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## Evolution of the EU and International Shipping: Drivers, Challenges and Scenarios

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### Abstract

By the year 2050, the international shipping shifts from a tri-polar world with East Asia as frontrunner and Europe and North America as followers. This trend however is coupled with uncertainties associated among others with the uptake of unconventional energy resources and with potential backlash from international free trade. The scope of the present paper is to examine this trend for EU and international shipping and analyse in particular the position of the EU maritime industry internationally. This is done through a literature review, discussions with sector representatives, a wide sector survey and a scenario analysis. The uncertainties of the European maritime industry's outlook are evaluated under three scenarios: sustainability, conventional high growth, and fragmented-world scenarios. The investigation found that for Europe, the sustainability growth scenario offers the most opportunities to prosper, with limited world trade restrictions. The conventional high growth drives the EU shipping to lead two deep sea markets, high precision and sustainable services for all shipping segments, and highly modular vessels combining the most profitable segments based on maximum capacity utilization. The threat for the EU shipping is a fragmented world scenario, where world regional blocks slice current EU shipping and new markets are not large enough to match lost world market. The paper concludes with a series of trends and recommendations for policy makers to reiterate the framing of a global level playing field.

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## 1. Introduction

The Athens Declaration of the EU Member States acknowledges that 75% of the EU imports and exports depend on maritime transport. It also underlines the need of maintaining the EU State Aid regime to support EU competition with non-EU countries, and recognizes the importance of a stable innovation-friendly regulatory framework for the competitiveness of the EU fleet in the context of liberalized international maritime services (Council of the European Union, 2014).

Oxford Economics (2015) outlines the importance of the EU shipping industry, which has a total impact on the EU GDP of 147 billion Euro, and on the labor market with 2.2 million jobs. The EU-controlled fleet represents 40% of the world tonnage, and grew by 70% from 2005 to 2014 (Oxford Economics, 2015).

The maritime transport sector is part of a global market that has developed a global governance system based on the historic background of the ‘Mare Liberum’ principle (International Labour Organisation – ILO; International Maritime Organisation - IMO). This system incorporates instruments such as the ILO’s Maritime Labour Convention (MLC) and the IMO’s Convention on Standards of Training, Certification and Watch keeping for Seafarers (STWC). On issues such as market access and market conditions however, ship operators still rely mostly on bilateral agreements between individual states. Besides this, the EU concluded Free Trade Agreements (FTAs) and Partnership and Cooperation Agreements (PCAs) containing provisions relevant for the maritime industry with a number of countries. In the future, more agreements may be concluded with other countries.

A basic condition for an effective EU maritime policy would be to have European ships sailing the flags of the Member States, thus applying EU legislation to these ships. However the global nature of international shipping makes EU policy making in this field very challenging, as many EU-owned ships are registered outside the EU. Hence, it is important to know and understand the development of the EU-flagged fleet, and see whether non-EU shipping registries develop and why.

All the above-mentioned challenges require a more holistic picture to be dressed of the status and future of EU shipping, taking into account developments in other continents and strategies deployed by players from those other continents. Subsequently, scenario’s over future evolution of the shipping business are to be drawn, as a framework within which decisions can be taken. That is exactly what this paper undertakes.

The approach to do so consists of consecutively a literature review of scientific and sector literature, discussions with sector representatives, a wide survey among sector associations and companies, and scenario building.

This paper explores the macro conditions and trends of EU global maritime trade, the meso conditions of shipping company performance, the market conditions of competition at trade lane level and micro analysis of the cost structure of EU international trips. All these, together with the insights regarding technology, environment, labour, safety and security conditions, are integrated into future scenarios for the EU shipping, including outlooks and policy options for each scenario. To do so, it is essential to understand the needs of the European shipping industry. This study therefore assessed these needs using a survey amongst ship-owners and by conducting interviews with other relevant stakeholders.

The paper in section 2 presents the key macro, market, meso, micro and side-constraints analysis of the EU and international shipping industry. It follows on in section 3 with the scenario analysis, and concludes in section 5 with a number of key recommendations for policy making and strategy development.

## 2. EU and International Shipping Industry Trends

This section addresses the picture of the current state of the shipping market and business. It consecutively deals with macro, meso, market and micro issues, and furthermore also analyses the impact of side constraints, namely the technological, environmental and labour playing field, and the established maritime agreements.

### *2.1. Macro analysis: demand and supply developments*

The shipping industry globally, depends heavily on the world economic growth. From 1980 to 2014, the world GDP grew by 3.5% yearly. The bi-polar world of the 1980's, consisting of North America and Europe, has been changing to a world with three growth poles, North America, Europe and Asia. Given that trade grows approximately twice as much as the GDP (UNCTAD, 2014; Bussiere, Callegari, Ghironi, Sestieri, & Yamano, 2011), the world trade has been growing by 7% yearly, and the South Asia trading at a faster phase than the rest of the world, 12% yearly approximately. The developments in seaborne trade from 1980 to 2013 shows container transport yearly grows by 42%, major bulk (iron ore, grain, coal, bauxite/alumina and phosphate) trades by 12%, and oil and gas by 2% (UNCTAD, 2014).

The fleet development shows shifts in volumes and registry (Artuso et al., 2015). Container vessel gross tonnage grew by a factor 14 from the year 1980 to 2014, and that of bulk vessels by a factor 4. This growth has been the result of increasing the number of ships, but more importantly during recent years is the increased size of the vessels (IHS Global Limited, 2015). It should be noted that the system of open registry has become very popular and nowadays more than 40% of the worldwide share in flagging is concentrated in three specialised countries, namely. Panama, Liberia, and the Marshall Islands. The growth in EU flagging is lower than the growth in EU fleet ownership. The faster growth in EU ownership than in EU flagging is related to the use of flags of open registries or local flags when ships are engaged in trade outside of EU waters.

Potential explanations for the increased use of open registries, besides lower labour costs, are favourable tax policies (tonnage tax, tax exemptions), the economic advantage of lowered environmental, labour and safety standards, the quality of services, and the ease of registration. Over the years, the differences between the open registries and the EU flags state registries have diminished as a substantial number of EU countries have introduced the tonnage taxation system as well and most open registries comply with minimum international regulations. The competitive differences occur therefore at a more nuanced level, e.g. tax exemptions within the tonnage tax system or recognition of labour certificates, or on other aspects such as quality of services.

