge the impact of the crisis on the maritime cluster².

In line with the improvement in corporate balance sheets of Italian businesses, in 2017 companies of the maritime cluster considered in this observation showed a dramatic growth which resulted in a 1.3% increase of employment and a 12.6% surge in revenues compared to 2016. This trend appears even more positive if weighed against the growth of overall turnover of Italian SMEs which, in the same period, amounted to 5.3%. Furthermore, 2017 balance sheets demonstrate the recovery of pre-crisis levels with employment increased by 11.3% and revenues grown by 12.6% in comparison to 2008.

Profitability of the maritime cluster in 2017 also appeared to have grown on average and showed a significant increase on 2016. In fact, ROE in 2017 was 11.1%, up by 1.8 points on 2016. Also, in 2017, the ROE for corporations as measured by Cerved was equal to 9.9%. Moreover, an analysis of ROI highlights a marked improvement in 2017 in comparison with 2016. In fact, corporations with a positive ROI tend to grow by 3.2 percentage points, an increase that is mainly due to businesses that possess a ROI higher than 20%.

¹ For example, the “Quinto Rapporto sull’economia del mare. Cluster marittimo e sviluppo in Italia”. Censis, 2015 and the “VIII Rapporto dell’economia del mare”, Unioncamere and Camera di Commercio di Latina, 2018.

² Balance sheet data have been extracted from AIDA database in April 2019.

2. THE ECONOMY OF THE SEA AND THE ROLE OF ACCOUNTANTS³

The economy of the sea is a strategic sector for Italy with big potential of growth and development. Its strategic relevance has significantly grown over the last few years thanks to increased international trade and a renewed centrality of the Mediterranean.

According to SRM's Fifth Annual Report "Italian Maritime Economy"⁴ the doubling of the Suez Canal resulted in record-breaking growth of the maritime traffic affecting Mediterranean ports with the Italian ones becoming particularly relevant.

Nevertheless, if on the one hand the potentiality and importance of the sea as a resource are glaringly obvious, and given the role that port and maritime activities could play in boosting the national economy, on the other it is necessary to support development through appropriate institutional tools to provide infrastructure crucial to the integration of maritime businesses (ports, shipowners, shipyards) in the reference economic-territorial system.

The utmost importance of the sea as a resource for the Italian economy is undoubtedly linked to the geographic configuration of our country and to the long-standing maritime tradition of coastal populations. Nonetheless, there is a very tight connection between the development of the different sectors and the policies pursued at central and local levels. In fact, the most significant development has been recorded in the sectors where policies have been more attentive to the needs of the sector. This is the case, for instance, of shipowners with the creation of the International Registry for Merchant Ships. Other sectors, in particular ports and tourist boats, have suffered from delays and inefficiencies which sometimes resembled plain hostility as is the case of yachting.

Keeping in mind the aforementioned strategic role, in 2018 the National Council of Accountants and Auditors started a project named "Attività d'Impresa" which addresses the need to expand the key contents and competences of accountants by assuming that these professionals possess crucial skills that can and should adapt to the necessities of companies in constant evolution.

Therefore, understanding the deep transformations currently undergoing in the different productive sectors represents a fundamental step to adjust professional accountants' offer to match the new needs of demand and improve the level of service generally offered to the clientele. The quest for new professional opportunities cannot overlook productive systems, their sectorial and territorial articulation, the new demand for services and the need felt by professionals to specialize in function of the company cluster. Alongside made in Italy, Service Economy, Hi-tech, Construction and Environment, the Economy of the Sea represents one of the most important sectors of the project "Attività d'impresa" of the National Council⁵.

³ Another contribution to the analysis of the maritime cluster was presented in the document "Il cluster marittimo e le opportunità per i Commercialisti". Cndcec and Fnc, September 2018 (<https://www.fondazionenazionalecommercialisti.it/node/1338>).

⁴ Italian Maritime Economy, China, energy corridors, ports and new routes: geomaps of a changing Mediterranean. Fifth Annual Report, SRM, Napoli, 2018.

⁵ See the document "I cluster d'impresa: opportunità di sviluppo per la professione". FNC, 21 May 2018 (<https://www.fondazionenazionalecommercialisti.it/node/1308>).

To this end, within the research project of the Observatory on Italian LLCs coordinated by the National Foundation of Research of Accountants⁶, the idea blossomed to elaborate a focus on corporate balance sheets in the maritime cluster considering not only LLCs but all sorts of companies.