Regarding environmental, safety and labour standards, De Sombre (2006) on flagging standards concludes that in practice, the economic advantage of lowered standards is offset by collective action by international organisations and states. De Sombre notes that overall, open registries are pressured to raise their standards while traditional maritime states lower their standards somewhat (DeSombre, 2006). The principles of this framework are confirmed through recent data of the yearly shipping industry flag state performance table for 2014 (ISF/ICS, 2014). In this overview, the main open registries, such as the Marshall Islands, Panama, Liberia, and Singapore, all have a positive score for their performance on port state control indicators, as well as on the ratification of conventions. The port state control indicators include scores for the three main Port State Control authorities, namely the Paris MOU, the Tokyo MOU, and the United States Coast Guard.

Labour standards of registries differ in their requirements regarding nationalities of officers and crew, and for certification requirements (Hill Dickinson, 2013). For the registries of Panama, Liberia, the Marshall Islands, Malta and the UK, there are no requirements with regard to the nationality at all. Several EU Member States have requirements regarding the nationality of the master of the ship or a minimum percentage requirement for the nationalities of the crew. The limitations in choice of crew nationality have an impact on the manning costs of a vessel following wage differences between European and non-EU Member States. Besides the nationality requirements, labour regulations and inspections of the flag state also seem important and representatives from the industry indicate that inspections by European flag states are considered to be more cumbersome than from open registries.

Tax reductions in many EU Member States seem to be an important factor by which EU Member States have not lost a larger share of their flags. However, to remain competitive, further pressure on taxation levels seems likely and without international minimum standards, EU Member States will need to follow this trend. This 'race to the bottom' implies that worldwide maritime nations are likely to lower their taxes, either by reducing tax rates, increasing number of tax exemptions or expanding the definition of the maritime cluster. EU Member States need to consider whether to follow this trend, knowing that not following will affect their market share especially in the less value added and more cost competitive segments.

## 2.2. Market analysis: competition and concentration

Due to the many different players, one might expect that the port and maritime industry is a highly competitive sector due to the many different players, large volumes transported, and long distances covered due to the considerable spatial separation of production and consumption. The nature of this competition has changed in recent years however. Nowadays, ports and the maritime industry compete as part of the (maritime) supply chains to which they belong.

The forms of control of the maritime industry and ports however, are likely to become increasingly flexible as in addition to mergers, recent developments in particular in the container business include as well alliances, joint ventures and dedicated handling activities. Cooperation may involve carriers, terminal operating companies, port authorities, hinterland operators, and hinterland terminal operators (Meersman et al., 2015; Van de Voorde & Vanelslander, 2014).

The driving forces of integration in container liner shipping include: increasing control over costs, pricing, entry and exit behaviour, access to technology and knowledge, reduced uncertainties, supply assurance and reduced complexities. Developments in the maritime industry require paying attention to shifting competitive balances and market power. Anti-trust enforcement revolves around the identification and measurement of market power. In fact, following a methodology developed to assess the container shipping industry's market power by trade lane (Sys, 2010), it clear that the market changed. Before the 2008 global economic and financial crisis, there was a situation with highly competitive trade lanes, where some were more heavily concentrated while others were not at all, leaving options for potentially new or smaller carriers to enter some of the markets (see Figure 1). This has shifted after the crisis to the situation where the market became more highly concentrated and stable.

## 2.3. Meso analysis: economic performance of the shipping industry

This section presents a benchmark analysis of the economic performance of shipping companies in all shipping markets<sup>†</sup>. It compares European shipping lines' performance with that of companies from Asia and Worldwide and by transport segment: container; dry bulk; tanker; and miscellaneous (Avention, 2014; PwC, 2014).

A first observation is that average cost per employee in all shipping segments is higher in Europe than in Asia. The widest gaps are found in the container liner shipping and miscellaneous sectors with European shipping companies facing average costs per employee of two times higher than their Asian counterparts. The gap in labour cost between European and Asian companies does not come as a surprise. Several studies (see Artuso et al., 2015) have reported on the different labour regimes and the economic convenience coming from cheaper East Asian labour force in particular. According to our findings, not only the wages, but also labour taxes and social security costs tend to be higher for the employees of European companies.

On the other hand, the productivity of European labour is higher than Asia, measured by the sales per employee. Yet, the higher productivity does not offset the higher cost of labour in the EU shipping industry (Avention, 2014; PwC, 2014). This indicator provides information on the productivity of the personnel. It is however, impacted among other things, by different labour conditions and laws (i.e. across countries, sectors, etc.), the labour intensity of the shipping sector, the level of training of employees, the quality of equipment employed, optimal planning and organisation. Sales can also vary as companies are restructured, or lease vessels, to respond to a peak in demand.

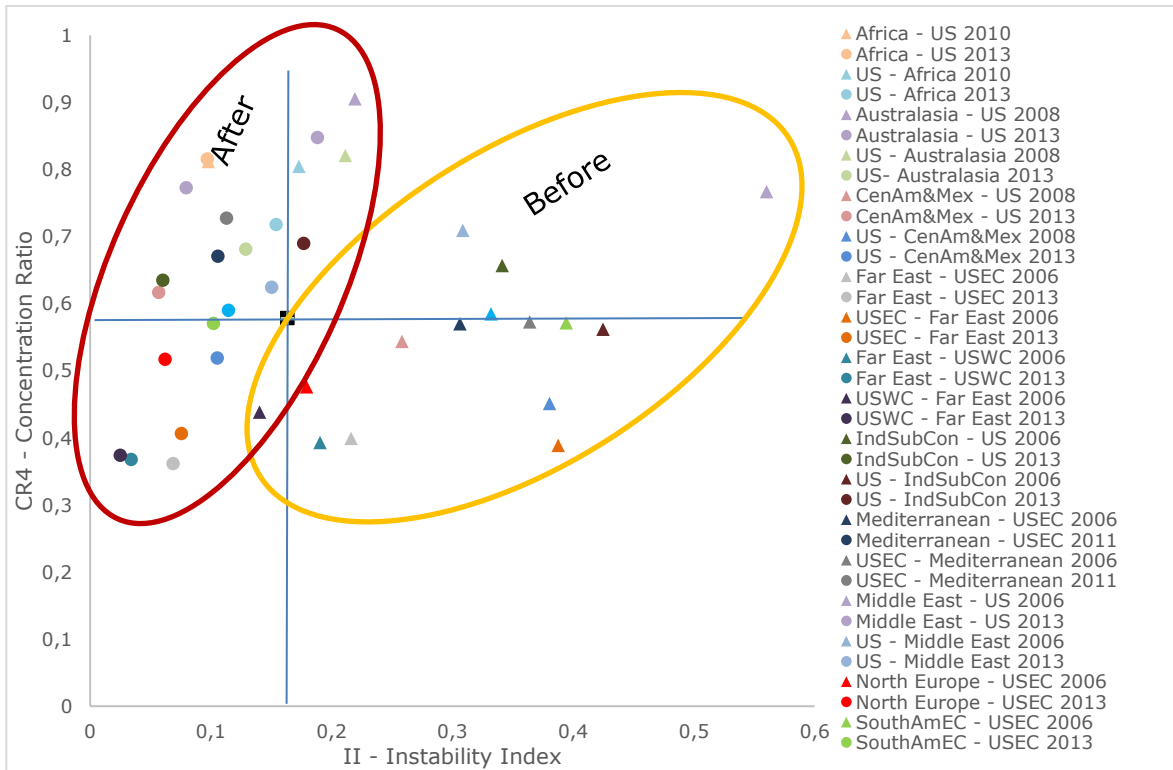
It is relevant to note that only a small part of the overall costs faced by shipping companies are related to labour (see section 2.4). Indeed, other operative and financial costs might have a greater influence in this respect.

The next section turns to the micro level of individual routes.

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<sup>†</sup> See Artuso et al. (2015) for a more extensive detail of the analysis.

Figure 1 Market Structure Dynamics by Trade Lane (2006 and 2013)



Source: Artuso et al., 2015

After the contextual macro analysis, the next section looks at the market forces at meso level.

#### 2.4. Micro analysis: loop level cost structures

This section examines the cost structure a route level. The most recent development at the micro level is the increasing importance given to the full supply chain visibility and coordination et al., 2008; Klievink, 2014). The main intention is not only the reduction of the operational risks, but also the reduction of operational costs through enhanced end-to-end supply chain efficiency. This is the end result of port competition (Álvarez-SanJaime, et al., 2015). A methodology that allows assessing the competitive position of EU ports in the container segment was developed by van Hassel, et al. (2014). It captures the total costs of the chain (hinterland, port, and sea costs) of moving cargo door-to-door and the differences based on the selection of ports. The analysis shows that the nearest port is not always the one minimizing the total chain costs (Table 1).

A simulation compares moving cargo on specific trips and with vessels characteristics as follows:

1. Chain origin: Berlin, Brussels, Paris, Milan, and Madrid
2. Port of Departure: Bremerhaven, Antwerp, Le Havre, Marseille and Lisbon
3. Port of Destination: Shanghai, China and Norfolk, USA
4. Ship cargo capacity: from 4,500 to 17,000 TEU

An important factor explaining the selection of a port of origin is the hinterland costs (by rail or by road) of moving cargo to distant ports. Note that this has implications for the selection of the shipping company, as each shipping company may call at different ports. Common sense might point shippers in Milan to use the Port of

Marseille for instance to move cargo to the Far East. However, the simulation shows the best option is the Port of Antwerp, after taking into account the total chain costs.

Port capacity plays an increasingly important role. For instance, the case of Antwerp versus Marseille, this occurs, as cargo moved in larger ships enjoys economies of scale to drive down per container chain costs.

On the other hand, the restriction of the port capacity not only prevails in the origin port, but also the destination port. For instance, shipments to most US East Coast do not allow vessels larger than 7,200 TEUs for draught reasons. In such case, the economies of scale of Antwerp versus Marseille for a shipper located in Milan loses ground.

A port like Lisbon shows a negative correlation between the length of the sea transportation distance and the port competitiveness, which is mainly due to the lack of capacity to handle ultra large container vessels in Lisbon.

## *2.5. Technological, Environmental and Labour developments*

Next to the micro, meso and macro environment, the impact of side constraints on the development of international shipping is examined. This section therefore deals with three issues which are considered side conditions for the way that international shipping can develop: technological, environmental and labour developments and regulation. They constrain the shipping playing field and are consecutively elaborated on this subsection.

### *2.5.1 Technological playing field*

Technological developments taken up by the shipping and maritime industry respond to a number of priorities, such as: efficient and reduced power used on board vessels; improved hydrodynamics and performance and reduced vessel impact at the sea; safer, secure, and efficient maritime transport; improved overall vessel performance; efficient and environment-friendly vessel powering; and new concepts for innovative services (Sames, 2015). Furthermore, the growth in the world economy and trade, has a corresponding effect in maritime freight. However, shippers and consumers increasingly require maritime freight to be more reliable and cost-competitive (Carbone & Martino, 2003). The response of the shipping industry has been to increase capacity with the same number of vessels, which allows control and reliability (Tran & Haasis, 2015). However, the net effect is a reduced number of companies able to provide the services. Ship size has to be coupled with port capacity developments to provide competitive and efficient services (Sys, et al., 2008).

Further important developments are the unmanned vessels, which still requires remote monitoring and controls, leading to substantial re-skilling needs of maritime labour (Porathe, 2014; Rødseth & Burmeister, 2012).

Reliability, capacity, and vessels increasing technological contents tend to require the corresponding developments and uptakes of Port Community Systems (Bichou & Gray, 2004; Long, 2009). Such systems allow for efficient and reliable information exchange among all willing stakeholders in the port system (Posti, Häkkinen, & Tapaninen, 2011), contributing to a synchronization of the end-to-end supply chain, as shippers and consumers demand (CORE Project, 2014). Further technological developments include alternative methods of propulsion, new environment-friendly developments like retrofitting, alternative fuels, automation, and others (DNV, 2012; Futureautics, 2014; Skaarup Shipping Corporation, 2011).

Environmental regulations and standards are traditionally key drivers of vessel design and business strategies in the shipping industry. Since the SOLAS Convention 1974, double hull designs are required in all passenger ships (IMO, 1974). After the Exxon Valdez accident, the USA required the double hull design on oil tankers with the oil Pollution Act 1990. The IMO followed with the creation of the MARPOL convention in 1992 for tankers' oil spills prevention. Finally, the EU accelerated the phasing in of double hull design requirements for oil tankers in its Regulation EC 417/2002.