3. CORPORATIONS OF THE MARITIME CLUSTER

The maritime cluster defined in this Observatory is organised in three sectors, each one comprising sub-sectors⁷. The various sectors identified present an heterogeneous corporate and dimensional structure which deserves a more detailed analysis before observing the dynamic of the main indicators and of some balance sheet indexes.

First of all, the shipyard sector, which comprises shipbuilding, yacht building and the companies dealing with repairs and maintenance. Then, the transport sector, comprising maritime and coastal transport of passengers and goods and the transport on inland waterways. Finally, the sector of logistics comprising inventory, services related to maritime and inland waterways transport, goods handling, forwarders, transport intermediaries and logistic services linked to the distribution of goods.

Overall, there are 12,060 active corporations analysed, of which 515 JSC, 9,897 LLC and 1,648 cooperatives, a figure that goes down to 8,225 if we consider those for which the balance sheet 2017 is available. All of these employ 170,571 people with an average of 21 employees per company and they produce a total of €41 billion of revenues with an average of €5 million of revenues per company and €239,000 of revenues per employee⁸.

Logistics, with 8,863 active companies and 6,246 companies with a 2017 balance sheet, is the prominent sector, capable of employing 122,365 people and producing €28 billion of revenues, 69% of the total. Shipyards follow with 2,522 companies (of which 1,506 with 2017 balance sheets), 27,743 employees and almost €6 billion of revenues produced in a year. Finally, we find transport with 674 active companies (of which 473 with a 2017 balance sheet), 20,463 people employed and €6.7 billion of revenues.

Companies in the sector of shipyards have an average of 19 employees and €4 million of revenues each and, from the point of view of structure, they are similar to logistic companies which have an average of 21 employees and €4.5 million of revenues each.

Different is the structure of the transport companies which have an average of 44 employees and €14.2 million of revenues each.

⁶ Observatory on LLCs balance sheets. Trend 2015-2017, FNC, Rome, 31 October 2018 (<https://www.fondazioneNazionaleCommercialisti.it/node/1348>).

⁷ The organization of the cluster in sectors and subsectors has been carried out by taking into account the codes of economic activity as specified by Istat Ateco 2007.

⁸ It seems necessary to specify that the data presented in this Observatory do not include groups but are limited to considerations regarding individual companies.

This is reflected in the analysis of average values of revenue per employee, which is higher for transport companies (€328,045) than for shipyards (€215,817) and logistics (€229,760).

Maritime cluster, Macrosectors (companies, workforce, revenues and average values)

Macrosectors	Active companies	Company balances 2017	Workforce	Average workforce	Revenues (€ thousand)	Average revenues	Revenue per employee
Shipyards	2,522	1,506	27,743	19	5,988,656	3,976,531	215,817
Transport	675	473	20,463	44	6,713,997	14,194,497	328,045
Logistics	8,863	6,246	122,365	20	28,105,947	4,501,994	229,760
Total Cluster	12,060	8,225	170,571	21	40,808,600	4,963,342	239,293

TABLE 1 - SOURCE: FNC elaboration on AIDA, 2018

In the macrosector ‘Shipyards’, it is shipbuilding that has the most significant weight with 16,770 employees (60.4% of the total) and €4.26 million of revenues (71.1% of the total), even though Fincantieri S.p.a. alone accounts for 45% of the overall workforce and 64% of revenues thus gaining the position of most important company of the maritime cluster in terms of revenues according to 2017 balance sheets. On the other hand, yacht building, with 954 active companies, has a similar weight to the sector of repairs and maintenance which boasts 754 active companies. The average number of employees by company is 36 in shipbuilding and 11 in the other two sectors. The average revenue by company is €9 million for shipbuilding, €2.25 million for yacht building and €1 million for repairs and maintenance. On the other hand, revenues per employee for the first two sectors, tend to be very similar to each other (€254,000 for shipbuilding and €207,000 for yacht building) while this figure is significantly lower in the sector of repairs and maintenance (€100,000 per employee).

Compared to shipbuilding, the sector of yacht building shows a lower concentration and in fact the biggest company in terms of turnover is Ferretti S.p.a. which accounts for 32.5% of the market. Conversely, in the sector of repairs and maintenance, Officine Meccaniche Navali and Fonderie S. Giorgio Del Porto S.p.a. reach 93% of total revenues.