Table 1. Total Chain Costs by Origin, Departure Port, and Destination Port

EU REGION	TRIP			PORT CAPACITY LIMITATION		TOTAL CHAIN COSTS			
	Origin	Departure Port	Destination Port	Max Ship Size (TEU)	Port Limiting Ship Size	Generalised Costs at EU Ports and International Sea (A)	Hinterland Cost (B)	Total (A+B)	
NORTH EUROPE TO FAR EAST	Brussels	Bremerhaven	Shanghai <sup>1</sup>	17,000		606	420	1,026	
	Paris						599	1,205	
	Berlin						356	962	
	Milan						749	1,356	
	Madrid						1,619	2,225	
	Brussels	Antwerp					573	164	737
	Paris						352	925	
	Berlin						522	1,095	
	Milan						631	1,204	
	Madrid						1,291	1,864	
	Brussels	Le Havre					584	387	972
	Paris						245	829	
	Berlin						733	1,318	
	Milan						693	1,277	
Madrid	1,070						1,655		
SOUTH EUROPE TO FAR EAST	Brussels	Marseille	Shanghai <sup>1</sup>	7,200	Marseille	788	686	1,474	
	Paris						672	1,460	
	Berlin						994	1,781	
	Milan						561	1,348	
	Madrid						862	1,650	
	Brussels	Lisbon				Lisbon	741	1,623	2,364
	Paris						1,396	2,137	
	Berlin						2,189	2,931	
	Milan						1,695	2,436	
	Madrid						557	1,298	
NORTH EUROPE TO US EAST COAST	Brussels	Bremerhaven	Norfolk <sup>2</sup>	7,200	US ports	448	420	868	
	Paris						599	1,047	
	Berlin						356	804	
	Milan						749	1,198	
	Madrid						1,619	2,067	
	Brussels	Antwerp					419	164	584
	Paris						352	771	
	Berlin						522	941	
	Milan						631	1,050	
	Madrid						1,291	1,710	
	Brussels	Le Havre					426	387	813
	Paris						245	671	
	Berlin						733	1,159	
	Milan						693	1,119	
Madrid	1,070						1,496		
SOUTH EUROPE TO US EAST COAST	Brussels	Marseille	Norfolk <sup>2</sup>	7,200	US & EU ports	480	686	1,166	
	Paris						672	1,152	
	Berlin						994	1,474	
	Milan						561	1,041	
	Madrid						862	1,342	
	Brussels	Lisbon					404	1,623	2,028
	Paris						1,396	1,801	
	Berlin						2,189	2,594	
	Milan						1,695	2,099	
	Madrid						579	984	

### 2.5.2 Environmental playing field

Environmental regulations emerging up to the year 2020 driving the developments of the shipping industry are listed in Table 2.

Table 2 Environmental regulations and standards due for the maritime industry

←	2015	2016	2017	2018	2019	2020	→
SEEMP	0.1% ECA Sulphur limit	NOx III	Cargo liquefaction (IMSBC Code amendment)	EU CO <sub>2</sub> monitoring, reporting, and verification (MRV)	Future ECAS	EEDI II	Global SOx limit
US BW Requirement	EEDI I	Ballast Water Convention	Polar Code	Low Sulphur Availability Review		0.5% Global SOx Limit	EEDI III
EEDI 0	EU Recycling Regulation EC CO <sub>2</sub> Monitoring and Reporting Verification (MVR)					Operational requirement on CO <sub>2</sub> . Energy Efficiency Operational Index (EEOI)	

Elaborated based on: IMO, and DNV, 2012; Stevens, et al., 2014

### 2.5.3 Labour playing field

The maritime transport sector is part of a global market which has developed a global governance system based on the historic background of *Mare Liberum* (International Labour Organisation – ILO; International Maritime Organisation - IMO). This system encompasses instruments such as the ILO's Maritime Labour Convention (MLC), transposed into EU legislation by Directive 2009/13/EC, and the IMO's Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STWC), implemented by Directive 2012/35/EU.

Crew sizes have become smaller due to technological changes, greater efficiencies (larger ships) and a push from shipowners to save labour costs. The skills required by maritime professionals have become more complex due to technological developments and the increasing emphasis on multi-modal supply chains. In the last decade, security tasks have been added above the usual working tasks of crews in order to comply with the ISPS code (International Ship and Port Facility Code, as part of the International Convention for the Safety of Life at Sea SOLAS, 1974), as well as additional security tasks to address piracy threats. The effect that larger ships have on saving labour costs is also interesting to note, as the same number of crew handles larger and larger ships.

## 2.6 Maritime agreements

Maritime agreements include a number of themes, notably commitments on maritime freedoms: access to international maritime transport), cargo-sharing, cabotage operations, access to port services and maritime auxiliary services, commercial presence, feeder and relay, offshore services, and movement of empty containers. This section analyses the state-of-play for each of the above types of agreements for the ten countries which are judged strategically most relevant to the EU from a shipping perspective: Russia, USA, Brazil, Singapore, China, Turkey, Republic of Korea, Japan, India, and Panama.

In general, the analysis shows that the number and width cargo-sharing arrangements have declined in the agreements of the EU and its Member States, and this appears to be consistent with the international trend. The reason for this decline is the emergence of the principle of freedom of maritime transport and the intensification of



“de-flagging” (i.e., the process of removing a vessel from a national registry and registering it in another country) due to the spread of open ship registries.

Cabotage operations have been largely excluded from any liberalisation effort at the international level, partly due to their politically sensitive nature in many countries. This general trend to exclude cabotage is well reflected in the agreements. In the US, the Jones Act provides a stricter regime since ships must also be built in the US in order to be allowed to operate. Yet, coastwise trade represents only a limited share of the total waterborne transport, amounting to 6.8%, whereas foreign trade amounts to 62.5%. Accordingly, the strict regime of the Jones Act is mitigated by the limited share of the cabotage operations in the total US waterborne transport. Consideration should be given also to the Chinese cabotage regime due to the overall relevance of this region for maritime transport. Through the Shanghai Free Trade Zone, China has recently permitted cabotage for Chinese-owned but foreign-flagged vessels. The cabotage scheme in India also deserves attention. Pursuant to domestic legislation, foreign-flagged vessels may be chartered and granted a special periodic license if no suitable Indian-flagged vessel operates on the route in question. Considering the growing trade flows to and from India, as well as the shortage of Indian-flagged vessels suitable for coastal trade, this may hold key benefits for EU shipping companies. It must be acknowledged, however, that this situation in India is not entirely new.

With regard to *feeder*<sup>‡</sup> and *relay*<sup>§</sup>, the former takes a higher share of overall traffic than the latter, approximately at a ratio of 85% to 15% of the total transshipment traffic. This means that in economic terms and on a global scale, *feeder* operations are much more relevant than *relay* operations. Figures on global regions indicate that *feeder* operations are particularly relevant in China, and the South East Asia region. South Korea is also relevant due to the large transshipment traffic that is carried through its ports as a result of *feeder* and *relay* restrictions in China. In the US, *feeder* and *relay* are also problematic due to the stringent requirements imposed under the Jones Act. However, the problem is considered moderate due to the limited share of *feeder* and *relay*, which represented merely 1.5% (in 2012) of the overall US waterborne transport. Moreover, *feeder* operations within China are more important than *relay* operations, as close to 25% of all traffic represents *feeder* while only about 4% are *relay* operations. Most maritime agreements of the EU and its Member States do not address *feeder* and *relay* of international cargo. Those that do mention it (e.g., the EU-China agreement) merely permit access to it, but prohibit the supply of such services by EU operators. Furthermore, both of these services form part of cabotage operations when the transport of international cargo happens between ports of the same country. Therefore, these services are generally prohibited for EU shipping companies.

Access to port services is generally liberalised in the agreements. Nonetheless, the examination of the agreements and other available studies has not revealed any prominent difficulty for EU operators to have access to the ports of the ten selected countries. The same applies to maritime auxiliary services. Consideration should be given to port areas in Brazil where, as a result of recent liberalising trends, the activities of EU shipping companies in ports are mainly carried out under leasing contracts. This gives them the long-term benefit of securing port facilities in a more cost-efficient way.

Almost all agreements of the EU and its Member States provide for the possibility for EU shipping companies to establish some form of commercial presence in the ten partner countries. The permitted forms range from representative offices to branches and subsidiaries. However, the extent of services that a foreign company can perform with these local offices depends on other horizontal restrictions, in particular on the share of permitted foreign equity in a company, restrictions on composition of board members, and other administrative hurdles imposed by domestic law upon the foreign entity. Such restrictions have an impact on the possibility for EU operators to access the markets of the foreign countries. A few countries must be highlighted in this regard as being problematic. The effectiveness of having a commercial presence in the US is hindered by the fact that the operation of a vessel is contingent on the vessel being wholly owned by US citizens, where a company qualifies under this title

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<sup>‡</sup> Feeder operation is defined as the pre- and onward transportation of international cargoes by sea, notably containerised, between ports located in a country.

<sup>§</sup> Relay of international cargo is defined as the practice of one company carrying cargo from one country to an overseas destination on its own vessel, transferring the cargo from one vessel to another operated by the same company in another port of that country.

when it meets a set of stringent administrative requirements. China has a 49% threshold on maximum foreign equity shares permitted in local companies, which means that control of the company will remain at the hands of locals.

The coverage of social, environmental, and safety clauses are limited in the maritime agreements and are focused on reiterating the applicable international regulations. Our desk research has not revealed any significant country that should be marked for attention. Some stakeholders, however, did raise safety issues that they face in the day-to-day operation in the US and China.

The movement of empty containers accounts for 15% of the operational costs related to container assets, representing a cost factor of €15 billion per year for the shipping companies (Rodrigue, Comtois, & Slack, 2013). Although most agreements do not address the movement of empty containers, some agreements do. For instance, the EU-China agreement permits the repositioning of empty containers between Chinese ports as an exception to cabotage restrictions. Where the agreements do not regulate the movement of containers, local regulations will be applicable. Accordingly, in the US, only containers owned or leased by the owner of the vessel can be moved. In other countries, such as South Korea and India, movement of empty containers is restricted due to cabotage limitations. With regard to the other non-EU countries, no relevant information was found on this aspect.

With regard to offshore services, our analysis revealed that this segment is of growing importance for the EU shipping industry. The EU's offshore sector grew by more than 150% in GT between 2005 and 2014. This means that the EU's share of global offshore fleet grew from 28% in 2005 to 37% in 2014 (in GT terms). The EU industry faces great competition in this segment from Asian competitors especially because of lower costs. However, EU operators seem to have identified a way to keep a competitive advantage. They do so by specialising in smaller segments, especially in building offshore support vessels and in educating highly qualified offshore service personnel.

## 2.7 Summary of trends

Analysis of the micro, meso and macro environment allows conducting a trend analysis. This analysis shows that at market level there, is a stabilization of the number of players in the international shipping industry. Microeconomics revealed that choice of ports is more based on total chain costs, than single port choice based on proximity to the shipper. It is important to note that stability of the shipping market as depicted in the market level analysis, may be also settling the ports of choice not on shippers-port proximity but on port capacity to handle larger vessels so as to generate economies of scale and reduce the total chain costs. The meso analysis indicates that the EU shipping fleet, although more productive, tends to be more expensive than Asian shipping companies. This implies a risk of flagging out to Asian countries, or setting pressure to set up open registries or second registries all over the EU to find different mechanisms to deal with tight labour and environmental standards, which tend to be stricter than for vessels with flags from the rest of the world. Technological developments, and environmental and labour standards reinforce the pressure to move towards larger ships and port capacity, unmanned ships, taking advantage of scale and efficiency, which required strong re-skilling of the maritime labour. The possibility of setting up maritime agreements that contribute to a global level playing field is still a challenge.

Whether changes at macro, market, micro, or meso level materializes, may drive the EU shipping into a better or worse competitive position. The following analysis presents the results of a scenario approach, whereby conventional, sustainable, or fragmented growth takes place, and the outcome for the EU shipping industry is checked, as well as the potential policy options for the EU.

## 3. Scenarios

A scenario exploration channels the uncertainties in future developments. The future challenges for the European maritime sector are discussed for three scenarios (see Artuso et al., 2015). These future challenges are scenario-dependent and the three scenarios differ on macro-economic and maritime drivers and are labelled as below.

- The *Sustainability Scenario* describes a world that is making good progress towards sustainability and this scenario combines an open, globalised economy with relatively rapid technological change. International cooperation results in a more global playing field regarding environmental, safety and labour regulations.

- The *Fragmented World Scenario* describes a world separated into regional blocks of countries with little co-ordination between them. The world has de-globalized and international trade is restricted. International co-ordination is not functioning, even existing regulations and conventions are ignored or poorly enforced, and a wide variety of region- or country-specific regulations exists, affecting the level playing field;
- The *Conventional Growth Scenario* is oriented towards economic growth and in this high-growth scenario, fossil fuels play a dominant role resulting in high GHG emissions. The world has increasingly globalised and the economic centre of the world is in Asia with dominant South-South trade flows. International cooperation is well functioning in this scenario, creating a rather equal level of playing field for the industry.