Maritime cluster, shipyards, Microsectors (companies, workforce, revenues and average values)

Microsectors	Active companies	Company balances 2017	Workforce	Average workforce	Revenues (€ thousand)	Average revenues	Revenue per employee
Shipbuilding	814	474	16,770	36	4,260,479	8,988,352	254,046
Yacht building	954	542	5,870	11	1,218,470	2,248,100	207,425
Repairs and maintenance	754	490	5,103	11	509,707	1,040,218	99,837
Total Cluster	2,522	1,506	27,743	19	5,988,656	3,976,531	215,817

TABLE 2 - SOURCE: FNC elaboration on AIDA, 2018

The Transport sector represents the shipowning enterprises and is divided into four different groups according to Istat's codes of economic activities which differentiate maritime and coastal transport from inland waterways and, for each of them, there is another distinction between the transport of goods and passengers⁹.

Table 3 shows the main indicators of the sectors making up the sector of transport. The maritime and coastal transport of goods and the transport of passengers by inland waterways are the most significant sectors in the category of transport. The former employs 6,540 people (32% of the total) and generates €3.66 million in revenues (54.5% of the total) with an average of 92 employees which is still the highest across all sectors of the cluster. Also, it has an average of €51.5 million of revenues, again the highest figure of the cluster and an overall volume of revenues by employee of €559,000 – a figure second only to the sector of transport by inland waterways. Although the sector “Others” comprises a significant number of companies (232 active out of a total of 675 in the sector transport), all of the companies, except Grimaldi Deep Sea S.p.a. of Grimaldi Group, have revenues lower than €100 million but all together they reach the figure of €1.79 billion (26.2% of the total). It is also interesting to notice how the transport of passengers by inland waterways plays a key role in terms of employment while being dominated by ACTV Spa, the Venetian local public transport company which also provides naval services in the lagoon, with 2,636 workers (83.7%) and €192 million of revenues (78.6%).

*Maritime cluster; transport, microsectors
(companies, workforce, revenues and average values)*

Microsectors	Active companies	Company balances 2017	Workforce	Average workforce	Revenues (€ thousand)	Average revenues	Revenues per employee
Maritime, and coastal passengers	264	172	4,507	27	774,665	4,503,866	171,642
Maritime, coastal goods	100	71	6,540	92	3,655,595	51,487,254	558,959
Inland waterways passengers	55	45	3,149	70	244,622	5,436,044	77,682
Inland waterways goods	24	21	377	19	253,510	12,071,905	672,066
Others	232	164	5,890	36	1,785,605	10,887,835	303,159
Total Cluster	675	473	20,463	44	6,713,997	14,194,497	328,045

TABLE 3 - SOURCE: FNC elaboration on AIDA, 2018

⁹ Several shipowning companies operate in different sectors, and that is why many of them end up in a residual unspecified sector defined 'other' while the companies identified as belonging to a more specific sector can also operate in other sectors. In this case, the criterion should take into account the most significant sector of operations even though we cannot be certain as to the fact that this rule is followed for every case.

Revenues by employee in this sector, in fact, represent the lowest value not only in the macrosector transport but in the whole maritime cluster and this is certainly due to such an issue, since published balance sheets clearly show that the Venetian company is burdened by significant personnel costs. Similarly, transport of goods by inland waterways, which only comprises 24 active companies, is dominated by Azienda Veneziana della Mobilità S.p.a. which has 190 employees (50.4%) and €237 million in revenues (93.5%) thus boasting absolute leadership in the volume of revenue by employee which, with €672,000, is the highest of the whole cluster.

Logistics comprises all the companies operating at the service of the maritime cluster, not only terminal operators but also forwarders and customs agents and, in general, most of the companies providing logistic services in port areas. Dry port operators are not included in this category as they mainly operate outside the port as is the case, for example, with railway and airborne transport or road haulage which are nevertheless strictly connected with the maritime cluster.

The sector which is by far the most important in the whole logistic sector is that of logistic services related to the distribution of goods. Distribution logistics comprises companies operating mainly on land but with a high degree of integration with maritime transport and or by inland waterways. Therefore, despite not being exclusively at the service of seaborne transport, this is considered as part of the maritime cluster.