The three scenarios are long term scenarios and address possible fundamental changes in the global economy, maritime sector or international co-operation. The scenarios describe transitions in the period up to 2050 and their intermediate results for 2030. In this section, the scenario insights are enriched with the perception of stakeholders on challenges for their sector, so as to verify the outcome and perspectives for the EU shipping sector. In general, the time horizon of stakeholders is more focused on short or medium term issues rather than on long term issues. The challenges raised by the stakeholders are included as part of the scenario where this issue is assumed to be most important. The focus of the discussion in this section is on the ten countries selected in section 2.. Additional countries are included in the discussion specifically when it becomes relevant. Specific attention is given to future conditions where the playing field is not even, either by trade barriers, market competitiveness, abusive incentives or regulation.

The outcomes are grouped into four main fields, which are consecutively presented in this section: fleet, competition, new routes and ports, and incentives and support.

### 3.1. Fleet registry competitors

The challenges regarding the competitiveness of the European registries differ for the three scenarios. First, in the Sustainability Scenario, international conventions set higher standards for environment, safety and labour conditions. On top of the international standards, regulations by the EU are not needed in this scenario, and a level playing field exists for the European flag states on this aspect. The aspect of fiscal competition is still unsolved and this is a remaining issue for European flag states in the competition with Singapore, China, Panama and other open registries like Liberia and the Marshall Islands. The Conventional Growth Scenario has much in common with the Sustainability Scenario except for the lack of attention for environmental regulations. Under both scenarios, quality of services of the registries is considered, besides fiscal conditions as an important competitive aspect.

The importance of a high quality registry service is emphasized by industry stakeholders, in particular to avoid cumbersome inspections. In their view, open registries, such as Panama, score well on service aspects and minimize the number of cumbersome inspections. Additional administrative requirements and inspections seems not to be necessary to score well on Port State Control indicators. For instance, the Tokyo MoU on Port State Control<sup>\*\*</sup>, which includes China, Japan, Korea, Russia, Singapore, and other Asia-Pacific countries, has the three main open registries, Panama, Liberia and Marshall Islands on its white list. Most European flags are on the white list as well, but some European flags, such as Belgium, Sweden and Luxemburg are positioned on the grey list. Open registries seem to remain on white lists for less costs and less administrative burden. It is therefore a challenge for European flags to improve their performance to move up to the white list, for instance through better information and reducing processing times and costs.

Regarding the mentioned cumbersome inspections, one needs to be careful in our view as a dedicated balance needs to be considered between the costs of inspections and need to perform them. For example, on the sulphur regulations in the North Sea and Baltic Sea, in the Conventional Growth Scenario, the stakeholders complain about the lack of enforcement and a competitive advantage of free riders not complying with the regulation. In the

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<sup>\*\*</sup> See <http://www.tokyo-mou.org/>.

Sustainable Growth Scenario, stakeholders are confident to comply, as regulations are well enforced and likelihood of free riding remains limited.

Under the Fragmented World Scenario, the level playing field is affected by the lack of new developments in international conventions on the environment, safety and labour, and a weak compliance with the existing international agreements. Different regulations between EU and competing registries, such as China, Singapore and Panama, are a challenge for the competitive position of European flag states. Increasing protectionism under this scenario is a concern for the EU. Stakeholders point out that protectionism might force a flagging-out process to non-EU flags in order to access regionalised and protectionist markets. Operating under another flag is attractive in regions where market access is restricted or other flags can operate more beneficially, for example by applying lower labour and environmental standards. As international conventions, setting global standards, are less relevant and often not enforced in this scenario, different regional blocks set their own labour, safety and environmental standards the fleet needs to comply with to access the market in their region. As European flag states are likely to use stricter regulations, it is for European shipowners attractive to operate in these markets under non-European flags, either open registries or local flags.

Although the level of change depends on the scenario assumptions, it is most likely that labour costs play a less dominant role, due to automation of activities on board and an increasing average ship size, in the future. The importance of labour costs varies between the short and long term. If the industry needs to act directly, labour costs are one of the few costs they can influence in the short term. A long term strategy has much more options and, for example, future labour costs can be traded with capital investment to sail more economically with larger vessels. Alternatively, innovation can be stimulated to reduce energy consumption or labour intensity.

### *3.2. Market competitiveness*

Regarding market competitiveness, in the Sustainability Scenario, international conventions on employment, safety, security, environment and market access set good standards to ensure market competitiveness. In this scenario, market access is liberalised and the European shipping industry can compete in most countries under comparable market conditions. In some countries and regions, such as Russia, Brazil and West Africa, market protectionism remains an issue but as a result of the open international political climate, it is less severe than under the other scenarios. Market conditions in China remain a high priority, mainly due to the high relevance that this market represents for the EU and its central position in global supply chains. For example, inefficiencies in Chinese ports have large domino effects on delays of supply chains serviced by ultra large container vessels.

In the Fragmented World Scenario, market competitiveness is a high priority issue for the European maritime industry in many countries including the USA and China. The USA is highly important due to the size of its economy, and visa requirements, cabotage restrictions and discriminatory treatment are reinforced under the Fragmented World Scenario. The shipping industry is under economic pressure and to improve margins, the market changes from low concentration and high competition to more concentration and less competition. Reduced margins are the norm, except in highly specialised or diversified segments.

If the market is not liberalised and is likely to become more severe under the Fragmented World Scenario, it is less severe, but still an issue, under the Conventional Growth Scenario; in such situation substantial market disruption exists which prevents, for example, shippers from benefiting from lower oil prices. In a highly concentrated market, with little competition, carriers are reluctant to transfer the benefits of lower oil prices in the form of lower freight rates. Another example of market disruption is related to the increasing practice of operating in alliances including various shipping lines offering different quality levels. In this situation, the shipper can pay for services to a shipping line that has high schedule reliability and on-time arrivals, but the service is executed by another shipping line as part of the alliance, which has lower reliability and on-time arrivals. These practices, which can only exist under non- or low-competitive conditions, have a negative impact on the competitiveness of the European maritime industry and the European economy as they increase transport costs. Stakeholders stress their fear for market concentration and call for mechanisms to strengthen competition in the long term, and reduce market concentration. Such mechanism should balance the improved margins of the shipping industry with the interest of consumers to benefit from competition.

Under the Conventional Growth Scenario, international conventions are functioning well and overall competitive conditions are better than in the Fragmented World Scenario. But like nowadays there are still a variety of challenges, such as unreliable customs brokerage, lengthy security checks, cargo handling delays, and lack of sufficient repair and maintenance services that hinder the EU maritime industry. Table 3 presents the challenges as mentioned by the stakeholders. This addresses today’s situation but many challenges are likely to remain issues at least in the short and medium future, for all scenarios, and for the Fragmented World Scenario and Conventional Growth Scenario also in the long run. Among the challenges affecting shipping companies’ margins are: inexistent or unreliable transshipment services; nationality requirements of the crew members, as well as the need to apply for visas in certain ports; cabotage restrictions requiring shipping companies to hire national services at less competitive rates; inefficient security checks; inefficient cargo handling; sometimes requirements to use expensive compulsory pilotage and towage at an excessive level; excessive port dues and charges; bribes requested to enable on-time port operations; lack of efficient customs brokerage; limited offshore support services; discriminatory treatment against foreign shipping companies; unreliable port information; and procedures and payment for temporal import of offshore equipment until it leaves the country.

Table 3 Challenges that hinder competitiveness of the EU maritime industry

<b>Main challenges hindering competitiveness to the EU shipping industry</b>	<b>China</b>	<b>USA</b>	<b>Russia</b>	<b>Brazil</b>	<b>India</b>	<b>Turkey</b>	<b>Other: West Africa, Australia, Egypt, Mexico</b>
Transshipment				X			
Nationality/residency/visa	X	X					X
Cabotage restrictions	X	X	X	X	X		X
Security checks		X					X
Cargo-handling		X		X			
Pilotage	X		X				
Towage	X		X				
Port dues and charges				X		X	
Dishonest use of power and bribery	X		X	X	X		X
Customs brokerage	X	X					
Taxations issues	X			X			
Repair/maintenance services		X	X				
Offshore services	X		X				
Discriminatory treatment		X					X
Unreliable port information	X						
Temporary import				X			X

### 3.3. New routes and ports

Regarding new international routes, the Sustainability Scenario specifies the potential for the Eurasia land bridge between Europe and China. In the long term, depending on political change in North Korea, this route can potentially also be extended to South Korea. For a successful operation of this line, active co-ordination and partnership is needed between European countries, Russia and China. Alternative routes exist for the Eurasia landbridge and depending on the routing, Mongolia and or Kazakhstan are important partners as well. For the Northern Sea Route, considered under the Conventional growth scenario, international co-operation with Russia and Asian countries, like the Republic of Korea, Japan and China, seems crucial for an efficient operation of this route.

In the Sustainability Scenario, a switch towards more sustainable fuels has been undertaken by the European and international shipping industry. An EU-wide LNG network is an important element for the future competitiveness of EU ports. At the moment North-European ports seem more active in developing LNG facilities and this might reinforce their leading position under this scenario compared to South-European ports. Stakeholders state that incentives to set up LNG facilities favour the North-European ports where there is a longer tradition of clean energy and environmental regulations. It is advisable that the EU focuses on a balanced approach including the South-European ports from the start. For ports with a strong position in handling energy carriers, such as coal or oil, or ports with a large petrochemical processing industry, a substantial transition is needed to maintain their competitive positions. Alternative energy carriers, such as biofuels, might be part of new activities in the ports, replacing loading, unloading, storage and processing activities for conventional energy carriers.

In the Fragmented World Scenario, port capacity needs are more modest than in the other two scenarios and Europe might apply port state control instruments more frequently as a substitute for the lack of international conventions to preserve Europe's interests. Under this scenario, the increase in ship size and associated infrastructure needs, are also more modest. A low economic growth in combination with trade barriers reduces freight volumes in this scenario and associated demand for vessel volumes. Furthermore, a higher share of regional flows, instead of global flows, makes an increase in vessel size less attractive. For larger vessels, the trade-off between lower sailing cost and higher transshipment cost is more advantageous for global flows than for regional flows.

In the Conventional Growth Scenario, port capacity demand increases very quickly and an increasing average ship size results in higher peak loads. Stakeholders emphasize that there is especially a need in South-European ports to upgrade their operational capacity to handle larger ship sizes and increased transshipment services. Furthermore, in this scenario, substantial port and hinterland infrastructure investments are needed for serving the European economy efficiently.

### *3.4. Incentives and support*

In the Sustainability Scenario, international conventions set worldwide applicable standards for an equal level playing field but these standards do not cover taxation levels. Hence, fiscal competition will remain with countries, such as Singapore, offering advantageous tax conditions for the maritime industry. The scope of incentives can cover maritime transport activities or wider definitions of the maritime cluster, for example including offshore or on-land activities. The EU's relations with West-African countries are in this scenario, similar to the other two scenarios, a high priority. From the shipping industry, there is a call of attention for trade, ports and infrastructure capacity building support from the EU to West- and other African countries.

As international conventions are rather generally implemented under the Sustainability Scenario, which sets an equal level playing field regarding labour, environmental, safety and security regulations, competition between companies will focus on quality and price as all other conditions are rather similar. Countries can support their own industry by offering high-quality and efficient services, for example flag registration or compliance with conventions, at low costs and a reduced administrative burden for the maritime industry. Economies of scale play an important role in offering high-quality services at low cost, and the ongoing worldwide concentration of market shares in few specialized registries is likely to continue. It is questionable whether the large number of European registries can all play an important role under these conditions. Most likely, market forces result in a further concentration of registry activities within Europe or European countries need to be willing to increase support for their relatively small registries. Further regions can improve their competitive condition by offering business development facilities, improved maritime education and support to research and development in the maritime field. In line with smart specialization strategies, regional options can be identified for the Maritime Industry.

In the Fragmented World Scenario, the world is divided into various regional blocks, and countries support their industry with supportive measures and hinder the entrance of competitors with protectionist regulations. In this scenario, the EU faces issues of unfair competition with almost all countries outside their economic partnership. Under this scenario, the EU has to rely on bilateral agreements to improve competitive conditions. This process will result in a variety of agreements and regulations for the maritime industry to comply with. From an economic perspective, this variety in regulations, compared to global regulations, is inefficient and results in increasing costs related to trading goods.

Under this scenario, local governments support their own industry by setting advantageous standards for their own industry and international competitors are required to meet these standards as well. Local governments also provide direct transfers to their own maritime industry and other supportive measures such as tax exemptions, beneficiary access to capital and privileged conditions for port-related services. Some of these actions might violate existing agreements, but under this scenario, international conventions and their implementation play a marginal role.

In the Conventional Growth Scenario, international cooperation and conventions are functioning relatively well, ensuring a level playing field. In this scenario, due to high growth rates, dominance of the Asian countries (East Asia is by far the largest economic region in the world), should be avoided and specific attention is needed for the relationships with Asian countries, such as China and Singapore. International cooperation, within the EU and between the EU and other partners, will be needed to negotiate effectively with these dominant Asian economies. Furthermore, in this liberalised world, Asian registries and open worldwide registries have a strong market position. Many aspects under this scenario, like focus of competition on taxation levels and quality of services, are similar to the Sustainability Scenario. The biggest difference is the lack of international attention for environmental issues and increased importance of Asia.