In the sector of distribution logistics there are 3,219 active companies and the 1,843 companies with a 2017 balance sheet available employ 51,866 people. These companies produce a total of €4.8 billion in revenues and have an average of 29 employees while their average revenue is €2.6 million. Nevertheless, revenue per employee is quite low, with €93,000, the second lowest figure after that of passenger transport by inland waterways.

The second sub-sector of logistics is represented by forwarders and customs agents with 1,459 companies which employ 29,178 people and a total of €13.5 billion in revenues. It seems clear, therefore, that logistics distribution is the first sector in terms of employment while that of forwarders and customs agents is the most significant in terms of revenues.

This sector's average number of employees is 20 and average revenues are €9.3 million per company with an average revenue per employee that is the highest of the logistics sector and the third most important of the whole cluster (€463,000). The companies which have the highest average number of employees are those of the sector of goods handling but this is probably due to the fact that the number of companies is quite low. In this sector the average number of employees per company is 46 even though the average revenue per employee is €138,000, a relatively low figure.

In conclusion, this structural analysis of companies of the maritime cluster has highlighted that the most significant sectors are: a) shipbuilding with a turnover of €4.26 billion and €254,000 in revenues per employee, b) forwarders and customs agents with a turnover of €13.5 billion and €463,000 in revenues per employee and c) shipowning companies which mainly deal with the maritime and coastal transport of goods with a turnover of €3.7 billion and €559,000 in revenues per employee.

Maritime cluster, Logistics, Microsectors
(Companies, workforce, revenues and average values)

Microsectors	Active companies	Company balances 2017	Workforce	Average workforce	Revenues (€ thousand)	Average revenues	Revenues per employee
Inventory	1,454	994	15,514	16	3,400,056	3,424,024	219,045
Related services	1,241	906	9,601	11	1,878,676	2,073,594	195,553
Goods handling	146	121	5,576	46	767,317	6,341,463	137,709
Forwarders and customs agents	1,615	1,459	29,178	20	13,510,113	9,259,844	462,709
Transport Intermediaries	1,188	923	10,630	12	3,731,859	4,043,184	350,509
Distribution logistics	3,219	1,843	51,866	29	4,817,926	2,617,016	92,934
Total Cluster	8,863	6,246	122,365	20	28,105,947	4,501,994	229,760

TABLE 4 – SOURCE: FNC elaboration on AIDA, 2018

Finally, before concluding the structural analysis of the cluster, it might be interesting to focus on data regarding the legal status of the companies of the maritime cluster. As table 5 shows, 82.1% of these are LLCs while JSC only account for 4.3% of the total. Also, cooperatives are significantly represented with 1,648 units. Moreover, it seems evident that the sector with the highest presence of JSCs is that of transport with 12.6% while cooperatives tend to be the most common legal status of companies operating in the sector of logistics (16.8%).

Maritime cluster, Macrosectors, corporations by legal status

Macrosectors	JSC	LLC	Coop.	Total
Constructions and repairs	59	2,386	87	2,532
Transport	86	521	73	680
Logistic services	370	6,990	1,488	8,848
Total Cluster	515	9,897	1,648	12,060

TABLE 5 - SOURCE: FNC elaboration on AIDA, 2018

4. THE LEVEL OF CONCENTRATION OF COMPANIES IN THE MARITIME CLUSTER

The maritime cluster shows a rather high level of industrial concentration. Alongside few big corporations there can be found a plethora of small and very small enterprises which characterize a very fragmented sector. As we will see below, there are only 587 companies with a turnover higher than €10 million and these account for 7% of the

whole cluster. The top 10 companies in terms of turnover (2017 balance sheets) account for 0.12% of the total but make up 11.3% of total workforce and 24% of revenues.

Secondly, the sector with the highest production concentration is also the one with the lowest entrepreneurial density. The transport of goods by inland waterways, in fact, is comprised by only 21 companies, 10 of which employ 82% of the workforce and produce 98.8% of revenues.

In general, concentration is very high in the sectors of transport where there is low entrepreneurial density, a factor mainly dependent on high economies of scale. This is the case of transport of passengers by inland waterways where 96.5% of the workforce and 96.7% of revenues belong to the top 10 companies. The same trend, with figures referred to the 10 biggest companies, can be observed in the maritime and coastal transport of goods (81.4% of the workforce and 93.6% of revenues) and in the maritime and coastal transport of passengers (76.3% of the workforce and 84.4% of revenues).

On the other hand, in logistics the level of concentration tends to decrease significantly despite showing a high average value. In the sector of related services, for instance, the top ten companies by turnover employ 22.3% of the workforce and produce 37.8% of revenues while in the sector of forwarders and customs agents the ten biggest corporations employ 34.1% of the workforce and account for 38% of total revenues. Finally, within the sector of logistics, the category showing the highest level of concentration is goods handling, where the top 10 companies by turnover employ 44.4% of the workforce and produce 55.2 of revenues.

Maritime cluster, % Share of workforce and revenues of the top 10 companies in each sector. Balance data 2017

Microsectors	Workforce	Revenues
Shipbuilding	52.7%	79.9%
Yacht building	29.4%	57.5%
Repairs and maintenance	11.6%	33.9%
Maritime, and coastal passengers	76.3%	84.4%
Maritime, coastal goods	81.4%	93.6%
Inland waterways passengers	96.5%	96.7%
Inland waterways goods	82.0%	98.9%
Other transports	42.5%	61.9%
Inventory	17.5%	34.1%
Related services	22.3%	37.8%
Goods handling	44.4%	55.2%
Forwarders and customs agents	34.1%	38.0%
Transport intermediaries	26.8%	35.5%
Distribution logistics	5.9%	20.6%
Total Cluster	11.3%	24.0%

TABLE 6 - SOURCE: FNC elaboration on AIDA, 2018

5. TRENDS IN THE MARITIME CLUSTER IN 2017 IN COMPARISON WITH 2016 AND 2008

Before moving on to analyse the main balance sheet indicators gauging profitability of the maritime cluster, it seems necessary to take a closer look at the trend of workforce and revenues in 2017 in comparison with 2016 and 2008 with the aim of understanding the consequences of the economic crisis.

If we only take into account the two economic indicators used in this paper, ie workforce and revenues, the analysis of the trend of the maritime cluster appears undeniably positive in comparison with both 2016 and 2008. Nevertheless, it is interesting to notice that this upward trend is heavily influenced by the growth recorder between 2016 and 2017 which accounts for most of the variation calculated in comparison with 2008. This is particularly true for workforce, which grew by 11.3% since 2009, gaining 9.5 pp in one year (2016/2017). A similar observation can be made for revenues which have grown by 12.6% in nine years with 7.5 pp gained between 2016 and 2017.

Nonetheless, individual subsectors show different trends which should be looked at more attentively. Firstly, in comparison with 2008, year commonly recognized as marking the beginning of the crisis that lasted until 2015, the sector of logistics shows the most significant growth (+19.5% of workforce and +17.3% of revenues) followed by transport (+7.2% of workforce and +12.4% of revenues). Shipyards, on the other hand, show a decline both in workforce (-9.7%) and revenues (-4.3%).

Moreover, if we take a closer look at the last year, shipyards show an increase in workforce (+7.6%) and a decline in revenues (-2.7%)¹⁰.

Maritime cluster, Macrosectors. Percentage variation workforce and revenues, year 2017 on 2016 and 2017 on 2008

Macrosectors	% Var. workforce 17/16	% Var. workforce 17/08	% Var. revenues 17/16	% Var. revenues 17/08
Shipyards	7.6%	-9.7%	-2.7%	-4.3%
Transport	4.2%	7.2%	7.0%	12.4%
Logistics	11.0%	19.5%	10.1%	17.3%
Total Cluster	9.5%	11.3%	7.5%	12.6%

TABLE 7 - SOURCE: FNC elaboration on AIDA, 2018

Table 8 below illustrates that the sector of shipyards has been affected by shipbuilding which shows the most dramatic decline in terms of workforce in comparison with 2008 (-12.6%) while recording a less marked decrease in revenues (-3.5%).

¹⁰ It is also important to highlight that the trend analysis has been carried out through a selection of samples of companies that had both balance sheets available. In the case of 2017/2016 variations, the overall sample is comprised of 7,272 companies in terms of employees and 7,400 companies in terms of revenues. As for 2017/2008 variations, the sample is smaller: 3,812 companies for employees and 4,285 for revenues.

On the other hand, it is noteworthy and surprising to notice the decline of revenues in the sector of shipbuilding between 2016 and 2017 (-8.7%) alongside a simultaneous growth of workforce (+8%). Conversely, in the sector of yacht building, there has been a more significant decrease of revenues in comparison with 2008 (-7.8%) and a less marked decline of workforce (-3.6%).