#### **4. Conclusions, messages, and recommendations for sustainable shipping markets.**

This paper described the key trends in the international and EU shipping market, as well as the main challenges of the EU shipping access to key non-EU markets. The analysis concludes with a number of key trends, messages and recommendations regarding possible steps to reiterate at EU and non-EU forums the need of framing a global level playing field.

##### *4.1. Market conditions: trends and possible next steps*

In terms of *trade developments*, the trends show EU trade relationships and maritime flows with fast growing and developing countries benefit from their industrial progress, population growth and higher income levels. Fast growing and developing countries increase the share of imported processed and industrialised goods, benefitting the EU exports, and balancing trade more. There is an uncertain scenario for large maritime flows of oil, coal, and gas, as a consequence of the growing importance of renewable resources and geopolitical concerns for self-sufficiency. The possible next steps, could be to reinforce and sustain trade developments with fast growing and developing countries, and to face the uncertainties for the EU supply of maritime transport services and port infrastructure and facilities for global energy flows.

Regarding *fleet registry competitors*, the trend is that the EU shipping risks flagging out if they stay at disadvantage as a result of an uneven global playing field on fiscal competition. There is lack of harmonised implementation of international conventions on environment, safety (IMO), and labour (ILO); the quality of the registry services; the inspection and enforcement standards of Port State Controls; and the use of competitive registries to access otherwise protectionist markets. Possible next steps could be to foster a level playing field on fleet registry competition. It is important to follow developments at global level on fiscal regimes and make efforts for harmonization; to develop and harmonize enforcement of environmental, safety, and labour standards through international organisations, to promote efficiency among registries and maritime authorities, taking into account the market access to provision of services by the entire EU maritime industry.

The *market competitiveness* tends to be higher and facing tight economic performance. Low margins have been the norm, except in very highly specialised or in highly diversified segments. In between the specialised and diversified segments, container liner industry markets had to change dynamics to improve their margins, from low concentration and high competition, to more concentration and less competition. The EU maritime industry margins have been also hindered by non-competitive challenges. Possible next steps could be to balance out improved margins in the shipping industry and reduced market concentration, to allow shippers and consumers to benefit from competition, and to reduce the likelihood of shipping companies to engage in collusive behaviour.

The importance of *new routes* varies according to the scenario. A Sustainability Scenario specifies the potential for the Eurasia land bridge between Europe and China; whilst the Conventional High-growth Scenario specifies the potential of the Northern Sea Route. Possibly, a successful operation of the Sustainability Scenario requires an active co-ordination and partnership between the European countries, Russia and China. For a successful operation of the Conventional Scenario, international co-operation with Russia and Asian countries, like the Republic of Korea, Japan and China, seems crucial for an efficient operation of this route.

The trends in *ports in the EU* are also scenario-dependent. The challenges are the development of a balanced EU-wide LNG network supportive of the future competitiveness of EU ports; preparing the transition of conventional fuels towards more sustainable sources of energy; and the increased ship sizes leading to high growth in peak flows to be managed by ports and hinterland infrastructure. A possible next step could be to balance the LNG network development to include South-European ports from the start. For ports with a strong position in handling energy carriers, such as coal or oil, or ports with a large petrochemical processing industry, a substantial transition is needed to retain their competitive positions. Alternative energy carriers, such as biofuels, might be part of this transition of port activities. The operational capacity of ports and hinterland infrastructure in Europe needs to be upgraded to handle larger ship sizes and increased transshipment services. These actions involve transport infrastructure as well as management solutions, including ICT solutions, further automation of flows and logistics concepts better differentiating between high speed urgent flows and less urgent flows.

The trends in incentives for the maritime industry is to ease one or more of the following burdens from stakeholders: operational, financial, and regulatory. Alternatively, incentives contribute to building up their operational, scale or scope capabilities. The presence of incentives in a country favours its position to be selected as the country flag. Possible steps could be at three levels. First, sustaining favourable taxation schemes and creating mechanisms to strengthen the corporate culture and structure of EU shipping companies. Second, setting up mechanisms to attract and sustain companies to maritime clusters; facilitating bank finance; and sustaining mechanisms for competence and skills building and development for the shipping industry. And third, trade facilitation by removing trade limits through diplomatic means with protectionist country/region/trade lane; reducing red tape in the EU; and supporting favourable unionisation to the maritime industry industrial relations.

*Labour* is one of the few cost items which ship-owners can directly act upon to reduce transport costs. As a consequence, there has been an ongoing process during several decades to reduce labour costs through technological developments, increasing ship size and replacing expensive with cheaper labour. Combined with additional security, related workload for existing crews in piracy-affected areas has led to situations where fatigue of crew members is more often the standard than the exception. The whole process has also worsened shipping's reputation for attracting new employees, and has limited possibilities for including new labour and training of new labour. Although the trend of reducing labour costs will be difficult to stop independently, there are a few areas where improvements can be made. For instance, as a result of an increasing average ship size and further automation of activities on board, the share of labour costs of the overall shipping costs is likely to reduce. This development is beneficial for the European Maritime Industry as long as it remains a front runner in innovation and adoption of new technologies. Research into schemes to make a maritime career more attractive for EU citizens and support the position of the EU as frontrunner in maritime technology in practice, e.g. R&D support measures, enabling the testing of new technologies, such as unmanned ships.

#### 4.2. Maritime agreements

Many of the older bilateral maritime agreements, while still in force, appear to have gained a 'dormant' status as the contracting parties seldom invoke them. In general all countries exclude foreign operators from cabotage.

*Feeder and relay operations* are not addressed in most maritime agreements of the EU and its Member States. Due to the increasing ship sizes, feeder is becoming more and more important. Relay operations are an important component in making maritime traffic more cost-efficient through optimal routing. Feeder also presents additional operational costs due to the necessity to outsource these operations to domestic shippers. Possible steps could be to consider more carefully feeder and relay operations and services in maritime agreements.

The *offshore* market is particularly important in Brazil, the US and Russia, but EU shipowners face restrictions in gaining access to this segment due to the need to use domestic flag vessels and abide by additional domestic rules. In



the case of the EU, it may be necessary to research into clarifying the eligibility requirements under the Maritime State Aid Guidelines to extend also to vessels providing offshore services.

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