Maritime Cluster, Shipyards, Microsectors. Percentage variation of workforce and revenues, year 2017 on 2016 and 2017 on 2008

Microsectors	% Var. workforce 17/16	% Var. workforce 17/08	% Var. Revenues 17/16	% Var. revenues 17/08
Shipbuilding	8.0%	-12.6%	-8.7%	-3.5%
Yacht building	5.4%	-3.6%	16.3%	-7.8%
Repairs and maintenance	8.9%	-1.1%	16.2%	-4.1%
Total Cluster	7.6%	-9.7%	-2.7%	-4.3%

TABLE 8 - SOURCE: FNC elaboration on AIDA, 2018

As for the sector of transport, significant variations can be observed between 2017 and 2008, in particular for the transport of passengers and goods by inland waterways. Such changes have been influenced by the limited dimension of these two sectors which, as mentioned in the structural and dimensional analysis above, are dominated by two Venetian companies operating mainly in the sector of lagoon public transport. Nevertheless, it is interesting to highlight that in maritime and coastal transport there is a significant difference between 2017/2008 workforce trends in passengers (+32.7%) and goods (-18.8%). Such a difference is confirmed but less markedly in the category of revenues (+9.5% and -4.4%).

It seems clear that the crisis of maritime transport of goods, consequently to the global economic and financial crisis, has significantly affected the whole Italian maritime cluster.

Therefore, the recovery experienced by this sector in 2017 (+5.6% in workforce and +9.6% in revenues) appears to be even more noteworthy. In the sector of logistics, with the exception of goods handling which presents a decline between 2017 and 2008 both in workforce (-6%) and revenues (-17.2%), all of the other subsectors show particularly significant upward trends, ie forwarders and customs agents (+18.5% workforce and +19.4% revenues) and distribution logistics (+67.8% and + 83.5%). Nevertheless, inventory and related services show slight increases between 2016 and 2017 with growth rates of 1.5% and 1.6% respectively in terms of workforce and 6.9% and 6.8% respectively in terms of revenues. Also compared to 2008 the revenues of these subsectors have changed only slightly with 9.3% and 6.6% respectively.

As for companies operating in goods handling, data show a significant attempt at recovering after the long crisis and the big losses suffered over the last years. In 2017, in fact, despite stagnation in workforce, turnover in this sector showed an increase of 2.3%.

Maritime Cluster, Transport, Microsectors, percentage variation of workforce and revenues, year 2017 on 2016 and 2017 on 2008

Microsectors	% Var. workforce 17/16	% Var. workforce 17/08	% Var. revenues 17/16	% Var. revenues 17/08
Maritime, and coastal passengers	9.9%	32.7%	10.9%	9.5%
Maritime, coastal goods	5.6%	-18.8%	9.6%	-4.4%
Inland waterways passengers	0.7%	-2.0%	0.6%	382.0%
Inland waterways goods	16.8%	39.7%	0.6%	761.2%
Others	-0.2%	14.6%	2.3%	22.9%
Total Cluster	4.2%	7.2%	7.0%	12.4%

TABLE 9 - SOURCE: FNC elaboration on AIDA, 2018

Maritime Cluster, Logistics, Microsectors, percentage variation of workforce and revenues, year 2017 on 2016 and 2017 on 2008

Microsectors	% Var. workforce 17/16	% Var. workforce 17/08	% Var. revenues 17/16	% Var. revenues 17/08
Inventory	1.5%	18.4%	6.9%	9.3%
Related services	1.6%	9.8%	6.8%	6.6%
Goods handling	-0.5%	-6.0%	2.3%	-17.2%
Forwarders and customs agents	4.1%	18.5%	9.9%	19.4%
Transport Intermediaries	53.6%	17.2%	8.0%	11.2%
Distribution logistics	15.9%	67.8%	18.6%	83.5%
Total Cluster	11.0%	19.5%	10.1%	17.3%

TABLE 10 - SOURCE: FNC elaboration on AIDA, 2018

6. MAIN BALANCE SHEET INDICATORS

Only 7.1% of corporations in the maritime cluster have a turnover higher than €10 million but these employ 51.4% of workforce and produce 76.5% of revenues: 587 companies giving work to almost 88,000 people and totaling slightly more than €31 billion in turnover. These companies have an average workforce of 149 employees, while companies with a turnover lower than €10 million, have a very different average workforce (10.9 employees).

Revenues per employee in the companies with over €10 million in turnover are €356,000 while those with a turnover up to €10 million earn €116,000 per employee.

*Maritime Cluster, Main values and economic indicators by turnover size
(2017 balance sheets)*

Indicator/Value	Companies with turnover Up to €10 million	Companies with turnover over €10 million	Total
Number	7,635	587	8,222
% share	92.9%	7.1%	100.00 %
Workforce	82,918	87,653	170,571
% share	48.6%	51.4%	100.00%
Average employees	10.9	149.3	20.8
Revenues (€ thousand)	9,601,176	31,207,422	40,808,598
% share	23.5%	76.5%	100.00%
Revenue per employee (€)	115,791	356,034	239,247

TABLE 11 - SOURCE: FNC elaboration on AIDA, 2018

Compared to 2016, in 2017 companies of the maritime cluster increased the volume of workforce by 6.7%, while revenues increased by 7%. This trend was more marked for smaller companies. In particular, companies with turnover up to €10 million increased the workforce by 8.9% against + 6.5% of those with a turnover higher than €10 million. On the other hand, in terms of revenues, companies with more than €10 million in turnover show a growth trend of 7.1% while smaller ones increased by 6.5%.

On the other hand, compared to 2008, workforce shows an increase of 8% while revenues have grown by 14.1% thanks to remarkably positive performances of bigger companies. In fact, in 2017 companies with a turnover over €10 million showed a growth in revenues of 16.8% while their workforce increased by 2.3%.

*Maritime Cluster, Trend 2017 (on 2016) of workforce and revenues by turnover size
(balance sheets 2017 and 2016)*

Indicator	Companies with turnover Up to €10 million	Companies with turnover over €10 million	Total
Workforce	8.9%	6.5%	6.7%
Revenues	6.5%	7.1%	7.0%

TABLE 12 - SOURCE: FNC elaboration on AIDA, 2018

*Maritime Cluster, Trend 2017 (on 2008) of workforce and revenues by turnover size
(balance sheets 2017 and 2008)*

Indicator	Companies with turnover Up to €10 million	Companies with turnover over €10 million	Total
Workforce	1.4%	2.3%	8.0%
Revenues	2.3%	16.8%	14.1%

TABLE 13 - SOURCE: FNC elaboration on AIDA, 2018

Before taking a closer look at the main balance sheet indexes, it is important to highlight the companies that have a positive net profit and those which possess positive net assets. The methodology hereby employed is made up of the calculation of the main balance ratios at aggregate level for each subsector analysed with reference to the restricted sample of companies that have positive net profits and assets. This analysis is then completed by the study of distributions of indexes by value category.

Companies of the maritime cluster with a balance in the green in 2017 are 89.2% of the total while those that have non-negative net assets are 97.8%. Turnover size seems to impact significantly on the former indicator (profitability) because 88.7% of companies with turnover up to €10 million are in the green whereas this percentage is 10.5 points higher in the turnover size class over €10 million.

Maritime Cluster; Companies with positive net profits and assets by turnover size (balance sheets 2017)

Indicator	Companies with turnover Up to €10 million	Companies with turnover over €10 million	Total
Companies with net profits >0	88.7%	95.1%	89.2%
Companies with net assets >0	97.6%	99.4%	97.8%
Companies with net profits and assets > 0	87.6%	94.9%	88.1%

TABLE 14 - SOURCE: FNC elaboration on AIDA, 2018

Table 15 shows the ROE of each sector of the maritime cluster in 2016 and 2017. In 2017 this indicator was 11.1%, up by almost two percentage points from 2016 when it was 9.3%. The increase involved all of the three macrosectors even though shipyards showed a more marked growth (4%) than that of transport (2.9%) and logistics where the ROE remained stable. As for the microsectors, the most significant ROE growth can be observed in shipbuilding (4.6%), forwarders and customs agents (4.2%) and yacht building (3.5%). Conversely, declines in ROE can be found in the maritime and coastal transport of passengers (-2.9%), related services (-1.5%), inventory (-1.3%) and distribution logistics (-1.3%).

In 2017, the microsectors showing the highest ROE are those of goods handling (21.2%) and forwarders and customs agents (20.3%). On the other hand, the lowest ROE can be found in transport of goods by inland waterways (2.2%) and related services (4.6%).

Nevertheless, if we take a closer look at the distribution of the ROE by category in 2017, it can be observed that 23.2% of all the companies of the maritime cluster (with balance sheets 2017 available) show negative or zero ROE while 30% has a positive ROE lower than 10%. Also, 15% of all the companies has an ROE between 10% and 20% while 31.9% shows an ROE over 20%. In particular, companies with an ROE lower than -10% are 12.5% of the total.

Maritime Cluster; Balance sheet indicators, Roe, years 2017-2016

Microsectors	2017	2016	% Var.
SHIPYARDS	10.3%	6.3%	4.0%
Shipbuilding	9.1%	4.5%	4.6%
Yacht building	14.5%	11.0%	3.5%
Repairs and maintenance	11.0%	10.9%	0.2%
TRANSPORT	11.6%	8.7%	2.9%
Maritime, and coastal passengers	13.0%	15.9%	-2.9%
Maritime, coastal goods	11.6%	8.9%	2.8%
Inland waterways passengers	7.4%	6.5%	0.9%
Inland waterways goods	2.2%	2.2%	0.0%
Other transports	12.0%	8.1%	4.0%
LOGISTICS	11.0%	10.8%	0.1%
Inventory	7.5%	8.8%	-1.3%
Related services	4.6%	6.2%	-1.5%
Goods handling	21.2%	19.0%	2.2%
Forwarders and customs agents	20.3%	16.2%	4.2%
Transport Intermediaries	18.8%	16.9%	1.9%
Distribution logistics	13.8%	15.1%	-1.3%
Total Cluster	11.1%	9.3%	1.8%

TABLE 15 - SOURCE: FNC elaboration on AIDA, 2018

Maritime Cluster; balance sheet indicators, Roe, year 2017 by value category

Value category	2017
Up to -10	12.5%
From -10 to zero	10.7%
From zero to 10	30.0%
From 10 to 20	15.0%
Over 20	31.9%

TABLE 16 - SOURCE: FNC elaboration on AIDA, 2018

If we now turn our attention to ROI, whose distribution by value class in 2016 and 2017 is illustrated in table 17 below, we can notice some generalized improvements because companies with positive ROI show 3.2% growth and, in particular, whose with a ROI higher than 20 percentage points tend to grow by 2.5%.

Maritime Cluster, Balance sheet indicators, Roi, Years 2017-2016 by value category

Value category	2017	2016	Var.
Up to -20	1.7%	2.1%	-0.4
From -20 to -10	4.1%	5.1%	-1.0
From -10 to zero	14.2%	16.1%	-1.9
From zero to 10	41.9%	41.2%	0.7
From 10 to 20	25.3%	22.9%	2.3
Over 20	12.8%	12.6%	0.2

TABLE 17 - SOURCE: FNC elaboration on AIDA, 2018

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This issue of SRM's Maritime Report analyses the new future challenges for the Mediterranean in the field of ports and shipping. New economic and maritime scenarios are currently being defined which will affect the competitiveness of our country's system and shape global routes and infrastructure.

In particular, transits through the Suez Canal, celebrating 150 years of operations, have been following dramatic upward trends for the past year. Secondly, the phenomenon of naval gigantism which continues to grow causing a sharp rise in the process of port selection. Due consideration is also given to China which has firmly established its strategic positioning in some of the most important port terminals of the Mediterranean. Finally, the role of Free Zones in ports which are continuing to attract industrial investment on the African bank, alongside the challenges set by new technologies and energy scenarios. Will we be able to win these challenges and turn them into opportunities?

This Report, enriched by analyses based on new direct missions carried out abroad, aims at providing food for thought and reflections on the aforementioned big topics. As is customary in this publication, the research contains papers written by renowned international centres of study such as the Shanghai International Shipping Institute, the Polytechnic of Hong Kong and the OECD who have contributed to increasing the value of this Report.

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Study Centre based in Naples, connected to the Intesa Sanpaolo Group, originally an intellectual and scientific safeguard, has the objective to improve the knowledge about Italy's territory in terms of infrastructural, productive and social assets with a European and Mediterranean vision in mind. Specialized in the analysis of regional dynamics, and with a particular eye on the Southern Italy, it runs two research observatories monitoring maritime transport, logistics and energy.

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